Fear and Loathing on Wall Street: Pricing Election Risk in an Era of Partisan Polarization

SEBASTIAN SAIEGH *

Abstract

I analyze how electoral risks associated with partisan polarization are priced in the option market. Hedging against an unfavorable election outcome should be more valuable when the leading candidates are expected to adopt very different policies. The empirical evidence reveals that, as elections in the United States became more polarized, investors grew more anxious about the realization of extreme negative events (an undesirable outcome) rather than mere exposure to electoral uncertainty (an unforeseen outcome). The greater sensitivity of asset prices to electoral outcomes lead to a significant increase in how much investors had to pay to insure themselves against electoral risk. The rise in premiums allowed option traders to profit from selling protection against election risk. Intensification of partisan polarization during the Trump era exacerbated electoral risk mispricing. These findings suggest that partisan polarization, can not only affect democratic norms, but can also undermine the ability of financial markets to efficiently price election risk.

Keywords: Election Risk, Polarization, Option Market
JEL Codes: D72, G13, G18, N22

*Professor of Political Science, Department of Political Science, UC San Diego; Social Sciences Building 370,9500 Gilman Drive,La Jolla, CA 92093; (858) 534-7237; ssaiegh@ucsd.edu

Introduction

In 1968, George Wallace called Republican and Democrats "Tweedle-dum and Tweedle-dee" and declared that there wasn't "a dime's worth of difference" between that year's presidential candidates. This point of view has become a relic from a distant past. The rise in elite polarization in the United States since the 1990s has been well-documented (McCarty 2019). In the electorate at large, public opinion surveys suggest that the public was still mixed in their allegiances until 1994; but, a significant divergence, started to occur from 2011 onward. Republicans and Democrats are currently more divided along ideological lines – and partisan antipathy is deeper and more extensive – than at any point in the last two decades.[1]

An extensive literature has examined the impact of rising partisan polarization in the United States on the quality governance and policy outcomes, including uncompromising obstructionism, political gridlock, and heightened policy uncertainty (cf. Baker et al. 2014; Abrajano and Hajnal 2015; Lee 2015; Canen, Kendall, and Trebbi 2020). Growing evidence of the consequences of polarization for economic outcomes also exists (Canes-Wrone and Park 2012; Baker, Bloom and Davis 2016; Azzimonti 2018). In this study, I investigate how the electoral risks associated with partisan polarization are priced in the option market. Investor sentiment can be effectively gauged using option prices for two reasons. First, options are intrinsically forward-looking contracts. As such, they account for the market's forecast of likely movements in asset prices before and after elections. In addition, as Kelly, Pástor, and Veronesi (2016) note, investors can use options to hedge against unfavorable election outcomes. To the extent that investors' costs from betting on the wrong candidate increase with partisan polarization, market participants should be willing to pay higher premiums to hedge against electoral risk when the leading candidates are expected to adopt very different policies.

[1] https://www.pewresearch.org/politics/2017/10/05/the-partisan-divide-on-political-values-grows-even-wider/

I use innovations in option-implied volatilities to estimate election price risk in the United States during the period between 1986 and 2020. The empirical evidence indicates that the sensitivity of asset prices to electoral risk is quite large, statistically significant, and varies substantially over time. The average option-implied risk on the day immediately after the identity of the winning candidate/party is revealed ranges from 2.37% between 1986 and 2010 to approximately 4.25% during the 2012-2020 period, respectively. These findings imply that hedging against election risk became more expensive over time.

Did the electoral outcomes of the past ten years warrant the higher option prices? A comparison between the option-implied electoral risk estimates and the realized post-electoral volatility of S&P 500 returns indicate that exposure to election risk did not earn a premium between 1986 and 2010. The average post-electoral volatility premium, however, rose to roughly 204 basis points after 2010, suggesting that option traders had an opportunity to profit from investors' fears of large post-electoral price movements.

To examine this issue in more depth, I analyze S&P 500 variance swap returns for the period between 2011 and 2020. For a given strike price set at trade inception, the buyer (seller) of a variance swap will profit if the subsequent realized volatility is above (below) the level set by the strike. Therefore, the returns from long variance positions – which are typically negative–, should increase in absolute terms (i.e. they should become more negative) whenever variance swap strike levels are excessively high. The analysis reveals that the average loss associated with a hypothetical long position in a 9-day S&P 500 variance swap contract subject to post-election jump risk was approximately 6.4 volatility points (with a minimum of 0.25 in 2012 and a maximum of 13.3 in 2020), compared to an average estimated loss of 2 volatility points for long variance positions without such exposure. Selling *electoral* insurance has thus been extremely lucrative in the past 10 years, raking in more than six times the variance swap contract's vega notional.

To further probe into the expensiveness of options around elections, I examine the profitability of strangles. I consider two hypothetical option trading strategies involving a short strangle and focus on buy-and-hold strategies that cover the period until electoral uncertainty is partially or fully resolved. To ensure that the findings are not confounded by other news, announcements, or shocks to the economy, I restrict my attention to a small window around each electoral contest. Specifically, I consider positions that are opened two days prior to an election and closed either on: (1) election day; or (2) the trading day immediately after the election outcome is revealed. If investors are not only concerned about electoral uncertainty, but also about the realization of extreme negative events, then the returns to the second strategy should be higher than those associated with the first one. The analysis reveals that between 2006 and 2014, both strategies delivered similar returns. However, for the three elections that took place between 2016 and 2020, a significant difference in favor of the second strategy (1.29%, with a t-statistic of 2.84) exists. This result indicates that, as partisan polarization increased, option traders could profit from investors' fears of large post-electoral price changes, rather than mere exposure to electoral uncertainty.

Finally, I examine whether S&P option prices were consistent with electoral forecasts during the 2016 and 2020 presidential elections. Following Gemmill (1992), who examines the efficiency of the London option market during the 1987 election, I consider a binomial pricing model to analyze the valuation of electoral risk. The findings indicate that, in the month leading to the 2016 election, option prices overestimated the probability of a Trump victory by an average of approximately 11 percentage points (28.7% compared to the 17.8% winning chance predicted by the polls). In the 2020 election, the evidence suggests that, during the last month of the campaign, option prices indicated a 48% chance of Trump refusing to vacate the Oval Office should he lose the election, compared to 44% according to prediction markets. In this case, the mispricing of the S&P options, fueled by investors' fears of a constitutional crisis, was large enough to make a riskless hedge portfolio unprofitable.

This paper contributes to an emerging literature that cuts across the fields of finance and political economy. To finance, my findings offer insights into electoral price risk. The results indicate that while market participants loath electoral uncertainty, it is downward post-electoral jumps in stock prices what they fear the most. To political economy, this study advances our knowledge of how capital markets respond to political risk. Regardless of the predictability of electoral outcomes, hedging against undesirable ones should be more valuable when the leading candidates are expected to adopt very different policies. To both literatures, this study provides direct evidence connecting partisan polarization to electoral risk premiums. I find that the greater sensitivity of asset prices to electoral outcomes has lead to a significant increase in how much investors have to pay to insure themselves against electoral risk.

1 Elections and Asset Prices

The impact of national elections on the stock market volatility has been investigated in numerous studies, including Pantzalis, Stangeland, and Turtle (2000), Leblang and Mukherjee (2004), Bialkowski et al. (2008), Boutchkova et al. (2012). Most of this research concentrates on realized or post-electoral volatility. I depart from this work by focusing on investors' *ex ante* assessments of election risk.

Carnahan and Saiegh (2021) model traders' decisions as a sequential sampling problem, where the optimal stopping strategy is driven by information-gathering costs and an investment's suitability to the future state of the world. Their findings indicate that risk-neutral traders' optimal investment strategies depend on: (1) their ability to make an accurate electoral forecast; and (2) the prospective losses associated with placing a bet on the wrong candidate. Financial markets are forward-looking; meaning that asset prices reflect current expectations of future value. Therefore, if electoral outcomes are fully predictable, the iden-

tity of the winning candidate should already be priced ahead of the electoral contest. In contrast, when the leading candidate has a considerable electoral advantage over his/her competitors, the outcome of the election will hardly be a surprise to investors. With regard to the degree to which investors' decisions may be affected by the electoral results, if the leading candidates are expected to adopt similar policies, then the reversal costs would be inconsequential. In contrast, sufficiently high polarization would increase the extent to which irreversible investments will be affected by the electoral outcomes.

