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Political preferences and stock markets

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ABSTRACT

The aim of this paper is to investigate the sensitivity of stock markets to election uncertainty and election shock. The analysis employs both fixed effect modelling approach and event study methodology, and utilizes a unique dataset of polling results measuring political preferences over 91 elections in EU countries. We show that election uncertainty induced by changes in political support significantly affects the volatility of stock markets in the pre-election period. Stock volatility also increases in post-election periods. We find that the difference between the outcome of the election and the expected one contributes to the magnitude of election shock, which influences stock markets. These suggest that the accuracy of pre-election polls can be used by market participants and academics as a proxy for market expectations. Our findings have also important implications for optimal investing strategies around elections and are of interest to fiscal policy makers and regulators of pollsters.

1. Introduction

Political uncertainty derived from political events has a strong influence on stock performance (e.g. Goodell, McGee, & McGroarty, 2020; Kelly, Pástor, & Veronesi, 2016; Pástor & Veronesi, 2013). This link often arises because investors respond to the policy uncertainty associated with the outcome of these events. Investors may not be able to fully anticipate political costs and benefits associated with governments' future actions, particularly during election periods when there are potential political changes. Wisniewski (2016) also argues that political events and uncertainty influence investors' decisions on market timing and portfolio allocation across different markets. In this paper, we focus on the effects of national elections, as processes that disseminate policy-related information to market participants.

Markets absorb election-related news and trends into stock prices in anticipation of electoral outcomes as implied by the informational efficiency (Pantzalis, Stangeland, & Turtle, 2000). An example would be the considerable increase in the CBOE Volatility index (VIX) before the 2020 US Presidential Election.[1] When polling results in July 2020 pointed to the potential victory of Joe Biden over Donald Trump, CBOE Volatility index (VIX) reached a record high of 28%, which is 41% above its historic average (Hodgson, 2020).[2] Another anecdotal example is that when the UK opinion polls suggested an even vote split between Conservative and Labour party (34% support each) on April 21, 2015, a period of higher volatility in the UK stock markets was observed.[3]

Such anecdotal evidence raises the question of how election uncertainty affects stock markets in the run up to elections. To answer this, we investigate the effects of opinion polls on stock markets during pre-election periods in European (EU) countries. Our choice of EU countries is motivated by a series of economic and political shocks in EU countries, following the global financial crisis and the European sovereign debt crisis. Many EU countries have experienced economic and financial downturns along with a high degree of political instability and several right-wing extremist and populist parties gaining consensus, consequently increasing partisan conflicts and policy uncertainty (Funke, Schularick, & Trebesch, 2016).

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[1] VIX, known as the market's "fear gauge", measures market's expected volatility over the subsequent 30 days. Ablan and Wigglesworth (2020) argue that, beyond the coronavirus pandemic, the US election presented another potential source of market uncertainty.

[2] Given that, activities in put options linked to US stock markets, which offer investors protection against falling US market prices, significantly increased (Smith & Platt, 2020). As investors might have different views about what happened next, the trading volume of call options, which allow traders to benefit from a spike in turbulence, also increased.

[3] British companies' shares such as BP (BP), Lloyds Banking Group (LYG), Rio Tinto (RIO), GlaxoSmithKline (GSK), Barclays (BCS), Royal Dutch Shell (RDS.A), HSBC (HSBC), and Diageo (DEO), displayed increased volatility.

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Opinion polls, which are conducted frequently, infer current voters' preferences which determine the political support and the likely winner of forthcoming elections, providing signalling effects across a period of time, unlike results of elections. We do not only focus on how stock markets respond to the ex-ante uncertainty about electoral outcomes, but also examine the ex-post reaction of stock markets to electoral outcomes. In order to do this, we apply a new measure of 'election shock', measured as the difference between the actual and expected electoral outcomes, and then examine stock markets' reactions to the 'election shock' in the post-election period.

There are two hypotheses that could explain the relationship between elections and stock markets' behaviour: election uncertainty hypothesis (EUH) and political uncertainty hypothesis (PUH) (Goodell & Vähämaa, 2013). The EUH predicts that stock returns and stock volatility decrease when election uncertainty related to forthcoming electoral results is reduced, while the PUH suggests that stock volatility might increase if the uncertainty about future policies increases despite the lower election uncertainty (see Section 3 for more details).

To empirically investigate our hypothesis, we employ two methods, which are appropriate and commonly applied in previous related literature (e.g. Fan, Talavera, & Tran, 2020b; Pantzalis et al., 2000): (i) Fixed effects model (FEM), (ii) Event study methodology. We use a dataset of 91 elections in 26 EU countries (excluding Luxembourg and Lithuania)[4] from January 2005 to September 2019. Polling results for the eventual largest party, the eventual runner up party, and the incumbent party of each country are hand-collected from countries' online articles and publicly available polling datasets, which provide frequent polling data. Election dates and electoral outcomes are manually collected from the European Election Database, government websites, and newspapers. The use of a unique polling dataset allows us to account for the frequent changes in political support that might have an immediate impact on stock markets. This largely reduces endogeneity bias caused by confounding variables.

Opinion polls provide pre-election forecasts which proxy the market expectation of electoral outcomes. Therefore, we expect the deviation between the actual electoral outcome and voters' expectation to contribute to election shocks. Higher accuracy of polling results implies less surprised investors, resulting in less stock return and volatility. This setting eliminates the possibility of reverse-causality between changes in financial markets and changes in the success likelihood of political parties, since the uncertainty over the eventual electoral outcome is resolved and is unable to be affected by subsequent price changes.

Our paper contributes to the literature in many aspects. First, it contributes to previous studies that focus on the relationship among political uncertainty, policy uncertainty, and financial markets. Similar to our study, Pástor and Veronesi (2013) find both stock price volatility and the risk premium increase before a change in policy regimes, especially when the economy is weak. Kelly et al. (2016) find a significant relationship between policy uncertainty and financial market valuation and price volatility. Goodell et al. (2020) reveal how changes in the probability of the incumbent party getting re-elected affect the variance of market returns using a sample from seven US elections. However, our paper, using a unique hand collected dataset, has a novel focus on the impact of opinion polls on stock market performance, allowing insights on political uncertainty that were previously unexplored by the literature. Moreover, while other related studies mainly consider a single country (US) (e.g. Goodell & Vähämaa, 2013; Li & Born, 2006), we employ a sample of 26 EU countries. The literature has shown evidence on the effect of changes in political support on stock performance and the importance of political variables in determining stock prices. Yet, there is limited research on the predictive power of frequent changes in political supports on stock performance at a multi-country level, which captures the characteristics of different political systems. To the best of our knowledge, this is the first study to investigate the stock market reaction to changes in political support measured by opinion polls across time (not only on or around election dates) at a multi-country level.

Our findings show that the election uncertainty and election shock affect stock volatility in all EU countries, while the election uncertainty only influences stock returns in core eurozone economies - Austria, Belgium, Finland, France, Germany, and Netherlands. Our results are broadly consistent with the findings of Li and Born (2006), Goodell and Vähämaa (2013), and Kelly et al. (2016), who reveal that elections are associated with periods of increased volatility. Our findings are also in line with Li and Born's (2006) results that stock returns tend to increase when there is a higher uncertainty about electoral outcomes.

Second, our work contributes to literature studying the determinants of election shocks (e.g. Bialkowski, Gottschalk, & Wisniewski, 2008; Pantzalis et al., 2000). Our work is linked to the literature that has highlighted political, institutional, socio-economic factors and press freedom are associated with the magnitude of election shocks, thus influencing the stock markets. While some empirical studies have revealed significant stock market reaction to election shocks (e.g. Bialkowski et al., 2008; Pantzalis et al., 2000), little attention has been given to the accuracy of pre-election polls and its role in anticipating movements in stock volatility and return. Therefore, compared with these previous studies, we explore the effects of the accuracy of prediction markets before elections. Our work is innovative since, for the first time to our knowledge, we can capture market reactions to political uncertainty induced by elections in various political systems. The evidence from stock markets could also be extended to option markets that could be associated with the information flows derived from opinion polls.

Third, we employ a unique hand-collected dataset of polling results for EU countries. In comparison, betting data are commonly used in US studies (for example, Goodell et al. (2020)). Since betting (historical) data are not available for EU countries, polling data are the only feasible indicator of public support for political parties in the absence of election.[5] Polls closely track changes in voters' preferences in short periods, hence reducing omitted variable bias.

Overall, we find that changes in the political support influence the level of stock volatility, therefore, our findings should be of interest to a wide range of market actors, such as participants in options markets and volatility traders. Polling results are signals that affect the way investors perceive the potential changes in political landscape, and hence assist them in their investing decision. During periods of increased volatility induced by election uncertainty, option prices could increase as they provide protection against an unfavourable policy decision or an undesirable election outcome (Kelly et al., 2016). When volatility is above the normal level, traders could cash in by designing strategic option portfolios. The investigation into stock return and stock volatility around elections has important implications for risk-averse investors who seek to hedge against political risk induced by changes in the success likelihood of political parties. Regulators and policy makers should be aware of the impact of pre-election polls on stock markets, so that they could stabilise markets by proposing reforms of pollsters' activities in formulating more accurate surveys for practical applications.

The remainder of this paper is organised as follows. Section 2 reviews the related studies, Section 3 provides the hypothesis of the study, Section 4 presents the methodology and main variables used in the

[4] Polling data is not available for Luxembourg. High and low stock prices data is not available for Lithuania.

[5] Although betting markets data seems to be a possible alternative measure of political support, which also aggregatees information provided by opinion polls, the data of betting markets is only available for current and upcoming elections for five EU countries in our sample (France, Germany, Ireland, Netherlands, and the UK). Therefore, due to the unavailability of historical betting data for countries in our sample, it is not possible to test the robustness of our results against prediction markets.

study, Section 5 describes the dataset, Section 6 discusses empirical results, and Section 7 concludes.

2. Related literature

Prior studies have shown that the uncertainty derived from political events has a significant impact on stock performance. Wisniewski (2016) argues that political developments have the potential to affect movements in stock prices and hence may influence the welling of citizens. Pástor and Veronesi (2013) propose a general equilibrium model of government policy choice to explain how political uncertainty affects stock prices. They argue that investors digest related news and learn about the impact of any given policy by observing the realized profitability in a Bayesian learning process. This learning process about political costs/benefits occurs before the important change in policy regimes which generates a risk premium for political uncertainty as well as increases volatilities and correlations of stock returns. Hill, Korczak, and Korczak (2019) find that the increase in the probability of a vote in favour of Brexit, which results in higher political uncertainty, has a negative impact on stock returns. Kelly et al. (2016) provide empirical evidence about the impact of uncertainty associated with national elections and global summits on option markets.

There have been a number of studies that examine whether and how stock markets react to elections. Focusing on the 2000 US Presidential Election, Knight (2006) investigates the partisan effect of electoral outcome probabilities on stock prices, as presidential candidates' proposed policies are expected to benefit individual companies in different ways. The authour finds that following the Presidential election of George W. Bush in 2000, stock prices of tobacco firms rose by 13%, while stock prices of Microsoft's main competitors fell by 15%. This is due to the differences in Bush and Gore campaign platforms.[6] Goodell et al. (2020) provide evidence of the association between election uncertainty, economic policy uncertainty, and financial market uncertainty during US Presidential elections. They find that changes in the incumbent party re-election probability result in changes in financial uncertainty in the final stage of election campaigns.

Instead of looking at the partisan effect, which assumes that markets or particular industries prefer one political party (e.g. the incumbent party) than another, Goodell and Vähämaa (2013) examine the non-partisan effect and find that the increase of stock market uncertainty measured by VIX is associated with positive changes in the probability of the eventual winner's success.[7] Li and Born (2006) show that stock volatility and stock return are positively associated with the election-induced uncertainty when no candidate with a dominant lead.

