Stockholm School of Economics

Department of Finance

4350 Master Thesis in Finance

Presidential election uncertainty and market reaction

Dongxue Zou (40926)

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Abstract

Uncertainty Information Hypothesis and Efficient Market Hypothesis suggest that asset prices will react to the uncertain US presidential election outcomes, in terms of both overall market level and individual companies/industries. This paper uses the event study framework to test such effect and finds mixed results. In general, the average initial market reaction is negative after election outcomes are known, and such reaction tends to persist until end of the year and even to presidential inauguration day. Moreover, this reaction is significantly correlated with certain election outcomes: the market reacts positively if a Republican candidate wins, and/or if the winner comes from the incumbent party, but reacts negatively if the winner is a re-elected candidate. But there is no significant evidence showing that the 2016 election impacted individual companies on the geographical level: companies located in Republican-supporting states underperformed, but had higher realized cash flow one year later.

Supervisor: Michael Halling

Key words: Presidential Election, Market Efficiency, Asset Pricing, Event Study

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1. Introduction

Many kinds of political events are believed to influence capital markets, as they are mostly unexpected ex ante and affect the economy from a wider scope. Examples of such political events can be change in fiscal policy (Croce et al, 2012), monetary policy (Bekaert et al, 2013), relevant regulations (Pastor and Veronesi, 2012), as well as other exogenous events such as scandals (Liu et al, 2016). Among them, probably the most notable one is the US presidential election.

Presidential elections are a significant type of political events, in that they determine the new president for the upcoming four years. Although theoretically, candidates from all parties can participate in the election, in US history, the winner always comes from one of the two biggest parties, Democratic or Republican, which have distinct economic and social policies. This in turn affects the general macroeconomic, social and technological landscape of US as well as, to some extent, the whole world. Besides, the implication of tax policies, enforcement of laws, among others, are also important factors that investors would take into consideration in their expectation of specific company performance and thus stock prices.

How presidential elections affect the capital market lies greatly in the uncertainty that they cause to the market participants and investors. In economic and financial theory, an asset's price is the average discounted expected future payoffs, weighted by the ex ante probabilities of outcomes that lead to the respective payoffs. Prior to Election Day, voters and investors hold different beliefs regarding the final winner, future policies, and associated future outcomes (payoffs) that the election will cause to the market. And these beliefs can either be confirmed or reversed with the evolvement of election campaigns, polls, presidential debates, and, especially in recent years, mass media coverage. Although statisticians argue that election results are predictable and the forecasting methods have been constantly developing (Campbell, 2004), these predictions are generally limited to popular votes, rather than the electoral votes which de facto determine the new presidents. Therefore, in most cases, the winner is still, to a large extent, unpredictable and uncertain, until the election result is unveiled after Election Day. This uncertainty can transmit to capital markets through different channels and affects asset prices. For instance, Pastor and Veronesi (2012, 2013) document that political uncertainty commands a higher risk premium. He et al (2009) propose

that sources of such impact could be heterogeneous interpretation of public information, or inventory information.

While the mechanism about how uncertainty causes asset return changes is still debated, it has been widely researched that such uncertainty is correlated with changes in asset returns/prices. Efficient Market Hypothesis (thereafter EMH, Fama 1970) suggests that, the market will incorporate new public information into prices. Uncertain Information Hypothesis (thereafter UIH, Brown et al 1988) also suggests that, investors would establish expectations about an asset's price before the outcome of an exogenous event is known, and then adjust this belief when the uncertainty of the event is resolved. Therefore, when the ex ante uncertain election outcome becomes public information, asset prices will be adjusted accordingly. Based on the logic of these two hypothesize, it is reasonable to infer that, if the election outcome is relatively uncertain to market participants, asset prices will change when the outcome is disclosed. Otherwise, if the market participants have relatively better knowledge of who the winner is and/or what his future policies will be, then the election outcome should have already been reflected in current market prices, and asset prices will change little, if any, when the outcome is disclosed.

To test this inference, this paper focuses on the movement of common stock returns in US around elections and links the uncertainty in elections to returns. The variables that are used in this paper to capture uncertainty include candidates' features and pre-election public opinion polling results. The general guideline is that, the more unpredictable or different from existing government/policy the election result is, the higher uncertainty the election outcome is, and the stronger the market reaction will be. Specifically, this paper defines a final winner who comes from the challenging party (as opposed to incumbent party), who is not re-elected, who has not been favored in pre-election polls, and/or who has won by wide margin in electoral votes, as having higher level of uncertainty. The corresponding hypothesis is that, the market will react to this type of final winner, when the election outcome is disclosed.

Using the event study method, I find mixed results: the market abnormal return tends to be negative one day after Election Day, in contrast with UIH. Market tends to react when the winner changes party or is not re-elected, but react in different ways. On the other hand, the market doesn't react to surprising winners, who were not favored during pre-election polls, nor does the market react to landslide winners, who won the electoral votes by wider margin.

What's also surprising is the evolvement of market abnormal returns. The abnormal return immediately after Election Day is positively correlated to cumulative abnormal return until year-end. This suggests that, market's reaction to election news doesn't reverse, at least not in the period of up to 40 trading days. Possible reasons could be structural changes in the market or initial market underreaction.

The performance of the whole market is driven by individual stocks/industries, so how individual stocks/industries react to election outcomes is another interest of research of this paper. Past studies find that certain industries/sectors are more sensitive to elections, such as Oehler et al (2013) and Wagner et al (2017). In the context of 2016 election, this paper doesn't find consistent pattern that links individual stock performance to the industry that the company belongs in. Moreover, the evolvement of post-election industrial average abnormal return is not correlated with ex ante promises of Trump's election campaign.

Besides industrial classification, other metrics have also been found to be effective in measuring firms' exposure to political events and election news, such as marginal tax rate and financial leverage ratio (Wagner et al 2017). Among these metrics, the headquarter location of companies is widely researched, and previous empirical studies find strong co-movement in stock returns for companies located in the same geographic area (Pirinsky and Wang, 2006). Company headquarter location is also found to be linked with their sensitivity to political events (Liu at al 2016).

Following these results, this paper also examines whether a company's reaction to presidential election outcome is correlated to its location. The underlying rationale is the Electoral College mechanism of US presidential elections: the presidents and vice presidents are ultimately determined by a small group of representatives (electors), who vote on behalf of all voters in their state. Historically, different states in the US have various social-political landscape and preference, and there has existed the divide of "blue" states (Democratic-supporting) and "red" states (Republican-supporting). For instance, California, which has most (55) electors among all states, is known for its liberal tendency and support for the Democratic Party, while Texas has been in favor of Republican Party traditionally. This political preference could be associated to state-specific laws and business climate, which affect companies that are located within its territory. Moreover, a president will impose policies that favor the business and economy of the states that voted for him, to secure the support of these voters to be re-elected. This paper uses the geographical location of

companies headquarter and the historical political preference landscape as a proxy to test such effect. But empirical results don't support such hypothesis: the historical political preference of geographic areas that the companies register in doesn't predict post-election abnormal returns as expected, for 2016 election. Companies located in red states turned out to underperform their counterparties in blue states in the short run. Possible reasons could be uneven distribution of company headquarters, as well as the fact that US economy is less influenced by politics.

The rest of this paper is structured as follows: section 2 reviews previous studies, section 3 introduces data and methodology, section 4 shows and explains empirical results, and section 5 concludes.

2. Literature review

In the context of presidential elections as well as other political events that could potentially affect financial market, what has been proposed by much previous studies is that, the existence and degree of uncertainty would have a non-negligible impact on asset prices. Brown et al (1988) establish an Uncertain Information Hypothesis (UIH): investors would establish expectations about asset prices before an exogenous event is known, and then adjust this belief accordingly when the uncertainty of the event is resolved. As a result, market volatility increases following the announcement of any major unanticipated events, and price change will always be positive regardless of the nature of such events. But the change in price is asymmetric: larger for unfavorable events than for favorable events. They test a large sample of company-specific events as well as CSRP equal-weighted and value-weighted market index, and find results supporting their hypothesis.

Reviewing the extent and influence of uncertainties is relevant to this paper, because the results of presidential elections are mostly not predicted by means such as public opinion polls, and therefore form a source of surprises to the market. For instance, Campell (2004) proves the existence of election outcome forecast errors. Randall (2008) points out that the forecast error for electoral votes is higher than for popular votes. Bialkowski et al (2008) find

that, in 27 OECD countries, stock market index variance tends to increase significantly around elections, showing that investors are still surprised by election outcomes.

This kind of uncertainty lies in many perspectives, and most famously in the partisanship of the new president. Past studies have extensively researched the existence of the "presidential puzzle", which argues that stock market in general has different performance under terms of presidents from different parties. For instance, Santa-Clara and Valkanov (2003) find that the market return in excess of one-month T-bill rate under Democratic administration is 9% (annually) higher than Republican administration for value-weighted portfolio and 16% higher for equal-weighted portfolio, for the period from 1927 to 1998, although market volatility is higher under Republican administration. However, the effect of presidential puzzle is somehow being debated. Leblang and Mkuherjee (2005) test the daily data of Dow Jones Industrial Average from 1896 to 2001, and get opposite result: both the return and volatility of DJIA index is lower under Democratic president administration. Oehler et al (2013) also find that a winning Democratic candidate has negative influence on the whole stock market both before and after the election, and some industries are significantly more sensitive to such outcomes.