Some traders may postpone their investment decisions until the electoral uncertainty is resolved. Others, however, may use options or other derivatives to hedge their investments. The issue then boils down to how these instruments should be priced when electoral outcomes are predictable or unpredictable ex-ante, as well as the investment's electoral sensitivity. An important implication of distinguishing between an unforeseen electoral outcome and the potential losses associated with placing a bet on the wrong candidate is that one should examine risk premiums for two types of shocks: to uncertainty, and to realized volatility (jumps). The former represents an increase in the dispersion of investors' conditional distribution for future outcomes; while the second shock is to the realization of large outcomes, i.e., squared returns (Dew-Becker, Giglio and Kelly 2021).[2]

Regarding the first risk factor, electoral uncertainty, investors typically count on public opinion polls to gauge each candidate's chance of winning. Their reliability came into question following Donald Trump's victory over Hillary Clinton in the 2016 U.S. presidential election. Nonetheless, as Gelman and Azari (2017) note, most national polls predicted the two-party vote with a reasonable level of accuracy. In their view, it was the closeness of the election – prompted by partisan polarization – what hindered analysts' ability to accurately predict the identity of the winning candidate.

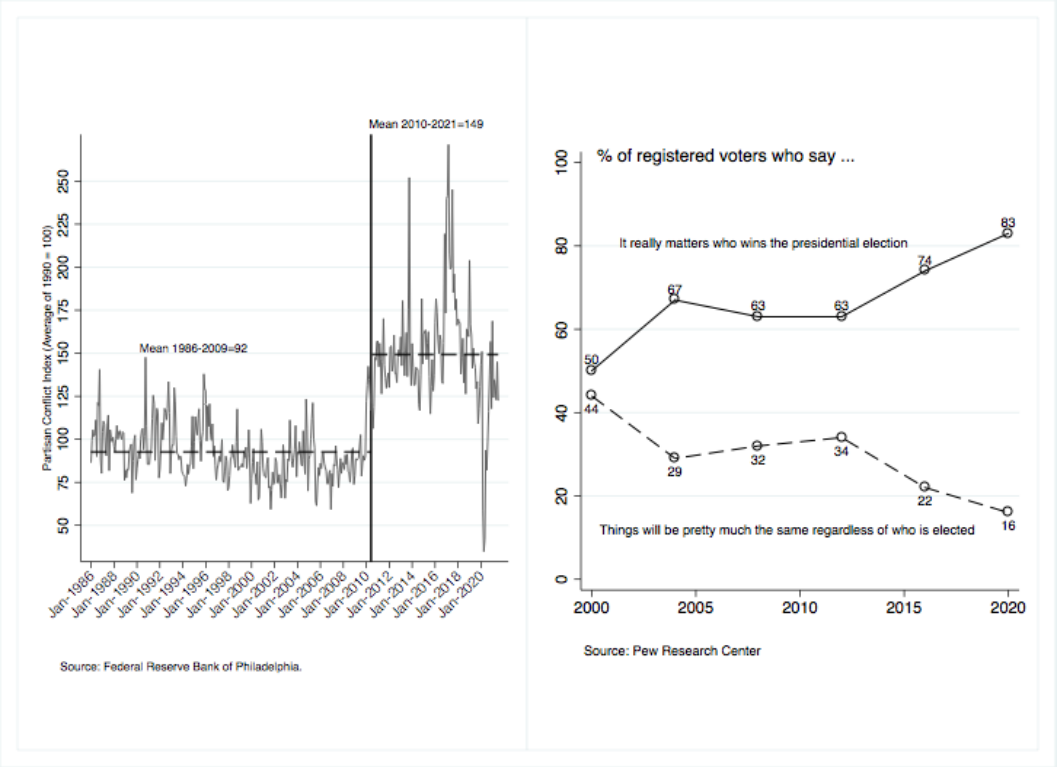
[2]Formally, given some shock ε, with $var_t(\varepsilon_{t+1}) = \sigma_t^2$, uncertainty is σ_t^2, while volatility is ε_t^2 (Dew-Becker, Giglio and Kelly 2021).

Partisan polarization has a much more direct impact on the second risk factor, large price changes. Consider the canonical *Downsian* model of political competition. Because the winner is randomly decided, electoral outcomes are extremely unpredictable. Nonetheless, both candidates should *converge* to the position of the median voter. Even if an investor's forecast about the identity of the winning candidate is incorrect, the electoral results would have no bearing on her investment's reversal costs. So, the election would be unpredictable, but inconsequential for asset prices. Consider now what would happen if the candidates do not converge to same policy position. Because the loss caused by making a wrong decision can be potentially high, market participants may be willing to pay a premium to insure themselves against election risk.

The left panel in Figure 1 shows the *Federal Reserve Bank of Philadelphia*'s Partisan Conflict Index (PCI) between 1986 and 2021. The measure tracks the degree of partisan conflict among U.S. politicians at the federal level by measuring the frequency of newspaper articles reporting disagreement in a given month. Higher index values indicate greater conflict among political parties, Congress, and the President.[3] A Perron-Vogelsang test indicates that the series is stationary with a structural break on June of 2010 (t = 3.812 compared with a 5% critical value of 3.560). The solid vertical line in the graph indicates the break date. The estimated increase in the average value of the index after the break amounts to 56.6 (with a standard error of 2.38), a statistically as well as substantively significant change.

[3]https://www.philadelphiafed.org/surveys-and-data/real-time-data-research/partisan-conflict-index. To calculate each month's index value, keyword searches are conducted on major U.S. newspapers, including The Washington Post, The New York Times, Los Angeles Times, Chicago Tribune, and The Wall Street Journal. See Azzimonti (2018) for more details.

Figure 1: Partisan Polarization in the United States



A corollary of partisan conflict is that candidates will hardly *converge* to the position of the median voter, making polarized elections both unpredictable as well as consequential for asset prices. The right panel in Figure 1 shows the percentage of registered voters in the United States who stated that "when it comes to making progress on important issues facing the country, it really matters who wins the presidential election." The data come from survey responses collected by the Pew Research Center between 2000 and 2020.[4] The evidence shows that voters see more importance in the outcome of the election today than they did in the past. In 2000, about one-half (50%) said the outcome of the election really mattered, while a significantly larger share of respondents said it really mattered who won in 2016 (74%) and 2020 (83%). Unless the identity of the winning candidate can be accurately predicted, the greater the likelihood that the candidates will adopt significantly different

[4]https://www.pewresearch.org/fact-tank/2020/10/07/voters-anxiously-approach-an-unusual-election-and-its-potentially-uncertain-aftermath/

policies, the higher the price that investors will have to pay to hedge against an undesirable electoral outcome. Therefore, the patterns uncovered in Figure 1 imply that hedging against election risk in the United States should have become more expensive over time.

2 Election Risk Pricing

Options are forward-looking contracts. As such, their prices should provide an "early warning" of how the value of their underlying assets will react to impending elections whose actual outcome is not yet known. Market efficiency often precludes investors from predicting the direction of assets' price changes associated with a given election outcome. Yet, investors usually anticipate that increased price variability will ensue from the revelation of the winning candidate's identity (Białkowski, Gottschalk, Piotr 2008; Boutchkova et al. 2012). A key question is how to extract such information from observed options prices.

