Received: 26 January 2020 | Revised: 24 March 2020 | Accepted: 12 May 2020

DOI: 10.1111/ecpo.12163

ORIGINAL ARTICLE

ECONOMICS & POLITICS WILEY

Electoral uncertainty and financial volatility: Evidence from two-round presidential races in emerging markets

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Abstract

We study how the predictability and the decisiveness of electoral outcomes affect financial volatility. We argue that traders' optimal investment strategies depend on their ability to make accurate electoral forecasts and the prospective losses associated with placing a bet on the wrong candidate. Using a triple difference-in-difference approach and data from two-round presidential elections in five Latin American countries between 1999 and 2018, we find that financial volatility is greatest in the days immediately following unpredictable, *decisive*, elections. Postelectoral volatility also occurs following predictable, *indecisive* elections. The effect of learning the identity of the winning candidate on financial volatility is null when the election is unpredictable and indecisive, as well as when the election is decisive, but the outcome is predictable. These findings offer insights into investors seeking to hedge price risk around elections. They also have important implications regarding the relationship between public opinion polls and postelectoral financial volatility.

KEYWORDS

domestic political economy, elections, financial volatility, Latin America

1 | INTRODUCTION

On August 12, 2019, Argentine assets suffered an unprecedented decline as investors dumped the country's currency, bonds, and stocks. The peso tumbled as much as 25%, dollar-denominated government bonds lost roughly 25% on average, and the country's benchmark stock index fell by 48%. The sell-off was an immediate response to incumbent President Mauricio Macri's loss to Peronist Alberto Fernández in a primary election, which occurred the day before. Hailed by Macri as a landmark election, the country's peculiar brand of primaries was widely seen as a preview of the country's forthcoming presidential contest. Just a day prior to the election, five different polling firms showed Fernandez in a statistical dead heat with Macri.[1] The biggest unanswered question was whether either of the candidates could garner 45% of the vote and make a second-round runoff election less likely. On election day, Macri lost by a far greater margin than expected. He received only 32.1% of the vote, compared to Fernandez's 47.7%. This example illustrates the main issue that motivates our analysis—how electoral outcomes can set off a shockwave in the financial markets.

Not all elections, however, lead to financial turmoil. Indeed, the Argentine benchmark stock index fell by <4% on October 28, 2019, the day following Alberto Fernandez's much anticipated electoral victory. These two radically different outcomes from the same country, during the same electoral cycle, and pitting the same two candidates against one another highlight how investors' trading strategies respond to both the accuracy of pre-electoral forecasts and an election's decisiveness. Election outcomes can be predictable or unpredictable ex-ante. They can also be decisive or indecisive. The former occurs whenever a candidate surpasses the required electoral threshold required to achieve an outright victory. In contrast, an election is indecisive when no candidate receives sufficient votes to clear the required winning threshold.

To examine the effect of these different electoral outcomes on financial markets, we model traders' decisions as a sequential sampling problem where the optimal stopping strategy is driven by information-gathering costs and an investment's suitability to the future state of the world (De Groot, 1970). We establish that risk-neutral traders should wait to make their investment decisions until the electoral results are known if: (a) The winner is predictable ex-ante, but the election is indecisive; or (b) the winner is unpredictable ex-ante, but the election is decisive. In contrast, delaying an investment should not be profitable when (c) the winner is unpredictable ex-ante, but the election is indecisive; or (d) the winner is predictable ex-ante, but the election is decisive.

A direct empirical implication of these optimal waiting strategies is that financial volatility should increase whenever traders have an incentive to postpone their investment decisions. The arrival of postelectoral news would induce traders to update their beliefs and search for new asset prices, triggering portfolio rebalancing and an increase in short-term price volatility. On the other hand, when traders do not have an incentive to delay their investments, there will be little difference between financial volatility before and after the election.

We focus on emerging markets where presidential elections are held under a two-round electoral system to empirically test our main argument. In this voting method (also known as the second ballot, runoff voting, or *ballotage*), a second round is held if no candidate or party achieves a given level of votes. The top two vote-getters move to the second round, and new balloting determines the winner by simple plurality voting. As such, elections held under these rules provide a great opportunity to identify decisive versus indecisive contests. Five of the six emerging markets with runoff presidential elections are in Latin America: Argentina, Brazil, Chile, Colombia, and Peru. Based on these criteria, our sample covers 36 elections in these five countries between 1999 and 2018. Using daily data and an event-study approach, we calculate the second moment of index excess return distribution in the countries included our sample.

The main empirical challenge, however, is to disentangle the countervailing effects of electoral uncertainty and the election's decisiveness on financial volatility. We employ a triple difference-in-difference strategy to address this identification problem. To capture electoral uncertainty and to assess an election's decisiveness, we use polling data for the two leading candidates in the days immediately preceding each election. In addition, we restrict our attention to a six-day interval around each electoral contest to ensure that our findings are not confounded by other news, announcements, or shocks to the economy. We compare financial volatility in the three days immediately before the election and the three days immediately after it took place. This research design allows us to uncover the extent to which the revelation of the winning candidate's identity triggers portfolio rebalancing in the days immediately following different types of elections.

Our results suggest that investors consider both the decisiveness of an election and the predictability of the election's winner. Annualized stock market volatility increases by about 27% on average in the three days immediately following a predictable, *indecisive* election. The estimated change in stock market volatility in the days immediately following an unpredictable, *decisive*, election is significantly larger, at about 80%. Using these estimates, we find that even for a well-diversified portfolio of stocks, a 15% chance exists that the expected gain/loss in the three days after an unpredictable, *decisive* election would be 4% or more. The findings also reveal that the change in postelectoral financial volatility is statistically indistinguishable from zero when the winner is unpredictable ex-ante, but the election is indecisive, and when an election is decisive, but the winner is predictable ex-ante. These results are robust when we control for the following scenarios: when the leading candidate is the incumbent president, when we account for small differences in electoral uncertainty, and when we adopt more stringent event window of 4 days/2 days around the election.

This study has implications for our understanding of the relationship between politics and financial volatility. The international political economy (IPE) literature often focuses on the mechanisms that link financial market turbulence with political outcomes. Financial market behavior, though, is shaped by democratic politics (Bernhard & Leblang, 2006; Leblang & Satyanath, 2008). As such, it is important to understand how politics affects financial volatility. Our paper's examination of the politics–finance interface considers factors that should be of great interest to financial scholars; as such, we believe that it has the potential to expand the IPE finance field. We also contribute to this literature by taking into consideration market volatility that falls short of outright financial crises (Rajan, 2010). From a practical standpoint, our main findings offer insights into investors seeking to hedge price risk around national elections.