The uncertainty also lies in whether the incumbent party/sitting president can win the election. The analogy is similar to, in a corporate context, whether the executives/board members are appointed internally or recruited externally. For instance, Smith and Amoako-Adu (1999) find that, in Canada, when family successors are appointed as corporate executives, stock price declines in a short-term, but this doesn't hold for non-family insiders or outsiders. Kräussl et al (2014) formulate the presidential election cycle (PEC) framework, which suggests that, in the period close to elections, the incumbent president would try to manipulate the economy to win the election, such as imposing business-friendly policies and economic incentive measures. Pantzalis et al (2000) find that, positive abnormal return is correlated with failure of incumbent party in 33 countries during the sample period from 1974 to 1995. Oehler et al (2013) also find that, in the US market, if the final winner comes from a challenging party, there is stronger reaction in the marketplace, than when the incumbent party wins.

Another form of uncertainty is the unpredictability of the winner. If market participants could predict the winner correctly, the election outcome should not be new information after the Election Day and the market should not react on this, and vice versa.

Many studies have documented how the changes of presidential candidates winning probability affect stock prices. For instance, Li and Born (2006) find that, in the case of unexpected victory, market reacts in a stronger way. The result holds for both equal-weighted market index and value-weighted market index, indicating that political events tend to influence both large cap and small cap stocks.

A final source of uncertainty in the elections comes from electoral voting results. The party/candidate who wins with "landslide" victory (wider margin) has more bargaining power to "defect" from their promises without the risk of losing power. As a result, the public is more uncertain about what kind of future policies they will impose. On the contrary, if one party/candidate has won by narrow margin, it means they cannot afford to alienate their supporters and have to stick to their previous promises, and the market is more certain about their future policies. For instance, Fowler (2006) finds that the margin of victory has a significant impact on inflation expectations and inflation risk in the US.

Election outcome uncertainty also impacts individual companies. Much research has documented that certain industries/firms are more sensitive to election outcomes than others. For instance, Oehler et al (2013) find that the extent of reaction to election outcome differs for 8 industries from 1980 to 2008, Wagner et al (2017) find that heavy industry and banking outperform healthcare, biotech, textiles underperform after 2016 election. Besides the industry classification, other company features have also been found useful in measuring individual companies' reaction to election news. For instance, Wagner et al (2017) find that, after the 2016 election, effective tax rate and capital expenditure are positively correlated with company stock abnormal returns, while percentage of foreign operation revenue is negatively correlated with company stock abnormal returns.

Among these features, what has been researched extensively in recent years is companies' location. For instance, Pirinsky and Wang (2006) find strong co-movement in stock returns for companies located in the same geographic area, which is not explained by company fundamentals. Kim et al (2012) have developed firms' proximity to political power (PAI) index and found that positive return for companies located in geographical areas that are politically closely aligned to the new president, where PAI is calculated as the degree of presidential party control of a state's political institutions such as number of state senators and state representatives. Liu et al (2016) also find significant relationship between a firm's reaction to political scandals and the proportion of state-owned enterprise expenditures in the

province that the firm is located in, in the Chinese market. Faccio and Parsley (2009) find that in case of sudden death of a politician, the companies headquartered in his/her hometown will experience a drop in market-adjusted value.

On the basis of these studies, in the next section I develop rationales for using variables to explain stock market behavior after elections, and establish corresponding hypothesize of this paper.

3. Development of hypothesis

The rational reaction of the market to new information should be based on the discounted expected future payoffs of possible outcomes, weighted by ex-ante probabilities of respective outcomes. Uncertain election outcome could be a type of unexpected information to the market, in terms of both future outcomes/payoffs (what kind of policies the new president will impose) and corresponding probabilities (how likely the new president will impose these policies). And this uncertainty is only resolved after the election outcome is known.

If a winner of an election is a candidate from the challenging party, he /she is more likely to impose policies that are different from current ones, in his/her term. In this case, the market participants will have heterogeneous expectations about such policies and their impacts, therefore the uncertainty in the marketplace will be higher. On the contrary, if the incumbent party candidate wins the election, it is more likely that the market participants/voters are satisfied with current policies, and the new president is more likely to impose similar policies. Similar analogy holds if the sitting president is successfully re-elected.

H1: a winning candidate who comes from the challenging party or/and is not re-elected, is uncertain to the market, and the market will react accordingly.

Public opinion polls can reflect market's belief towards the election outcomes. Higher ex ante supporting rate in public opinion polls for one candidate means he/she is favored by

market participates, and the market assigns higher probability to the future outcome that is associated with his/her victory. If, at last, he/she doesn't win the election, the market will adjust such belief by a larger extent, to reflect payoffs of the new outcome. In other words, the market will be surprised or shocked by such results.

H2: a winning candidate who was not correctly predicted in pre-election public opinion polls, is uncertain to the market, and the market will react accordingly.

What could also bring uncertainty to the market is the winning margin of a candidate in an election. Electoral winning margin matters, because in the case of "landslide" victory, the winning party/candidate is more favoured by the electoral voters, and therefore has more bargaining power to deviate from his or her election campaign promises, without bearing high risk of losing power. In other words, a wider winning margin gives the winner/winning party the "leeway" to impose the extreme version of their policies, and the market participates will need to adjust their beliefs to reflect such change. On the contrary, if one party/candidate has won by narrow margin, it means they cannot afford to alienate their supporters and have to stick to his or her election campaign promises, in order to succeed in the re-election. And in this case, the market is more certain about his or her potential policies.

H3: a winning candidate who has a wide percentage winning margin in the electoral votes, is uncertain to the market, and the market will react accordingly.

While these three hypothesizes focus on the overall market reaction, the next two hypothesizes examine the reaction of individual stocks/industries and focus on the 2016 election, as a supplement and further investigation.

In the 2016 election campaign, the two major candidates, Donald J Trump and Hillary Clinton proposed surprisingly different policies, which were in favor of some industries than others. If, as has been documented by other studies, the election outcome indeed contains information that can't be explained by common risk factors such as market beta, growth or size, then when the election outcome is disclosed publicly, the market will react to this information. It is reasonable to assume that, industries that will potentially benefit from Trump's promises or future policies, should see stock price increase, resulting from higher future payoffs, and vice versa.

H4: the 2016 election has different impacts on the industry level.

Moreover, companies whose headquarters are located in states that historically had favored Republican candidates, are also expected be benefited from Trump's victory, and vice versa. Similar to H4, during their election campaign, the two candidates had different geographic focus, which are expected to influence the post-election performance of companies. Another rational for this hypothesis is that, choosing to register in a state shows the political tendency/preference of the founder/executives of a company, which could affect how the market/investors price the company. What's more, a new president is more likely to impose policies that favor the states that voted for him, to secure the support of these voters, to be re-elected. As a result, it is reasonable to assume that, companies in "red states", or states that prefer Republican candidates, will see price increase, resulting from higher future payoffs, and vice versa.

H5: the 2016 election has different impacts on the geographical level.

After the above hypothesizes are developed, in the next part I will discuss the data and methodology that is used to test the empirical validity.

4. Data and methodology

4.1 Event study

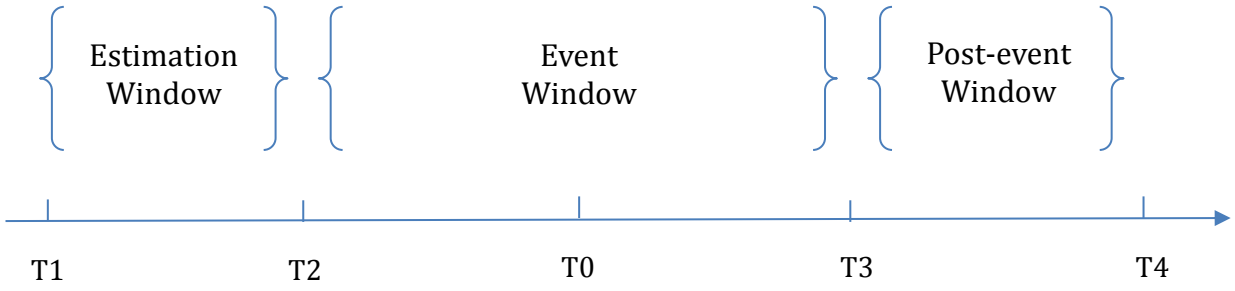
Event study is a widely-applied strategy in investigating how the market's reaction to certain events evolves over time. It was firstly proposed in 1930s and has been discussed and improved ever since. MacKinlay (1997) has done a comprehensive review and summary of methods and assumptions adopted in event study, which forms the basis of this paper.

The implied assumption of event study methodology is the semi-strong form of Efficient Market Hypothesis, which proposes that market price reflects all public information.

Therefore, the market should react to news when and only when it becomes public information, resulting in changes in price and therefore returns. Market reaction is measured by abnormal return, which is defined as the actual (realized) return of a certain asset during the event window minus the "normal" return of that security at the same time. And the "normal" return is defined as the ex-ante expected return conditional on information that is only available before the event takes place. It is equivalent to the control group in difference-in-difference analysis, is not directly observed and needs to be estimated.

Many models have been used to estimate the "normal" return. MacKinlay (1997) has classified the models into two categories, statistical models and economic models. The formal assumes that asset return follows statistical distribution rather than being driven by economic force. The most commonly used statistical models include constant mean return model, market model, and factor models, etc. The latter, on the contrary, uses econometric models to simulate asset return behavior. Widely used economic models apply Capital Asset Pricing Model (CAPM), Arbitrage Pricing Theory (APT), among others, to estimate asset return behavior.

Event study methodology investigates market's reaction from a "timeline" perspective. Three specific phrases are usually needed to constitute the timeline:



T0 is the time when the event takes place (event day). The period between T1 and T2 constitutes estimation window, which is the period we use to construct a model for estimating return characteristics. This period is assumed not to be influenced by the event, or in other words, in this period no one in the market would anticipate the event is going to happen or have any information about the event. The period between T2 and T3 constitutes event window, which is the interest of research and normally a short interval around the event day (T0). The period between T3 and T4 constitutes post-event window and is often used to research the longer-term impact of the event. There could also be gaps between estimation window and event window, or between event window and post-event window. Due to space

concern, calculation of abnormal returns and cumulative abnormal returns, as well as how to determine if they are significantly different from zero, are presented in Appendix 1.