Prior studies estimate different measures of volatility to capture market uncertainty. While Li and Born (2006) examine volatility dynamics around the US presidential elections, and Goodell et al. (2020) examine the changes of future realized volatility in response to changes in election uncertainty, we focus on the effect of elections on implied volatility. To the best of our knowledge, this study is the first attempt to address the effects of election uncertainty on Parkinson's (1980) daily intraday volatility, measured by the spread between the highest and lowest points of a daily stock prices (see Section 4.1). According to Engle and Gallo (2006), this measure of stock volatility has a predictive power in forecasting models for realized volatility, thus improving volatility estimates. They also reveal that the model-based realized volatility forecasts have a significant explanatory power in tracking the value of the market-based implied volatility measure *VIX*.

There are clear voids in the literature that this paper addresses. Previous studies have not investigated the immediate impact of frequent movements in political supports on stock returns and volatility at a multi-country level with various political systems. The literature has not also explored the role of pre-election polls in anticipating changes in stocks' volatility and return. To the best of our knowledge, our paper is the first to fill these important gaps and investigate market responses to political uncertainty induced by elections in various political systems. Our paper is unique in utilising a rich, hand collected dataset of polling results for EU countries.

Further, while omitted variables' bias and reverse causality are key concerns in previous related literature, our study employs frequent polling data to capture the election uncertainty, and hence the omitted variables' bias is largely reduced. The use of polling data also facilitates the calculation of a non-partisan election uncertainty indicator (See Section 4.2). This measure does not indicate whether changes in political support are toward or away from the incumbent party, so that the reverse causality is less likely to occur in our empirical analysis. The polling results dataset enables us to extend the studies of Pantzalis et al. (2000) and Bialkowski et al. (2008), by analysing the ex-post effects of electoral outcomes on stock markets. We control for the level of the electoral outcome shock by taking the difference between the actual electoral outcome and the expectation of voters before the election. This helps overcoming the reverse-causality bias between changes in financial markets and changes in the political support.

3. Hypothesis

We posit two hypotheses regarding the relationship between elections and stock markets. The first hypothesis is:

H1. Election uncertainty has a significant impact on stock return and stock volatility in pre-election periods.

As the election process disseminates future policy-related information to markets, it is expected that the uncertainty about the electoral outcome will have a significant impact on stock markets. Investors are usually sensitive to the likelihood of various electoral outcomes and expected to respond to changes in forthcoming electoral outcomes. Therefore, investors are more likely to hold different positions to hedge against alternative election outcomes (e.g. option trading) rather than hold static positions or wait until after the election to hedge or adjust their respective positions (Goodell et al., 2020). For example, prior to the 2020 US presidential election, the trading volume of call and put options with maturities covering election period and aftermath has significantly increased in response to the higher implied volatility prior to the election (Smith & Platt, 2020).[8]

Our paper draws from the Pástor and Veronesi's (2013) theoretical model, which illustrates that investors cannot fully anticipate which policy the government is going to choose, nor the political costs/benefits associated with adopting a given policy. In the context of national elections, political uncertainty is interpreted as the uncertainty about who will be elected, with investors facing the uncertainty about the electoral outcome. Following Pástor and Veronesi's (2013) model, changes in stock prices are driven by three factors: economic shocks, firm-specific shocks, and shocks to political uncertainty. The uncertainty around elections translates in uncertainty about future policy choices. Therefore, election uncertainty affects stock market uncertainty via its impact on the policy environment (Goodell et al., 2020). The

[6] In the tobacco industry, Gore favoured FDA regulation of nicotine as an addictive drug, while Bush did not commit to a specific platform on this issue. In the Microsoft case, no candidates committed to a specific policy regarding Microsoft, but Bush seems to be more pro-Microsoft than Gore.

[7] Election uncertainty in both studies of Goodell and Vähämaa (2013) and Goodell et al. (2020) is measured by daily futures prices around US elections obtained from US presidential election prediction markets (IEM).

[8] There were 6836 open October contracts on 31st January 2020 and 9399 by mid-February 2020 compared to zero open October contracts on 31st January 2016 and 50 contracts by mid-February 2016 in relation to the previous US election in 2016 (Stafford, 2020). October contracts are important as they cover the election period (in November) and aftermath.

uncertainty around the political cost of implementing a given policy may vary across political parties. Hence, information regarding the likelihood of a particular election outcome may reflect both election and political uncertainty. We consider the market effect of election uncertainty through non-partisan and partisan lens.

Regardless of the partisan effect which assumes that markets prefer one political party (e.g. the incumbent party) to another, the relationship between elections and stock markets can be explained under two hypotheses: election uncertainty hypothesis (EUH) and political uncertainty hypothesis (PUH), which are proposed by Goodell and Vähämaa (2013). Given the EUH, it is expected that stock market return and volatility decrease when the uncertainty related to forthcoming election results is reduced and the other way around. The EUH is broadly consistent with the uncertain information hypothesis (UIH) developed by Brown, Harlow, and Tinic (1988), who argue that asset valuations will rise with decreasing uncertainty and that a rise in asset values is associated with a decrease in required return and a consequent reduction of volatility. In the same vein, Bialkowski et al. (2008) argue that any market-wide fluctuations in response to election shocks might drive up the systematic volatility of all stocks listed, resulting in higher option prices prior to elections.

In contrast, the PUH predicts that volatility might increase when the election outcome becomes more certain (Goodell & Vähämaa, 2013). Even though the election uncertainty may be lessened with the increase in the likelihood of the election victory of the eventual largest party, the uncertainty regarding future policy may increase. Changes in election likelihoods reflect changes in information regarding future policy. Such changes are unanticipated by market participants, hence should be reflected by the market through increased volatility (Ederington & Lee, 1993). Therefore, policy uncertainty is expected to be positively associated with stock volatility in the run up to the election.

The EUH and PUH imply opposite signs on the coefficients for stock volatility, whereby election uncertainty is expected to have a positive sign as expected by the EUH, while a negative sign as expected by the PUH. These different effects are driven by the uncertainty regarding future policies. The EUH assumes that the decrease in election uncertainty may reflect less policy uncertainty. Specifically, the information regarding the likelihood of a particular winning party provides clearer information regarding future macroeconomic policy, which is disseminated during campaign period. A decrease in latent macroeconomic uncertainty, economic policy uncertainty, and monetary policy uncertainty predicts a subsequent fall in stock volatility (Megaritis, Vlastakis, & Triantafyllou, 2021). On the other hand, policy uncertainty may increase as predicted by the PUH. The increase in policy uncertainty might be attributed to changes in proposed policies and their effects on stock markets due to unanticipated changes in election likelihoods (Goodell & Vähämaa, 2013).[9]

Under Pástor and Veronesi's (2013) model, political uncertainty is defined as the uncertainty about government actions, hence the probability of re-election of the incumbent party could be an important driver of policy uncertainty, affecting stock return and volatility. With regards to the incumbent party, investors have had an opportunity to learn about its political costs over the previous mandate. Therefore, if there is an increase in the re-election likelihood of the incumbent party when all else is equal, less uncertainty about political costs is to be excepted (Goodell et al., 2020), resulting in less stock return and volatility. This is referred to the partisan election uncertainty.

The second hypothesis is:

H2. Election shocks have significant impacts on stock return and volatility in post-election periods.

We explore the effects of election shocks on stock markets. Stock markets are expected to react to elections uncertainty. Therefore, if the electoral outcome does not correspond to voters' expectation, it would constitute an election shock. Election shocks are measured by the difference between the actual and expected electoral outcomes. It is expected that the higher the polling differences are, the less is the uncertainty, which would result in less stock return and volatility. An accurate prediction of the electoral outcome (when the vote share for the eventual largest party is equal or higher than voters' expectation) helps reducing the surprise and keeps investors informed and prepared. In contrast, an inaccurate prediction (when the vote share for the eventual largest party is smaller than voters' expectation) will result in a political shock for market participants. According to Pantzalis et al. (2000), as the uncertainty over the eventual electoral outcome is resolved, subsequent price changes tend to be positive on average. Observed abnormal return and volatility associated with uncertainty resolution should be higher (lower) for a higher (lower) uncertainty event.

4. Methodology

4.1. Stock indicators

To examine Hypothesis 1 (H_1) and Hypothesis 2 (H_2), following Fan et al. (2020b), we employ two measures of volatility: daily volatility (*Vol*) and abnormal volatility (*Ab_vol*). We calculate *Vol* based on intraday high and low stock prices (Parkinson, 1980):

$$Vol_{it} = \frac{ln\left(S_{it,high}/S_{it,low}\right)}{2\sqrt{ln2}} \quad (1)$$

Where Vol_{it} is the daily stock volatility of country i at time t. $S_{it,high}$ and $S_{it,low}$ are the intraday high and low stock prices respectively. Parkinson's (1980) method, utilised for estimating the historical volatility, uses the information on daily trading ranges such as the highest and lowest prices of the trading day to calculate the variance. This measure is employed in several studies, such as Fan et al. (2020b) and Sapkota (2022).

Ab_vol_{it} is the difference between the daily volatility and the average volatility. We calculate the average volatility (*Avg_vol*) for each country using 200 trading days for the period from $t = -230$ to $t = -30$.[10,11]

$$Ab\_vol_{it} = Vol_{it} - Avg\_vol[-230; -30] \quad (2)$$

Where Ab_vol_{it} is the abnormal volatility of country i at time t. Vol_{it} is the daily stock volatility of country i at time t. *Avg_vol [−230; −30]* is the average volatility during 200 trading days period from t = −230 to t = −30.

For Hypothesis 2 (H_2), which examines how stock volatility reacts during post-election periods, cumulative abnormal volatility (CAV) is used, with abnormal volatilities cumulated over consecutive days. CAV is defined over different event windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7], where election day is on day 0. Following Gande and Parsley (2005), who indicate that a short time window, reduces contamination from other events, we focus on the [0; 1] window; however, longer time windows are used for robustness checks.

We also examine the effect of election uncertainty and prediction on the abnormal return (*Ab_ret*) and cumulative abnormal return (*CAR*). *Ab_ret* is calculated using the mean-adjusted returns method (Fan, Talavera, & Tran, 2020a). The mean daily return for each country

[9] This study does not aim to provide a direct test of EUH and PUH, since it would require data on policies and policy uncertainty, which is beyond the scope of this study. The hypotheses are inferred from the signs of the estimated coefficients.

[10] In the event of market closures, such as national holidays, the time period is extended as necessary.

[11] For robustness tests, we estimate Eqs. (8), (9), (10) and (11), using alternative [−200,−30] and [−230, −60] time windows, and the results, available on request, are robust.

represents the expected daily return and is calculated using 200 trading days, from t = −230 to t = −30. *Ab_ret* is calculated as the difference between the daily log return (*Ret*) and the expected daily average of the log return (*Avg_ret*):

$$Ab\_ret_{it} = Ret_{it} - Avg\_ret[-230;\ -30] \tag{3}$$

CAR is calculated by cumulating *Ab_ret* over consecutive days in different event windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7], where the election day is 0.

4.2. Election uncertainty and election shock indicators

Following Goodell and Vähämaa (2013) and Kelly et al. (2016), we use two variables to measure the non-partisan election uncertainty in the run up to the election: (i) *Pol_unc,* which is the poll spread between the support for the eventual runner up party (RUP) and the eventual largest party (LP) and (ii) *Poll_chg,* which is the change within 30 days in the support for the eventual largest party.[12,13]

$$Pol\_unc_{it} = Support\ for\ RUP_{it} – Support\ for\ LP_{it} \tag{4}$$

$$Poll\_chg_{it} = \Delta Support\ for\ LP_{it} \tag{5}$$

Pol_unc is positive (negative) when the RUP (LP) leads over the LP (RUP), indicating that RUP (LP) is more favoured than LP (RUP) in pre-election polls. An increase in *Pol_unc* implies more election uncertainty since the LP is less certain to win. *Poll_chg* is positive (negative) when there is more (less) support for the LP, hence an increase in *Poll_chg* implies less election uncertainty. It should be noted that *Pol_unc* and *Poll_chg* capture different effects of election uncertainty. While *Pol_unc* captures whether LP leads over RUP in opinion polls, *Poll_chg* measures changes in the support for LP. For example, if the support for LP changes from 30% to 35% and the support for RUP changes from 30% to 37% on date *t*, *Poll_chg* equals 5%, representing the increase in support for LP (less election uncertainty), however *Pol_unc* equals 2%, representing RUP lead over LP by 2% (more election uncertainty). When both LP and RUP have an equal probability of being elected, *Pol_unc* equals zero. These two variables are used separately as well as simultaneously in Eq. (8) to examine Hypothesis 1 (H_1).