Following Leung and Santoli (2014), consider an extension of the Black-Scholes model with a single price jump occurring immediately after a scheduled news announcement, whose size is normally distributed with a volatility of $\sigma_e^{\mathbb{Q}}$ (where $\mathbb{Q}$ is the risk-neutral probability). Suppose that equity prices are log-normally distributed, and that the price of a European call with strike K and maturity T is given by

$$C(t, S_t) = C_{BS}\left(T - t, S_t; \sqrt{\sigma^2 + \frac{(\sigma_e^{\mathbb{Q}})^2}{T - t}}, K, r\right), 0 \leq t < T_e \tag{1}$$

where $C_{BS}(\tau, S; \sigma, K, r)$ represents the usual BS formula with time to maturity τ and spot price S, and T_e is the scheduled news announcement date. Given this price formula, the implied volatility (IV) can be expressed as the deterministic function:

$$I(t;K,t) = \begin{cases} \sqrt{\sigma^2 + \frac{(\sigma_e^{\mathbb{Q}})^2}{T-t}} & \text{if } 0 \leq \text{t} < T_e \\ \sigma & \text{if } T_e \leq t < T, \end{cases} \tag{2}$$

where σ is the diffusive volatility (Leung and Santoli 2014). As Dubinsky et. al (2019) note, this extension of the Black-Scholes model has two important implications: (1) IVs increase continuously prior to release of new information; (2) IV discontinuously falls after the information is released.

The behavior of implied volatility around prescheduled news releases has been studied extensively, including investors' reactions to earning announcements (Patell and Wolfson 1979 & 1981; Ederington and Lee 1996; Dubinsky et al. 2019); Federal Open Market Committee (FOMC) meetings (Chen and Clements 2007; Vähämaa and Äijö 2011; Gospodinov and Jamali 2012); as well as monthly employment report, CPI report, and PPI report dispatches (Nikkinen and Sahlström 2004). For example, Patell and Wolfson (1979) show that implied volatilities rise to a maximum level immediately preceding the release of the news, and drop to their "normal" levels after the news is assimilated into the securities price. The magnitude of this earnings-induced increase in implied volatility depends on (1) the uncertainty of earnings information and (2) the magnitude of the market's response to the earnings information. In their view, the release of prescheduled news resolves uncertainty in the market, and since implied volatility is the expected future volatility, such an announcement reduces the degree of future uncertainty (Patell and Wolfson 1979 & 1981).

National elections have a predictable schedule, and usually have a potentially sizable impact on asset prices. In this case, an important source of uncertainty is the identity of the winning candidate, which is only revealed with certainty after the election concludes. As such, the impact of elections on option-implied volatility has also received scholarly attention. For instance, in his study of the 1987 British parliamentary election, Gemmill

(1992) documents that the implied volatility of the FTSE 100 index increased substantially before the election.[5] Goodell and Vähämaa (2012) and Mnasri and Essaddam (2021) examine US presidential elections between 1992 and 2008, and find that the implied volatility of the S&P 500 increases before elections when the voters become more, rather than less, certain about the identity of the eventual winner. Using cross-national for the period 1990-2012, Kelly, Pastor and Veronesi (2016) show that one-month at-the-money (ATM) options whose lives span national elections tend to be more expensive than neighboring options. They also find that the value of option protection is higher in a weaker economy and when the election outcome is more uncertain. Carvalho and Guimaraes (2018) study the effect of the 2014 Brazilian presidential election on options prices of state-controlled companies (Petrobras, Banco do Brasil and Eletrobras). Their results highlight the vulnerability of state-controlled companies to political risk.

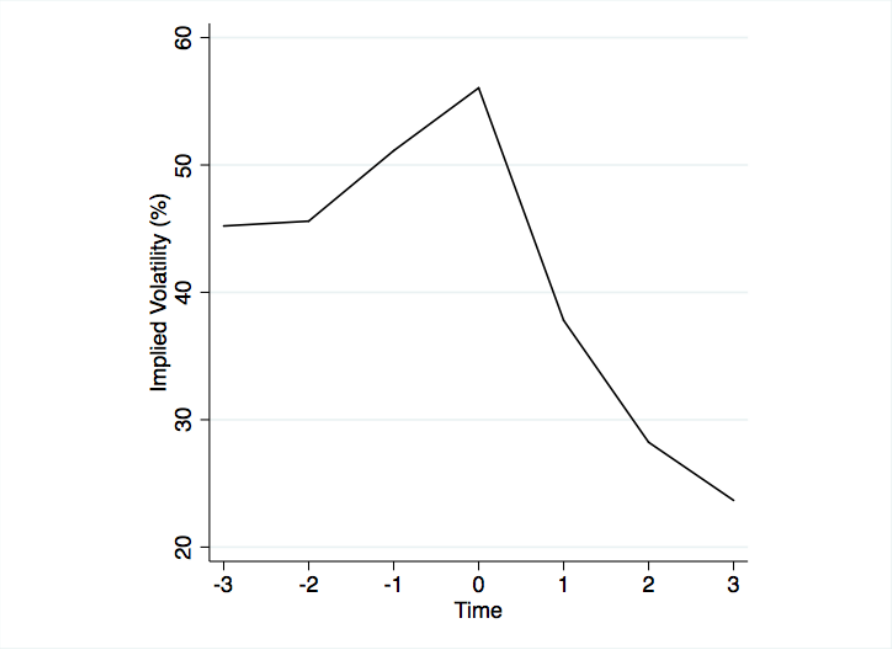
My contribution, relative to existing work, is to investigate how the electoral risks associated with partisan polarization are priced in the option market. I examine all national elections in the United States (presidential as well as mid-term ones) between 1986 and 2020. Therefore, I am able to test if hedging against election risk in the U.S. has become more expensive in the last decade vis-a-vis the previous period. Furthermore, I use data on option contacts with different strike prices (including both at-the-money (ATM) and out-of-the-money (OTM) options), with varying expiration dates (ranging from three months to three days). Therefore, in my empirical analyses, I am able to: (1) assess the sensitivity of security prices to electoral uncertainty as well as to post-electoral downside risk; and (2) test for changes in the variances of stock returns around elections using an event window that is sufficiently narrow to minimize the presence of other contaminating information.

[5]Gwilym and Buckle (1994) update Gemmill's analysis for the 1992 British parliamentary election.

2.1 Electoral Risk in the U.S. (1986-2020)

The discussion presented above suggests that there should be a detectable pattern in the changes of implied volatility before and after elections. To illustrate this point, Figure 2 shows the expected volatility of the S&P 500 index in a window of seven trading days centered on the 2020 United States presidential election (October 29th-November 6th).[6] The ordinate shows the implied volatility of S&P options calculated using at- and out-of-the-money puts and calls with more than 2 days and less than 9 days to expiration.[7] The implied volatility increased rapidly from 45.2% to over 56% as time approached the election. However, once the identity of the winning candidate was revealed – and its effects were assimilated into stock prices–, the volatility dropped significantly to 37.8% (and subsequently to 23.7%).

Figure 2: Option-Implied S&P Volatility



[6]The days are identified in the horizontal axis as 3,-2,-1, 0, 1, 2,3, with day zero denoting the trading day immediately before the identity of the winning candidate is revealed (i.e. November 3rd, election day).

[7]The data corresponds to the near term SPX option series used by the Chicago Board Options Exchange (CBOE) to calculate their 9-Day Volatility Index (VIX9D). These include PM-settled weekly SPX options expiring on Friday November 6th, 2020 and on Friday November 13th, 2020. See https://www.cboe.com/us/indices/dashboard/VSTN/

The pattern uncovered in Figure 2 suggests that the anticipated stock price reaction (in terms of variability) to election outcomes can be detected in pre-electoral option prices. It also implies that, as discussed in Dubinsky et al. (2019), it is possible to derive an analytical estimator of the *electoral* price risk based on implied volatility dynamics around elections. Let σ_{IV,t_1} and σ_{IV,t_2} represent the implied volatilities of two options at times t_1 and t_2, with identical maturity at time T. Assuming that the identity of the winning candidate is revealed after the close on date t_1 (or before the open on the next trading date, t_2), then the annualized implied variance should be $\sigma^2 + \frac{(\sigma_e^{\mathbb{Q}})^2}{T-t}$ just before the election, and σ^2 after the election. Applying Equation (2), and solving for $\sigma_e^{\mathbb{Q}}$, one can obtain the following estimator of electoral risk based on the post-electoral decrease in implied volatility:

$$\sigma_e^{\mathbb{Q}} = \sqrt{(T-t)(\sigma_{IV,t_1}^2 - \sigma_{IV,t_2}^2)} \quad . \tag{3}$$

Consider the changes in the expected volatility of the S&P 500 index around the 2020 U.S. presidential election illustrated in Figure 2. The implied volatility fell from 56% on Tuesday November 3rd to 37.8% in the following day. This drop in implied volatility implies a post-electoral price change of $\sigma_e^{\mathbb{Q}} = 5.62\%$.