4.2 Market's reaction to election outcomes

In the first part of paper, the interest of research is how asset returns have been influenced by historical elections and I focus on the overall market instead of individual stocks. The reason is that, very few stocks have trading history dating back to earlier election times in the first half of 20th century, if any. Even for those stocks that do have that long listing history, their prices have been affected by various company-specific events, leading to bias in the result. Looking at the whole market, on the contrary, such idiosyncratic affect could be offset or smoothed out to give a "cleaner" result. Besides, using stocks that have survived from 1930s to now, is implicitly picking some of the most successful stocks and excluding companies that went bankruptcy or became unlisted for other reasons, and will make the result subject to survivorship bias.

This paper uses Dow Jones Industrial Average Index (thereafter Dow Jones) as a proxy for the whole market. The main reason for selecting Dow Jones is that, founded in the 19th century, it has longest tracking record among all major US stock market indices, allowing to introduce more observations.

The sample incorporates 21 presidential elections, from 1936 to 2016. I choose to start with 1936 election, because it is the earliest election that had Gallup polling data available, which is an important variable in my analysis (explained in later parts).

The schedule of US presidential elections has been fixed in the 20th century[1]. The election process was initiated as early as one year before the election, but generally, the two major parties would hold nominating conventions to choose their candidates by September of election year, who then would participate in Presidential debates. The Election Day is the first Tuesday after the first Monday in November, every four years. In my sample, the earliest Election Day is November 2nd, in 1948, 1976 and 2004 elections. And the latest Election Day is November 8th, in 1932, 1960, 1988 and 2016 elections.

[1] Source: https://www.usa.gov/election

The outcome of the election is determined by the electoral votes of all states. The total number of electors has changed slightly in my sample period, and since 1968 has been fixed at 538. A candidate would need to win more than half elector votes to win. Table 1 gives an introduction of the 21 elections in the sample.

Table 1 Descriptive summary of 21 elections

This table presents summary of 21 US presidential elections that took place between 1936 and 2016. Losing candidate refers to the candidate who got the second most electoral votes. Source: https://www.history.com and https://www.usa.gov .

Year	Winning candidate	Losing candidate	Party of winner	Incumbent	Re-elected	Election Day	Total number of electors	Electoral votes won over losing candidate
1936	Roosevelt	Landon	Democratic	Yes	Yes	1936-11-03	531	515
1940	Roosevelt	Willkie	Democratic	Yes	Yes	1940-11-05	531	367
1944	Roosevelt	Dewey	Democratic	Yes	Yes	1944-11-07	531	333
1948	Truman	Dewey	Democratic	Yes	No	1948-11-02	531	214
1952	Eisenhower	Stevenson	Republic	No	No	1952-11-04	531	353
1956	Eisenhower	Stevenson	Republic	Yes	Yes	1956-11-06	531	384
1960	Kennedy	Nixon	Democratic	No	No	1960-11-08	537	84
1964	Johnson	Goldwater	Democratic	Yes	No	1964-11-03	538	434
1968	Nixon	Humphrey	Republic	No	No	1968-11-05	538	110
1972	Nixon	McGovern	Republic	Yes	Yes	1972-11-07	538	503
1976	Carter	Ford	Democratic	No	No	1976-11-02	538	57
1980	Reagan	Anderson	Republic	No	No	1980-11-04	538	440
1984	Reagan	Mondale	Republic	Yes	Yes	1984-11-06	538	512
1988	Bush	Dukakis	Republic	Yes	No	1988-11-08	538	315
1992	Clinton	Bush	Democratic	No	No	1992-11-03	538	202
1996	Clinton	Dole	Democratic	Yes	Yes	1996-11-05	538	220
2000	Bush	Gore	Republic	No	No	2000-11-07	538	5
2004	Bush	Kerry	Republic	Yes	Yes	2004-11-02	538	35
2008	Obama	McCain	Democratic	No	No	2008-11-04	538	192
2012	Obama	Romney	Democratic	Yes	Yes	2012-11-06	538	126
2016	Trump	Clinton	Republic	No	No	2016-11-08	538	77

To estimate the daily abnormal return, I use an estimation window of 252 trading days, which normally lasts for one calendar year. The estimation window ends 30 trading days before the event day, to make sure it is not influenced by any election-related news. Then I specify the first trading day after Election Day as day 0 in the event window, for two reasons. Firstly, in earlier elections, there was no trading data available on Election Day. Secondly, before electronic technology and internet were introduced into voting process, it would normally take at least one day to collect, count and calculate the votes before the winner was known. Even after electronic voting has been introduced, this process is still long. For instance, in the 2016 election, Donald Trump claimed his victory on November 9th, after knowing that he had won more than 270 elector votes[2]. Therefore, I assume that there would be about one day's delay before the market could know the exact election outcome.

I choose a relative long event window to test the market reaction, starting from Day -1 and ending on Day 40. Then I examine the daily abnormal returns at three specific points: Day -1, Day 0 and Day 1. The first one shows the market's behavior before the election outcome is known, the second one shows the immediate reaction of the market, and the last one shows if this reaction would persist or reverse in short term. Then I also look at the cumulative daily abnormal return from Day -1 until Day 40. The event window starts from Day -1, to incorporate possible information leakage before the Election Day, if any. And the event window ends on Day 40, to examine if the cumulative effect of the presidential election news can last until year-end, which is at most 40 trading days after the Election Day. Here I use the relative measure (how many trading days have passed since Election Day) instead of exact calendar day, to make event windows across different elections more comparable.

Previous studies such as Wagner et al (2017) extend this event window even to presidential inauguration day, which is normally January 20th in the next year after the election[3]. However, I choose not to do so, because the release of election outcome per se, is already a signal to the market, which announces the new president in the upcoming four years. In the period from when election outcome is known, to inauguration day, it is still under the governance of the current president. During this time interval, the president-elected is not in power to impose any policies. In other words, the inauguration ceremony doesn't add

[2] Source: https://apnews.com/fb2e92a47f054019a2589ace78d20836/Trump-wins-White-House-in-astonishing-victory.
[3] Source: https://www.usa.gov/election#item-211442

much new information, if any, to the market, and therefore is irrelevant to accessing elections' impact[4].

In estimating market abnormal return, I use the constant mean model, for two reasons. Firstly, it has been argued in previous studies, such as Brown and Warner (1985), that the constant mean model is a simple but effective model, and the results it generates are, to a large extent, similar to other models. Secondly, since the Dow Jones index is already a proxy for the whole market per se, calculating a market-adjusted or factor-adjusted abnormal return for it will not add much new information, if any.

Under the constant mean model, abnormal return is calculated as:

$$AR_{it} = R_{it} - \mu_i$$

Where $R_{it}$is the simple rate of return for asset *i* at time *t*, and $\mu_i$is the simple average return estimated from the estimation window for the same asset.

And cumulative abnormal return (CAR) from time $\tau_1$to τ_2 (where $\tau_1<\tau_2$) is calculated as:

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau}$$

After obtaining the (cumulative) abnormal returns for every election, I need to examine how these returns are related to election-specific features. To test this effect, I establish following multivariate regression:

$$AR_i(CAR_i) = \beta_0 + \beta_1 * Party_i + \beta_2 * Incum_i + \beta_3 * ReEl_i + \beta_4 * Margin_i + \beta_5 * Leading_i + \beta_6 * IndGrowth_i + \varepsilon_i, (1)$$

In regression (1), the subscript *i* is election-specific. The dependent variable $AR_i$and $CAR_i$are abnormal and cumulative abnormal returns, respectively.

The independent variables are defined as follows:

$Party_i$ is a dummy variable indicating the partisanship of final winner: 1 for Democratic and 0 for Republican. This variable is included to capture the well-documented "presidential partisanship puzzle": Democratic and Republic parties have highly different

[4] I want to thank Prof. Dr. Michael Halling for his suggestion on this point.

policies. Ideologically, the former is more liberal, and the latter is more conservative. This difference should be reflected in market returns.

$Incum_i$ is a dummy variable indicating whether the final winner came from the party in-office or not: 1 if the winning candidate came from incumbent party and 0 otherwise. If the winner comes from the challenging party, it is more likely that he or she will impose different policy in his or her terms, and vice versa, which will also be reflected in market beliefs.

$ReEl_i$ is a dummy variable indicating the term of the newly elected president: 1 if the winning candidate was re-elected and 0 otherwise. The analogy is similar to the incumbent variable, if the winner is re-elected, it means his previous policy was recognized by voters and/or market participants and it is more likely that similar policy will be imposed. In such case, the future policy is less uncertain. $ReEl_i$ and $Incum_i$ used to test Hypothesis 1.

$Margin_i$ is the percentage winning margin in terms of electoral votes. Wider winning margin means the new president can afford to impose policies that are different from what he promised during the election campaign, and the market will interpret this as more uncertain. On the other hand, if one party/candidate has won by narrow margin, it means they cannot afford to alienate their supporters and have to stick to their campaign promises, and the market is more certain about their future policies. This variable is used to test Hypothesis 2.

$Leading_i$is a variable indicating the final winner's average leading point over his/her opponent in pre-election public opinion polls, retrieved from Gallup website. If the ex-ante supporting rate of the final winner was not greater than his or her opponents (the final winner had a zero or negative leading point), it means that the final winner was not predicted by the ex-ante poll and would therefore be a surprise or shock to the market. this variable is used to test Hypothesis 3.

Some prior studies such as Oehler et al (2008) use a dummy variable (whether the average ex ante supporting rate of the winner is greater than 5%) to capture this uncertainty. This is somehow arbitrary. Therefore, I choose to the raw average leading point instead[5].