This paper builds on the literature on the relationship between uncertainty and investment decisions (Bernanke, 1983; Canes-Wrone & Park, 2012; Cukierman, 1980; Dixit & Pindyck, 1994; Pastor & Veronesi, 2012), as well as the efficient market hypothesis, dating back to the classical work of Fama (1970). In the context of national elections, an important source of uncertainty is the identity of the winning candidate. Several studies have investigated how electoral outcomes affect corporate investment cycles (Julio & Yook, 2012), equity market valuations (Mosley & Singer, 2008; Sattler, 2013), foreign exchange (Campello, 2014), equity flows (Frot & Santiso, 2013), credit ratings (Vaaler, Schrage, & Block, 2006), and sovereign bond spreads (Campello, 2015; Vaaler, Schrage, & Block, 2005) in emerging countries.

We depart from this work by focusing on the second moment of financial returns. As such, our contribution is to examine whether electoral results contribute to heightening the amount of uncertainty surrounding the realization of expected returns, rather than to analyze whether they drive asset prices up or down. In this regard, this paper is closely related to and complements the work of Leblang and Mukherjee (2004), Bialkowski, Gottschalk, and Wisniewski (2008), and Boutchkova, Doshi, Durnev, and Molchanov (2012). Our approach, however, differs in several critical ways. First, in our cross-national analysis, we use pre-election polling data rather than ex post vote margins. Second, we restrict our event window to a small interval around each electoral contest to ensure that the results are not confounded by extraneous news, announcements, or economic shocks. Third, our study of financial volatility in the context of runoff elections using a triple difference design allows us to disentangle the countervailing effects of political uncertainty and an election's decisiveness. In this respect, this paper nicely aligns with recent advances in the study of corporate finance research (Atanasov & Black, 2016).

The remainder of this paper is organized as follows. In Section 1, we provide our theoretical argument linking electoral uncertainty and traders' behavior. In Section 2, we describe the data, and we introduce our identification strategy. In Section 3, we present our main empirical findings. A final section concludes.

2 | ELECTORAL UNCERTAINTY AND TRADERS' BEHAVIOR

Policy uncertainty can increase the value of waiting to make investments with high reversal costs, as illustrated by the "bad news" principle introduced by Bernanke (1983). Cukierman (1980) provides a simple and instructive formalization of the role of uncertainty on the timing of irreversible investment project selection. In his model, the optimal investment strategy is driven by information-gathering costs and the project's suitability to the future state of the world. Canes-Wrone and Park (2012) extend this insight to examine the way irreversible investments are affected by electoral results. To identify the roles played by electorally induced uncertainty and reversal costs on the value of the option to delay an investment, we model traders' decisions as an optimal stopping problem (De Groot, 1970).

Consider the following example: A trader is considering buying (shorting) stocks in a traditional oil and gas company before the results of the election are revealed. All else equal, investment returns will be affected by the victorious candidate's policies. Suppose that one party is sympathetic to renewables (fossil fuels); then, if its candidate wins, the price of the oil and gas company will likely fall (rise). The trader wants to make a decision that is best suited to the party that will hold office. As such, a trader may choose to sit on the sidelines until her information about the identity of the future policy-maker becomes reasonably accurate. Waiting, however, will be costly for the trader, as increased knowledge of the potential winner will likely affect the stock's price. If she waits too long to buy (sell), and the winning candidate's identity is revealed, she will end up chasing the market. On the other hand, suppose that the trader buys (shorts) the stocks before the election takes place. If she correctly predicted the winning candidate, then she would likely make a profit. But if she chose incorrectly, then it is unlikely that she will get out of the trade without losing a substantial amount of money.

2.1 | Optimal waiting time

Following De Groot (1970), suppose that a risk-neutral trader makes a decision $d \epsilon D$ (e.g., the size of her long/short position) and that $D=\{d_1,d_2\}$ has only two points. Suppose also that the identity of the candidate that will hold office is represented by $\Omega=\{\omega_1,\omega_2\}$, which also has two points. We can specify the trader's loss function L as follows:

$$L\left(\omega_1,d_1\right)=L\left(\omega_2,d_2\right)=0$$

$$L\left(\omega_1,d_2\right)=L\left(\omega_2,d_1\right)=b>0,$$

where b represents the reversal costs from betting on the wrong candidate.

The trader may increase her knowledge about the investment's suitability of her investment by taking observations $X_1, X_{2,\ldots}$ one at a time from some distribution involving a parameter W whose value is unknown. Suppose that each observation X is a discreet random variable for which the value of the p.f. $f_i(x) = \Pr(X = x | W = \omega_i)$ is given by:

$$f_1(1) = 1 - \alpha, f_1(2) = 0, f_1(3) = \alpha;$$

$$f_2(1) = 0, f_2(2) = 1 - \alpha, f_2(3) = \alpha.$$

The parameter α is a given number, such that $0 < \alpha < 1$. Therefore, the observed value of X can only be 1, 2, or 3. Note that the probability that $X = 1$ is positive only if $W = \omega_1$, the probability that $X = 2$ is positive only if $W = \omega_2$, and the probability that $X = 3$ is the same under both values of W (De Groot, 1970:268).

Our assumptions about W and the distribution of $f_i(x)$ differ from those in Cukierman (1980) and Canes-Wrone and Park (2012). They assume that the unknown parameter W is normal with mean μ and precision τ and that the random variable X is normally distributed with mean W and precision p. As such, they consider that the election is merely a signal of the state of the world (Cukierman, 1980) and/or that voters are uncertain about the winning candidate's true *type* (Canes-Wrone & Park, 2012). This kind of information is unlikely to be fully revealed right after the election. In contrast, the actual identity of the winner becomes apparent as soon as all the ballots are counted. We thus believe that ours is a more realistic representation of how traders care about the identity of the winning candidate. Given two existing candidates A and B, what matters to traders right after the election is whether A or B would be the winner, rather than what *type* of candidate would win given a hypothetical distribution of candidates.[2]

As noted in the example discussed above, collecting information is costly. We assume that traders face a fixed cost, c, per observation. Finally, suppose that the prior distribution of W is specified as follows:

$$\Pr\left(W = \omega_1\right) = \xi = 1 - \Pr\left(W = \omega_2\right).$$

Given the symmetry in the problem, we can assume that $\xi \leq (1/2)$ without loss of generality. The trader's decision to wait n periods and observe n values of X before making her investment depends on the posterior distribution of W which incorporates both ξ and the observations X obtained by waiting and incurring the necessary costs. The posterior probability that $W = \omega_1$ will be 1 if $X = 1$, will be 0 if $X = 2$, and will be ξ if $X = 3$.