To further examine the impact of national elections on asset prices in the United States, I will rely on the the estimator in Equation (3), and innovations in implied volatility around elections using various indexes developed by the Chicago Board of Option Exchange (CBOE). For example, its well-known VIX index (popularly known as the "fear gauge") provides a 30-day expectation of volatility given by a weighted portfolio of out-of-the-money European options on the S&P 500. While the VIX index is reported for a 30-day maturity, the formulas used to calculate its value are valid at any horizon. In addition, the CBOE uses the same methodology to compute volatility indexes on broad-based stock indexes, exchange traded

funds, as well as individual stocks and commodities.[8] For each of these indexes, the sample is restricted by CBOE data availability. For instance, the S&P 500 9-Day Volatility Index (VIX9D) starts on January 4th, 2011. Nonetheless, the S&P 30-day index, the price history is available from January 2nd, 1986 to the present. Therefore, it is possible to examine electoral price risk for national elections in the United States between 1986 and 2020. It should also be noted that, from Equation (3), $\sigma^2_{IV,t_1} > \sigma^2_{IV,t_2}$ must hold. Otherwise, the estimator is not defined. Elections on which the hypothesis of a decreasing implied volatility after the identity of the winning candidate is violated are thus excluded from the analysis.

Table 1 provides electoral price risk estimates using the estimator $\sigma_e^{\mathbb{Q}}$ for different asset classes. Jensen's inequality implies that the average of the standard deviations is less than the square root of the average. Therefore to be conservative, and following Dubinsky et al. (2019), I average the estimators in volatility units. I report summary statistics over the sample period from 1986 to 2020, including the average (Mean), and the standard error (SE) of all observations without errors. The column Error counts the number of elections on which the hypothesis of a decreasing implied volatility after the identity of the winning candidate is announced is violated. The last column provides the number of elections under consideration (Obs.).

The empirical evidence indicates that national elections in the United States have an effect on diversified portfolios, including those offering exposure to stocks in Emerging Markets (MSCI EEM), as well as specific asset classes (such as oil or gold). Using the Wilcoxon signed-rank test, the null that large post-electoral price moves are not priced in options can be rejected for most cases. The two exceptions (marked in grey) are given by the 30-day S&P 500 between 1986-2010, and the MSCI EAFE that provides exposure to companies in Europe, Australia, Asia, and the Far East.

[8]For the technical details on the calculation of the VIX index, please see the CBOE VIX white paper: https://cdn.cboe.com/resources/vix/vixwhite.pdf.

Table 1: Electoral Price Risk, 1986-2020

All Elections						
Asset	Maturity	Mean	S.E.	Error	Obs.	Period
S&P 500	30-day	2.99	0.41	6	12	1986-2020
S&P 500	30-day	2.37	0.31	5	8	1986-2010
S&P 500	30-day	4.25	0.81	1	4	2012-2020
S&P 500	9-day	4.37	0.82	1	4	2012-2020
Russell 2000	30-day	3.81	0.65	1	5	2010-2020
DJIA	30-day	3.72	0.59	1	5	2010-2020
NASDAQ-100	30-day	3.72	0.69	1	5	2010-2020
MSCI EAFE	30-day	3.13	0.63	3	4	2008-2020
MSCI EEM	30-day	4.59	0.53	2	3	2012-2020
Crude Oil ETF	30-day	3.79	0.84	1	5	2010-2020
Gold ETF	30-day	2.88	0.26	1	5	2010-2020
Presidential Elections Only						
S&P 500	30-day	3.64	0.56	3	6	1988-2020
S&P 500	30-day	2.81	0.27	2	4	1986-2010
S&P 500	30-day	5.31	0.42	1	2	2012-2020
S&P 500	9-day	5.57	0.11	1	2	2012-2020

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The results also reveal that the sensitivity of asset prices to election risk is quite large. To place these estimates in context, consider the S&P 500 intra-day returns between 1986 and 2020 (excluding the day immediately after national elections). Their mean value was 0.04%, with a standard deviation of 1.16%. The post-electoral price change estimated from option prices is substantially higher, with a variance ratio larger than six, on average. A simple value at risk (VAR) calculation indicates that the probability that a hypothetical USD 100 investment in the S&P 500 would lose more than USD 3 in a single day during

this period was roughly 1.2%. The evidence in Table 1 also reveals that electoral risk varied substantially over time, ranging from 2.37% between 1986 and 2010 to approximately 4.25% during the 2012-2020 period, respectively. In addition, the average electoral risk tended to be higher in the case of presidential, rather than congressional races. Finally, an examination of the cases where $\sigma^2_{IV,t_1} < \sigma^2_{IV,t_2}$ (the column *Error*), indicates that their frequency was much higher during the 1986-2010 period than in the 2012-2020 era. These last two findings suggest that most elections with negligible risks were concentrated in contests with relatively inconsequential outcomes.

3 Electoral Volatility and Risk Premiums

The evidence presented in the previous section indicates that election risk in the United States is routinely priced by the option market. The findings also reveal that, in the last decade, insuring against election risk has become more expensive. An important question is whether the electoral outcomes of the past ten years warrant the higher option prices. If options market participants correctly forecast the magnitude of the post-electoral price changes, then no significant difference between the expectation of future realized variance under the risk-neutral measure and the expectation under the physical measure should exist. Otherwise, a discrepancy between them would indicate that investors demand a premium for bearing the electoral risk of an option position (Bollerslev, Tauchen and Zhou 2009).

How much compensation did investors require in the form of electoral risk premium? A comparison between the option-implied electoral risk estimate ($\sigma^{\mathbb{Q}}_e$) and the realized post-electoral volatility of returns can shed some light on this question. Following Dubinsky et al. (2019), I compute the expected 1-day volatility derived from option prices by adding to the post-electoral jump volatility 1 day's diffusive volatility, and compare it to the realized volatility (measured as squared returns). In the case of the S&P 500, the average actual jump

(3%) is indistinguishable from the average estimated post-electoral jump for the 1986-2010 period. After 2010, however, the average actual jump amounts to 3.3%, while the average estimated post-electoral jump is 5.34%, implying an average risk premium of roughly 204bps.

3.1 Variance Swap Returns

The existence of an electoral risk premium after 2010 suggests that option traders had an opportunity to profit from investors' fears of large post-electoral price movements. To further examine this issue, I analyze S&P 500 variance swap returns between 2011 and 2020. A variance swap is an instrument which allows investors to trade future realized (or historical) volatility against current implied volatility. Selling a variance swap is like being short volatility at the strike level. The trade will be profitable if the market delivers less realized volatility than that implied by the strike of the option. Conversely, buying a variance swap is like being long volatility. The buyer will profit if the subsequent realized volatility is above the level set by the strike.[9]

Selling a variance swap can thus be likened to selling insurance, with a steady income punctuated with occasional large drawdowns. Buying a variance swap, in turn, is like buying insurance: paying a relatively small premium for a potentially large payout if things go wrong, but expecting to forfeit some, or all, of the premium on most occasions. Given these insurance-like characteristics, long volatility positions on an underlying index (such as the S&P 500) are usually biased to make a loss, while short volatility positions are, on average, profitable. This bias is referred to as the volatility risk premium.