Some studies also use other approaches to measure this forecast uncertainty. For instance, Li and Born (2006) define the uncertainty $U_{n,t}$ as:

$$U_{n,t} = (X_{n,t} - Y_{n,t})/\sigma_{n,t}$$

[5] I want to thank Prof. Dr. Michael Halling for his suggestion on this point.

where $X_{n,t}$ is the percentage of poll respondents who prefer the candidate of the incumbent party, $Y_{n,t}$ is the percentage of poll respondents who prefer the candidate of incumbent party out of power and $\sigma_{n,t}$ is the poll's sampling error.

Standardizing the leading points by dividing the sampling error can help to keep all variables at similar scale and more comparable, but due to data availability this may introduce other bias. The reason is that the Gallup poll data for different elections has different number of observations. For recent elections, daily poll data is available, but there are only around ten polls for every election before 1990s. Higher observation frequency would 'smoothen' the data trend and cause a downward bias in volatility in recent elections. Therefore, this paper still uses the 'raw' data, instead of standardizing it by dividing its volatility.

For elections before and in 2012, I use the poll results from Gallup, which has longest tracking history dating back to 1936. But Gallup didn't hold public opinion polls for the 2016 election, which is also an interest of this research. Therefore I use the poll data from Real Clear Politics, which is also a major political survey entity and had similar results as Gallup in most previous elections, as source for the 2016 election.

$IndGrowth_i$is a proxy for macro-economic condition. This variable is incorporated for controlling purposes, as well as capturing the rational expectation of stock market return. According to Pastor and Veronesi (2013), political uncertainty is higher in a weaker economy. This paper uses the log growth rate of Industrial Production Index in the month of Election Day compared to last month, retrieved from Board of Governors of the Federal Reserve System.

Table 2 reports the independent variables and table 3 reports the pair-wise correlation of these variables.

4.3 Industry performance and Trump's victory

After testing how the whole market has reacted to historical elections, I want to examine how individual stocks respond to such events, to identify which companies/industries become winners after an election and which become losers. And in this section, the 2016 election is the interest of research.

Table 2 Election-specific variables

This table presents election-specific variables used the multivariate regression (1). Party equals 1 if the winner is a Democratic candidate and 0 otherwise. Incum (incumbent) equals 1 if the winner came from incumbent party and 0 otherwise. ReEl (re-elected) equals 1 if the winner was re-elected (second term). Leading is the winner's ex ante average supporting point in pre-election polls, over the losing candidate who got second most electoral votes. Margin is the winner's percentage electoral votes winning margin over the losing candidate. IndGrowth (Industrial Growth) is the log growth rate of US Industrial Production Index in November of election year. IndGrowth is quoted from Board of Governors of the Federal Reserve System, Leading is from www.gallup.com and www.realclearpolitics.com, and other variables are from https://www.history.com and https://www.usa.gov.

Year	Party	Incum	ReEl	Leading	Margin	Ind Growth
1936	1	1	0	5.50%	96.99%	2.79%
1940	1	0	0	4.63%	69.11%	2.31%
1944	1	1	1	4.00%	62.71%	-0.81%
1948	1	1	1	-8.71%	40.30%	-1.30%
1952	0	1	1	8.00%	66.48%	2.00%
1956	0	1	0	12.40%	72.32%	-0.86%
1960	1	0	0	0.29%	15.64%	-1.42%
1964	1	1	1	34.00%	80.67%	3.04%
1968	0	0	0	11.33%	20.45%	1.29%
1972	0	1	0	27.40%	93.49%	1.16%
1976	1	0	0	6.00%	10.59%	1.45%
1980	0	1	1	-1.60%	81.78%	1.73%
1984	0	0	0	18.50%	95.17%	0.38%
1988	0	0	0	6.83%	58.55%	0.15%
1992	1	1	1	12.21%	37.55%	0.44%
1996	1	1	0	18.93%	40.89%	0.86%
2000	0	0	0	-3.08%	0.93%	0.02%
2004	0	1	1	3.14%	6.51%	0.19%
2008	1	0	0	5.63%	35.69%	-1.24%
2012	1	1	1	2.55%	23.42%	0.55%
2016	0	0	0	-4.45%	14.31%	-0.25%

Table 3 Pair-wise correlation of independent variables

This table presents pair-wise correlation of election-specific variables to be used the multivariate regression (1). IndGrowth is quoted from Board of Governors of the Federal Reserve System, Leading is from www.gallup.com and www.realclearpolitics.com, and other variables are from https://www.history.com and https://www.usa.gov.

	Party	Incum	ReEl	Leading	Margin	IndGrowth
Party	1					
Incum	0.1376	1				
ReEl	0.1589	0.6794	1			
Leading	-0.0059	0.2327	-0.0846	1		
Margin	-0.0700	0.3700	0.0303	0.5058	1	
IndGrowth	0.0099	0.1977	0.0827	0.4500	0.4395	1

The sample used in this section is the constituents of Standard & Poor 500 index (thereafter S&P 500). The main reason for choosing S&P 500 instead of Dow Jones is that, it gives a better sample size (Dow Jones only has 30 constituents). The total number of individual stocks incorporated in this index is currently 505. I exclude the companies that have headquarter address outside US, because they are also subject to the regulation of foreign laws and policies and, therefore, don't have as much as comparability as US-located companies. I also exclude the stocks that have missing trading data in either estimation window or event window. After screening, there are 448 stocks left in the sample.

To calculate abnormal returns for individual stocks, I use Fama-French Three Factor model (Fama and French, 1993), because this model can effectively rule out the effect of market movement and leave only idiosyncratic component of asset returns. In recent years, this model is gradually being replaced by Fama-French Five Factor model. The availability of the Five Factor model, however, is not as good (starting from 1964). To be consistent with the sample period length in the first part, I will still use the Three Factor model instead.

Under the Three Factor model, the daily abnormal return is calculated as:

$$AR_{it} = R_{it} - (\beta_{i1} * MktRf_t + \beta_{i2} * HML_t + \beta_{i3} * SMB_t)$$

Where $i$is company-specific, $R_{it}$is realized return of company i.

$MktRf_t$, $HML_t$and SMB_t are the three factors proposed by Fama and French, market risk premium, value factor (high minus low) and size factor (small minus big). β_{i1}, β_{i2},and $\beta_{i3}$are the corresponding factor loadings, estimated from OLS regression with data in estimation window.

The abnormal returns are calculated using same length of estimation window and event window as described in previous section. Specifically, the estimation window is from April 2rd 2015 to September 23th 2016, and the event window is from November 8th 2016 to December 30th 2016, where the event day is November 9th 2016.

The two major candidates, Donald J Trump and Hillary Clinton, had surprisingly different promises about upcoming political, economic and social policies. Some policies would affect the whole economy, while others would only affect certain stocks or industries. Therefore, it is necessary to have a brief review of Mr. Trump's promises about his future policies[6] from an ex-ante perspective.

Among Trump's economic policies, the one that would have greatest impact on the general economy, should be his tax cut intention, which allows businesses to deduct interest expense against interest income, with any net interest expense not being deductible but being carried forward indefinitely to use against future net income[7]. Wagner et al (2017) find positive correlation between company post-election return and effective tax burden, even after other variables such as company stock beta etc, confirming the significant effect of Trump's victory on the whole economy.

Moreover, Trump also had promises and policies that might influence specific industries/companies differently (Lilleker et al 2016):

- Replace and repeal previous medical insurance system (Obamacare) (a);
- Dismantle the Dodd-Frank Wall Street Reform and Consumer Protection Act (b);
- Withdraw from the Paris Climate Agreement, encourage use of fossil fuel, and dismantle environmental regulations (c);
- Increase the national defense budget and military spending (d);
- Negotiating trade agreements and increase tariff on imports from countries such as China and Mexico (e);

[6] The page about Trump's campaign policies on his official website has been deleted, therefore some of the contents of this section are quoted from his speeches and interviews with mass media.
[7] Sources: KPMG: House Republican tax reform "blueprint" – Initial observations.

- Rebuild US infrastructure, revitalize manufacturing, and bring jobs back to US (f).

From the ex-ante perspective, banks, insurers and financial institutions would benefit from (a) and (b). Mining, oil and utility companies would benefit from (c). Construction and heavy industry companies would benefit from (e). Manufacturing, automobile and transportation companies would benefit from (f). On the other hand, policy (e) means that those companies that rely heavily on imports would have a negative outlook under Trump's policy, such as textiles, consumer goods, retail, and services.

Wagner et al (2017) research almost the same sample as used in this paper, and examine CAPM-adjusted abnormal returns. They find significant pattern on industry level. To test Hypothesis 4, this paper does a robustness check of their result and uses Fama-French Three Factor adjusted abnormal returns. Instead of using a multivariate regression of company returns on industry fixed effect, I use a more straightforward approach: classifying all companies into different industries and examining the average abnormal return of every industry. In this way, it is easier to access whether the impact of the election confirms investors' prior belief.

Following Oehler et al (2013), I classify all firms into 8 industries according to their SIC code: mining, construction, manufacturing, transportation/communication/electric/gas/sanitary services (thereafter transportation), wholesale trade, retail trade, finance/insurance/real estate (thereafter finance), and services. I exclude the firms that are classified as agriculture, forestry and fishing (SIC code 0100 to 0999), public administration (SIC code 9000 to 9899) and non-classifiable establishments (9900 to 9999). The reason is that there are too few firms in these industries (0 in agriculture, 3 in public administration, and 1 in non-classifiable establishments). For every industry, I calculate and compare the average abnormal return on day -1, day 0 and day 1 and cumulative abnormal return until year-end. The reason for choosing these points is similar as stated in part 4.2.

