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U.S. CONGRESSIONAL ELECTION UNCERTAINTY AND STOCK MARKET VOLATILITY

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ABSTRACT

This paper uses a Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) model to estimate the effect of uncertainty surrounding U.S. congressional elections on the level and volatility of U.S. stock market returns from 2000-2008. Uncertainty in these elections is measured using asset prices from the Iowa Electronic Market (IEM), online, real money, and online futures market where payoffs are based on real-world events including U.S. elections. This research model uses IEM futures contracts based on the control of the U.S. Senate and/or House of Representatives by either of the two major political parties in the United States. The election futures market prices are used to measure the "closeness" of upcoming election outcomes. The model results indicate that the volatility of U.S. stock market returns in the S&P 500 index is increased by uncertainty regarding which political party will control the U.S. Congress after the results of upcoming elections.

Keywords: Stock Market, Election, GARCH, Iowa Electronic Market, Volatility, Efficient Market Hypothesis

1.0 INTRODUCTION

The basic contention of the Efficient Markets Hypothesis for stocks is that all relevant information is immediately reflected in a stock's price. Any uncertainty regarding information would result in greater volatility in stock price changes. A source of uncertainty

about economic conditions could be the outcome of a national political election, such as for political party control of the houses of the U.S. Congress. If different political parties are associated with very different fiscal and regulatory policies, uncertainty over election outcomes could create uncertainty about the potential future course of national economic policy. In this paper, asset prices from a political futures market for party control of the houses of U.S. Congress are used to create a measure of uncertainty regarding U.S. Congressional election outcomes. This measure of uncertainty is then used to measure any impacts on volatility in the stock market.

A common statistical model for stock market returns and volatility is the Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) model. When a measure of national election outcome uncertainty is included in a GARCH model of daily returns for the S&P 500 Index, the impacts on market volatility can be estimated. In this research, uncertainty about the party control of the houses of the U.S. Congress is based on asset prices from the Iowa Electronic Market (IEM). The IEM Congressional Control market is a real money online futures market where payoffs are based on the outcomes of elections for members of Congress. The IEM is an educational and research project operated by the Tippie College of Business at the University of Iowa. An advantage of using asset prices in a political futures market like the IEM is that participants stand to gain or lose real money based on the election outcome. Therefore, these asset prices may better reflect anticipated election outcomes than polls, which might reflect more about what poll respondents want to occur rather than what they believe will actually happen in the election (Berg, et.al., 2008).

This statistical model will explore the relationship between national election uncertainty and financial market performance. It builds on the research from Bowes (2018) in the use of a unique data source; political futures market asset prices, to create a measure of election uncertainty. The results will further advance the knowledge of how uncertainty influences the incorporation of expectations into market activity.

2.0 LITERATURE REVIEW

Previous analysis of national elections on stock market outcomes has dealt primarily with Presidential elections, for example, Santa-Clara and Volkanov (2003), Mattozzi (2008), Li and Born (2006), and Bowes (2018). While there has been little research on the impacts of U.S. Congressional an election outcome on stock market performance, there have been papers relating to Congressional activities in general. Ferguson and Witte (2006) wrote about the "Congress Effect" in the financial markets, which meant simply whether Congress is in or out of session. They found that stock returns are lower, and volatility is higher when Congress is in session. Snowberg, et al (2006) did research on stock returns as they relate to political party control of Congress, but after the election outcome was known rather than during the election period. These authors found that equity values rose with Republican majorities in Congress. Finally, Ederer, et al (2008) also looked at post-election Congressional control and found that markets performed better with a divided government, or not a single party controlling House, Senate, and Presidency.

None of these papers looked at stock market performance during a Congressional election prior to its outcome. As for why there is a lack of research about Congressional election

uncertainty and stock performance as compared to Presidential elections, one can only speculate. Perhaps it has to do with polls and elections for individual Congressional candidates being at the state, rather than the national level. These elections occur simultaneously, but they involve multiple candidates in different sets of states during different election years. Polls reflect individual local elections, not national outcomes, and it may be difficult to combine all polls for all local elections into a single measure of outcome uncertainty at the national level.