Consider the following hypothetical variance swap contract. One party agrees to pay a fixed amount at maturity (i.e. the price of the variance swap), in exchange for a payment equal to the sum of squared daily log returns of the S&P 500. The payoff, $p_{\tau,m}$ at expiration

[9]Variance swaps, however, are convex in volatility: a long position profits more from an increase in volatility than it loses from a corresponding decrease.

of a contract initiated at time τ and with maturity m, and Strike Price, $SP_{\tau,m}$, is given by:

$$p_{\tau,m} = VN_{\tau,m} \times [(RVS_{\tau,m})^2 - (SP_{\tau,m})^2] \tag{4}$$

where VN, the Variance Notional, is determined as:

$$VN_{\tau,m} = \frac{Vega\ Notional}{2 \times SP_{\tau,m}},$$

and the Realized Volatility Strike of the S&P 500 is calculated using the formula:

$$RVS_{\tau,m} = \sqrt{\frac{252 \times \sum_{i=\tau+1}^{\tau+m} \left(ln \frac{Index_i}{Index_{i-1}}\right)^2}{m}} \times 100.$$

Most market participants think in terms of volatility. Therefore, the profit/loss of a long variance swap is usually expressed in vega notional, which represents the average profit or loss for a 1% (1 vega) change in volatility. So, for instance, suppose a 9-day variance swap is stuck at 20 with a vega notional of USD 100. An investor holding a long position will be delivered the difference between the realised variance over the next seven trading days and the current strike price, multiplied by the variance notional. If the index only realises 15%, the payoff will be equal to $100 \times \frac{15^2-20^2}{40} = -437.5$, a loss of 4.375 vegas.

I am interested in the reward required by a risk averse investor for being exposed to the post-election jump risk. Following Kelly, Pastor and Veronesi (2016), I compare the payoffs of variance swap contracts in a "treatment" group to those in two neighboring "control" groups. The first group contains contracts whose expiration includes the day when the outcome of a national election is revealed. The latter two consist of contracts initiated around elections, but whose expiration excludes that date. Specifically, denoting the trading day immediately following the identity of the winning candidate is revealed as $t = 1$, the treatment group

includes the payoffs of contracts, $p^{Treat}_{\tau,m}$ initiated at time $\tau \in \{-m-t < \tau < t\}$. The pre-treatment group includes the payoffs of contracts, $p^{Pre}_{\tau,m}$ initiated at time $\tau \in \{-2m-t < \tau < -m\}$, and the post-treatment group is consists of the payoffs of contracts, $p^{Post}_{\tau,m}$ initiated at time $\tau \in \{t-1 < \tau < m+1\}$. While the contracts in each of these groups have different expiration dates, all of them have the same time to maturity. Therefore, the average payoffs for each of these groups are fully comparable.

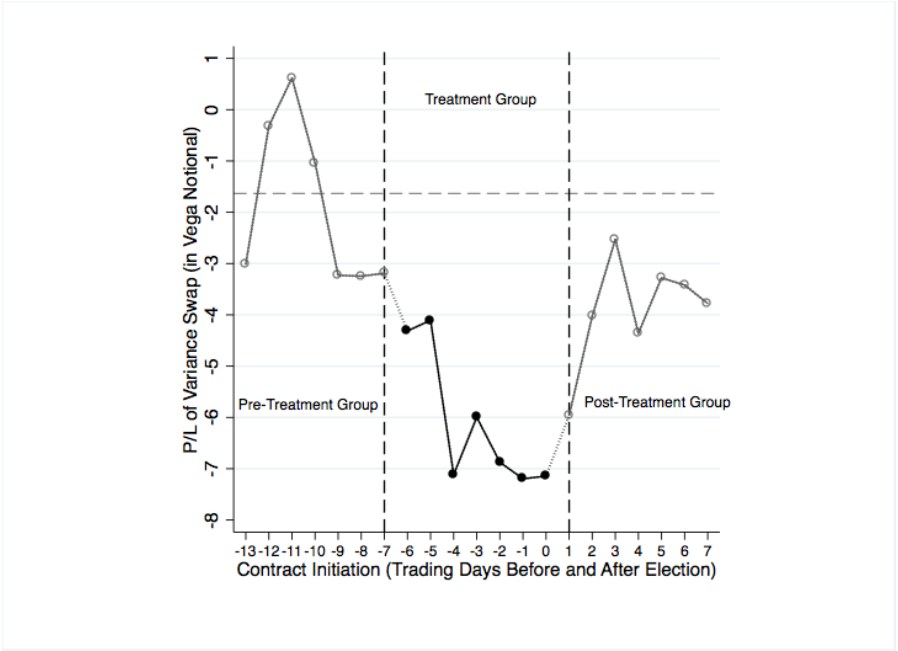
Extensive data on quoted prices for S&P 500 variance swaps across multiple national elections are difficult to obtain. But, the VIX index is equal to the square root of a variance swap on its underlying, the S&P 500. Therefore, variance swap strikes can be easily inferred from VIX levels. To minimize the presence of contaminating information, I restrict my attention to a small window around each electoral contest. Specifically, I use the CBOE 9-Day Volatility Index (VIX9D), which is based on the entire strip of options contracts, as a proxy for the prices of variance swaps on the S&P 500 that mature in seven trading days.[10] Because the VIX tends to trade slightly above variance swap prices, and to account for capped variance swaps (which usually trade below uncapped variance swaps), I estimate the variance swap strike prices at 175bps below the VIX9D. Using these estimated values of $SP_{\tau,m}$, the sum of squared daily log returns of the S&P 500, and equation (4), I calculate the payoffs $p_{\tau,m}$ for the variance swaps contracts included in the "treatment" group as well as the two neighboring "control" groups.

Figure 3 shows the average profit/loss (p/l) of long variance swap contracts initiated around the five national elections that took place in the United States between 2011 and 2020. The vertical axis displays the the average p/l of the variance swap contracts, expressed in terms of vega notional. The contract initiation dates, τ, are shown in the horizontal axis, with day one denoting the trading day immediately after a national election. Therefore, while

[10]The CBOE uses calendar days rather than trading days in the VIX calculations, thus the discrepancy between 9 and 7 days.

the calculation of payoffs of contracts initiated at $-8 < \tau < 1$ (treatment group) includes price changes in the S&P 500 on the day when the identity of the winning candidate is revealed, contracts initiated outside of that window (control groups) do not. The solid circles, connected by a black line, indicate the average p/l of contracts in the treatment group, whereas the p/l of the contracts in the control groups are represented by the hollow circles, connected by a grey line. For reference, the average p/l of long variance swaps of -1..63 in the full sample (excluding the three-weeks window around national elections used to calculate the average payoffs in treatment/control groups) is represented by the horizontal dashed grey line.

Figure 3: P/L of Long Variance Swap Contracts around Elections, 2012-2020



The evidence reveals that the average loss of long variance swap contracts with an expiration date immediately preceding the resolution of electoral uncertainty (i.e. initiated at $\tau = -6$) was -3.19, compared to -4.31 for a similar variance swap initiated the day after. Likewise, the average loss of long variance swaps initiated the day when the identity of the winning candidate was revealed (i.e. $\tau = 1$) was -5.96, compared to -7.14 for a similar one

initiated the day before. This loss of roughly one additional vega (illustrated by a dotted grey line) represents the average exposure to the election outcome. The evidence also indicates that the bias of long volatility positions on the S&P 500 in the treatment group were larger (i.e. the expected returns from receiving the fixed rate in variance swaps were more negative), compared to variance swaps in the control groups. This electoral volatility risk premium (EVRP) can be calculated as:

$$EVRP = \overline{p_{\tau,m}^{Treat}} - \frac{1}{2}(\overline{p_{\tau,m}^{Pre}} + \overline{p_{\tau,m}^{Post}}), \tag{5}$$

where $\overline{p_{\tau,m}^{Treat}}$, $\overline{p_{\tau,m}^{Pre}}$, and $\overline{p_{\tau,m}^{Post}}$ are averages of the payoffs associated with the variance swap contracts included in the treatment, pre-treatment, and post-treatment groups, respectively. The average EVRP across all five elections amounts to -3.17 (t-statistic=-3.49), indicating that variance swap holders were willing to pay a larger premium to hedge against electoral price risk during the 2011-2020 period. This finding is not only statistically but also economically significant. Selling volatility has historically been profitable; but selling *electoral* insurance in the past 10 years has been even more lucrative, raking in more than six times the variance swap contract's vega notional.