4.4 Company headquarter location and Trump's victory

The final test of this paper is to link companies' headquarter location with their stock returns. The rational lies in the electoral voting college system of US, which means the presidents are determined state-wise. And every state has an instinct social-political landscape and preference. This political preference could be associated to state-specific laws and business climate, and in turn affects companies that are located within its territory. On the other hand, choosing to register in a state also shows the political tendency/preference of the founder/executives of a company, which will in turn affect how the market/investors' belief towards the company. Moreover, if one state has been in favor of one party historically and the candidate from that party wins, it is reasonable to assume that he/she will implement policies that favor the economy of that state, to secure support of these "core" voters. All these factors fuel and supplement one another.

This paper uses this geographical location as a proxy to examine the political impact on individual stocks, to test Hypothesis 5. In this test, I use the electoral voting results in the past 20 elections from 1936 to 2012, as a proxy to classify the political preference of every state:

$$AR_i = \beta_0 + \beta_1 * Revg_i + \beta_2 * RP_i + \varepsilon_i \quad (2)$$

The explanatory variables are defined as follows:

i is company-specific.

$Revg_i$is the revenue growth in the most recent financial year until 2016 October, for company *i*. This variable is included to capture the intrinsic value of stocks, from an ex-ante perspective. And it is assumed to be not influenced by presidential elections.

RP_i indicates the extent of historical political preference of state that the firm located in. It is calculated as the percentage of times that the state's electors voted for Republican candidates in the past 20 elections (detailed information of this data is presented in appendix 2). Some states voted for less than 2o times, for instance, District of Columbia participated in 13 electoral votes. The calculation is adjusted accordingly in such case. The summary statistics of this variable are presented in table 4.

Table 4 Summary statistics of revenue growth and state historical political preference

This table presents summary statistics of the two variables used in regression (2). Revg (revenue growth) is calculated as the percentage revenue growth in the most recent financial year before 2016 October, obtained from Compustat – Capital IQ. RP (Republican preference) is calculated as percentage of times that the state's electors voted for Republican candidates in the past elections from 1936 to 2012, obtained from https://www.archives.gov/federal-register/electoral-college/votes/votes_by_state.html.

	Mean	Median	Standard deviation	Max	Min	Skewness	Kurtosis
Revg	0.0050	0.0126	0.1646	0.8017	-0.5357	0.0072	3.8756
RP	0.5300	0.5500	0.2148	0.9300	0.0000	-0.0676	-0.1771

5. Empirical results and discussions

5.1 Abnormal returns and cumulative abnormal returns: an initial observation

The main testable implication of UIH is that, when the uncertainty of an event-induced outcome is resolved, price change tends to be positive regardless of the nature of the event. Table 4 reports abnormal returns on day -1, 0 and 1, as well as the cumulative abnormal returns until year-end, for every election.

My result doesn't support UIH, as on day 0 (when uncertainty is expected to be resolved), 13 out of 21 elections had negative abnormal return. More specifically, both the mean and median abnormal return are negative (-0.0046 and -0.0029, respectively) on day 0.

Apart from this observation, there is no clear pattern indicating how the abnormal return evolves in the three days around election. However, in general, the abnormal returns on day -1, are not as significant as on day 0 and day 1. This is in line with EMH and shows that, the market reacts to the election outcome only when it becomes public information.

Table 5 Market abnormal returns and cumulative abnormal returns in 21 elections

This table reports abnormal returns and cumulative abnormal returns of Dow Jones Industrial Average Index around Election Day from 1936 to 2016, estimated from constant mean model. Abnormal returns are as daily return in excess of its mean. Cumulative abnormal return is the sum of abnormal returns from day -1 to day 40. AR (0): daily abnormal return of day 0. AR (-1): daily abnormal return one trading day before day 0. AR (1): daily abnormal return one trading day before day 0. CAR (year-end): cumulative daily abnormal return from day -1 to day 40. *** p<0.01, ** p<0.05, *p<0.1.

Election year	AR (-1)	AR (0)	AR (1)	CAR (year-end)
1936	-0.0038	0.0215**	0.0077	-0.0352
1940	0.0064	-0.0234**	0.0442***	0.0111
1944	0.005	-0.0029	0.0014	0.0435
1948	0.0078	-0.0385***	0.0113*	-0.0607
1952	0.0038	0.004	0.0048	0.0843***
1956	0.01	-0.0085	-0.0049	0.0087
1960	0.003	0.0081	0.0166**	0.0622
1964	0.0021	-0.0026	-0.001	-0.0306
1968	-0.0024	0.0034	0.0012	-0.0289
1972	0.0004	-0.0013	0.0043	0.0523
1976	0.0003	-0.0108	0.0032	0.0045
1980	0.0134	0.0167*	-0.019**	0.0585
1984	0.0122	-0.0087	-0.0036	-0.0271
1988	0.0019	-0.0038	-0.0011	0.0605
1992	-0.0033	-0.0094	0.0061	0.0005
1996	0.0057	0.015**	0.0037	0.0293
2000	-0.0024	-0.0042	-0.0068	-0.0299
2004	-0.0021	0.0099	0.0173**	0.0619
2008	0.0336**	-0.0496***	-0.0477***	0.0188
2012	0.0092	-0.0246**	-0.0104	-0.0189
2016	0.0034	0.0134	0.0112	0.0616

There is no clear pattern in the series of cumulative abnormal returns either, except that the significance is much lower, which shows that the impact of election news has been incorporated in market price quickly and should not be relevant for longer-term returns. This is also in line with EMH.

Wagner etc (2017) finds that, on the industry level, after the 2016 election, the abnormal returns on Day 0 are negatively correlated with the cumulative abnormal returns till year-end. They interpret this as it took longer time for the market to incorporate information about particular industries into prices. However, this is not true on the overall market level, as the abnormal return on Day 0 is positively correlated with year-end cumulative abnormal returns (correlation 0.39).

Does this finding contradict to EMH? Not necessarily. The semi-strong form of EMH suggests that, the market price should reflect all public information and no price trend can persist, otherwise there exists arbitrage opportunities in the marketplace that will drive such pattern away. However, the cumulative abnormal return calculated in this paper is just the simple sum of daily abnormal returns, not buy-and-hold abnormal returns. That means, the existence of such long-term trend is not equivalent to arbitrage opportunities. Therefore, this phenomenon alone is not a rejection to EMH.

One possible explanation for this finding is that, the market tends to initially underreact to the election news. What speaks against such hypothesis is that, such positive correlation doesn't hold on industrial level, as discussed by Wagner et al (2017).

Another possible reason for such persist return pattern is structural change in the market, caused by the election outcomes. For instance, Bialkowski et al (2008) find observable changes in market volatility weeks after elections. What speaks in favor of this hypothesis is that, such positive correlation persists even until presidential inauguration day, which is normally 20th January in the next year after the election (the coefficient of abnormal return on day 0 and cumulative abnormal return on inauguration day is 0.27), although it is still unclear how the elections cause such market structural change.

5.2 Abnormal returns and election-specific characteristics

Table 6 reports regression results from equation (1). Three sets of regressions are used, and dependent variables are AR (0), AR (1) and CAR (year-end) that are reported in 5.1. To avoid look-ahead bias, AR (-1) is not considered in this part. For each set of regression, the left

columns are regression results without controlling for industrial growth, and the right column are regression results including industrial growth.

Table 6 Market (cumulative) abnormal return and election-specific features

This table presents OLS regressions of the daily abnormal return on Day 0, Day 1 and cumulative abnormal returns from Day -1 to Day 40 (year-end), on election uncertainty variable sets. For each dependent variable, the left column shows regression results without controlling for industrial growth and the right column shows regression results after industrial growth. T-statistics are reported in brackets under coefficients. Observations: 21 for each regression. *** p<0.01, ** p<0.05, *p<0.1

Dependent Variable	AR (0)		AR (1)		CAR (year-end)	
Constant	-0.0006	0.002	0.001	0.0029	0.0316	0.0302
	(-0.11)	(0.39)	(0.18)	(0.58)	(1.42)	(1.37)
Party	-0.0135**	-0.0139**	0.0031	0.0028	-0.0296*	-0.0294*
	(-1.97)	(-2.27)	(0.36)	(0.35)	(-1.78)	(-1.77)
Incum	0.0175	0.0196**	0.0019	0.0034	0.0062	0.0052
	(1.6)	(2.41)	(0.18)	(0.36)	(0.27)	(0.22)
ReEl	-0.0119	-0.015**	-0.0029	-0.0052	0.0030	0.0047
	(-1.13)	(-2.09)	(-0.69)	(-1.07)	(0.14)	(0.22)
Leading	0.0051	-0.0224	-0.0145	-0.0351	-0.0265	-0.0119
	(0.12)	(-0.79)	(-0.61)	(-0.93)	(-0.26)	(-0.12)
Margin	-0.0057	-0.014	0.0008	-0.0054	-0.0066	-0.0022
	(-0.54)	(-1.5)	(0.06)	(-0.42)	(-0.21)	(-0.06)
IndGrowth		0.6364**		0.4764		-0.3367
		(2.04)		(1.25)		(-0.45)
R-squared	-0.0034	0.1544	-0.3132	-0.2626	-0.1584	-0.2295

This model shows moderate explanation power for abnormal return on day 0, but not in longer time, as can be seen from very low adjusted R-squared for AR (1) and CAR (year-end). This is reasonable, because the value of explanatory variables is known as soon as the election result is revealed and an efficient market will incorporate this sets of new information into price quickly. After that, such information is hardly relevant to the market.