Give the trader's loss function, her expected loss when $\Pr\left(W = \omega_1\right) = \xi$ will be ξb, while her expected loss will be 0 when $\Pr\left(W = \omega_1\right) = 0$ or when $\Pr\left(W = \omega_1\right) = 1$. Regardless of whether $\mathrm{W} = \omega_1$ or $\mathrm{W} = \omega_2$, the probability that $X_i = 3$ for every observation $(\mathrm{i} = 1, \cdots, n)$ is α^n. Therefore, as De Groot (1970:269) notes, the total risk $\rho(\mathrm{n})$ for the optimal timing when exactly n observations must be taken is as follows:

$$\rho(\mathrm{n}) = \xi b \alpha^n + cn.$$

Suppose that it is worthwhile to take at least one observation (i.e., $\rho(1) < \rho(0)$), then the optimal value n^* of observations can be approximated by considering n a continuous variable and differentiating $\rho(n)$ to find the minimizing value.

Using the first-order condition for the minimization of $\rho(n)$ and solving for n^* yields:

$$n^* = \frac{ln\left(-\frac{c}{\xi b ln(\alpha)}\right)}{\ln(\alpha)}$$

In our interpretation of this optimal stopping problem, a lopsided electoral contest would be one where α is very close to 0, in contrast, one where the winner is unpredictable ex-ante would be one where α is very close to 1. The effect of a change in α on the optimal waiting time can be obtained as follows:

$$\frac{\partial n^*}{\partial \alpha} = \frac{-1 + \ln\left(-\frac{\xi b \ln(\alpha)}{c}\right)}{\alpha \ln^2(\alpha)}.$$

The denominator of this expression is positive. Recall that $b > 0$, $0 < \alpha < 1$, and $\xi \leq \frac{1}{2}$. As such, the expression $\ln\left(-\frac{\xi b \ln(\alpha)}{c}\right)$ in the numerator is also positive, implying that $\frac{\partial n^*}{\partial \alpha} < 0$ if $\ln\left(-\frac{\xi b \ln(\alpha)}{c}\right) < 1$. Solving for the reversal costs b, we find that the optimal waiting time decreases in α when $b < -\frac{ec}{\xi \ln(\alpha)}$. Therefore, when reversal costs are relatively small, the optimal waiting time decreases in α, the probability that the election is too close to call (i.e., the probability that $X = 3$). In contrast, when traders' reversal costs from betting on the wrong candidate increase (i.e., $b > -\frac{ec}{\xi \ln(\alpha)}$), the rate of change of the optimal waiting time, n^*, is unambiguously positive in the parameter α.[3]

2.2 | Empirical implications

The sequential sampling problem presented above highlights how traders' optimal waiting time depends on their ability to make an accurate electoral forecast and the prospective losses associated with placing a bet on the wrong candidate. From an empirical standpoint, identifying these countervailing effects requires that we have measurable indicators of the informational content of the signals, as well as the reversal costs.

Investors typically rely on public opinion polls to gauge each candidate's chance of winning. The extent to which these assessments of voters' preferences are fully informative usually depends on the competitiveness of a given election. When the leading candidate has a considerable electoral advantage over his/her competitors, the outcome of the election will hardly be a surprise to investors. In contrast, when the electoral support for the leading candidates is evenly distributed, the predictions of even then most accurate of public opinion polls will be within the margin of error (i.e., the difference between the sample and whole population).[4]

As for reversal costs, runoff elections provide an opportunity to identify the decisiveness of an electoral contest. Consider the first round of balloting. The vote difference between the first- and second-place candidates, while important, is not decisive—the critical factor is whether the leading candidate is very close to the threshold that determines if a second round is necessary. A trader will only have to pay a higher price if she places a bet on the wrong candidate, and a second round is not reached. But, if she correctly anticipates that no candidate will win the first round outright, the reversal costs will be necessarily lower. After all, even if her forecast about the identity of the leading candidate is incorrect, the electoral results could still be reversed in the second round. In contrast, making the wrong choice before the second and final round of balloting will be quite costly. Reversal costs should thus be higher in the second round, except in first-round elections where the leading candidate is very close to the win threshold. As such, we can only consider the latter, as well as second-round elections as *decisive* contests.[5]

One could alternatively assess the risk of placing the wrong bet by the degree of political polarization. Intuitively, if the leading candidates are expected to adopt similar policies, then the reversal costs would be inconsequential. In contrast, sufficiently high polarization would increase traders' incentives to delay their decisions until after the election takes place. Extreme polarization, however, is also often associated with policy gridlock (cf. Binder, 2004). Therefore, political polarization may reduce rather than increase the risks associated with placing a bet on the wrong candidate, as policy change becomes less likely, regardless of who wins the election.[6]

Lastly, it should also be noted that, short of time-inconsistency problems (i.e., reneging on their promises), candidates' policy stances should already be priced by the market ahead of the electoral contest. In addition, traders could always use options (calls, puts, and/or straddles) as well as other derivatives (e.g., credit default swaps) to hedge their investments, even in the case of highly polarized elections between a radical right versus radical left candidate. The problem, irrespective of the candidates' ideological orientation, still boils down to how these instruments should be priced when electoral outcomes are predictable or unpredictable ex-ante, as well as decisive or indecisive.

In sum, according to the optimal stopping model presented above, investors would find it profitable to collect additional information before reaching a decision (a) when the winner is predictable ex-ante, but the election is indecisive; or (b) when the election is decisive, and the winner is unpredictable ex-ante. In contrast, delaying an investment should not be profitable when: (c) The winner is unpredictable ex-ante, but the election is indecisive; or (d) the winner is predictable ex-ante, and the election is decisive. Table 1 summarizes these empirical implications.