The election uncertainty variables in Eqs. (4) and (5) are non-partisan measures as they do not indicate whether changes in electoral probability are toward or away from the incumbent party. To control for the partisan election uncertainty, we explore whether changes in the incumbent party re-election probability correlate with stock return and stock volatility. The absolute value of changes within 30 days in the support for the incumbent party (*Govsup_chg*) is used following Goodell et al. (2020). In case of positive (negative) changes in the re-election probability of the incumbent party, a higher value of *Govsup_chg* indicates an increase (decrease) in support for the incumbent, which implies less (more) election uncertainty due to less (more) policy uncertainty (see Section 3).[14]

$$Govsup\_chg_{it} = |\Delta Support\ for\ the\ \text{incumbent party}_{it}| \tag{6}$$

In line with Hypothesis 2 (H_2), whether the election shock influences stock return and volatility in post-election periods, this paper follows Bélanger and Soroka (2012) in measuring the election shock by calculating the difference between the electoral outcome and the most recent polling result within 30 days prior to the election of LP, as follows[15]:

$$Poll\_diff_{it} = Vote\ share\ for\ LP\ at\ election_{it} – Support\ for\ LP\ in\ the\ most\ recent\ poll_{it} \tag{7}$$

Poll_diff captures the error of polling prediction indicating the deviations between voters' expectation and the actual electoral outcome. *Poll_diff* is positive (negative) when the vote share of LP in the electoral outcome is higher (lower) than the support for LP before election day. The higher the value of *Poll_diff* is, the less surprising the electoral outcome is and vice versa. When electoral outcome meets the voters' expectation, *Poll_diff* equals zero.

4.3. Modelling approaches

We conduct panel data estimations with country and time fixed effects (FEs), which are most commonly applied method in relevant prior studies (e.g. Fan et al., 2020b; Rouatbi, Demir, Kizys, & Zaremba, 2021; Smales, 2020) to examine how stock markets respond to the election uncertainty and election shock. Country FE controls for all time invariant variables that might affect stock markets. Time FE controls for time variant variables that are common for all countries in the sample. Thus, the full set of country and time FE helps reducing the endogeneity bias caused by omitted variables. In addition, the omitted variable bias is further reduced by measuring election uncertainty indicators using changes in frequent polling results. This allows the examination of the reactions of stock markets to election uncertainty across time (not only on or around election days). Hence, given the setting of our paper, the FEM appears to be the most appropriate methodology.[16,17]

First, we examine whether the election uncertainty affects stock volatility and return over the period prior to elections (H1), as follows:

$$y_{it} = \alpha + \beta Pol\_unc_{it} + \gamma Poll\_chg_{it} + \delta Avg\_rat_{it} + \theta Vix\_chg_{it} + \varphi Co_i + \omega Year_t + \varepsilon_{it} \tag{8}$$

y_{it} are daily stock volatility (Vol_{it}), abnormal volatility (Ab_vol_{it}), or abnormal stock return (Ab_ret_{it}). See Section 4.1 for definitions.

Pol_unc_{it} is defined using Eq. (4) and measures the election uncertainty (see Section 4.2). According to the EUH, stock volatility is expected to increase when the election outcome is more uncertain and vice versa. Hence, an increase (decrease) in the *Pol_unc*, which implies more (less) election uncertainty, might be associated with an increase (decrease) in the stock volatility. Although lower *Pol_unc* may lessen the election uncertainty, it may increase the policy uncertainty predicted by the PUH, resulting in higher stock volatility.

Poll_chg is defined in Eq. (5). An increase (decrease) in the *Poll_chg*

[12] The eventual largest party is sometimes different from the winning party. For example, in the 2013 Italian general election, the grand coalition of Democratic Party, the People of Freedom, the Civic Choice, the Union of the Centre and the Radicals led by Enrico Letta took the office albeit the M5S leads the vote share in the election.

[13] From this point, LP and RUP represent the eventual largest party and the eventual runner up party, respectively.

[14] However, testing the effects of policy uncertainty directly is out of the scope of this study. This test would require other data relating to implemented policies and policy uncertainty, which is left for future research.

[15] Bélanger and Soroka (2012) use the difference between the predicted vote share and the actual share received by the incumbent to measure the error of the election prediction model.

[16] Generalised Method of Moment (GMM) is another method employed by more-general literature on market reactions. However, it is not possible to employ GMM method in our setting since GMM requires panels with small number of periods T (time-dimension) and large number of cross-section unit N (cross-sectional dimension) (e.g. Roodman, 2009). Applying the GMM model to a sample with a small cross-section dimension, as in our study (26 EU countries), would lead to biased estimated parameters, biased standard errors and a weakened over-identification test (e.g. Law & Singh, 2014).

[17] Machine learning methods have recently been applied to financial time series forecasting (e.g. Lu, Ma, Xu, & Zhang, 2022), such as predicting the stock market volatility using macroeconomic and financial factors or to examine the co-movements of various financial markets. However, these approaches tend to require a larger dataset to allow the algorithms to adapt correctly and as such seem more appropriate for big data.

implies less (more) election uncertainty, resulting in a decrease (increase) in the stock volatility as predicted by the EUH. However, according to the PUH, when policy uncertainty increases following the increase in *Poll_chg*, stock volatility should increase.[18]

Lower election uncertainty, as measured by either lower *Pol_unc* or higher *Poll_chg*, is expected to be associated with lower *Ab_ret* according to the EUH. For robustness tests, *Pol_unc* and *Poll_chg* are used separately as well as simultaneously in Eq. (8).[19]

Avg_rat_{it} is the average of comprehensive credit rating assigned to country i at time t by the largest three credit rating agencies (CRAs): S&P, Moody's, and Fitch, based on 52-point scale.[20] Sovereign ratings control for economic fundamentals, political and financial conditions of country i at time t.

Vix_chg_{it} is the daily logarithmic changes of CBOE VIX index to control for global risk (as used in the previous literature, see for example, Wang, Lu, He, & Ma, 2020 and Abad, Alsakka, & ap Gwilym, O., 2018).

Co_i and $Year_t$ are country and year FE respectively. ε_{it} is the error term. Huber-White robust standard errors are used to account for heteroscedasticity.[21]

Regarding the partisan election uncertainty, we use *Govsup_chg*, which is defined using Eq. (6), and measures the absolute changes in the re-election probability of the incumbent. Different expectations about the economy reversely influence the re-election probability of the incumbent (Snowberg, Wolfers, & Zitzewitz, 2007). For example, the incumbent may be punished for poor economic performance during its mandate. It should be noted that this paper examines the correlation (and does not focus on causality) between the re-election probability of the incumbent and stock markets.[22] The following model is estimated separately for positive and negative changes in *Govsup_chg*:

$$y_{it} = \alpha + \beta Govsup\_chg_{it} + \delta Avg\_rat_{it} + \theta Vix\_chg_{it} + \varphi Co_i + \omega Year_t + \varepsilon_{it} \quad (9)$$

Eqs. (8) and (9) are also estimated using three sub-samples: "GIIPS", "CORE", and the remaining countries ("REM") groups. In Eurozone, "GIIPS" represents distressed peripheral economies (Greece, Ireland, Italy, Portugal, and Spain), and were most affected during the sovereign debt crisis and characterised by high level of debt. "CORE" represents core eurozone economies (Austria, Belgium, Finland, France, Germany, and Netherlands).

We employ an event study methodology to investigate the reaction of stock market features to elections. Event study is commonly used in the literature to examine how stock markets perform in different countries around multiple election dates (see for example, Bialkowski et al., 2008; Kelly et al., 2016; Pantzalis et al., 2000). In general, event study methodology is one of the most popular tools in applied economics and finance to examine the information contents of shocks and news to financial market behaviour (e.g. Au Yong and Laing (2021), Nozawa and Qiu (2021), Tosun (2021)). In our setting, this method quantifies the elections' economic impact on abnormal stock return and volatility. We calculate CAV_{it+s} (CAR_{it+s}) which is the cumulative abnormal volatility (cumulative abnormal return) over [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6] and [0; 7] time windows, where $t = 0$ is the election day (see Section 4.1). By using short time windows, we can mitigate the information contamination problem. Following Pantzalis et al. (2000), this study uses *t*-test and Wilcoxon test to examine whether the average and median *CAVs* (*CARs*) are significantly different from zero. To examine H2, whether election shock affects stock volatility and stock return, the following model is used:

$$CAV_{it+s} = \alpha + \beta Poll\_diff_{it} + \delta Avg\_rat_{it} + \theta Vix\_chg_{it} + \lambda\, Ideology_{it} + \gamma Y\_crisis_t + \varphi Co_i + \varepsilon_{it} \quad (10)$$

$$CAR_{it+s} = \alpha + \beta Poll\_diff_{it} + \delta Avg\_rat_{it} + \theta Vix\_chg_{it} + \lambda\, Ideology_{it} + \gamma Y\_crisis_t + \varphi Co_i + \varepsilon_{it} \quad (11)$$

Eqs. (10) and (11) are estimated using the sample in days after the elections.

$Poll\_diff_{it}$ is defined as in Eq. (7) and measures the pre-election polls errors. Higher $Poll\_diff_{it}$ results in less election-induced uncertainty which in turn decreases the stock volatility in the post-election period and vice versa.

Ideology measures the right-left position of the eventual largest party.[23] We consider the effect of the ideology of the eventual largest party since it affects future policies (Bialkowski et al., 2008).

Y_crisis_t equals to 1 during European debt crisis (2008–2013) and 0 otherwise to control for the crisis period in the sample.[24,25]

Avg_rat_{it} and Vix_chg_{it} are defined as in Eq. (8). Co_i is country FE. ε_{it} is the error term. Robust Huber-White standard errors are used to account for heteroscedasticity.

5. Data descriptions

We consider elections for the top offices in each country, such as presidential (e.g. in France) and parliamentary (e.g. in UK) elections. Therefore, polling results for LP, RUP, and the incumbent party are used. Opinion polls, which are conducted by various polling firms, in the run up to elections, infer current voters' preferences which determine the political support and the likely winner of forthcoming elections.[26] Opinion polls have become a popular platform for gauging voting intentions; hence they can be used as a proxy for market expectation of election outcomes. Polling data is hand-collected from online articles and publicly available polling datasets whenever available as long as they report the date of the survey's fieldwork or the publication date and

[18] As a robustness check, we estimate Eq. (8) using four dummy variables, *High_pol_unc* and *Low_pol_unc* instead of *Pol_unc,* and *High_poll_chg* and *Low_poll_chg* instead of *Pol_chg,* indicating high and low election uncertainty than the mean. The results, available on request, are consistent with our findings in Section 6.1.

[19] There are no collinearity concerns when adding these variables into the same regression since there is a weak negative correlation between *Poll_chg* and *Pol_unc* (−0.098).

[20] 52-point numerical comprehensive credit rating scale is employed to capture the outlook and watch status together with the actual ratings. Watch and outlook status are designed to signal rating reviews and possible future rating changes (Tran, Vu, Klusak, Kraemer, & Hoanf, 2021).

[21] As robustness test, we estimate Eq. (8) using standard errors clustered at *time-period* level. The *time- period* is a category variable equals to 0 for the pre-crisis period (before 2008), 1 for the crisis period (from 2008 to 2010), and 2 for the post-crisis period (after 2010). The results are consistent and show that *Vol* is positively affected by *Pol_unc,* while *Poll_chg* is not statistically significant in any of the regressions (Table A.1 in the Appendix).

[22] The non-partisan election uncertainty measure in Eq. (8) does not indicate whether changes in probability are toward or away from the incumbent party (Goodell et al., 2020), hence the reverse causality is less likely to occur.