Abnormal return in short term is strongly correlated with macro-economic conditions, which is represented by industrial growth. A number of prior studies argue that, aggregate

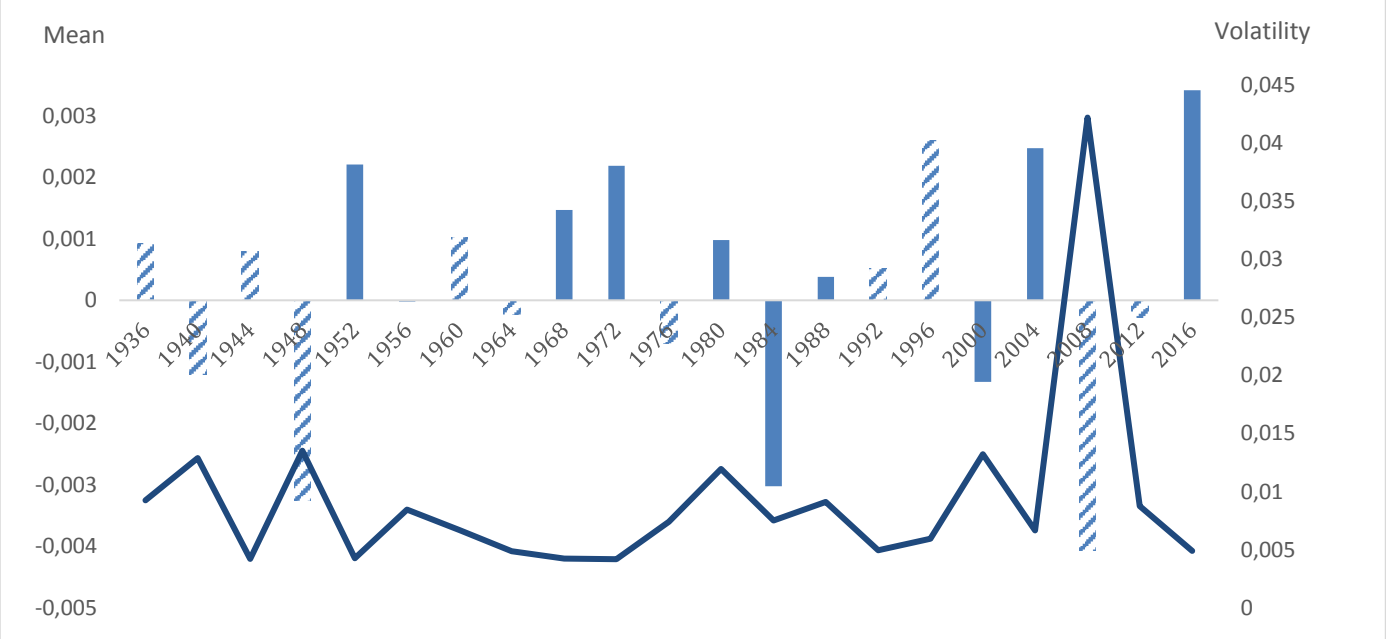
stock return is associated or affected by real economy activities, although there is dispute about whether the relation is positive or negative or how long the relationship lasts. Theoretically, stock returns are exposed to macro-economic conditions, which poses systematic risk to the financial market. As the index itself is a proxy for the whole market, it is naturally exposed to such risk as well. If we consider stock price as a discounted present value of future cash flows, then the macro-economic systematic factor can have influence in three perspectives. Firstly, risk-free rate and equity premium are subject to changes. Secondly, firms would alter their expectation of future states and adjust their cash holding and dividend payout policy accordingly. Finally, the real value of future cash flow may also change in respond to aggregate production levels. Chen et al (1986) test this theory and show that monthly industrial production growth, among other economic variables, is positively correlated to monthly stock returns during the period 1958 to 1984. Lee (1992) finds that industrial production growth can explain up to 10.61% of variance of 24-month forecast error variance of stock return. While my result confirms these studies in pointing out the impact of industrial growth on market abnormal return is significant and positive on day 0, this effect becomes insignificant in longer horizon. It is reasonable, because the monthly industrial growth used in the regression is release by the Federal Reserve at the beginning of every month, and in longer term (after 40 trading days, or almost two calendar months in my case), this information becomes outdated and irrelevant.

What's also worthy noticing is that, after incorporating economic conditions into the regression, on day 0, the coefficients of all five other independent variables increase in magnitude: Incum, ReEl and Margin variables become significant, and the degree of significance of Party variable increases. The R-squared of the model also increases. This seems to support Santa-Clara and Valkanov (2003) study that the presidential election reveals information that is not correlated with business cycle variables. Pastor and Veronesi (2013) argue that the risk premium caused by political uncertainty is higher in a weaker economy. To test their argument, I divide the sample into two sub-samples. If, during the election month, the production growth is higher than its historical average, then I define it as in expansion, otherwise it is in recession. I re-run the same regression (without macro-economic variable) for these two subsamples. But there is no obvious pattern showing that the coefficients of independent variables in the recession sub-sample are more significant than their counterparties in the expansion sub-sample. What's more, the R-squared of both regression decreases sharply to around -0.5, in both short term and long terms. Therefore this doesn't support Pastor and Veronesi (2013) rationale.

The coefficient of partisan dummy also confirms the existence of "presidential puzzle" in the US. The coefficient is significantly (at 5% level) negative on day 0, which shows that market's immediate reaction to Democratic presidents is negative. Leblang and Mukherjee (2005) test this partisanship effect from 1944 to 2000 in US stock market and show that the market tends to favor a right-wing party. Their explanation is that traders in the market prefer a right-wing party (Republican-like), who would have policies resulting in a lower-inflation environment, because this will push up trading volume, overall market return and volatility, compared to a left-wing party (Democratic-like). While it is difficult to test the motivation of traders, it is possible to test if the market mean return and volatility is truly higher after the victory of a Republican candidate. But based on historical one-month (22 trading days) mean and volatility of Dow Jones daily returns after every election, there is no clear-cut pattern showing that a Republican candidate would cause higher volatility or average market return (presented in figure 1). I also calculate the one year mean and volatility, and don't find any consistent pattern either. Therefore, my results do not to support Leblang and Mukherjee (2005)'s rational.

Figure 1 Historical one-month mean and volatility of Dow Jones post-election returns

This figure shows the average daily return and volatility for Dow Jones Industrial Average Index after every election. Columns stand for simple average daily return (left axis), and lines stand for daily volatility (right axis). Both are calculated from the period of 22 trading days after Election Day. Columns filled with strips indicate Democratic victory.



While it is unclear about whether Republican presidents can boost market confidence and change trader behavior, it is true that they are more likely to impose expansionary economic policies, compare to their Democratic counterparties. For instance, Wong and McAleer (2009) argue that, Republican presidents tend to be more active in policy manipulation to win re-elections than their Democratic counterparts, which could potentially explain why market's reaction to winner partisanship is still significant in the long run. To sum up, the presidential puzzle is still an anomaly in US stock market and could be interesting for future research.

The effect of incumbent and re-election is surprising. The re-election dummy is highly correlated with incumbent dummy, but the market seems to react differently to these two variables: the coefficient of re-election dummy is negative and significant on day 0, while the coefficient of incumbent is positive and significant. At a first glance, my empirical results don't clearly support Hypothesis 1.

The positive effect of re-elected presidents has been documented by a couple of studies. For instance, Snowberg et al (2007) find that positive correlation between President G. W. Bush's probability of re-election and major stock index returns, in his 2004 election campaign. And the negative effect of incumbent winners has also been found. For instance, Oehler et al (2013) argue that a change in presidency between different parties would cause strong market effect. An analogue to this phenomenon is the change of corporate executives. In a corporate context, when family successors are appointed as corporate executives, stock price decline in a short-term, but this doesn't hold for non-family insiders or outsiders (Smith and Amoako-Adu, 1999). But none of these studies finds inconsistent market reaction to re-elected candidates and incumbent candidates, which appears to be a puzzle. However, it is worth noticing that, in my sample, only 3 out of 12 incumbent candidates who participated in the next election eventually lost. This means potential collinearity in the regression specification and could affect the final results.

Another surprising finding is that, unexpected victories and close elections don't have significant effect on market returns, not supporting either Hypothesis 2 or Hypothesis 3. The market doesn't respond much to pre-election public opinion poll results, no matter if macro-economic variable is controlled or not. This result is in line with Oehler et al (2013) study: they also find no significant or persistent impact of a "close election", which they define as a consistent 5% lead of one candidate, on post-election returns. One possible explanation is

that, the subject of polls are mainly voters for popular votes, whereas the outcome of election is decided by electoral votes. As a result, these polls don't predict the actual election outcomes and the market doesn't price such information into price.

While the market should incorporate electoral voting results into prices, how this can take into effect is slightly different. Unlike all the other variables whose value are almost immediately known after Election Day, the exact winning margin is released into the market gradually. In most cases, one candidate would claim victory before he knows exactly how many electors votes he has won. As a result, winning margin is often known days or months after the election outcome is revealed, and, therefore, not reflected in returns on day 0 or day 1.

In sum, in this part I obtained mixed results. While they in generals support the semi-strong form of EMH, the inconsistent finding about incumbent variable and re-elected variable is worthy noticing.

5.3 The 2016 election and industry returns

Table 7 shows the descriptive statistics of individual abnormal returns of S&P 500 constituents. Although the index surged on Nov 8th, after controlling for Fama-French factors, both the average and median return are negative on Day 0, suggesting higher risk around Election Day. It is worth mentioning that there are some extreme outliers for AR (1) and CAR (year-end), as can be seen from the large kurtosis and standard deviation of these two series, which could bias my tests. Table 8 reports the average returns and corresponding t-statistics based on the industry level, following Oehler et al (2013) classification.

Table 7 Summary statistics of abnormal returns and cumulative abnormal returns

This table reports summary statistics of daily abnormal return on Nov 8th (day -1), Nov 9th (day 0), Nov 10th (day 1), and cumulative daily abnormal return from day -1 to year-end (30th December 2016), adjusted by Fama French Three Factor model. The sample is constituents of S&P 500 index.