The notion that financial volatility should increase in the days immediately following unpredictable, *decisive*, elections is quite intuitive. The arrival of unanticipated and consequential news would induce traders to update their beliefs and search for new asset prices, triggering portfolio rebalancing and thus increasing short-term price volatility. The idea that traders should delay their investments when the winner is predictable ex-ante but the election is indecisive is less intuitive. The reason is that the probability that $X_i = 3$ for every observation decreases in α. When the loss that caused by making a wrong decision is small, it makes sense for the trader to wait until she obtains an observation X_i whose value is different from 3. In extremis, the optimal course of action would be to wait until the electoral results are announced to choose d.

TABLE 1 Empirical implications

Expected increase in postelectoral volatility?		
	Winner	
Election Outcome	**Predictable**	**Unpredictable**
Indecisive	Yes	No
Decisive	No	Yes

3 | DATA, MEASUREMENT, AND ESTIMATION

The two-round system can be used in primary elections, to elect mayors, for the election of legislative bodies, as well as directly elected presidents. Given our interest in financial volatility in the context of national elections, we focus on the latter.

3.1 | Sample selection

We examine presidential elections in Latin America during the period between 1999 and 2018. We focus on this world region for three reasons. First, given that direct elections for the executive branch of government only occur in separation of powers systems, we do not consider parliamentary democracies. We also exclude semipresidential countries from the analysis. In contrast to pure presidentialism, executive power under semipresidentialism depends on whether the president controls a legislative majority or not. Under unified government, voters assign responsibility to the president, but under cohabitation, voters assign responsibility to the prime minister's party rather than the president (Hellwig & Samuels, 2008). The concentration of presidential systems and runoff elections make Latin America an ideal setting to carry out our study. As of 2018, of the 28 presidential democracies with a population greater than one million, more than half (16) are in Latin America.[7] Eighteen of these 28 countries use a two-round system to elect the president; and two-thirds of them (12 out of 18) are in Latin America (Institute for Democracy and Electoral Assistance 2018).[8]

Second, presidential elections in Latin America are ideal case since its financial markets are suitable to testing our empirical expectations. Our hypotheses focus specifically on high-frequency financial trading data. In addition, it is also necessary to have an index that allows for meaningful cross-country comparisons across different market capitalization sizes and sectors. Finally, we needed a comprehensive benchmark of comparable bonds issued by a group of similar countries. Given these criteria, only six of the 18 presidential countries with runoff elections are considered emerging markets. And five of these are in Latin America (Argentina, Brazil, Chile, Colombia, and Peru) and the remaining one in Asia (Indonesia). Thus, our decision to focus on presidential elections from these five Latin American countries is well justified.

Finally, focusing on Latin American presidential elections satisfies the requirement of having pre-election polling data. As discussed earlier, we need to empirically examine the relationship between the closeness of elections and the predictability of the winning candidate's identity. The literature often infers ex-ante electoral competitiveness from ex post measures, such as the percentage margin of victory (i.e., the difference between the winning candidate's percentage and that garnered by the runner-up). An important conceptual objection to using ex post vote margins, however, is simply that they do not always accurately reflect pre-election beliefs. As Cox (1988) notes, such an approach is problematic given that the margin of victory is measured after the election (after all, pre-election beliefs may be correct on average, in the same way that polls are; so that actual election results can be used as proxies for pre-election beliefs). An additional concern is that a given percentage margin of victory can correspond to elections which are quite different in terms of the capacity of the leading candidate to clear the threshold that determines if a second round is necessary. To measure the probability that a leading candidate will win outright (calculated before the election), we need to use surveys conducted by reputable firms in the days immediately preceding each election. Fortunately, such data exist for most Latin American elections going back to the late 1990s.

TABLE 2 Study sample

Country	Election date	Election type	Candidate A	Candidate B	Vote A	Vote B	Poll A	Poll B	Polling firm	Release date
Argentina	25-10-2015	Decisive	Mauricio Macri	Daniel Scioli	34.15	37.08	28	42	Ipsos-Mora y Araujo	Oct. 18th
Argentina	22-11-2015	Decisive	Mauricio Macri	Daniel Scioli	51.34	48.66	51.8	43.6	Management & Fit	Nov. 8th
Brazil	06-10-2002	Indecisive	Luis Inácio Lula da Silva	José Serra	46.4	23.2	39	19	Ibope	Sept. 10
Brazil	27-10-2002	Decisive	Luis Inácio Lula da Silva	José Serra	61.3	38.7	58	36	Ibope	Oct. 22nd
Brazil	01-10-2006	Decisive	Luis Inácio Lula da Silva	Geraldo Alckmin	48.61	41.64	49	44	Datafolha	Sept. 29
Brazil	29-10-2006	Decisive	Luis Inácio Lula da Silva	Geraldo Alckmin	60.83	39.17	62	38	Datafolha	Oct. 25th
Brazil	03-10-2010	Decisive	Dilma Rousseff	José Serra	46.9	32.6	51	41	Ibope	Oct. 1st
Brazil	31-10-2010	Decisive	Dilma Rousseff	José Serra	56.05	44	47	29	Datafolha	Oct. 29th
Brazil	05-10-2014	Indecisive	Dilma Rousseff	Aécio Neves	41.6	33.5	40	24	Datafolha	Oct. 3rd
Brazil	26-10-2014	Decisive	Dilma Rousseff	Aécio Neves	51.64	48.35	49	41	Ibope	Oct. 22nd
Brazil	07-10-2018	Indecisive	Jair Bolsonaro	Fernando Haddad	46	29.3	36	22	Datafolha	Oct. 6th
Brazil	28-10-2018	Decisive	Jair Bolsonaro	Fernando Haddad	55.13	44.87	47	39	Datafolha	Oct. 27th
Chile	12-12-1999	Indecisive	Ricardo Lagos	Joaquín Lavín	47.96	47.51	45.8	39.6	CERC	Dec. 8th
Chile	16-01-2000	Decisive	Ricardo Lagos	Joaquín Lavín	51.31	48.69	49.2	50.8	Jaime Egaña Baraona	Jan 13th
Chile	11-12-2005	Indecisive	Michelle Bachelet	Sebastián Piñera	45.96	25.41	41	22	CERC	Dec. 9th
Chile	15-01-2006	Decisive	Michelle Bachelet	Sebastián Piñera	53.5	46.5	48.7	40	Imaginacción	Jan. 5th
Chile	13-12-2009	Indecisive	Sebastián Piñera	Eduardo Frei	44.06	29.6	38.2	22.6	El Mercurio-Opina	Dec. 9th
Chile	17-01-2010	Decisive	Sebastián Piñera	Eduardo Frei	51.61	48.39	46.1	41	El Mercurio-Opina	Jan. 9th
Chile	17-11-2013	Indecisive	Michelle Bachelet	Evelyn Matthei	46.7	25.03	32	20	Ipsos	Oct. 31st
Chile	15-12-2013	Decisive	Michelle Bachelet	Evelyn Matthei	62.16	37.83	65.2	34.9	Ipsos-Usach	Dec 2nd