[23] The variable *Ideology* was collected from the Manifesto Project Dataset- https://manifesto-project.wzb.eu/.

[24] Given the small number of observations (91 elections), we do not control for all the year dummies as they would saturate the model while not being statistically significant. Previous studies (e.g. Danbolt, Siganos, & Vagenas-Nanos, 2015) which employ the event study approach only control for the country FE, and do not control for the time FE.

[25] For robustness checks, Eqs. (10) and (11) are estimated with/without year FE instead of using *Y_crisis* or replacing *Y_crisis* by *Y_criris2*. *Y_criris2* equals to 0 for pre-crisis period (before 2008), 1 for crisis period (2008–2013), and 2 for post-crisis period (2013–2019). Consistent results, available on request, are obtained.

[26] Polling firms have been criticised for failing to predict some recent political events, such as Brexit referendum. However, Jennings and Wlezien (2018) find no evidence to support the claims of a crisis in the accuracy of polling.

the agency that performed the polling.[27] Following Kelly et al. (2016), we obtain polling results from different pollsters instead of cherry picking since there is no clear benchmark to identify which poll is more reliable. The survey mode could give a rise to the sampling error (Pasek, 2015). Hence, most pollsters have incorporated weightings and other techniques that are designed to increase the representativeness compared to other measures of political support. Notably, the use of weighting protocols based on relevant population parameters is the most pervasive technique.

We unify polling results for EU countries (excluding Luxembourg for which there are no data available) from January 01, 2005 to September 03, 2019. Polling results are pooled together in a single poll of polls by taking the average polls estimate when more than one poll is recorded in a single day (Jennings & Wlezien, 2018). The sample period covers 95 elections that have polling data available within 30 days prior to election days.

The elected dataset, which includes election dates and electoral outcomes, is collected from the European Election Database.[28] For election outcomes that report the vote share for a coalition of multiple parties, polling results for the coalition are used if available, otherwise the sum of polling results of all party members in the coalition is used. This is a common approach in the literature (Kelly et al., 2016). We collect stock data from Thomson Eikon, for which the country stock index is selected following Afonso, Furceri, and Gomes (2012) and Abad et al. (2018). For countries with more than one index, the headline index is selected. Lithuania stock index does not have daily high and low prices, therefore it is excluded from the analysis. When matching the stock dataset and election dataset, the final sample includes 91 elections for 26 EU countries (excluding Luxembourg and Lithuania).

Table 1 reports the descriptive statistics of the opinion polls for the support for LP and RUP by country. Column 2 shows that the starting dates are not the same for all countries due to data availability. The end date included corresponds to the most recent election that took place before 03/09/2019 (Column 3). The dataset includes 9341 (9225) observations of the support for LP (RUP).[29] In general, the mean value of the support for LP is higher than RUP except for four countries including Denmark, Italy, Slovenia, and UK (Columns 5 and 8).

Table 2 summarises the election data by country. France and Greece held elections more frequently than others (six elections) during the sample period (Column 2). The two-round system is used in French presidential elections, which are considered as two separate election dates in this paper (following Kelly et al. (2016)). France therefore has six election dates in three years (2007, 2012, and 2017). In the case of Greece, there are two elections in 2012 and two elections in 2015. Such high frequency of elections was driven by poor economic conditions as a result of the sovereign debt crisis. Due to limited polling data availability, the sample includes one election in Malta and one election in Cyprus.

Column 4 of Table 2 reports the average of the difference between electoral outcome and the most recent voters' expectation within 30 days prior to the election (*Poll_diff*). This is the difference between the vote share for LP in the electoral outcome and pre-election polling result. Out of 26 EU countries, eight countries (Belgium, Cyprus, Finland, France, Germany, Hungary, Ireland and Poland) show negative *Poll_diff*, whereby the vote share for LP is lower than expected. This implies that there is a higher election-induced uncertainty in these countries. However, in all countries, the support for LP is higher than the support for RUP in the recent poll ahead of the election (Column 5), suggesting that the success likelihood of LP is more certain.

Table 3 presents the definition and summary statistics for the variables used in the empirical analysis. The mean value of *Pol_unc* is −3.27% indicating that LP leads over RUP by 3.27% on average. The highest *Pol_unc* is 29.5% (on 4th Feb 2011 in Italy) while the lowest is −53% (on 17th Nov 2009 in Hungary).[30] The average *Poll_diff* indicates that the support for LP in the election is slightly higher than expected by 0.813%. The low level of *Ab_ret* in Greece, along with the high level of *Vol* (10.04%) and *Ab_vol* (8.37%) on 24th June 2016 are the result of the spill over effect of Brexit referendum. Aristeidis and Elias (2018) show that the referendum's results' announcement (24th June 2016) immediately affects Greek indices due to the increase in economic and political uncertainty, but the effect only presented for a short period.

6. Empirical results

6.1. Election uncertainty and stock markets

Eq. (8) is estimated to explore the impact of election uncertainty on stock volatility (*Vol*) and abnormal volatility (*Ab_vol*) in EU countries. The key independent variables are the two election uncertainty indicators: *Pol_unc* and *Poll_chg* (See Section 4.2). To interpret the coefficients, we calculate both the marginal effect and the economic significance of the explanatory variables. The former is calculated for *Pol_unc*, by taking the median ratio of *Pol_unc* coefficient to the fitted absolute value of *Vol (Ab_vol)*, while setting *Pol_unc* to zero. The marginal effect of *Poll_chg* is calculated in the same way. The economic significance is calculated following Mitton (2022), as the absolute value of a one-standard-deviation change in the explanatory variable multiplied by coefficient, and the resulting change in the dependent variable is expressed as a percentage of its standard deviation.

Table 4 reports the results of Eq. (8) for the full sample. The results show that *Pol_unc* is positive and significant in all estimations (Columns 1, 3, 4, and 6). *Vol* is positively affected by *Pol_unc*, with the coefficient is 0.002 (the marginal effect is 0.184% and economic significance is 3.360%). *Ab_vol* is positively affected by *Pol_unc,* with the coefficient is 0.001 (the marginal effect is 1.174% and economic significance 1.818%). The findings suggest that stock volatility increases (decreases) ahead of the elections due to the higher (lower) election uncertainty measured by higher (lower) *Pol_unc*. The effect of election uncertainty on stock volatility goes beyond the effect of global risk and national economy since Eq. (8) controls for changes in CBOE VIX index and sovereign credit ratings. The findings are consistent with H_1, the EUH and prior studies (e.g. Li & Born, 2006). The uncertainty related to the forthcoming election result can affect the market uncertainty via its impact on the future policy choices. Investors are unable to fully anticipate which policy the wining party is going to choose, and the political costs/benefits associated with adopting a given policy.

Poll_chg is not statistically significant in any of the regressions, both with and without *Pol_unc* (Columns 2, 3, 5, and 6). This indicates that *Poll_chg* is not the dominant political determinant of changes in stock

[27] We date each poll by the survey end-date when polls are conducted over multiple days. In the case that the fieldwork date is not available, a careful procedure is taken to calibrate the date following Jennings and Wlezien (2013), whereby the publication date is used as the survey end-date.

[28] The election data is collected from original sources, prepared and made available by the Norwegian Centre for Research Data (NSD). Available at: http://www.nsd.uib.no/european_election_database/about/. Data of recent elections, which are not updated on NSD, is obtained from government websites or newspapers.

[29] There is a slight difference between the number of observations between LP and RUP in six countries (Belgium, Czech, Italy, Slovakia, Slovenia and Spain). Such difference is attributed to the fact that RUP might be either party or coalition of multiple parties, which only were formed prior to the election day, so that there is no data across time as the data for LP.

[30] In the 2013 Italian general election, the M5S won the most votes of all parties despite the support for M5S on 04/02/2011 is only 0.9% (less than the support for the incumbent party PDL by 29.5%). Prior to the 2010 Hungarian parliamentary election, there was a significant fall in the popularity of the Socialist party (the incumbent party) which helped Viktor Orbán lead Fidesz to the victory in 2010.

Table 1
Descriptive statistics of opinion polls.

			Support for eventual largest party			Support for eventual runner up party		
Country	Start date	End date	No. of Obs. ($N = 9341$)	Mean (%)	Std. Dev. (%)	No. of Obs. ($N = 9225$)	Mean (%)	Std. Dev. (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Austria	12/07/2006	09/10/2017	192	25.76	4.85	192	25.24	3.37
Belgium	29/04/2007	14/05/2019	9	25.44	6.42	6	13.13	8.83
Bulgaria	03/07/2009	22/03/2017	33	26.14	4.92	33	22.50	4.74
Croatia	04/07/2008	03/09/2016	101	33.09	3.60	101	25.57	4.88
Cyprus	17/07/2015	13/05/2016	6	33.63	1.59	6	26.30	1.46
Czech	10/01/2005	17/10/2017	143	27.05	3.80	112	7.76	5.88
Denmark	07/02/2005	04/06/2019	349	23.43	3.00	349	23.82	5.45
Estonia	31/07/2006	28/02/2019	91	26.94	4.65	91	25.96	3.00
Finland	31/01/2006	09/04/2019	110	20.86	2.79	110	14.78	5.59
France	22/03/2007	05/05/2017	117	30.20	12.92	117	28.36	7.15
Germany	04/01/2005	22/09/2017	2022	36.97	3.62	2022	26.23	3.16
Greece	28/08/2007	05/07/2019	370	25.76	6.11	370	17.64	7.76
Hungary	28/03/2006	03/04/2018	188	47.96	5.54	188	20.34	4.55
Ireland	20/05/2007	23/02/2016	66	28.97	4.55	66	21.71	4.03
Italy	17/03/2006	16/02/2018	1122	19.26	9.06	1121	30.09	4.69
Latvia	02/07/2010	30/09/2018	16	19.86	3.76	16	10.06	4.83
Malta	07/01/2012	03/03/2013	5	51.72	0.64	5	24.88	2.83
Netherlands	10/06/2010	14/03/2017	1681	18.14	2.82	1681	15.82	3.00
Poland	09/01/2005	22/10/2015	301	30.38	6.12	301	28.53	5.14
Portugal	21/01/2005	30/09/2015	114	40.42	4.18	114	31.55	2.95
Romania	27/06/2008	07/12/2016	13	36.99	5.50	13	30.18	5.48
Slovakia	31/05/2010	14/02/2016	5	30.96	11.94	4	8.95	3.81
Slovenia	11/09/2008	01/06/2018	125	15.82	5.84	46	18.74	8.18
Spain	04/01/2005	27/04/2019	746	33.67	8.91	745	30.05	7.18
Sweden	22/08/2010	06/09/2018	326	28.02	3.66	326	23.93	4.92
UK	03/05/2005	07/06/2017	1090	35.64	4.04	1090	37.58	4.94

This Table presents descriptive statistics of the support for the eventual largest party and the runner up party in the run up to elections. The sample covers 26 EU countries (excluding Luxembourg and Lithuania) for the period from 2005 to 2019.

volatility, which instead is represented by *Pol_unc*. The findings show that changes in the likelihood of success of the eventual largest party does not determine market volatility, which is instead influenced by the distance between the two leading competitive parties in opinion polls.