Another interesting aspect of understanding market performance related to Congressional Elections is the concept introduced by Higgs (1997) of "regime uncertainty". It suggests that individual candidates and more importantly individual policies are not necessarily as important as the fact that the whole regime or political party and landscape may change. Business, entrepreneurial, and consumer risks are ever present, but political risk adds a new dimension. A change in stock prices does not tell us anything about changes in expectations for the future, but increases in the variance of these prices would certainly be magnified if a regime change were likely. An important part of resolving some of that uncertainty would be discovering which party will be most influential in making policy for some time. New research on regime uncertainty, entrepreneurship, recessions, and other phenomena such as von Laer, et al., (2016) and Wisniewski, (2012) could be extended by additional measures of resolving that uncertainty.

So, what may be more important in terms of national economic policy is not the individual candidates involved in each state and local election but the political party that ultimately controls the houses of Congress once the elections have concluded. Polls relating to the eventual control of Congress do exist, such as FiveThirtyEight (https://projects.fivethirtyeight.com/congress-generic-ballot-polls/), Monmouth University, and Quinnipiac University. However, these polls are more generic, politically party preference polls that are conducted well before the election candidates are even known (Greenwood, 2021; Lonas, 2022).

A different measure of election outcome uncertainty regarding political party control does exist at the national level in the form of asset prices in political futures markets. The Iowa Electronic Markets, operating in the Tippe College of Business at the University of Iowa, conducts Congressional Control Markets during national election periods in which participants can trade shares representing the eventual political party control of both houses of the U.S. Congress. This research uses prices from the IEM Congressional Control Markets from 2000-2008 as a measure of uncertainty about party control of U.S. Congress during an election period.

Methodology in this paper follows Bowes (2018), who used a GARCH model to estimate the effects of U.S. presidential election uncertainty on volatility in daily stock market returns. Like this research, the measure of election uncertainty for Bowes (2018) was based on the difference in asset prices in the IEM political futures markets, but for U.S. Presidential election candidates. The evidence supported the assertion that when presidential election outcomes are less certain, daily stock returns measured by the S&P 500 Index become more volatile.

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3.0 GENERAL MODEL AND HYPOTHESIS

The Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) model is commonly used to analyze stock market performance (Beaulieu, et al, 2006; Zivot, 2008; Ahmed and Suliman, 2011). The basic GARCH model estimates two equations: a conditional mean equation and a conditional variance equation, as shown:

Conditional Mean: $y_t = \beta_i X_i + \varepsilon_t$ (1)

Where Xi will typically include lagged values of the dependent variable but can also include other explanatory variables, and

Conditional Variance: $\sigma^2_t = \theta_0 + \alpha_1\varepsilon^2_{t-1} + \ldots + \alpha_p\varepsilon^2_{t-p} + \gamma_1\sigma^2_{t-1} + \ldots + \gamma_q\sigma^2_{t-q}$ (2)

Where the □ terms are referred to as the ARCH terms and the □ terms are called GARCH terms. Other variables may enter the conditional variance estimate as a part of the constant term, □0. Because the variance of stock returns is the measure of volatility (Ahmed and Suliman, 2011), it is the estimated coefficients on those variables included in the constant term that are the focus of this study.

The specific model estimated in this study, following the example set by Li and Born (2006) and Bowes (2018), is:

Conditional Mean: $r_t = \beta_0 + \beta_1 r_{t-1} + \beta_2 U_t + \beta_3 E_t + \beta_4 Dh_t + \beta_5 Rh_t + \beta_6 Rb_t + \varepsilon_t$ (3)

where rt is the daily return from the S&P 500 stock index, Ut is the measure of U.S. Congressional Control uncertainty (described below), and Et is a dummy variable indicating whether day t is during a U.S. Presidential election year (Et = 1 if a Presidential election year, 0 if a mid-term election). The variables Dht, Rht, and Rbt are all dummy variables that indicate whether the highest-priced contract on day t is the Democrat majority in the House of Representatives (House) only, the Republican majority in the House only, or the Republican majority in both the House and the Senate (Variables = 1 if the highest contract, 0 otherwise, with Democrat majority in both House and Senate as the control variable).

This study uses a GARCH(1,1) estimation, meaning there is a single lagged variable in the ARCH and GARCH terms of the conditional variance equation, following the examples of Li and Born (2006), Zivot (2008), and Bowes (2018). The election uncertainty variables will be included in the conditional variance equation and will enter as exponential terms along with the constant.