(Continues)

TABLE 2 (Continued)

Country	Election date	Election type	Candidate A	Candidate B	Vote A	Vote B	Poll A	Poll B	Polling firm	Release date
Chile	19-11-2017	Indecisive	Sebastián Piñera	Alejandro Guillier	36.64	22.7	43	23	Cadem	Nov. 17th
Chile	17-12-2017	Decisive	Sebastián Piñera	Alejandro Guillier	54.57	45.43	54.2	45.8	Cadem	De. 15th
Colombia	30-05-2010	Indecisive	Juan Manuel Santos	Antanas Mockus	46.68	21.51	34	32	Ipsos Napoleón Franco	May 22nd
Colombia	20-06-2010	Decisive	Juan Manuel Santos	Antanas Mockus	69.1	27.5	66.5	27.4	Invamer Gallup	June 10th
Colombia	25-05-2014	Indecisive	Juan Manuel Santos	Óscar Iván Zuluaga	25.69	29.25	28.5	29.5	Ipsos-Napoleon Franco	May 17th
Colombia	15-06-2014	Decisive	Juan Manuel Santos	Óscar Iván Zuluaga	51	45	41	49	Ipsos-Napoleon Franco	June 6th
Colombia	27-05-2018	Indecisive	Iván Duque	Gustavo Petro	39.14	25.09	41.5	29.5	Invamer	May 19th
Colombia	17-06-2018	Decisive	Iván Duque	Gustavo Petro	53.98	41.81	57.2	37.3	Invamer	June 6th
Peru	08-04-2001	Indecisive	Alejandro Toledo	Alan García	36.51	25.77	37.2	17.2	Analistas y Consultores	April 1st
Peru	03-06-2001	Decisive	Alejandro Toledo	Alan García	53.1	46.9	40.7	31.2	Universidad de Lima	May 27th
Peru	09-04-2006	Indecisive	Alan García	Ollanta Humala	24.324	30.61	21.9	29.2	Universidad de Lima	April 5th
Peru	04-06-2006	Decisive	Alan García	Ollanta Humala	52.62	47.38	53.8	46.2	Universidad de Lima	June 2nd
Peru	10-04-2011	Indecisive	Ollanta Humala	Keiko Fujimori	31.7	23.55	31.8	22.3	Datum	April 8th
Peru	05-06-2011	Decisive	Ollanta Humala	Keiko Fujimori	51.45	48.55	50.8	49.2	Datum	June 3rd
Peru	08-04-2016	Indecisive	Keiko Fujimori	Pedro Pablo Kuczynski	21.05	39.86	17.8	43.1	CPI	April 1st
Peru	03-06-2016	Decisive	Keiko Fujimori	Pedro Pablo Kuczynski	50.1	49.9	45.2	54.8	CPI	May 27th

Note: In Brazil, Chile, Colombia, and Peru, a first-round win requires 50% plus one of the votes. In Argentina, a candidate must win either 45% plus one or 40% with a difference of more than 10 points over the second-place finisher.

Altogether, our data consist of 42 presidential elections in the five Latin American countries with emerging markets and runoff elections (Argentina, Brazil, Chile, Colombia, and Peru) between 1999 and 2018. At least four presidential elections took place in each country during this period. The first election corresponds to Argentina's presidential election held on October 24, 1999, and the last election occurred in the second round of the Brazilian presidential election held on October 28, 2018. We further restrict our analysis to electoral contests with two rounds of balloting to minimize the amount of unobserved heterogeneity. In only six of the elections did an outright winner emerge in the first round (four in Argentina and two in Colombia). Therefore, our sample consists of 36 electoral contests.

Table 2 presents the details of each election, including its date, the identity of the two leading candidates, their voting percentages, as well as their polling numbers, the name of the polling firm, and the survey date.[9] In every election, the two rounds of balloting were separated by <5 weeks. The two leading candidates for each round were also identical, except in three cases (Colombia's Juan Manuel Santos in 2014; Argentina's Mauricio Macri in 2015; and Peru's Pedro Pablo Kuczynski in 2016). The least predictable elections were the second round of Peru's 2001 presidential election between Alejandro Toledo and Alan Garcia, and the second round of the 2010 Brazilian presidential election between Dilma Rousseff and José Serra.

3.2 | Financial volatility

To measure our dependent variable, financial volatility, we use data on total return performance of stocks and bonds in each of the five countries included in our sample. In the case of stocks, we rely on the Morgan Stanley Capital International (MSCI) Emerging Market Stock Latin America Index. This benchmark index captures large and mid-cap representation in each of the 5 countries included in our sample and covers approximately 85% of their free float-adjusted market capitalization.[10] Regarding bond markets, we use J.P. Morgan's Emerging Markets Latin American Bond Index (EMBI). The index tracks total returns for traded external debt instruments from Argentina, Brazil, Colombia, Chile, Mexico, and Peru. Its components are selected to reflect different liquidity, maturity, and structural constraints (including both sovereign bonds and debt instruments from state-owned companies, such as Chile's CORFO and Mexico's PEMEX).[11]

Both the MSCI and the EMBI are constructed as total return performance indices, with dividends reinvested; namely, they consider not only the capital appreciation of the included assets, but also the income received on these securities. The income consists of dividends in the case of shares of stock and interest in the case of bonds.[12] Our sample covers the period from January 1, 1999, to January 1, 2019, which generates 5,218 daily return observations for each time series. Returns are continuously compounded and expressed in US dollars. Following the standard practice in the literature, we use logarithmic returns to calculate each index's daily cumulative returns:

$$r_{i,t} = \ln\left(\frac{I_t^i}{I_{t-1}^i}\right),$$

where ln is the natural logarithm operator and I^i represents the total return from holding index i between the periods t and $t-1$ (which correspond, in this case, to two consecutive trading days).