Vix_chg has a positive and significant effect on *Vol* and *Ab_vol* in all regressions. This implies that the higher the global risk is, the more volatile the stock markets become, which is consistent with Abad et al.'s (2018) findings. *Avg_rat* has a negative effect on *Vol* (Panel A), indicating that stock markets are less volatile in countries with higher sovereign credit rating.[31]

Eq. (8) is also estimated using country sub-groups: "GIIPS", "CORE", and the remaining countries ("REM") groups, defined in Section 4.3. The results for *Vol* and *Ab_vol* are reported in Tables 5 and 6 respectively.[32]

Table 5 shows that *Pol_unc* have different effects on *Vol* in GIIPS compared with the other two country groups. While *Pol_unc* has an insignificant effect on *Vol* in GIIPS group, the coefficient of *Pol_unc* is positive and significant, consistent with the EUH, in CORE and REM groups. In CORE (REM) sub-sample, the coefficient of *Pol_unc* is 0.007 (0.003), implying that the marginal effect is 0.830% (0.388%) and the economic significance of 8.416% (7.008%) (Columns 4 and 6 (7 and 9)). The *Vol* reacts more strongly to changes in *Pol_unc* in CORE group compared to REM group. This result might be driven by differences in economic conditions, political stability, and media effect between the groups. The magnitude of the election uncertainty is associated with the level of political, economic, and press freedom since these factors determine how much information about political parties are available to the public (Pantzalis et al., 2000). Given the long-lasting debt crisis, GIIPS countries have experienced a high level of macroeconomic uncertainty and policy uncertainty for a long period, which tend to mute the effect of the election uncertainty on the performance of financial markets. According to Pástor and Veronesi (2013), during weaker economic conditions, a policy change is more likely to happen since the current policy is typically perceived as harmful. Therefore, the asymmetric effect on GIIPS countries compared to the other sub-group countries might relate to the policy uncertainty as expected by PUH.

Similarly, Table 6 shows a positive and significant effect of *Pol_unc* on *Ab_vol* in CORE and REM groups. In the CORE (REM) sub-sample, the coefficient of *Pol_unc* is 0.003 (0.004), implying that the marginal effect is 2.195% (3.853%) and the economic significance is 3.731% (9.474%). In contrast, *Ab_vol* is negatively affected by *Pol_unc* in GIIPS, with the coefficient of *Pol_unc* is −0.003 (the marginal effect is −1.745% and the economic significance is 5.155%) (Column 1). This difference in stock reactions in the GIIPS group might be driven by the policy uncertainty as predicted by the PUH, since replacing poorly performing policies during weaker economic and financial conditions is expected to provide protection to the financial markets (Pástor & Veronesi, 2013). Although the election uncertainty might increase as *Pol_unc* increases, the uncertainty regarding future policy may decrease. Hence, investors may favour the proposed policy, which in turn may reduce stock markets' volatility.

Tables 5 and 6 show that *Poll_chg* has insignificant impact on both *Vol* and *Ab_vol*. As *Poll_chg* in country sub-groups has a small variation, it is less likely to influence stock volatility.[33] The coefficients of *Vix_chg* are largely consistent with the results for the full sample in Table 4.

Eq. (9) considers the correlation between the partisan election

[31] To control for any potential expansionary patterns before elections, the potential reversed trend in the post-election period, and any potential country-specific effects, we estimate Eq. (8) adding *Government Expenditure* and *Fiscal Balance* variables. Results are robust (See Table A.2 in the Appendix).

[32] We estimate Eq. (8) for two sub-samples: (i) global financial crisis period of 2008–2010, and (ii) non-crisis period. Results, available on request, are consistent and similar across both crisis and non-crisis periods, implying that our results are not driven by the global financial crisis.

[33] The standard deviation of *Poll_chg* in GIIPS, CORE, and REM group is 2.607%, 1.403%, and 3.183% respectively. The standard deviation of *Pol_unc* in GIIPS, CORE, and REM group is 11.639%, 6.710%, and 11.086% respectively. The summary statistics for sub-sample groups are available upon request.

Table 2
Elections' descriptive statistics.

Country	No. of elections	Years of election	Poll_diff (%)	Poll_spread (%)
(1)	(2)	(3)	(4)	(5)
Austria	4	2006, 2008, 2013, 2017	1.60	1.88
Belgium	3	2010, 2014, 2019	−6.34	1.47
Bulgaria	4	2009, 2013, 2014, 2017	1.61	9.09
Croatia	3	2011, 2015, 2016	5.22	1.83
Cyprus	1	2016	−1.11	5.80
Czech	3	2010, 2013, 2017	0.97	8.36
Denmark	4	2005, 2011, 2015, 2019	0.11	4.29
Estonia	4	2007, 2011, 2015, 2019	1.35	1.78
Finland	4	2007, 2011, 2015, 2019	−1.42	3.85
France*	6	2007, 2012, 2017	−1.28	9.03
Germany	4	2005, 2009, 2013, 2017	−1.12	10.75
Greece**	6	2007, 2012, 2015, 2019	4.84	5.27
Hungary	4	2006, 2010, 2014, 2018	−1.87	24.50
Ireland	3	2007, 2011, 2016	−1.28	14.67
Italy	4	2006, 2008, 2013, 2018	2.32	0.89
Latvia	3	2010, 2014, 2018	1.59	5.74
Malta	1	2013	14.63	12.00
Netherlands	2	2012, 2017	3.78	1.81
Poland	4	2005, 2007, 2011, 2015	−0.19	8.54
Portugal	4	2005, 2009, 2011, 2015	0.46	8.29
Romania	3	2008, 2012, 2016	0.72	21.13
Slovakia	3	2010, 2012, 2016	0.94	25.22
Slovenia	3	2011, 2014, 2018	3.27	3.55
Spain	5	2008, 2011, 2015, 2016, 2019	0.75	9.75
Sweden	2	2014, 2018	2.62	7.75
UK	4	2005, 2010, 2015, 2017	0.26	5.39
Total	91			

This Table presents the descriptive statistics of 91 elections in 26 EU countries (excluding Luxembourg and Lithuania) from 2005 to 2019 that have polling data available within 30 days ahead of the election. *Poll_diff* is the average difference between the electoral outcome and the most recent polling result for the eventual largest party within 30 days prior to the election. *Poll_spread* is the average lead of eventual largest party over the eventual runner up party in the most recent poll within 30 days prior to the election.
(*) Presidential elections in France have 2 rounds.
(**) Greece has 2 elections in 2012 and 2 elections in 2015.

Table 3
Variables' definitions and summary statistics.

Variables	Definition	Mean	Std. dev.	Min	Max
Vol (%)	Volatility (Parkinson, 1980) $Vol_{it} = \frac{ln(S_{it,high}/S_{it,low})}{2\sqrt{ln2}}$	0.896	0.605	0.000	10.040
Ab_vol (%)	Abnormal volatility equals to volatility today t = 0 minus the average volatility over the period [−230; −30] (Fan et al., 2020b): $Ab\_vol_{it} = Vol_{it} - Avg\_vol[-230;-30]$	−0.014	0.559	−1.831	8.371
Ab_ret (%)	Abnormal return equals to log return today t = 0 minus the expected return calculated by average return over the period [−230; −30] $Ab\_ret_{it} = Ret_{it} - Avg\_ret[-230;-30]$	−0.005	1.323	−14.358	13.413
Poll_chg (%)	Changes within 30 days in the support for the eventual largest party before the election (Goodell & Vähämaa, 2013). $Poll\_chg_{it} = \Delta$ *Support for* LP_{it}	0.027	2.373	−17.500	19.500
Pol_unc (%)	The negative poll spread between the support for the eventual largest party (LP) and the eventual runner up party (RUP) (Kelly et al., 2016). $Pol\_unc_{it} =$ *Support for* RUP_{it} − *Support for* LP_{it}	−3.273	10.163	−53.000	29.500
Avg_rat	Average sovereign credit rating of the largest CRAs: S&P, Moody's, and Fitch based on 52-point scale (Altdörfer et al., 2019). The 52-point CCR is employed to capture the outlook and watch status together with the actual ratings. The top rating triple- A (AAA/ Aaa) is attributed to the level 52. It is followed by AA+/ Aa1 = 49, AA/ Aa2 = 46, AA-/ Aa3 = 43… CC/ Ca to C/SD/D = 1. This scale also accounts for outlook/watch actions by adjusting "+/-1" for positive/negative outlook; "+/-2" for positive/negative watch; and "0" for stable outlook.	43.780	12.103	2.000	52.000
Vix_chg (%)	The daily logarithmic changes of CBOE VIX index (Thomson Reuters Eikon) (Abad et al., 2018, Wang et al., 2020).	−0.165	6.910	−17.791	23.200
Poll_diff (%)	The difference between election outcome and the most recent polling result for the eventual largest party within 30 days ahead of elections (Bélanger & Soroka, 2012). $Poll\_diff_{it} =$ *Vote share for LP at election*$_{it}$ − *Support for LP in the most recent poll*$_{it}$	0.813	4.158	−9.540	14.630
Ideology	Right-left position of the eventual largest party (Manifesto Project Dataset - https://manifesto-project.wzb.eu/).	−3.663	16.872	−52.670	35.411
Y_crisis	Dummy variable equals to one during sovereign debt crisis (2008–2013) and 0 otherwise.	0.385	0.489	0.000	1.000
Govsup_chg (%)	The absolute value of changes within 30 days in the support for the incumbent party (Goodell et al., 2020).	1.541	1.732	0.000	16.000

The table reports the definitions and summary statistics of all variables used in in the empirical analysis.
Note: *Vix_chg* data is winsorised at the top and bottom 1% to remove outliers.

Table 4
The effect of non-partisan election uncertainty on stock volatility and abnormal volatility – full sample's results.

Variables	Panel A: Vol			Panel B: Ab_vol		
	(1)	(2)	(3)	(4)	(5)	(6)
Pol_unc	0.002*		0.002*	0.001*		0.001*
	(0.001)		(0.001)	(0.001)		(0.001)
Poll_chg		0.000	0.001		−0.000	0.001
		(0.003)	(0.003)		(0.003)	(0.003)
Avg_rat	−0.008***	−0.006***	−0.008***	0.002	0.004**	0.002
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Vix_chg	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	1.085***	0.903***	1.084***	−0.141**	−0.303***	−0.142**
	(0.059)	(0.113)	(0.059)	(0.060)	(0.112)	(0.059)
Observations	9216	9332	9216	9215	9331	9215
R-squared	0.257	0.257	0.257	0.134	0.134	0.134
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

The Table presents the results of Eq. (8) using the full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. Dependent variables are daily volatility (*Vol*) and abnormal volatility (*Ab_vol)* presented in Panel A and Panel B respectively. *Pol_unc* is the negative poll spread between the support for the eventual largest party and the eventual runner up party. *Poll_chg* measures changes within 30 days in the support for the eventual largest party before the election. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of both country and year dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

uncertainty, measured by *Govsup_chg*, and both *Vol* and *Ab_vol*. This analysis examines whether investors favour the incumbent party as they know about the political costs of this party while it has been in power. Eq. (9) is estimated separately for the positive and negative changes of *Govsup_chg* and the results are reported in Table 7. In the case of positive changes, *Govsup_chg* and *Vol (Ab_vol)* are, as expected, negatively correlated in all estimations using the full sample, GIIPS, and REM groups (Panel A). In the case of negative changes, *Govsup_chg* and *Vol (Ab_vol)* are, as expected, positively correlated in the CORE group (Panel B). The findings indicate that the stock markets are less (more) volatile when the support for the incumbent increases (decreases) resulting in less (more) policy uncertainty. It appears that investors in CORE group are more sensible to the negative news. Investors might pay more attention on negative news about government support if they are more risk averse.

We also examine the non-partisan effect of election uncertainty on stock abnormal return (*Ab_ret*). The results are reported in Table 8. *Pol_unc* and *Poll_chg* appear to have an insignificant impact on *Ab_ret* in almost all estimations, except for the CORE countries. In the CORE group, *Poll_chg* has a negative effect on *Ab_ret*, with the coefficient of *Poll_chg* is −0.030. Given the popularity of opinion polls in CORE countries, stock return might be more sensitive to changes in polling results compared to those in other countries. Investors in CORE countries might use opinion polls as a reliable signal of electoral prospect, so that the effect of election uncertainty on stock returns is homogeneous. This finding is consistent with the EUH, highlighting that the stock market return decreases when the uncertainty about forthcoming election results (as measured by higher *Poll_chg*) is reduced. Eq. (9) is also estimated to examine the correlation between the partisan election uncertainty *(Govsup_chg)* and *Ab_ret*. The results (available on request) show an insignificant relationship between *Govsup_chg* and *Ab_ret*.

6.2. Stock markets around election days

We examine how stock volatility changes in the post-election period using Event study methodology. The effect of electoral outcome shock on stock volatility is estimated using Eq. (10). The dependent variable is cumulative abnormal volatility CAV, which is the sum of abnormal volatility over different event windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6] and [0; 7], where the election day is on date 0.