	AR (-1)	AR(0)	AR (1)	CAR (year-end)
Mean	-0.0002	-0.0053	-0.0037	-0.0196
Minimum	-0.1297	-0.2264	-1.1345	-1.1277
Lower (25%) Quantile	-0.0055	-0.0242	-0.0158	-0.0772
Median	0.0003	-0.0065	0.0008	-0.0106
Upper (75%) Quantile	0.0061	0.011	0.0183	0.0495
Maximum	0.0677	0.1235	0.0994	0.2919
Standard deviation	0.0145	0.0368	0.0623	0.1113
Skewness	-1.7351	-0.5174	-13.7628	-2.4153
Kurtosis	20.3207	8.3765	245.7492	24.2779

The development of industrial average abnormal returns after Election Day seems not to be in line with expected impact of Trump's election campaign promises. Mining and Manufacturing are expected to benefit from Trump's presidency, but turn out to underperform in both short and long terms. Retail trade firms are expected to lose from Trump's presidency, but turn out to outperform in both short and long run. The development of returns in financials and services industries seem to behave as expected, but not significant. None of the industries reacted significantly to Trump's victory, in both short and long terms, except Mining. In short, the impact of Trump's presidency has not been transmitted on the industry level. I also repeat same test with Fama-French 17 industry classification and don't find consistent and significant patterns either (results reported in appendix 3).

A possible reason for the lack of significance in the abnormal returns, is "heterogeneity across companies within the same industry", as suggested by Wagner et al (2017). They use almost the same sample of stocks (but different estimation window and event window), and find that CAPM-adjusted abnormal returns are associated with firm features such as beta and growth expectations, as well as strong industry fixed effects. However, since this paper uses three-factor adjusted abnormal returns, the potential impact of firm features is already excluded, leaving relatively "clean" company idiosyncratic

components. Therefore, it is reasonable to infer that the 2016 election still mainly influences individual companies through common risk factors, such as market beta, size and growth.

Table 8 Industrial average abnormal returns and cumulative abnormal returns

This table reports the average daily abnormal return adjusted by Fama French 3-factor model Nov 8th (day -1), Nov 9th (day 0), Nov 10th (day 1), and average daily cumulative abnormal return from day -1 to year-end (30th December 2016) for eight industry groups. The sample is constituents of S&P 500 index. T-statistics are reported in brackets under corresponding value. *** p<0.01, ** p<0.05, *p<0.1

Industry	Number of firms	SIC code	AR (-1)	AR (0)	AR (1)	CAR (year-end)
Mining	20	1000 to 1499	-0.0025	-0.0168	-0.0434	-0.1601**
			(-0.11)	(-0.42)	(-1.27)	(-2.04)
Construction	6	1500 to 1999	-0.014	0.0032	-0.0001	-0.0887
			(-0.5296)	-0.0679	(-0.0099)	(-1.42)
Manufacturing	163	2000 to 3999	0.0007	-0.0035	-0.0106	-0.034
			-0.0533	(-0.0981)	(-0.111)	(-0.25)
Transportation	65	4000 to 4999	0.0046	-0.0224	-0.0098	0.0012
			-0.4416	(-0.8183)	(-0.3627)	-0.016
Wholesale trade	9	5000 to 5199	-0.007	0.0214	0.0175	0.0153
			(-0.3394)	-0.5694	-0.6479	-0.128
Retail trade	33	5200 to 5999	-0.0111	0.0131	0.0253	0.0242
			(-0.4502)	-0.6647	-1.1143	-0.2688
Financials	93	6000 to 6999	-0.0005	0.0042	0.0085	0.0183
			(-0.0449)	-0.1064	-0.37	-0.2789
Services	55	7000 to 8999	0.0022	-0.0189	-0.0046	-0.0111
			-0.1823	(-0.4847)	(-0.2266)	(-0.077)

5.4 The 2016 election, location and cross-sectional returns

Table 9 reports the regression results from (2). Revenue growth in the most recent financial year, is highly significant in explaining the abnormal return on Day 1 as well as cumulative

abnormal return until year-end (both at 0.01 level), but not significant for abnormal return on day 0 (although still positive).

Table 9 Regression results on historical preference of company headquarter location

This table presents OLS regressions of the abnormal return on Day 0 (first column), Day 1 (second column) and cumulative abnormal returns from Day -1 to year-end (third column), on company headquarter location political preference variables and company revenue growth. T-statistics are reported in brackets under respective coefficients. Observations: 448 for each regression. *** p<0.01, ** p<0.05, *p<0.1.

Dependent variable:	AR(0)	AR(1)	CAR(year-end)
Constant	-0.0022	0.0034	0.0042
	(-0.39)	(0.70)	(0.39)
Revenue Growth	0.0179	0.0543***	0.0910***
	(1.24)	(4.08)	(3.52)
Republican Preference%	-0.007	-0.0163*	-0.0396*
	(-0.60)	(-1.80)	(-1.73)
R-squared	0.0034	0.0194	0.0325

One possible reason is that, as Wagner et al (2017) suggests, the market believes that Trump's victory will lead to a more aggregate economy, which benefits companies that have higher revenue growth expectations. But their results differ from table 9 in that, their revenue growth variable is also positive and significant on Day 0. Therefore, another explanation sees more plausible: the election indeed forms some source of surprise to the market, so that in a short time, market price tends to be driven by such new information and deviate from its fundamental value. However, as time goes, this information will be incorporate into market prices, and assets will still be priced based on their fundamental value.

A surprising finding is that: a state's historical political preference for Republican is inversely correlated with the post-election abnormal returns of companies headquartered in its territory, both in short-term (Day 1) and long-term (year-end), not supporting Hypothesis 5. In other words, the companies that are located in red states (states that have historically favored Republican) underperform their counterparties in blue states (Democratic-supporting states) or in "swinging" states, after the 2016 election.

The best approach to investigate to reason for such result, is to look at the change in discount rate and projected future cash flow for these companies, immediately after the election. However, lack of data availably makes me unable to conduct such test. Then it is also interesting to know, whether these red-states-located companies will continue to underperform in longer horizon, after year 2016? The most straightforward approach is to compare the cumulative abnormal returns, estimated with estimate window of same length, in the next year. In this case, the estimation window will start from 2016/04/02 and end on 2017/09/23. However, because the Election Day falls exactly in this window, the associating high volatility around Election Day is likely to distort parameter estimation.

Another approach is to examine the realized cash flow of these companies in the next year. Following Liu et al (2016), I use two measures, change in Return on Assets (ROA, net income divided by total assets), and change in Sales/Total Assets, to proxy for company realized cash flow and operating performance. Apart from these variables, I also include a third measure, change in annual sales growth. I classify all companies into three quantile groups based on their location of historical political preference, and compare these three measures. Results are reported in table 10.

Table 10 Realized cash flow of three quantile groups after one year

This table presents the post-election realized cash flow of three quantile portfolios, where all companies are split into three groups by the political preference of the states they located in. Group 1 refers to companies located in states that voted for Republican for most times in the past 20 elections, and so on. Realized cash flow is measured by realized returns on assets (ROA, net income/total assets), realized sales/total assets, and realized revenue growth rate. Δ ROA, Δ Sales/Total Assets and Δ Sales growth are difference in these three measures between 2016 and 2017. Data source: Compustat – Capital IQ. *** p<0.01, ** p<0.05, *p<0.1.

				1 minus 3	
	1(highest)	2	3(lowest)	Difference	t-stat
Δ ROA	0.0233	-0.0060	-0.0052	0.0285***	4.1439
Δ Sales/Total Assets	0.0026	0.0042	0.0074	-0.0047	-0.1452
Δ Sales growth	0.1021	0.0114	0.0544	0.0091	1.6219

From 2016 to 2017, the performance of companies located in red states did not weaken. On the contrary, these companies experienced significantly increase in ROA, compared to their counterparties in blue states.

The findings of table 9 and table 10 indicate that, the historical political preference of companies headquarter location may not to be a good proxy to explain the cross-sectional reaction to the 2016 election outcome. As mentioned in the previous section, heterogeneity across companies within the same location could be a possible reason. The uneven distribution of companies also adds to this fact. For instance, out of 448 companies in my sample, 62 are located in California, followed by New York (51), Illinois (32) and Massachusetts (19), among others, all of which are famous blue states (historically preference for Republican < 0.4). This could distort the representativeness of the whole sample.

Moreover, the significant findings of Liu et al (2016) are based in Chinese market, where the financial market is still highly regulated and state-owned economy plays a very important role in the whole economy, so it is reasonable that the political connection effect and relevant impact is stronger there. On the contrary, the US market is closer to a complete competitive market, where the political impact could be weaker. Moreover, the sample used in this section is S&P 500 constituents, many of which have diversified operations across the world and could also be subjective to the impact of events from other countries. Therefore, it is not surprising to see that these companies are less affected to local political environment.

Still, why did red-state-located companies underperform in relatively short term, but saw increase in realized cash flow in longer time? Could there be market initial underreaction and then overreaction? Did the initial underperformance come from decrease in expected cash flow, or increase in discount rate? How did the discount rates of these companies change one year after the election? All these could be interesting for future research.

6. Conclusion

This paper contributes to current studies in confirming the stock market's reaction to presidential election outcomes, in the context of 21 historical elections, which has largest sample size, to my best knowledge. And the empirical results are mixed.

Firstly, the market does react to election outcomes, but only in very short term. And such initial reaction tends to be negative on average. Secondly, the market does react to the partisanship of the winner, confirming the existence of "partisanship puzzle" proposed by many prior studies. Thirdly, the market doesn't react regardless of whether the winner was favored before the election, or if he won a close election. The market does react if the winner changes party, or is not re-elected, but, surprisingly, reacts in a different way.