Average returns over this long period vary significantly across markets. While the MSCI consisting of a portfolio of Peruvian stock shares boosted an annual return of roughly 12%, investors in the Argentinean MSCI registered losses to the tune of 9%. In bond markets, the average yearly return of the Brazilian EMBI portfolio was 10.5% during this period. Investors in EMBI portfolio consisting of Colombian debt instruments, in turn, received an annual average return of 8.7% on their investment.

In the current era of integrated financial markets, however, asset prices often respond to local as well as global stimuli. The price of Brazilian stocks may plummet in response to the announcement of tariffs in the United States. Therefore, most investors do not make their decisions based on an asset's total absolute return, but rather care about its excess return. The excess pertains to the return over a risk-free asset. Instead of focusing on total absolute returns, we calculate for each country its index's excess return. And following the standards in the financial literature, we use U.S. Treasury bills to calculate the rate of return of a risk-free asset.

Investors also typically compare an asset's performance to the returns they would have obtained by holding a benchmark portfolio. For example, the bond prices of every Latin American country may rise in response to an interest rate cut by the U.S. Federal Reserve. We thus use the excess returns of Latin America's composite MSCI and EMBI indices as "benchmark" market portfolios.[13] This process creates a set of excess returns for the stock and bond indices aggregated at the regional level, as well as five sets of stock and bond indices at each national level.

Our main interest is not on returns per se, but rather on the second moment of the return distribution. Larger swings in price are riskier than smaller swings in price; and more frequent price changes are riskier than less frequent price changes. It is thus common for investors to use variance (or, its positive square root, standard deviation) as a measure of how far a security's return deviates from its average during a given period. And regardless of whether the deviation from the average is a positive or negative deviation, both are considered as risk. To isolate each country's specific component of variance, we use a generalized autoregressive conditional heteroskedasticity (GARCH) framework. This specification is often compared with the way traders predict the conditional volatility of returns, as it incorporates in each period the most recent forecast error as well the previous period's forecasted variance.[14]

3.3 | Identification strategy and model specification

A GARCH(1,1) model can be fruitfully used to examine how electoral outcomes affect traders' behavior. Disentangling the effects of political uncertainty and an election's decisiveness on financial volatility, however, calls for an appropriate research design. Recall that traders' optimal waiting time depends on their ability to make an accurate electoral forecast and the prospective losses associated with placing a bet on the wrong candidate. Therefore, as Atanasov and Black (2016) note, the correct specification for this problem would be a triple difference-in-difference approach.

Let the time around an election (i.e., before and after) be the "treatment." We are interested in estimating how time affects financial volatility differentially across two groups, *decisive* versus *indecisive* elections. Note that, as per the argument presented above, time itself does not affect the realized volatility. It is just a stand-in for the real treatment, the revelation of the winning candidate's identity, that happens between the two time periods.

So far, a standard difference-in-difference design would be appropriate. We still need to account, however, for the crucial role of expectations (i.e., the heterogeneity across different levels of electoral uncertainty represented by p). Let Y_t denote volatility at time t; and $T \in \{0,1\}$ be an indicator taking the value of 1 if time t corresponds to a period after an election (and 0, for t before the election). Let $S \in \{0,1\}$ be 0 for *indecisive* elections and 1 for *decisive* elections. Finally, electoral uncertainty $U \in \{0,1\}$ indicates the predictability of the electoral outcome (where 0 is predictable and 1 is unpredictable). The DDD estimator is given by:

$$\hat{\varphi}_{DDD} = \hat{E}\left[\overline{Y}_{S=1}^{T=1}, U=1\right] - \hat{E}\left[\overline{Y}_{S=0}^{T=1}, U=1\right] - \left\{\hat{E}\left[\overline{Y}_{S=1}^{T=0}, U=1\right] - \hat{E}\left[\overline{Y}_{S=0}^{T=0}, U=1\right]\right\}$$
$$- \left(\hat{E}\left[\overline{Y}_{S=1}^{T=1}, U=0\right] - \hat{E}\left[\overline{Y}_{S=0}^{T=1}, U=0\right] - \left\{\hat{E}\left[\overline{Y}_{S=1}^{T=0}, U=0\right] - \hat{E}\left[\overline{Y}_{S=0}^{T=0}, U=0\right]\right\}\right).$$

The DDD estimate can be recovered in a regression framework with a triple interaction. The basic specification would be as follows:

$$Y_t = \alpha + \beta_1 T + \beta_2 S + \beta_3 U + \gamma_1 T * S + \gamma_2 S * U + \gamma_3 T * U + \delta_1 T * S * U + \in_t$$

where α is a constant, and $\in_t$ is an error term. The coefficient β_1 represents how learning the identity of the winning candidate affects volatility when there is no electoral uncertainty but the election is indecisive; β_2 reflects the change in the volatility between *indecisive* and *decisive* elections in the days immediately preceding predictable elections; and β_3 shows how electoral uncertainty affects volatility in the days immediately preceding *indecisive* elections. The estimate for the treatment effect in *decisive* elections when the electoral outcome is fully predictable (i.e., the "placebo" DD) is γ_1. Finally, the treatment effect when *decisive* elections are unpredictable differs by $(\gamma_1 + \delta_1) - \gamma_1 = \delta_1$, which is the coefficient of the triple interaction term, or the DDD estimate.

We measure our dependent variable Y, financial volatility, using the procedure outlined in the previous section. For each election in our sample, we produce estimates of the GARCH volatility in the stock and bond markets. Notice that if the election takes place after the markets are closed at time t, the conditional volatility estimate corresponding to the day when ε_i and h_i^2, as well as the identity of the winning candidate, are known is given by.

$$. \qquad h_{i,t+2}^2 = \gamma_0 + \gamma_1 \varepsilon_{i,t+1}^2 + \gamma_2 h_{i,t+1}^2$$

Therefore, to properly identify how the arrival of new information affects traders' behavior, we use the first lag of our volatility forecast as our dependent variable. Finally, for ease of interpretation, we express the daily standard deviations, $h_{i,t}$, in annualized terms.[15]

With respect to our treatment variable T, it is important to note that asset prices react very quickly to the arrival of new information. As news is timely and usually short term in impact, the opportunity to profit only exists for as long as the news is fresh. Therefore, election outcomes should only affect securities' prices during very brief periods of time. To capture the full effect of elections of financial volatility and to make sure that our results are not confounded by other news, announcements, or shocks to the economy, we restrict our attention to a six-day interval around each electoral contest. All the elections in our sample took place on weekends, when no financial trading occurs. Therefore, $T = 1$ in the three days immediately before an election (Wednesday, Thursday, and Friday) and $T = 0$ in the three days immediately after the election (Monday, Tuesday, and Wednesday).