Table 9 reports changes in volatility following the election day. *t*-test and Wilcoxon test are used to examine whether the average and median CAVs are significantly different from zero (Pantzalis et al., 2000). The mean and median values of CAVs in [0; 1] window are 0.296% and 0.068% respectively, statistically significant at 5% level, implying that stock markets are more volatile on election days and the following day after the election. The rise in stock volatility continues for a number of days thereafter, with the mean CAVs significantly increases from 0.296% in [0; 1] time window to 0.341% (0.352%) in [0; 2] ([0; 3]) time window. This implies that within 3 days period after the election dates, the ex-post disagreement among market participants increases significantly. These findings are consistent with Bialkowski et al. (2008), who show that following high abnormal volatility, markets tend to settle in 15 trading days following elections. In some countries, the official announcement about government formation may not be released until several days after the elections due to the need to form coalitions. After elections, the political parties, usually led by the prime ministerial candidate from the largest party, enter negotiations over the partisan composition of the cabinet (Mattila & Raunio, 2004). Unless a single party wins by huge majority, governments tend to emerge through a process of inter-party bargaining in which electoral outcom0es provide only the initial bargaining weights to form a new government.

Eq. (10) is estimated to examine whether election shocks determine changes in CAVs, and results are reported in Table 10. The main variable of interest is *Poll_diff* (defined in Section 4.2). The results show that the *Poll_diff* has a negative and significant effect on the CAV across all time window, except for the [0; 1] time window. Particularly, a 1% increase in *Poll_diff* is associated with 0.058% decrease in CAV within [0; 2] time window (the marginal effect is −9.642% and the economic significance is 18.988%), with the effect of *Poll_diff* lasting until day 7 after the election.[34] This finding is consistent with H2, indicating that stock markets are less volatile when there is less election induced-uncertainty measured by higher *Poll_diff*. This is due to investors being less surprised and more informed about the electoral outcome following the polling result of LP. Therefore, the accuracy of polling results can be added as a key determinant of election shocks which influence the stock markets. Although prediction markets have failed to predict some of the recent political events such as the Brexit referendum or the victory of Donald Trump in the 2016 US election, their role as a proxy for market expectation of the election outcomes cannot be negated (Goodell et al., 2020). Regarding the control variables, *Vix_chg* has a statistically positive effect on CAV in [0; 1] and [0; 2] time windows, while *Avg_rat* has a

[34] The marginal effect and economic significance of *Poll_diff* is calculated in the same way as *Poll_chg* and *Pol_unc* (See Section 6.1).

Table 5
The effect of non-partisan election uncertainty on stock volatility – country groups' results.

Variables	GIIPS			CORE			REM		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pol_unc	−0.002		−0.002	0.007***		0.007***	0.003*		0.003*
	(0.002)		(0.002)	(0.002)		(0.002)	(0.002)		(0.002)
Poll_chg		0.007	0.008		−0.003	−0.001		−0.003	−0.002
		(0.007)	(0.007)		(0.006)	(0.007)		(0.003)	(0.003)
Avg_rat	0.006	0.006	0.006	0.036***	0.030***	0.036***	−0.009	0.002	0.005***
	(0.006)	(0.006)	(0.006)	(0.011)	(0.011)	(0.011)	(0.006)	(0.007)	(0.001)
Vix_chg	0.005*	0.005*	0.006*	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.242	0.826***	0.240	−1.229**	−0.922*	−1.229**	1.085***	0.684***	0.362***
	(0.303)	(0.178)	(0.303)	(0.549)	(0.547)	(0.549)	(0.313)	(0.206)	(0.074)
Observations	2416	2418	2416	4128	4131	4128	2672	2783	2672
R-squared	0.232	0.232	0.233	0.232	0.229	0.232	0.224	0.228	0.219
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

The Table presents the results of Eq. (8) using sub-group countries GIIPS, CORE, and REM from 01/01/2005 to 03/09/2019. In Eurozone, "GIIPS" represents distressed peripheral economies (Greece, Ireland, Italy, Portugal, and Spain), while "CORE" represents core eurozone economies (Austria, Belgium, Finland, France, Germany, and Netherlands). "REM" is the remaining countries. The dependent variable is the daily volatility (*Vol*). *Pol_unc* is given as the negative of the election poll spread between the eventual largest and runner up parties. *Poll_chg* is changes within 30 days in % support for the eventual largest party before the election. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of both country and year dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

Table 6
The effect of non-partisan election uncertainty on stock abnormal volatility – country groups' results.

Variables	GIIPS			CORE			REM		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pol_unc	−0.003*		−0.002	0.003**		0.003*	0.004***		0.004***
	(0.002)		(0.002)	(0.002)		(0.002)	(0.002)		(0.002)
Poll_chg		0.007	0.007		−0.004	−0.003		−0.003	−0.001
		(0.007)	(0.007)		(0.006)	(0.006)		(0.003)	(0.003)
Avg_rat	0.009	0.009	0.009	0.009	0.006	0.009	0.001	0.011	0.001
	(0.006)	(0.006)	(0.006)	(0.011)	(0.011)	(0.011)	(0.006)	(0.008)	(0.007)
Vix_chg	0.006*	0.006*	0.006*	0.006***	0.006***	0.006***	0.006***	0.005***	0.006***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Constant	−0.533*	−0.262	−0.535*	−0.569	−0.423	−0.566	−0.104	−0.198	−0.110
	(0.313)	(0.186)	(0.314)	(0.538)	(0.534)	(0.539)	(0.322)	(0.216)	(0.323)
Observations	2416	2418	2416	4128	4131	4128	2671	2782	2671
R-squared	0.103	0.103	0.104	0.183	0.182	0.183	0.174	0.173	0.174
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

The Table presents the results of Eq. (8) using sub-group countries GIIPS, CORE, and REM from 01/01/2005 to 03/09/2019 . In Eurozone, "GIIPS" represents distressed peripheral economies (Greece, Ireland, Italy, Portugal, and Spain), while "CORE" represents core eurozone economies (Austria, Belgium, Finland, France, Germany, and Netherlands). "REM" is the remaining countries. The dependent variable is abnormal volatility (*Ab_vol*). *Pol_unc* is given as the negative of the election poll spread between the eventual largest and runner up parties. *Poll_chg* is changes within 30 days in % support for the eventual largest party before the election. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of both country and year dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

statistically negative effect on CAV in [0; 1] time window. *Ideology* does not appear to have a significant effect on CAV across all time windows.

We also examine how stock return reacts following election days using event study and the effect of the election shock on stock return using Eq. (11). The dependent variable is the cumulative abnormal return CAR, which is the sum of abnormal return over different event windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7], where the election date is on date 0. The results of the event study (available on request) show that the coefficients of CAR are not significant, indicating that stock return are not significantly affected by elections. This finding is consistent with Bialkowski et al.'s findings (2008), who provide evidence of increased stock volatility accompanied by negligible CARs during elections. They argue that much of the future policy uncertainty is resolved during balloting periods, hence stock prices can adjust dramatically in either direction causing stock volatility to increase while having an insignificant effect on stock return.[35] Disagreement among investors' views on stock valuation could be driven by their different views on electoral outcomes and the prospect of future policies (e.g. Boutchkova, Doshi, Durnev, & Molchanov, 2012; Knight, 2006; Wagner, Zeckhauser, & Ziegler, 2018). Future policies are expected to benefit firms in different ways. For example, Wagner et al. (2018) find that in the US, only the values of high-tax and domestically focused firms increased after Trump's victory in 2016 due to the prospect of lower corporate taxes and more restrictive trade policies. The results of Eq.

[35] Bialkowski et al. (2008) examine changes in stock return during the days after elections using a sample of 27 OECD countries from 1980s to 2004. They find that the mean of CARs within different time windows (e.g. 2, 5, 10, and 25 days) after elections is statistically insignificant.

Table 7
The effect of partisan election uncertainty on stock volatility and abnormal volatility.

Panel A. Positive changes in the re-election probability of the incumbent party

Variables	Full sample		GIIPS		CORE		REM	
	Vol	Ab_vol	Vol	Ab_vol	Vol	Ab_vol	Vol	Ab_vol
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Govsup_chg	−0.014***	−0.012**	−0.022**	−0.018**	0.003	0.001	−0.012**	−0.005
	(0.005)	(0.005)	(0.009)	(0.009)	(0.012)	(0.011)	(0.006)	(0.006)
Avg_rat	−0.007**	0.002	0.001	0.002	0.021	−0.009	0.001	0.002
	(0.003)	(0.003)	(0.008)	(0.008)	(0.016)	(0.016)	(0.004)	(0.009)
Vix_chg	0.006***	0.006***	0.001	0.002	0.008***	0.009***	0.008***	0.008***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)
Constant	1.029***	−0.126	1.053***	0.075	−0.419	0.409	0.643***	0.041
	(0.159)	(0.159)	(0.256)	(0.265)	(0.805)	(0.782)	(0.229)	(0.268)
Observations	4343	4343	1219	1219	1829	1829	1295	1295
R-squared	0.256	0.136	0.247	0.114	0.221	0.210	0.183	0.149
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Panel B. Negative changes in the re-election probability of the incumbent party

Variables	Full sample		GIIPS		CORE		REM	
	Vol	Ab_vol	Vol	Ab_vol	Vol	Ab_vol	Vol	Ab_vol
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Govsup_chg	−0.002	−0.002	−0.010	−0.007	0.029*	0.031*	−0.002	−0.001
	(0.005)	(0.005)	(0.011)	(0.011)	(0.016)	(0.016)	(0.006)	(0.006)
Avg_rat	−0.008***	0.002	−0.001	0.002	0.036**	0.008	−0.028***	−0.008
	(0.003)	(0.003)	(0.007)	(0.008)	(0.016)	(0.015)	(0.008)	(0.007)
Vix_chg	0.005***	0.005**	0.010**	0.010**	0.003	0.003	0.002	0.001
	(0.002)	(0.002)	(0.005)	(0.005)	(0.003)	(0.003)	(0.002)	(0.002)
Constant	0.958***	−0.265*	0.966***	−0.096	−1.328*	−0.596	1.436***	0.226
	(0.154)	(0.152)	(0.246)	(0.251)	(0.794)	(0.779)	(0.216)	(0.215)
Observations	4372	4371	1264	1264	1875	1875	1233	1232
R-squared	0.250	0.118	0.208	0.089	0.228	0.159	0.229	0.181
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

The Table presents the results of Eq. (9) for 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019, and for sub-groups estimations for GIIPS, CORE, and REM countries. In Eurozone, "GIIPS" represents distressed peripheral economies (Greece, Ireland, Italy, Portugal, and Spain), while "CORE" represents core eurozone economies (Austria, Belgium, Finland, France, Germany, and Netherlands). "REM" is the remaining countries. *Vol (Ab_vol)* is daily volatility (abnormal volatility). *Govsup_chg* is the absolute value of changes within 30 days in the support for the incumbent party. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of both country and year dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

(11) also show that the election shock (*Poll_diff*) has an insignificant effect on stock return in post-election periods (available on request).

To test for asymmetric effects, the sample is divided into two subsamples with negative and positive *Poll_diff*. Results are reported in Table 11 for the estimations of Eq. (10) on CAV. Election shocks seem to have an asymmetric effect on CAV. Particularly, in the case of positive changes, an increase in *Poll_diff* results in a decrease of stock volatility in [0;2], [0;3], [0;4], [0;5], [0;6] and [0;7] time windows. In the case of negative changes, *Poll_diff* does not seem to have a significant impact. This might be driven by the small number of observations (38 cases). Consistent with the main tests, election shocks have an insignificant effect on CAR in both cases (see Table A.3 in the Appendix).[36]

6.3. Discussion

Employing a unique hand-collected dataset of polling results for EU countries, we investigate the stock markets responses to election uncertainty and election shock. The findings of our paper facilitate better understandings of stock markets' reactions to election-induced uncertainty, measured directly from polling results, in EU countries. In comparison, previous studies (such as Goodell and Vähämaa (2013) and Goodell et al. (2020)) consider only a single country (US) and betting data to calculate election uncertainty. Our results also add a novel contribution to related literature, revealing the accuracy of polling results as a key determinant of election shocks which influence the stock market behaviour.