3.2 Electoral Volatility Trading

The returns from long variance positions – which are typically negative–, should increase in absolute terms (i.e. they should be even more negative) whenever variance swap strike levels are excessively high. To further probe into the expensiveness of options around elections, following Gao, Xing, Zhang (2018) I look at the profitability of a *strangle*. This is a trading strategy that involves combining a put and a call on the same asset, with different exercise

prices – not necessarily at-the-money – and time to maturity.[11] This strategy is a particularly appealing when one expects a security or an entire index to make a large move following an event, but one is unsure about the direction of this move. National elections fit this description very well. They are recurring, have a predictable schedule, and have the potential to trigger large price movements. It is often difficult, however, to predict the direction of the movement.

Suppose someone considers that option prices are overestimating the magnitude of a post-electoral price movement. She could then write a strangle (i.e. sell both calls and puts) ahead of the election to capture the volatility premium impounded in option prices. Her profit will be limited to the total premiums received, whereas her potential loss will be unlimited if the price of the underlying asset rises, and substantial if it falls. Therefore, the strategy's success depends on the magnitude of price movement (regardless of its direction) and the change in implied volatility. If the options market had correctly priced the post-electoral price change, then she will likely lose money. In contrast, her position will be profitable if the price reaction of the underlying asset to the revelation of the winning candidate's identity is smaller than what is implied by the (combination of both) option prices.

I calculate average straddle returns around U.S. national elections for the period between 2006 and 2020 using the CBOE's VIX Strangle Index (VSTG). The index tracks the value of a hypothetical portfolio which overlays a short strangle of VIX options and a long VIX call on one-month Treasury bills.[12] I consider positions that are opened and closed over different windows around the election day. Based on the implied volatility dynamics around elections

[11] In the case of a strangle, the exercise price of the put should be less than the exercise price of the call. When the put and the call have the same exercise price, the position is called a *straddle*.

[12] VIX options did not exist until 2006, so the VSTG is only available after March 21st, 2006. The short VIX put and call have strikes set at the 5th and 95th percentile values of the forward distribution of VIX. The long VIX call has a strike set at the 99th percentile. The number of capped short VIX strangles is set to ensure that 80% of the value of the portfolio at the previous rebalancing date is preserved. For more details on the calculation of the index, please go to: https://cdn.cboe.com/api/global/us_indices/governance/VSTG_Methodology.pdf.

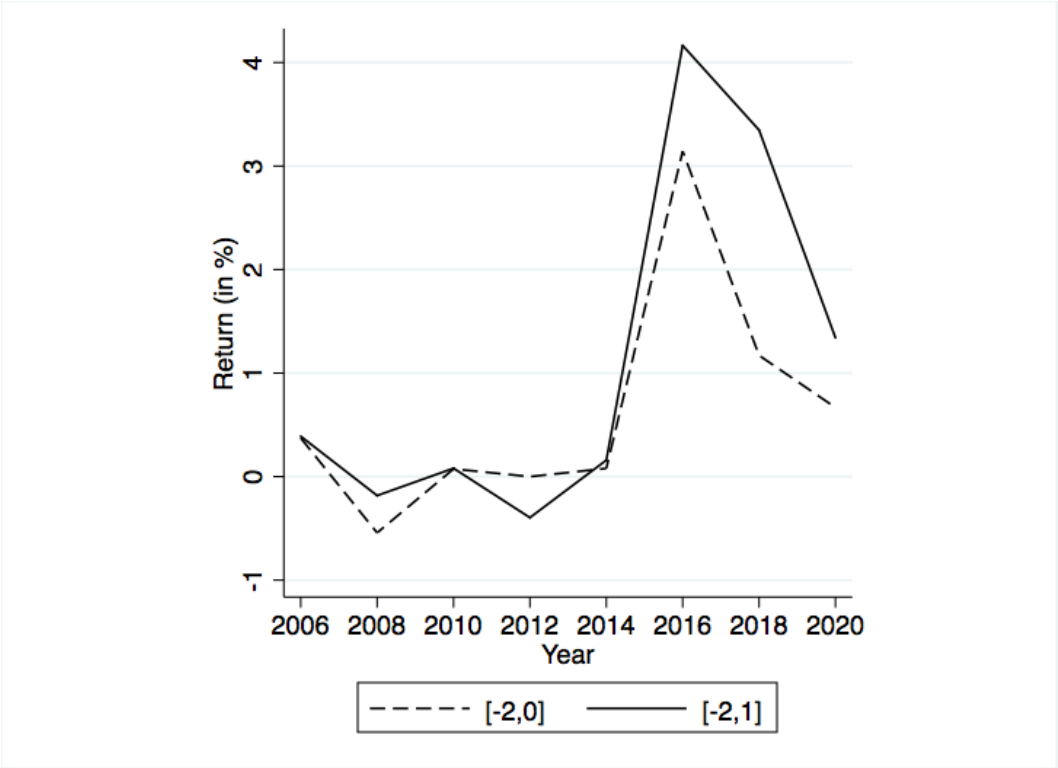
uncovered above, I focus on buy-and-hold strategies that cover the running up of electoral uncertainty until electoral uncertainty is partially or fully resolved. Specifically, the starting date is chosen on day -2, and the ending dates are either days 0, or 1, with day zero denoting the trading day immediately before the identity of the winning candidate is revealed. So, for the strategy over [2,0], the VSTG index is bought on day -2 (the Friday before the election) and sold on election day (a 3-day holding period). In the strategy over [2,1], the VSTG index is also bought on day -2 (the Friday before the election), but it is sold the day after the election day (a holding period of 4 days).

The distinction between the ending dates should capture two different effects around elections: the pre-electoral effect and the post-electoral one. The first effect is relevant for the strategy ending on day zero, which is strictly before election outcomes are revealed. The value of the VSTG index might increase before the election day due to electoral uncertainty (an unforeseen outcome). The second effect should capture the actual exposure to the election outcome. If the magnitude of the post-electoral price change is small enough, the straddle returns will be positive, leading to a further increase in the VSTG index.

Figure 4 shows the returns associated each of the two hypothetical VSTG trading strategies for all the national election held in the United States between 2006 and 2020. The dashed line corresponds to the strategy over [-2,0] (i.e. the pre-electoral effect), and the solid line to the strategy [-2,1] (i.e. the post-electoral effect). The average return of the [-2,0] strategy for the five elections that took place between 2006 and 2014 was -0.003%, compared to 1.66% (with a significant t-statistic of 2.84) for the three following ones (2016, 2018, and 2020). In the case of the [-2,1] strategy, the average four-day return for the five elections that took place in the 2006-2014 period was 0.01%, but rose to 2.95% (with a significant t-statistic of 4.60) thereafter. As a benchmark, the average return for a 3-day (4-day) holding period over all trading days (excluding the positions opened/closed around the election day) was 0.059 (0.088) between 2006 and 2014, and 0.001 (0.001) in the post-2014 period.

The post-2014 returns associated with the two hypothetical VSTG *electoral* trading strategies are both statistically as well as economically significant, indicating that option prices overestimated both electoral uncertainty as well as post-electoral price jumps in the last three U.S. national elections. In the former case, there is usually not much that the investment community does not already know in the final two days before the contest regarding the election's outcome. Nonetheless, as Figure 4 shows, while the option market slightly underpriced the likelihood of Barak Obama's victory in 2008, it significantly overpriced electoral uncertainty in the Trump era.