To capture electoral uncertainty, U, we rely on the polling data for the two leading candidates in the days immediately preceding each election listed in Table 2. If the predicted margin of victory for any of the two candidates is large, then the election outcome is quite predictable. In contrast, if the electoral support for the two leading candidates is evenly distributed, the outcome of the election is unpredictable. Our measure of unpredictability is thus calculated as follows:

$$\frac{1}{|(\text{Predicted Vote of Candidate A} - \text{Predicted Vote of Candidate B})|}$$

When the value of U approaches zero, an election is extremely predictable. When the two leading candidates are separated by 3 points or less, the value of $U \leq 0.33$. And, as the distance between them is merely one percentage point, the value of $U = 1$. In the analysis presented below, we treat uncertainty as both an indicator variable (that takes the value of 1 when $U > 0.33$, and 0 otherwise) and a continuous measure.

Regarding S, we classify the elections in our sample as either *decisive* or *indecisive* contests in the following way. By definition, we consider all second-round elections to be *decisive* contests. In the case of first-round elections, we classify them using the polling data and each country's win threshold. Specifically, we consider a first-round election to be a *decisive* contest if the predicted support for the leading candidate is within 3 percentage points of the winning threshold. So, for example, in the first round of the 2015 Argentine presidential election, Daniel Scioli was the leading candidate polling at 42%. In Argentina, a candidate can win a first-round election outright if he/she obtains 45% plus one of the votes. A Scioli victory was within the statistical margin of error, making this election a *decisive* contest.[16] In contrast, neither Jair Bolsonaro nor Fernando Haddad, the two leading candidates in the first round of Brazil's 2018 presidential election, were close to the 50% winning threshold in the pre-election polls (the former was polling at 36%, while the latter was at 22% two days before the election). As such, we consider this election to be an *indecisive* contest.

Finally, we account for the possible effects on incumbency advantage. Financial markets could view these candidates as "known quantities" and front-runners, thereby decreasing levels of electoral uncertainty. As Table 2 demonstrates, two of the six elections featured an incumbent as a leading candidate.[17] To control for this potential source of heterogeneity, we create an indicator variable called Incumbent, which takes the value of 1 when one of the leading candidates was the incumbent president, and 0 otherwise.

4 | MAIN RESULTS

Prior to discussing our main results, we provide evidence to justify our triple difference strategy. Figure 1 below plots the average of the first lag of our volatility forecast in the elections in our sample (vertical axis) for each day of the week, between the Tuesday before they took place and the Wednesday of the following week later (horizontal axis). As discussed above, all the electoral contests took place on weekends. The vertical dotted line indicates the Friday before the election.

The first difference that emerges is the potential "jump" that occurs in the days immediately after the election. We see a second difference between *decisive* versus *indecisive* elections. And the third difference relates to predictable versus unpredictable races. The left panel shows the average annualized volatility for predictable (solid line) and unpredictable races (dashed line) when the election is indecisive. As discussed above, we consider that an election is unpredictable if the support for the leading candidates is within the margin of error. Notice that, in the case of indecisive elections, market volatility exhibits a modest postelectoral "bump" in the case of predictable races.

The right panel of Figure 1 shows the average annualized volatility for predictable (solid line) and unpredictable (dashed line) races, when the election is decisive. A comparison between the period before and after the elections (marked by the vertical dashed line), the predictability of the results (the dashed versus solid line), and the type of electoral contest (the left versus the right panel) clearly indicates that financial volatility experienced a significant increase in the days immediately following unpredictable, *decisive*, elections.

Overall, our empirical evidence supports our use of a triple difference-in-difference design. We now proceed to examine the effect of elections on financial volatility using the triple interaction regression framework discussed above. Our dependent variable, measured as the annualized volatility, only takes positive values. Therefore, we follow Wooldridge (2010) and use a Poisson regression with the Huber/White/Sandwich linearized estimator of variance in our analyses. Asset volatility exhibits significant variation across markets and through time. To account for temporal variation in financial volatility and to ensure that the regression coefficients are identified by within-country variation, we include country fixed effects as well as year fixed effects.[18] Our sample consists of 432 observations (made up of the volatility estimates of the two asset classes, during six different days, for each of the 36 elections).

The triple difference estimates of the impact of elections on financial volatility are presented in Table 3. The top (bottom) panel shows the results for stocks (bonds). The first model excludes any additional controls, whereas the second one includes the *Incumbent* dummy. The third model shows the robustness of our results when we use a continuous measure of electoral uncertainty rather than the indicator variable. In the fourth model, we adopt a more stringent event window of 4 days around the election. Our treatment variable takes the value of 1 in the two days immediately before an election, and 0 in the two days immediately after the election. Given the shorter time span of our analysis, the sample size is reduced to 144 observations for each asset class. Finally, in our last model, we adopt an even smaller event window of 2 days around the election. Our treatment variable takes the value of 1 in the day immediately before an election, and 0 in the day immediately after the election. Given the shorter time span of our analysis, the sample size is reduced to 72 observations for each asset class.