Prior studies (e.g. Pantzalis et al., 2000; Wisniewski, 2016) have shown that stock markets absorb election-related news during pre-election periods, while stock markets are surprised by electoral outcome shocks in post-election periods. Elections are usually associated with periods of increased volatility (Goodell & Vähämaa, 2013; Kelly et al., 2016), whereas investors tend to be sensitive to various electoral outcomes' likelihoods since they reflect the election uncertainty and policy uncertainty. Contributing to this strand of literature, our results illustrate a significant rise in stock markets volatility on election days and several days thereafter in EU countries. We also find that stock volatility significantly increases ahead of the elections in CORE and REM countries due to high election uncertainty, consistent with EUH. In contrast, stock market volatility in GIIPS countries declines during increased election uncertainty in pre-election periods, consistent with PUH. In line with Pástor and Veronesi's (2013) argument, the high level

[36] We also investigate the effect of election uncertainty on CAV in GIIPS versus NON-GIIPS countries. Results, available on request, show that the coefficient of *Poll_diff* is significant and negative in both GIIPS and Non-GIIPS groups. However, the impact of election uncertainty on the cumulative abnormal volatility seems to be more profound in GIIPS than non-GIIPS countries. This could be driven by the higher level of sensitivity to electoral news in GIIPS countries.

Table 8
The effect of non-partisan election uncertainty on stock abnormal return.

Variables	Full sample			GIIPS			CORE			REM		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Pol_unc	0.001		0.001	0.001		0.001	0.003		0.002	0.003		0.003
	(0.002)		(0.002)	(0.004)		(0.004)	(0.004)		(0.004)	(0.004)		(0.004)
Poll_chg		−0.005	−0.006		−0.004	−0.005		−0.030**	−0.030**		−0.002	−0.002
		(0.006)	(0.006)		(0.015)	(0.015)		(0.014)	(0.014)		(0.006)	(0.007)
Avg_rat	−0.003	−0.003	−0.003	−0.008	−0.006	−0.008	−0.008	−0.013	−0.008	0.008	0.024	0.008
	(0.005)	(0.005)	(0.005)	(0.013)	(0.013)	(0.013)	(0.027)	(0.027)	(0.027)	(0.018)	(0.021)	(0.018)
Vix_chg	−0.072***	−0.071***	−0.072***	−0.094***	−0.094***	−0.094***	−0.088***	−0.088***	−0.088***	−0.027***	−0.026***	−0.027***
	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Constant	0.177	0.147	0.174	0.091	0.031	0.088	0.380	0.628	0.407	−0.274	−0.669	−0.278
	(0.261)	(0.261)	(0.262)	(0.405)	(0.395)	(0.406)	(1.359)	(1.341)	(1.361)	(0.527)	(0.591)	(0.528)
Observations	9225	9346	9225	2416	2418	2416	4128	4131	4128	2681	2797	2681
R-squared	0.144	0.142	0.144	0.165	0.165	0.165	0.236	0.237	0.237	0.045	0.045	0.045
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

The Table presents the results of Eq. (8) using the full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019, and for sub-groups estimations for GIIPS, CORE, and REM countries. In Eurozone, "GIIPS" represents distressed peripheral economies (Greece, Ireland, Italy, Portugal, and Spain), while "CORE" represents core eurozone economies (Austria, Belgium, Finland, France, Germany, and Netherlands). "REM" is the remaining countries. The dependent variable is the abnormal return (*Ab_ret*). *Pol_unc* is the negative poll spread between the support for the eventual largest party and the eventual runner up party. *Poll_chg* is changes within 30 days in % support for the eventual largest party before the election. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of both country and year dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

Table 9
Event study – the response of CAV to elections.

Time window	Mean	Median
[0;1]	0.296***	0.068**
[0;2]	0.341**	−0.038
[0;3]	0.352*	−0.005
[0;4]	0.326	−0.092
[0;5]	0.293	−0.063
[0;6]	0.355	−0.167
[0;7]	0.457	−0.182

This Table presents the average and median cumulative abnormal volatility (CAV) in response to the elections using the full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. CAV is calculated over different time window [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7] where the election day is on date 0. T-test and Wilcoxon test are used to examine whether the average and median CAVs are significantly different from zero. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

of political uncertainty and weaker financial and economic conditions in GIIPS countries may offer protection to their financial markets from the consequences of high election uncertainty.

In general, our results provide evidence supporting a statistically significant relationship between election uncertainty and stock volatility, while the relationship between election uncertainty and stock return is not significant (except for CORE group). These findings reveal heterogeneous effects of election uncertainty on stock markets. Market participants may react differently to the information provided by opinion polls, hence this may result in more discrepancies in stock valuation rather than actual changes in stock return (Enikolopov, Petrova, & Sonin, 2018). These results are broadly consistent with the findings of Fan et al. (2020a), who show that social media information, which jointly mentioned firms and political figures (e.g. politicians, policy keywords, and policy-sensitive industries), affects the same firms' stock volatility but does not affect stock return, as investors have diverse reactions to social media information flows. Particularly, small non-institutional investors are more likely to be exposed to noisy information obtained from debates on social media platform.

Overall, our study furthers the existing literature on the relationship among political uncertainty, policy uncertainty, and market uncertainty. To the best of our knowledge, it is the first study to reveal the significant impact of political uncertainty on market behaviour, which are driven by changes in political support at multi-country levels. This study therefore provides a better understanding about the interaction between political preferences with financial instability. Our findings can inform policy debates surrounding the best way to keep financial markets stable and allow market participants to hedge risk during distress periods. While our focus is specifically on political uncertainty, future research could extend the investigation to encompass other types of economic and political shocks, such as the recent Covid-19 pandemic and 2022 Russia-Ukraine crisis.

7. Conclusion

The main aim of this paper is to investigate the reaction of stock markets to election uncertainty and election shock. We empirically test our hypotheses using a unique dataset of polling results and electoral outcomes of 26 EU countries (excluding Luxembourg and Lithuania) during the period from January 2005 to September 2019. Polling results for the eventual largest party, the eventual runner up party, and the incumbent party are hand-collected from various online sources (e.g. online articles and publicly available polling datasets). Given that the polling dataset is at a multi-country level, this study provides a unique analysis on the election uncertainty associated with different political systems across countries in comparison to prior studies using data from a single country (e.g. Goodell et al., 2020). Having frequent polling results

Table 10
The effect of election shock on CAV.

	[0;1]	[0;2]	[0;3]	[0;4]	[0;5]	[0;6]	[0;7]
Poll_diff	−0.016	−0.058*	−0.082**	−0.118**	−0.160**	−0.198**	−0.224**
	(0.020)	(0.030)	(0.038)	(0.051)	(0.063)	(0.080)	(0.099)
Avg_rat	−0.032**	−0.035	−0.035	−0.028	−0.023	−0.032	−0.040
	(0.015)	(0.026)	(0.037)	(0.047)	(0.055)	(0.067)	(0.085)
Vix_chg	0.027*	0.037*	0.031	0.042	0.061	0.077	0.086
	(0.014)	(0.022)	(0.027)	(0.035)	(0.045)	(0.061)	(0.074)
Ideology	−0.001	−0.002	−0.012	−0.004	−0.002	−0.001	−0.005
	(0.009)	(0.015)	(0.026)	(0.031)	(0.038)	(0.044)	(0.059)
Y_crisis	0.198	0.114	−0.033	−0.076	0.025	0.186	0.356
	(0.173)	(0.271)	(0.360)	(0.456)	(0.552)	(0.712)	(0.851)
Constant	2.408**	3.026	3.168	3.530	3.849	5.500	6.595
	(1.187)	(2.056)	(2.666)	(3.430)	(4.300)	(5.862)	(7.128)
Observations	91	91	91	91	91	91	91
R-squared	0.375	0.405	0.371	0.340	0.342	0.349	0.338
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO

The Table presents the coefficient estimates of Eq. (10) using the full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. The dependent variable is the cumulative abnormal volatility *(CAV)* over different time windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7] where the election day is on date 0. *Poll_diff* is the difference between election outcome and the most recent polling result for the eventual largest party within 30 days ahead of election. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of country dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

Table 11
The effect of election shock on CAV – asymmetric effect.

Panel A. Positive Poll_diff

	[0;1]	[0;2]	[0;3]	[0;4]	[0;5]	[0;6]	[0;7]
Poll_diff	−0.062	−0.215*	−0.332*	−0.428*	−0.538*	−0.709*	−0.904**
	(0.081)	(0.120)	(0.174)	(0.220)	(0.275)	(0.345)	(0.432)
Avg_rat	−0.040	−0.036	−0.032	−0.023	−0.000	−0.016	−0.003
	(0.034)	(0.044)	(0.063)	(0.080)	(0.096)	(0.116)	(0.139)
Vix_chg	0.020	0.025	0.008	0.014	0.021	0.037	0.021
	(0.019)	(0.034)	(0.047)	(0.060)	(0.077)	(0.101)	(0.126)
Ideology	−0.012	−0.026	−0.044	−0.045	−0.053	−0.063	−0.090
	(0.013)	(0.022)	(0.040)	(0.048)	(0.058)	(0.068)	(0.092)
Y_crisis	0.348	0.359	0.337	0.321	0.546	1.209	1.521
	(0.391)	(0.622)	(0.769)	(0.971)	(1.190)	(1.574)	(1.758)
Constant	3.285	3.924	4.282	4.956	4.758	7.247	8.121
	(2.029)	(2.890)	(3.734)	(4.816)	(6.089)	(8.022)	(9.521)
Observations	53	53	53	53	53	53	53
R-squared	0.421	0.498	0.491	0.466	0.459	0.485	0.492
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO

Panel B. Negative Poll_diff

	[0;1]	[0;2]	[0;3]	[0;4]	[0;5]	[0;6]	[0;7]
Poll_diff	0.036	0.051	0.020	0.007	−0.039	−0.056	−0.021
	(0.058)	(0.069)	(0.077)	(0.101)	(0.098)	(0.118)	(0.130)
Avg_rat	−0.000	0.020	0.031	0.068	0.075	0.058	0.042
	(0.028)	(0.065)	(0.069)	(0.111)	(0.132)	(0.155)	(0.166)
Vix_chg	0.025	0.026	0.022	0.026	0.038	0.034	0.057
	(0.021)	(0.031)	(0.032)	(0.048)	(0.051)	(0.059)	(0.063)
Ideology	0.002	0.019	0.023	0.035	0.057	0.064	0.072
	(0.014)	(0.024)	(0.027)	(0.038)	(0.042)	(0.047)	(0.052)
Y_crisis	0.254	0.116	−0.142	−0.310	−0.552	−0.868	−0.769
	(0.345)	(0.592)	(0.616)	(0.946)	(1.051)	(1.235)	(1.332)
Constant	−0.390	−0.813	−1.273	−2.905	−2.256	−0.828	−0.103
	(1.252)	(2.708)	(2.796)	(4.459)	(5.121)	(6.211)	(6.458)
Observations	38	38	38	38	38	38	38
R-squared	0.718	0.723	0.637	0.590	0.670	0.689	0.727
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO

The Table presents the coefficient estimates of Eq. (10) using full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. Dependent variable is cumulative abnormal volatility *(CAV)* over different time windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7] where election day is on date 0. *Poll_diff* is the difference between election outcome and the most recent polling result for the eventual largest party within 30 days ahead of election. The sample is divided into 2 sub-groups with positive and negative *Poll_diff*. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of country dummies. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

allows us to capture the immediate reaction of stock markets to changes in political support.