Conditional Variance: $\sigma^2_t = \exp(\theta_0 + \theta_1 U_t + \theta_2 E_t + \theta_3 Dh_t + \theta_4 Rh_t + \theta_5 Rb_t) + \alpha\varepsilon^2_{t-1} + \gamma\sigma^2_{t-1}$ (4)

The primary tested hypothesis is:

$H_0: \theta_1 = 0$

Rejecting this null hypothesis would support that argument that uncertainty about U.S. Congressional elections does influence the volatility of stock market returns.

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4.0 DATA

The two sources of data used in this model are daily values of the S&P 500 stock index and daily price data from the IEM U.S. Congressional Control markets. The S&P 500 was chosen as a broad measure of stock performance that is closely tied to the performance of the U.S. economy and therefore likely to be affected by election outcome uncertainty. The IEM is chosen as the source of political futures market asset prices because it is well established and has operated consistently over several U.S. Congressional elections.

Data cover daily values on open stock trading days from January 3, 2000, through election day (November 7th) 2008. The IEM has periodically changed the way that futures contracts are described in its U.S. Congressional Control futures markets. This range of years is chosen because it represents the longest contiguous set of IEM Congressional Control Market years in which the futures contracts were identically defined. Stock market return data is based on closing daily values of the S&P 500 stock index. Following many studies, including Ahmed and Suliman (2011), the continuously compounded daily return is computed as:

$$r_t = \ln(SP_t/SP_{t-1}) \qquad (5)$$

Where SP_t is the closing daily value of the S&P 500 stock index.

Measures of election uncertainty are based on four futures contracts traded in the IEM U.S. Congressional Control market. Each contract is called a "Winner-Take-All" contract. In a Winner-Take-All market, contracts that match the outcome of the election are worth $1.00, while all other contracts are worth $0. There is one contract for each possible Congressional Control outcome: Democrat control of House/Republican control of Senate, Republican Control of House/Democrat control of Senate, Democrat control of both House and Senate, and Republican control of both House and Senate. The price of each contract ranges from $0-1.00. A market participant will purchase a contract if the expected value of the contract ($1.00 x the percent chance that the outcome occurs) is at or above the asking price and sell a contract if the expected value is at or below the offered price. Therefore, closing contract prices represent the potential for each outcome as perceived by participants in the IEM market.

The measure of election uncertainty, U_t, will be based on the difference between the closing daily prices for the two highest priced contracts. These two contracts would represent what the market perceives to be the most likely outcomes. If the prices for these contracts are very close together, then there is more uncertainty about the election outcome, as the chance of either of these outcomes is perceived by market participants to be very close. On the other hand, if the highest priced contract is well above the second highest priced contract, the market participants view the election outcome as more certain.

The variable used in the estimation is a dummy variable that takes on a value of 1 when the difference in prices between the two highest priced contracts is large enough to indicate that the election outcome is relatively certain. This measure follows the use of a dummy variable by Li and Born (2006) based on the closeness Presidential candidates in polls, and Bowes (2018), who used a dummy based on the closeness of candidate prices in the U.S. presidential Election futures markets operated by the IEM. In this study, the variable $U_t = 1$ if the

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difference between the two highest priced contracts >= 0.23 (0 otherwise). Larger differences in the contract prices would indicate less uncertainty about the election outcome. The value of 0.23 represents the mean difference between the two highest contract prices for all election years on days that the IEM election futures markets were open and active.

Following Li and Born (2006) and Bowes (2018), the main focus of the study is election uncertainty during an "election period". At this time, Congressional candidates are known, and those races that have the most impact on party control of the houses of Congress are likely to be given national attention. In this study, the "election period" is identified as the days that the IEM U.S. Congressional Control Market is open for trading and the relevant IEM contract prices can be utilized. Outside of this "election period", the election uncertainty variable is assigned a value of 1, as it is assumed that there is perfect certainty regarding which party controls each house of Congress until the next set of elections. Summary statistics for all variables are presented in table 1.

TABLE 1. Summary Statistics

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*	*Description*
r	-0.000122	0.0129	-0.0903	0.116	S&P 500 daily return
U	0.805	0.363	0.00	1.00	Highest Contracts Price Difference dummy
E	0.166	0.372	0.00	1.00	Presidential Election Year dummy
Dh	0.0943	0.292	0.00	1.00	Democrat House Control Only dummy
Rh	0.0220	0.147	0.00	1.00	Republican House Control Only dummy
Rb	0.102	0.303	0.00	1.00	Republican Control Both Houses dummy
Observations = 2227					

Because the IEM contract price dummy has been assigned a value of 1 during non-election periods, a separate set of summary statistics for these variables only on days during election periods, defined as days on which the IEM U.S. Congressional Control Market is open, is presented in Table 2.