After 2016 election, even though Trump and Clinton had such distinct promises about future policies, there was no significant industry pattern and different industries didn't react as expected. Moreover, companies located in red states underperformed after Trump's victory, in relatively short term, but this underperformance didn't persist for long time.

A major caveat of this study is selection of the sample period, or more specifically, the tradeoff between sample size and relevance. Although the sample of 21 elections is already larger than many other election-related studies, it can't be considered as a large sample in empirical studies. However, increasing the sample size means including earlier elections into the sample, and these elections which took place more than 80 years ago are hardly relevant to more recent elections.

It is also worth mentioning that, in the 80 years of my sample period, there have been a large number of major events that could impact the social, political and economic landscape of US. A non-exhausting list of such events could include World War II, Vietnam War, the end of Cold War, assassination of President John Kennedy and Cuban missile crisis, among others. It is not reasonable to assume that behavior of investors and voters have stayed the same with the development of these events. This, again, is a dilemma for election-related studies. It could make more sense to divide the whole sample into subsamples, but how to define different samples is also subject to personal judgments.

Hopefully, my results could shed light for investors and researchers in terms of how stock market responds to presidential elections. In this thesis I use only daily data, and it could be interesting to research how quickly the market reacts to elections, given the availability of high-frequency data and intraday trading data in recent years. As has been pointed out by Wolfers and Zitzewitz (2016), during the process when the electoral voting result was gradually disclosed in the 2016 election, major financial market indices around the globe responded within minutes or even seconds.

Another interesting researching area is the mechanism of election effects and the reason for its persistence, be it market structural changes, or policy factors, among other reasons. Since elections also involved much individual psychology and behavior, which is mostly irrational and heterogeneous, behavioral finance may also be useful in explaining the inherent mechanism.

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8. Appendices

Appendix 1: Calculation of abnormal return, cumulative abnormal returns and their significance

Abnormal return of an asset is calculated as:

$$AR_{it} = R_{it} - E(R_{it}|X_t) \quad (3)$$

AR_{it}, R_{it} and $E(R_{it}|X_t)$ are the abnormal, actual (realized) and "normal" return for security *i* at time *t*, respectively, and $X_t$is the information set at time *t.*

Abnormal return is the disturbance term in equation (3). To determine the significance of abnormal return, econometric studies use a null hypothesis that the event has no influence on asset returns, or put differently, abnormal return equals zero. Therefore the abnormal return as error term would follow identical and independent normal distribution with a conditional mean of 0 and conditional variance of $\sigma^2(AR_{it})$:

$$AR_{it} \sim N\left(0, \sigma^2(AR_{it})\right)$$

Taking the market model as an example, in estimation window:

$$R_{it} = \widehat{\alpha_i} + \widehat{\beta_i}\, R_{mt} + \varepsilon_{it}$$

R_{it} and R_{mt} are the returns for asset i, and the whole market, respectively, at time t. $\widehat{\alpha_i}$ and $\widehat{\beta_i}$are the estimated parameters obtained from OLS regressions. $\varepsilon_{it}$is the error term, and:

$$E(\varepsilon_{it}) = 0 \qquad var(\varepsilon_{it}) = \sigma^2_{\varepsilon,i}$$

In event window:

$$\sigma^2(AR_{it}) = \sigma^2_{\varepsilon,i} + \frac{\sigma^2_{\varepsilon,i}}{L_1}\left[1 + \frac{(R_{mt} - \widehat{\mu_m})^2}{\widehat{\sigma_m}^2}\right] \quad (4)$$

Where R_{mt} is realized market return, $\widehat{\mu_m}$ is average market return in estimation window, $\widehat{\sigma_m}^2$is variance of market return in estimation window, and $L_1$is the length of estimation window.

In the above equation (4), the first term on right hand side is called the real disturbance term, and the second term is called estimation error. When the estimation

window is relatively long (e.g, L_1 is large), the estimation error can be reduced and ignored in practice.

It is possible that the price may take a longer time to incorporate information, and the selection of event day is sometimes arbitrary and imprecise. Therefore, it is necessary to look at the cumulative abnormal return (CAR) of an event. As the name suggests, CAR is an aggregation of abnormal returns and is adapted to multi-day event window.

$$CAR_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{i\tau}$$

$CAR_i(\tau_1, \tau_2)$ is the cumulative abnormal return from $\tau_1$to τ_2. $\tau_1 < \tau_2$ and both lie in event window.

The null hypothesis is that CAR also follows normal distribution with expected mean of zero:

$$CAR_i(\tau_1, \tau_2) \sim N\big(0, \sigma^2(\tau_1, \tau_2)\big)$$

For a large-enough estimation window:

$$\sigma^2\big(CAR_i(\tau_1, \tau_2)\big) = (\tau_2 - \tau_1 + 1)\, \sigma_{\varepsilon,i}^2$$

Having the realized value and standard deviation, we can judge if an abnormal return or a cumulative abnormal return is statistically different from zero.

$$\frac{AR_{it}}{\sigma(AR_{it})} \sim N(0,1)$$

Appendix 2: Percentage of times that every state's electors voted for Republican Candidates, 1936 – 2012.

This table reports historical electoral vote results, by states. The second column is calculated as total number of times that the state's electoral votes voted for Republican candidates, divided by the total number of times that the state participated in presidential elections, from 1936 to 2012. Source: https://www.archives.gov/federal-register/electoral-college/votes/votes_by_state.html. * Alaska participated in 14 elections. ** District of Columbia participated in 13 elections. *** Hawaii participated in 14 elections.

State	% No. Times voted for Republican candidates
Alabama	55%
Alaska*	93%
Arizona	75%
Arkansas	40%
California	45%
Colorado	70%
Connecticut	40%
Delaware	40%
D.C.**	0%
Florida	55%
Georgia	45%
Hawaii***	14%
Idaho	75%
Illinois	40%
Indiana	85%
Iowa	55%
Kansas	90%
Kentucky	55%
Louisiana	50%
Maine	60%
Maryland	30%
Massachusetts	20%
Michigan	45%
Minnesota	15%
Mississippi	55%

(continued)

State	% No. Times voted for Republican candidates
Missouri	50%
Montana	70%
Nebraska	90%
Nevada	50%
New Hampshire	55%
New Jersey	45%
New Mexico	45%
New York	30%
North Carolina	50%
North Dakota	90%
Ohio	55%
Oklahoma	75%
Oregon	45%
Pennsylvania	35%
Rhode Island	20%
South Carolina	60%
South Dakota	90%
Tennessee	60%
Texas	60%
Utah	75%
Vermont	65%
Virginia	65%
Washington	35%
West Virginia	35%
Wisconsin	40%
Wyoming	80%

Appendix 3: Fama-French 17 industry classification returns

This table reports the average daily abnormal return adjusted by Fama French 3-factor model for day -1, day 0 and day 1, and average daily cumulative abnormal return from day -1 to year-end (30th December 2016) for 17 groups based on Fama-French 17 Industry portfolios[8]. The sample is constituents of S&P 500 index. T-statistics are reported in brackets under corresponding value. *** p<0.01, ** p<0.05, *p<0.1

Industry	Number of firms	AR(-1)	AR(0)	AR(1)	CAR(year-end)
Food	18	0.0114	-0.025	-0.1014	-0.1025
		(0.99)	(-0.97)	(-0.38)	(-0.37)
Mines	4	0.0185	0.0373	-0.0137	-0.1386
		(0.54)	(0.70)	(-0.24)	(-1.33)
Oil	22	-0.0079	-0.0199	-0.0377	-0.1312
		(-0.57)	(-0.72)	(-1.29)	(-1.39)
Clths	8	-0.0058	-0.005	0.0151	-0.1022
		(-1.15)	(-0.42)	(1.14)	(-0.99)
Durbl	5	0.0079	-0.0036	0.0029	-0.0551
		(1.43)	(-0.38)	(0.13)	(-0.65)
Chems	9	-0.0015	-0.0128	-0.0052	-0.0186
		(-0.05)	(-0.47)	(-0.24)	(-0.10)
Cnsum	22	-0.0036	0.0246	0.0043	0.0175
		(-0.24)	(0.43)	(0.12)	(0.17)
Cnstr	14	-0.0064	0.0012	0.0099	-0.0398
		(-0.35)	(0.04)	(0.53)	(-0.55)
Steel	1	-0.0026	0.083	0.0032	-0.0445
		-	-	-	-
Fabpr	2	0.0059*	-0.0053	-0.0097	-0.0584
		(1.68)	(-0.17)	(-0.24)	(-0.82)
Machn	44	0.0005	-0.0097	-0.0077	-0.0317
		(0.06)	(-0.37)	(-0.27)	(-0.32)
Cars	8	-0.0038	-0.0077	0.0151	0.0093
		(-0.92)	(-0.24)	(0.93)	(0.10)

(continued)

[8] Source: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_17_ind_port.html .

Industry	Number of firms	AR(-1)	AR(0)	AR(1)	CAR(year-end)
Trans	22	0.0035	-0.0128	0.012	0.0207
		(0.28)	(-0.31)	(0.57)	(0.21)
Utils	31	0.0054	-0.0309**	-0.0224	-0.0241
		(0.63)	(-2.11)	(0.93)	(-0.45)
Retail	25	-0.011	0.0118	0.0251	0.0067
		(-0.42)	(0.56)	(0.98)	(-0.07)
Finan	93	-0.0005	0.0042	0.0085	0.0183
		(-0.04)	(0.11)	(0.37)	(0.28)
Other	120	0.0006	-0.0087	-0.0003	-0.0044
		(0.05)	(-0.24)	(-0.01)	(-0.04)