To examine our research question, Fixed-effects model (FEM) and Event study approach are employed. These modelling approaches are selected since they are appropriate and commonly applied techniques in previous related literature (e.g. Fan et al., 2020b; Kelly et al., 2016; Pantzalis et al., 2000; Rouatbi et al., 2021) to examine the impact of election uncertainty and election shock on the stock markets. In the FEM, country and time FE controls for the potential confounding variables that can affect both elections and stock performance. The use of FEs also helps reducing the endogeneity bias caused by omitted variables. Event study methodology is employed to capture the stock market behaviour (return and volatility) in different countries around political election dates. The use of Event study methodology along with frequent polling dataset enable us to consider the frequent changes in political support and their immediate impact on stock markets, largely reducing endogeneity bias. Further, our methodology is innovative as we introduce a new measure of 'election shock' to capture the election shock and investigated its impact on stock market performance. 'Election shock' is calculated by taking the difference between the actual electoral outcome and voters' expectation measured by polling results prior to elections.

We find that stock markets tend to be more volatile in response to higher election uncertainty in pre-election periods, as measured by a lower electoral poll spread between the eventual largest and runner up parties. This finding is consistent with the election uncertainty hypothesis (EUH). In contrast with the CORE or remaining countries, the abnormal volatility in GIIPS countries tends to decrease when the election uncertainty increases as predicted by the political uncertainty hypothesis (PUH). In GIIPS countries, the uncertainty regarding future policy may decline despite the increase in the election uncertainty. Regarding the partisan election uncertainty, assuming that investors favour the incumbent party, we find a positive correlation between the stock volatility and the election uncertainty.

We also find that stock volatility increases in post-election periods and this reaction is determined by the accuracy of pre-election polls. Stock returns seem to be unaffected by the election uncertainty and election shock, except for Eurozone core countries whereby an increase in election uncertainty is associated with an increase in stock abnormal returns. These findings reveal heterogeneous effects of elections on stock markets, implying that market participants react differently to pre-election polls and have different stocks' valuation.

Our findings provide important insights into the link between the election uncertainty and financial uncertainty in EU countries, highlighting several implications for practitioners and academics. First, these results can be of interest to participants in option markets and volatility traders who seek to interpret how changes in the success likelihood of political parties may influence the level of stock volatility. During the period of high intraday volatility as a result of election-induced uncertainty, options may trade at the higher implied volatility and higher prices (Bialkowski et al., 2008). In terms of strategies, traders can cash in on the above-normal volatility by designing specific combinations of options that can be profitable, such as straddles and strangles. Also, we show that the negative poll spread between the eventual largest and runner up parties (*Pol_unc*) has the highest explanatory power on the predictability of changes in volatility. Thus, it would be rational to short sell put options in the run up to elections when *Pol_unc* tends to decrease (reducing volatility).

Additionally, our findings provide important information for investors about stock volatility and expectations during election periods, hence contributing to the existing literature on stock markets' informational efficiency (e.g., Rahman, Guotai, Das Gupta, Hossain, & Abedin, 2022). Also, the design of our empirical analysis shows heterogeneous market reactions to the election uncertainty in countries with different economic conditions. This helps investors to make informed investment and risk management decisions during election periods, and thus our paper adds to the prior literature on portfolio and risk management during uncertain events (e.g., Chai, Chu, Zhang, Li, & Abedin, 2022; Rahman et al., 2022). It is important for investors to understand that GIIPS countries might have different exposure to election uncertainty compared to the rest of EU countries. This heterogeneous effect might be due to investors' psychology and selling pressures by foreign and domestic investors (Dharani, Hassan, Huda, & Abedin, 2023).

Furthermore, stock markets tend to react to the accuracy of pre-election polls in post-election periods, hence the efforts to formulate precise pre-election opinion polls should be furthered. Policymakers therefore should consider the market impact of opinion polls when debating the new regulation and reform of pollsters. In a broader sense, investment equity price movements might affect fiscal policy outcomes, particularly the budgetary outcomes, via a series of channels such as capital gains/losses related taxes, turnover taxes from transactions in assets, indirect taxes from the real economy activity changes as a feedback loop from changes in asset prices (Tagkalakis, 2011). Therefore, this suggests that fiscal policy makers should act proactively and build up fiscal buffers during the stable period to cover for the uncertainty during election periods.

Finally, elections capture only a subset of political events faced by investors, hence future research can analyse other political and external events, such as regulatory reforms, the Scottish independence referendum, the Brexit referendum, the Covid-19 pandemic and 2022 Russia-Ukraine crisis. This will help in improving the understanding of the role of political events in determining prices of stocks and other financial assets, such as bonds, options, and credit default swaps.

Data availability

Data will be made available on request.

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Appendix

Table A.1
The effect of partisan election uncertainty on stock volatility and abnormal volatility – standard errors clustered by time period.

Variables	Panel A: Vol			Panel B: Ab_vol		
	(1)	(2)	(3)	(4)	(5)	(6)
Pol_unc	0.002**		0.002*	0.001		0.001
	(0.000)		(0.000)	(0.002)		(0.002)
Poll_chg		0.000	0.001		−0.000	0.001
		(0.001)	(0.002)		(0.001)	(0.001)
Avg_rat	−0.008	−0.006	−0.008	0.002	0.004	0.002
	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)

(*continued on next page*)

Table A.1 (*continued*)

Variables	Panel A: Vol			Panel B: Ab_vol		
	(1)	(2)	(3)	(4)	(5)	(6)
Vix_chg	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Constant	1.085**	0.903*	1.084**	−0.141	−0.303	−0.142
	(0.121)	(0.222)	(0.120)	(0.160)	(0.255)	(0.159)
Observations	9216	9332	9216	9215	9331	9215
R-squared	0.257	0.257	0.257	0.134	0.134	0.134
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES

The table presents the results of Eq. (8) using the full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. Dependent variables are daily volatility (*Vol*) and abnormal volatility (*Ab_vol)* presented in Panel A and Panel B respectively. *Pol_unc* is the negative poll spread between the support for the eventual largest party and the eventual runner up party. *Poll_chg* measures changes within 30 days in the support for the eventual largest party before the election. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of both country and year dummies. Standard errors clustered at time-period level are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

Table A.2
The effect of partisan election uncertainty on stock indicators – controlling for government expenditure and fiscal balance.

Variables	Panel A: Vol			Panel B: Ab_vol			Panel C: Ab_ret		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pol_unc	0.002**		0.002**	0.002*		0.002*	0.001		0.001
	(0.001)		(0.001)	(0.001)		(0.001)	(0.002)		(0.002)
Poll_chg		0.000	0.002		−0.000	0.001		−0.005	−0.006
		(0.003)	(0.003)		(0.003)	(0.003)		(0.006)	(0.006)
Avg_rat	−0.006***	−0.004*	−0.006***	0.003*	0.005**	0.003*	−0.006	−0.005	−0.006
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)
Vix_chg	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	−0.073***	−0.072***	−0.073***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Gov_expenditure	−0.021**	−0.016*	−0.021**	−0.007	−0.002	−0.007	−0.011	−0.010	−0.011
	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.009)	(0.022)	(0.021)	(0.022)
Fis_bal	−0.030***	−0.027***	−0.030***	−0.014*	−0.010	−0.014*	0.003	0.004	0.003
	(0.008)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)	(0.018)	(0.018)	(0.018)
Constant	1.934***	1.549***	1.935***	0.103	−0.334	0.103	0.909	0.799	0.886
	(0.419)	(0.544)	(0.419)	(0.418)	(0.543)	(0.418)	(1.217)	(1.184)	(1.217)
Observations	9216	9332	9216	9215	9331	9215	9225	9346	9225
R-squared	0.259	0.259	0.259	0.135	0.135	0.135	0.144	0.142	0.144
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

The table presents the results of Eq. (8) using the full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. Dependent variables are daily volatility (*Vol*), abnormal volatility (*Ab_vol),* and abnormal return *(Ab_ret)* presented in Panels A, B, and C respectively. *Pol_unc* is the negative poll spread between the support for the eventual largest party and the eventual runner up party. *Poll_chg* measures changes within 30 days in the support for the eventual largest party before the election. Control variables are defined in Table 3. Government expenditure *(Gov_expenditure)* and Fiscal Balance *(Fis_bal)* are also added as control variables. In all regressions, FE are captured by a full set of both country and year dummies. Huber-White robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

Table A.3
The effect of election shock on CAR – positive versus negative *Poll_diff*.

Panel A. Positive Poll_diff							
	[0;1]	[0;2]	[0;3]	[0;4]	[0;5]	[0;6]	[0;7]
Poll_diff	0.058	0.238	0.296	0.159	0.189	0.314	0.140
	(0.148)	(0.240)	(0.316)	(0.275)	(0.301)	(0.262)	(0.280)
Avg_rat	0.063	0.080	0.076	0.070	0.056	0.100	0.159
	(0.045)	(0.096)	(0.132)	(0.132)	(0.137)	(0.112)	(0.117)
Vix_chg	−0.134**	−0.192**	−0.133	−0.166**	−0.134	−0.161**	−0.240**
	(0.052)	(0.080)	(0.084)	(0.079)	(0.081)	(0.073)	(0.087)
Ideology	0.022	0.046	0.100	0.087	0.087	0.049	−0.005
	(0.026)	(0.051)	(0.081)	(0.078)	(0.084)	(0.054)	(0.047)
Y_crisis	1.022	1.847	1.831	1.087	1.303	−0.653	−1.153
	(0.802)	(1.485)	(1.644)	(1.768)	(1.794)	(1.495)	(1.946)
Constant	−5.778*	−6.667	−6.368	−6.558	−4.294	−8.809	−11.999
	(3.266)	(5.106)	(6.824)	(7.357)	(7.163)	(6.415)	(7.424)
Observations	56	56	56	56	56	56	56
R-squared	0.577	0.555	0.521	0.492	0.419	0.569	0.483
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO

(*continued on next page*)

Table A.3 (*continued*)

Panel B. Negative Poll_diff							
	[0;1]	[0;2]	[0;3]	[0;4]	[0;5]	[0;6]	[0;7]
Panel B. Negative Poll_diff							
	[0;1]	[0;2]	[0;3]	[0;4]	[0;5]	[0;6]	[0;7]
Poll_diff	0.222	0.032	−0.081	0.010	−0.038	−0.052	0.106
	(0.131)	(0.121)	(0.209)	(0.215)	(0.281)	(0.309)	(0.393)
Avg_rat	−0.030	−0.094	−0.150*	−0.240**	−0.222**	−0.030	0.074
	(0.066)	(0.068)	(0.073)	(0.094)	(0.095)	(0.101)	(0.116)
Vix_chg	−0.089*	−0.073	−0.100	−0.071	−0.090	−0.117	−0.143
	(0.046)	(0.055)	(0.072)	(0.072)	(0.076)	(0.074)	(0.087)
Ideology	0.019	−0.002	−0.032	−0.052	−0.077	−0.008	−0.040
	(0.029)	(0.034)	(0.056)	(0.062)	(0.072)	(0.081)	(0.085)
Y_crisis	0.089	−0.533	−0.520	0.407	−0.705	−0.879	−0.586
	(0.692)	(0.757)	(1.042)	(1.081)	(1.180)	(1.252)	(1.412)
Constant	1.981	5.686	7.115*	9.718**	8.490*	0.647	−6.952
	(3.165)	(3.492)	(3.763)	(3.821)	(4.464)	(4.935)	(5.317)
Observations	38	38	38	38	38	38	38
R-squared	0.878	0.869	0.833	0.787	0.777	0.776	0.781
Country FE	YES	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO	NO

The table presents the coefficient estimates of Eq. (11) using full sample of 26 EU countries (exclude Luxembourg and Lithuania) from 01/01/2005 to 03/09/2019. Dependent variable is cumulative abnormal return *(CAR)* over different time windows [0; 1], [0; 2], [0; 3], [0; 4], [0; 5], [0; 6], and [0; 7] where election day is on date 0. *Poll_diff* is the difference between election outcome and the most recent polling result for the eventual largest party within 30 days ahead of election. The sample is divided into 2 sub-groups with positive and negative *Poll_diff*. Control variables are defined in Table 3. In all regressions, FE are captured by a full set of country dummies. Robust standard errors are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively.

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