Figure 4: VSTG Index Returns, 2006-2020



The difference between the returns to the VSTG [-2,1] strategy before and after the 2016 U.S. presidential election are even more pronounced. It is thus possible to compute difference-in-differences (DD) estimates of the post-electoral effect on VSTG returns. Before 2016, both strategies deliver similar returns (the average difference between the [-2,1] and

[-2,0] strategies is 0.01% with a t-statistic of 0.11). In contrast, after the 2014 election, the average difference is 1.29% (with a t-statistic of 2.84) in favor of the [-2,1] strategy. These findings indicate that since 2016, investors have not only been concerned about electoral uncertainty (an unforeseen outcome), but also about the realization of extreme negative events (an undesirable outcome).

4 Electoral Risk Mispricing

The analysis of long variance swaps' returns as well as short strangles' earnings yield three important results. First, selling protection against election risk has become increasingly profitable in recent years. Second, the source of those profits can be traced not only to electoral uncertainty, but also to investors' fears of large post-electoral price changes. Third, the peak in the returns associated with *electoral* short strangles occurred in 2016, suggesting that the option market's overestimation of election risk coincided with the arrival of Donald Trump on the political scene.

In this section, I examine the relationship between S&P option prices and electoral forecasts to account for the rise in election risk premiums. Implied volatility can be interpreted as the market's expectation of the average return volatility over the life of an option contract. Consequently, semi-strong form efficiency requires that market participants correctly estimate how an anticipated news release will affect the valuation of asset prices. In the context of a presidential election, option prices should thus reflect all publicly available information regarding each candidate's chance of winning. Otherwise, an inconsistency between the option market and public opinion polls would be an indication of electoral risk mispricing.

4.1 Election Forecasts and Option Prices

As in Gemmill (1992), I rely on the simple one-step binomial pricing framework introduced by Cox, Ross and Rubinstein (1979) to analyze the valuation of electoral risk. Let O_t be a European option on an underlying asset with a current price S_t. Denote the option's strike by K, its expiry by T, and the election day as T_e, where $t < T_e < T$. An option bought ahead of the date when the identity of the winning candidate is revealed (at time $t \leq T_e$) will give someone the right to trade the underlying at a strike price of K after the election takes place. To keep things simple, I assume that the underlying asset will pay no cash dividends during the life of the option. I also ignore transaction costs, margin requirements, and taxes.

Suppose that at expiration, the spot price of the underlying asset can only have two possible values. With probability q, it can increase, and become $S_T^u = uS_t$, where $u > 1$; and with probability $(1-q)$, it can decrease, and become $S_T^d = dS_t$, where $d < 1$. Therefore, for $S_T = \{S_T^u, S_T^d\}$, the option's value at expiration will be $C_T = max(0, S_T - K)$ in the case of a call, and $P_T = max(0, K - S_T)$ in the case of a put. To avoid riskless arbitrage opportunities, O_T should be equal to the value of O_t invested for the time interval $\Delta = T - t$ at the risk-free interest rate, $O_T = O_t e^{r\Delta}$, or equally, $O_t = O_T e^{-r\Delta}$. As Cox, Ross and Rubinstein (1979) show, the value of the option O_t can be calculated as:

$$O_t = e^{-r\Delta}[pO^u + (1-p)O^d], \tag{6}$$

where O^u is the value of the option at expiration if the price of the underlying goes to uS_t, O^d is the value of the option at expiration if the price of the underlying goes to dS_t, and:

$$p = \frac{e^{r\Delta} - d}{u - d}. \tag{7}$$

There are many plausible available choices with regard to the parameters u and d. For

instance, the price of the underlying asset could either increase by 1.8% or decrease by 1.5%. Following Cox, Ross, and Rubinstein (1979), I adopt the parametrization, $u = e^{\sigma\sqrt{\Delta}}$, where σ is the volatility of the underlying asset. Assuming that that the product of the up move multiplier and the down move multiplier is 1, then $d = e^{-\sigma\sqrt{\Delta}}$.

Equation (7) can help us elucidate the relationship between option prices and electoral forecasts. First, notice that, as long as the interest rate is positive, then $d < e^{r\Delta} < u$. Therefore, p has the properties of a probability: it will always be greater than zero and less than one. Second, as Cox, Ross, and Rubinstein (1979) note, p is the value that would justify the current price of the underlying asset, S_t, in a risk-neutral world. In the context of a national election examined here, we can interpret p as the probability that the spot price will increase to S_T^u at time $T_e < T$. So, consider a presidential election between two candidates, L and R. Assume that on day $t < T_e$ during the campaign, the option O_t expires in one month, the riskless interest rate is 2.5%, and the volatility of S_t is 20%. According to those inputs, and using equation (7), $p = 0.68$. Suppose the market expects the underlying asset to increase (decrease) in value if R wins (loses). To the extent that asset prices are sensitive to electoral outcomes, then R's probability of winning, as predicted by public opinion polls should be roughly 68%. Otherwise, the behavior of options prices would be inconsistent with the information in public opinion polls.

4.2 The Trump Factor

Trump's controversial style offers an excellent opportunity to examine the relationship between partisan polarization and electoral risk mispricing. As the example presented above indicates, the impact of an election on options prices can be analyzed using a simple one-step binomial pricing model. I thus rely on this framework to test whether S&P option prices were consistent with electoral forecasts in the 2016 and 2020 U. S. presidential elections.

According to Wolfers and Zitzewitz (2018), markets expected the S&P 500 to be worth around 11% less under President Trump than Clinton when U.S. markets closed on November 8th, 2016 (election day). At the same time, public opinion polls suggested only a 28.6% chance that Trump would win. Were option prices consistent with the electoral forecasts? To answer this question, I calculate the probability of a Trump victory derived from option prices and compare them with Trump's winning probabilities according to public opinion polls. I place my focus in the closing month of the campaign; namely, the period between October 10th, 2016 and November 8th, 2016. I rely on the *Fivethirtyeight* election forecasts to obtain daily predictions of Trump's winning probabilities based on opinion-poll data. [13] Next, I estimate the daily values of the probability of a Trump victory derived from option prices using equation (7). I rely on the VIX index to capture the market's expectation of S&P 500 returns' volatility. The index is reported for a 30-day maturity, so time to expiration (in years) is set to $\Delta = 30/365$. Finally, as a proxy for the risk-free interest rate, I use the 1-Month U.S. Treasury par yields.[14]