TABLE 2. Summary Statistics During Election Periods

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*	*Description*
r	-0.000252	0.0179	-0.0903	0.116	S&P 500 daily return
U	0.231	0.283	0.00	0.998	Highest Contracts Price Difference dummy

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E	0.656	0.475	0.00	1.00	Presidential Election Year dummy
Dh	0.371	0.483	0.00	1.00	Democrat House Control Only dummy
Rh	0.0851	0.279	0.00	1.00	Republican House Control Only dummy
Rb	0.401	0.4905	0.00	1.00	Republican Control Both Houses dummy
Observations = 564					

5.0 EMPIRICAL RESULTS AND CONCLUSIONS

The estimation results of the GARCH model specified by equations (3) and (4) are presented in Table 3. As with other models of stock returns, including Bowes (2018), Li and Born (2006) and Ferenstein and Gasowski (2004), this model assumes a student's t-distribution for the error term.

Table 3. GARCH Model Results		
Observations = 2227		Wald Chi^2 = 2.07
Log Likelihood = 6918.71		Prob > Chi^2 = 0.84
Dependent Variable = r_t		
Conditional Mean		
Variable	Coefficient	Z
Constant	0.0006069	0.58
U	-0.00041	-0.4
E	-0.00049	-0.54
Dh	-0.00059	-0.38
Rh	-0.0027	-0.99
Rb	0.0003422	0.33
Conditional Variance		
Variable		
Constant	-8.17	-16.73**
U	-2.92	-5.1**

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E	4.104128	9.71**
Dh	-5.52	-7.66**
Rh	-0.2167256	-0.32
Rb	-8.63383	-2.54**
e^2_{t-1} (ARCH)	0.1346272	3.88**
s^2_{t-1} (GARCH)	0.6767179	15.72**
** Significant at the 5% confidence level		

Results for the estimate using IEM price dummies show a negative and statistically significant estimated coefficient in the conditional variance equation. Thus, we reject the null hypothesis and support the argument that greater uncertainty surrounding party control of the houses of the U.S. Congress prior to elections creates greater volatility in stock returns. It is important to remember that this variable takes on a value of 1 when the price difference between contracts is large enough to indicate more certainty in the election outcome. Therefore, the negative coefficient indicates greater variance in returns when election outcomes are less certain.

The estimated coefficient on Et, indicating that the Congressional election is taking place during a U.S. Presidential election year, is positive in the conditional variance equation estimate. This result captures the additional market volatility when uncertain party control of Congress is paired with the uncertainty of a U.S. Presidential election.

The dummy variables for highest contract price are all negative in the conditional variance and are statistically significant for Democrat House control only and for Republican control of both houses of Congress. These results suggest that the stock market is, on average, less volatile than when people think that the most likely outcome is Democrat control of both houses. This result is consistent with the previously mentioned findings of Snowberg, et al (2006) that the markets perform better with Republican majorities in Congress and Ederer (2008), who found better market performance with divided government.

This research supports the assertion that uncertainty in a national election can impact financial markets.

Even when elections are taking place at a state or local level, such as for members of the U.S. House of Representatives and Senate, financial market volatility increases when the national policy impacts of the election outcomes are less certain. In this case, uncertainty about political party control of the houses of U.S. Congress results in uncertainty about the future course of national economic policy. These results are consistent with previous research, including Li and Born (2006) and Bowes (2018), and provides additional evidence for a strong connection between political outcomes and uncertainty about the economy.

The result that uncertainty surrounding the outcome of elections with national policy implications, such as for party control of Congress, can increase market volatility is

compatible with an efficient market hypothesis. Researchers critical of the efficient market hypothesis have suggested that excessive volatility is evidence against market efficiency (Cochrane, 1991), this research argues for and supports the idea that market efficiency is consistent with greater volatility resulting when relevant policy-related information becomes less certain (Kostohryz, 2011).

Finally, as with Bowes (2018) this research further illustrates the usefulness of data from political futures markets like the IEM. Criticism of these kinds of markets based on limited participation and bias (Forsythe, et al, 1992; Berg and Reitz, 2006) is contradicted since, as with Bowes (2018), the results presented here are consistent with previous research. It is worth reasserting Bowes (2018) that price data from political futures markets like the IEM is a valuable source of useful information.

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