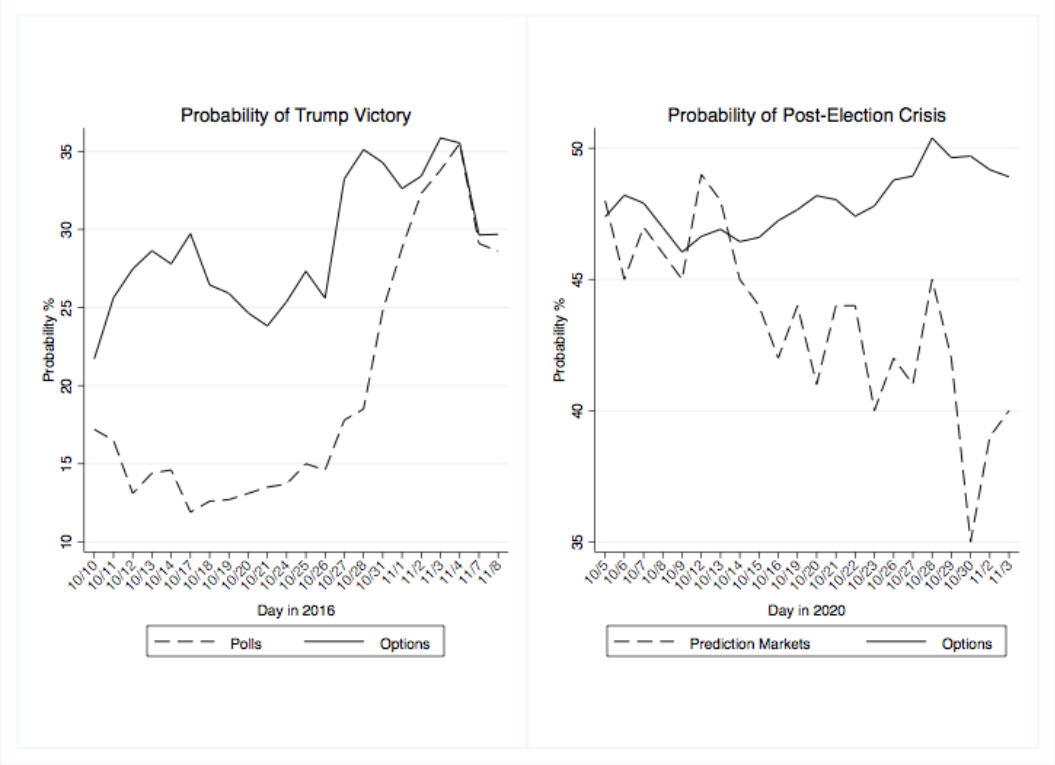
The left panel of Figure 5 shows the probabilities of a Trump victory estimated from public opinion polls (dashed line) and from S&P 500 options (solid line) for the period between October 10th, 2016 and November 8th, 2016. The findings indicate that, in the closing days of the campaign option prices were consistent with the electoral forecasts. Indeed, for the last three observations (Nov. 4-Nov. 8), the options and polls probabilities are almost identical. Moreover, as noted above, market professionals were expecting a 11% decline in the S&P 500 if Trump won the election. The estimated values of the parameters u and d on election day (not shown), are 1.055, and 0.948, respectively. These figures imply that markets expected the S&P 500 to be worth roughly 10.7% less under President Trump than Clinton, which is very similar the expected fall estimated by Wolfers and Zitzewitz (2018). The behavior

[13] https://projects.fivethirtyeight.com/2016-election-forecast/

[14] https://www.treasury.gov/resource-center/data-chart-center/interest-rates/

of options prices, however, was grossly inconsistent with the information in opinion polls throughout most of the final month of the campaign. Before November 4th, 2016, option prices overestimated the probability of a Trump victory by an average of approximately 11 percentage points (28.7% compared to the 17.8% winning chance predicted by the polls). These results indicate that, overly fearful of a Trump victory, market participants were willing to consistently pay higher premiums to hedge against such an outcome.

Figure 5: Electoral Risk Mispricing



Turning to the 2020 U.S. presidential election, markets did not seem to care too strongly whether the victorious candidate would be Democratic or Republican. Instead, as the *Economist* noted, investors appeared to be especially keen on downside protection to hedge against the prospect of a period without a clear winner, as well as the potential for outright post-election chaos. In particular, markets were especially spooked by President Trump's

reluctance to say that he would accept the election result.[15] Once again, I examine the closing month of the campaign. In this case, I focus on the period between October 5th, 2020 and November 3rd, 2020. Whereas no forecasts based on public opinion polls on the issue exist, it is possible to use data from prediction markets to assess the probability that Trump would refuse to vacate the Oval Office should he lose the election. For example, *PredictIt*, an online prediction market, offered traders to sell shares on the event "Will Trump or Biden personally concede defeat within two weeks of Election Day?" I use these data to estimate the probability that Trump would refuse to accept the election result.[16] Next, I estimate the probability of a post-election crisis derived from option prices using the same inputs as before (i.e. the VIX index, and U.S. Treasury par yields).

The right panel of Figure 5 shows the probabilities that Trump would refuse to accept the election outcome estimated from prediction markets (dashed line) and from S&P 500 options (solid line) for the period between October 5th, 2016 and November 3rd, 2020. Their contrast is remarkable. In period's initial four days (Oct. 5-Oct. 8), there was some similarity between them. But, thereafter prediction markets signalled a falling probability that Trump would refuse to concede defeat, whereas option prices signalled a rising probability of a post-electoral crisis, reaching 50% on October 28th, 2020.[17] The estimated values of the parameters u and d on that date (not shown), are 1.122, and 0.891, respectively. These figures imply that markets expected the S&P 500 to fall by 23.1% if Trump refused to accept the election result.

[15] https://www.economist.com/finance-and-economics/2020/10/10/how-investors-are-hedging-against-possible-election-chaos-in-america. See also: https://www.reuters.com/article/usa-election-markets/with-biden-bets-and-trump-hedges-investors-prepare-for-u-s-election-day-idUSKBN27I0NZ

[16] Daily closing prices for the period between October 5th, 2020 and November 3rd, 2020 were obtained from PredictIt, https://www.predictit.org/markets/detail/6906/Will-Trump-or-Biden-personally-concede-defeat-within-two-weeks-of-Election-Day. Data on election day (November 3rd, 2020) come from Smarkets, https://smarkets.com/event/41808439/politics/us/us-presidential-election-2020/will-trump-concede?lang=en-US

[17] In addition to president Trump, the incumbent vice-president, Mike Pence also seemed reluctant to concede defeat. In the October 8th, 2020 vice presidential debate, he provided evasive answer to a question posed by the moderator about a peaceful transition of power.

To further quantify the mispricing of the S&P options around the 2020 U.S. presidential elections, consider the following position. Suppose that on October 7th, 2020, a market maker bought 100 plain vanilla, at-the-money calls on the S&P 500 index expiring three days after the election (Friday November 6th, 2020). According to the CBOE data, the premium for one call was 102.7 dollars. Assuming that there were no additional fees or commissions, the market maker should have borrowed 10,270 dollars to buy the call options. Suppose also that the marker maker immediately hedged the long position by short selling an appropriate number of units of the underlying index. At expiration, the position would have produced a net loss of 1,533 dollars, or approximately 15%. Note that, over the 30-day period, realized daily volatility (1.23%) was lower than the level of implied sold (1.38%). Hence, the higher prices of option prices, fueled by investors' fears of a constitutional crisis, made the hypothetical riskless hedge position unprofitable.

Conclusions

A significant number of scholars have examined the deleterious effects of political sectarianism (cf. Finkel et al. 2020). Most of this work, however, focuses on the behavior of voters and politicians. This study shows that partisan polarization, can not only affect democratic norms and political accountability, but can also undermine the ability of financial markets to efficiently price election risk. As elections in the United States became more polarized, their outcomes turned out to be more consequential for asset prices, leading to a significant increase in the price that investors had to pay to hedge against electoral risk. The evidence also indicates that the rise in option prices allowed option traders to profit from investors' fears of large post-electoral price movements. Finally, the analysis suggests that further rise in partisan polarization during the Trump era exacerbated electoral risk mispricing.

The electoral risk premiums uncovered here are not only statistically significant, but they

are also fairly large in economic magnitude. For example, selling 9-day S&P 500 variance swap on election day in 2020 with a vega notional of USD 100,000 would have turned a profit of approximately USD 1,637,444. In the case of the delta-hedged position opened on October 7th, 2020 discussed above, the premium for one call given by the "incorrect" volatility of 26.34% was USD 102.7, compared to a price of USD 91.7 derived from the "correct" volatility of 23.5%. The cost of a standard contract is usually 100 times the quoted price; so in this case, the loss would have been USD 1,100 per contract.

These findings are particularly noteworthy because they uncover the adverse effects of polarization in the most unlikely of places: the option market. In contrast to many securities, option prices are closely tied down by arbitrage considerations. In addition, whereas trading in stocks and/or bonds has become increasingly common among retail investors, most of the option trading strategies examined in this study require a significant degree of financial experience, as well as considerable funding in terms of margins and collateral. Given these high stakes, one would expect that rational, rather than emotional, decision-making would govern these transactions. Nonetheless, as with voters and politicians, the behavior of the participants in the option market has been affected by the rising tide of partisan polarization that has afflicted the United States in recent years.

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