Before interpreting the results, a few points are worth noting. First, the triple difference estimates exhibit very little variation across the models (except when we use the continuous measure of electoral uncertainty). This finding is reassuring and suggests that the triple difference strategy adequately accounts for any other omitted variables. Second, the recovered effects are smaller in the case of bonds

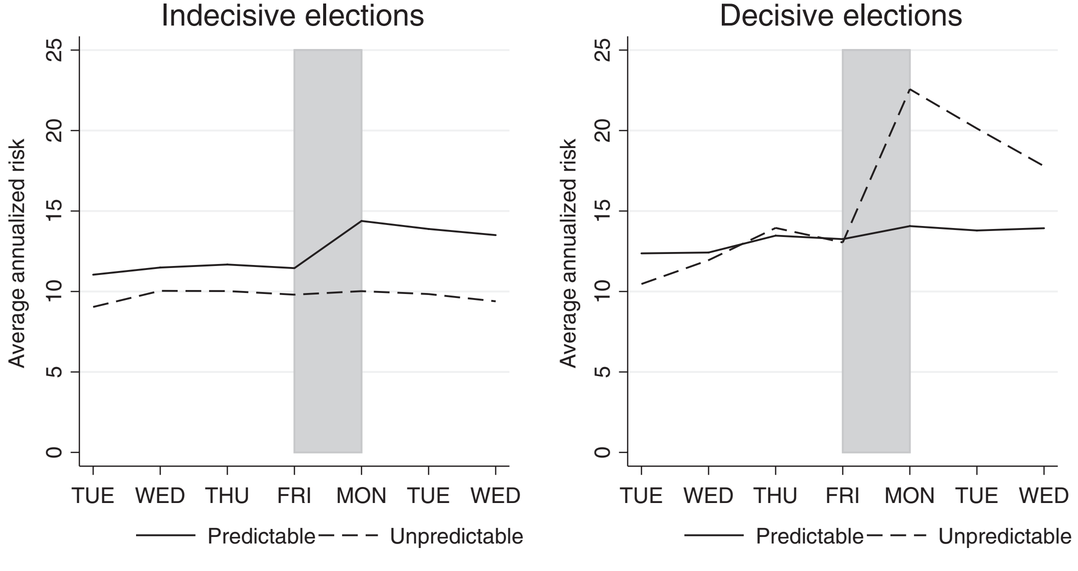

FIGURE 1 Market volatility by election type and predictability

TABLE 3 Main results

	(1)	(2)	(3)	(4)	(5)
Stocks					
Treat × Decisive × Uncertainty	**0.799*** (0.199)**	**0.799*** (0.153)**	**1.412*** (0.296)**	**0.836*** (0.236)**	**0.955*** (0.324)**
Treat × Decisive	−0.184** (0.081)	−0.184** (0.080)	−0.312*** (0.094)	−0.233** (0.099)	−0.251** (0.128)
Treat × Uncertainty	−0.260* (0.155)	−0.260*** (0.087)	−0.437** (0.177)	−0.253 (0.195)	−0.266 (0.272)
Uncertainty × Decisive	0.311* (0.182)	0.264 (0.163)	1.010*** (0.268)	0.234 (0.223)	0.227 (0.295)
Treat	0.238*** (0.068)	0.238*** (0.068)	0.273*** (0.076)	0.259*** (0.086)	0.296** (0.116)
Decisive	0.127 (0.082)	0.150* (0.081)	0.006 (0.092)	0.176* (0.103)	0.175 (0.124)
Uncertainty	0.331*** (0.115)	0.354*** (0.081)	0.229 (0.149)	0.369** (0.148)	0.381* (0.206)
Incumbent Candidate		−0.372*** (0.042)			
Constant	3.803*** (0.084)	3.779*** (0.084)	3.802*** (0.085)	3.749*** (0.106)	3.748*** (0.135)
Observations	216	216	216	144	72
Pseudo *R*-squared	0.58	0.59	0.58	0.60	0.62
Bonds					
Treat × Decisive × Uncertainty	**0.331** (0.146)**	**0.331*** (0.102)**	**0.577*** (0.211)**	**0.332* (0.185)**	**0.276 (0.253)**
Treat × Decisive	0.058 (0.070)	0.058 (0.067)	0.006 (0.079)	0.072 (0.087)	0.097 (0.127)
Treat × Uncertainty	−0.043 (0.117)	−0.043 (0.053)	−0.049 (0.135)	−0.028 (0.147)	−0.017 (0.204)
Uncertainty × Decisive	0.318** (0.148)	0.266** (0.122)	0.628*** (0.191)	0.347** (0.175)	0.300 (0.249)
Treat	0.028 (0.053)	0.028 (0.052)	0.031 (0.059)	0.011 (0.066)	0.001 (0.093)
Decisive	−0.079 (0.052)	−0.057 (0.050)	−0.137** (0.059)	−0.064 (0.066)	−0.066 (0.095)
Uncertainty	0.066 (0.106)	0.097 (0.069)	0.018 (0.118)	0.060 (0.132)	0.047 (0.189)
Incumbent Candidate		−0.338*** (0.041)			
Constant	2.412*** (0.062)	2.390*** (0.061)	2.406*** (0.063)	2.381*** (0.078)	2.346*** (0.115)
Observations	216	216	216	144	72
Pseudo *R*-squared	0.45	0.46	0.45	0.45	0.45

Note: We include country fixed effects as well as year fixed effects. Argentina and the year 1999 are the excluded categories.
Robust standard errors in parentheses ***$p < .01$, **$p < .05$, *$p < .1$.

compared to stocks. Bonds are usually less volatile on average than stocks because more is known and certain about their income flow. Third, the coefficient on the "treatment" dummy (i.e., learning the identity of the winning candidate) is either positively associated with financial volatility (in the case of stocks) or statistically indistinguishable from zero (in the case of bonds). Given the triple interaction term, this effect conforms with the theoretical expectations laid out in Section 1: Traders prefer to wait until the electoral results are announced before reaching an investment decision, when the winner is predictable ex-ante (i.e., $U=0$), but the election is indecisive (i.e.,$S=0$). Fourth, the estimate for the "placebo" DD (i.e., the treatment effect when $S=1$ and $U=0$) is either negatively associated with financial volatility (in the case of stocks) or statistically indistinguishable from zero (in the case of bonds). Finally, the results from our second model (reported in column 2) suggest that elections where one of the leading candidates is the incumbent president are associated with lower levels of financial volatility.

Moving onto the substantial interpretation of our results, the non-linear nature of our estimator implies that there is no single marginal effect associated with the revelation of the winning candidate's identity, so we report measures of interaction on both additive and multiplicative scales. We start with the latter. In our baseline model (column 1), the incidence rate ratio (IRR) for a one-unit change in the DDD estimate for stocks, $e^{0.799}$, is 2.23 a statistically significant amount. Likewise, the DDD estimate for bonds is 1.40. It is thus clear that the combined effect of learning the identity of the winning candidate, the type of election, and the electoral uncertainty exceeds the product of the effects of these factors considered separately.[19]

Regarding our measures of additive interaction, we can calculate them using the parameters of the Poisson regression. Specifically, we estimate the predicted volatility for every combination of our treatment variable (T), our electoral uncertainty measure (U), and the election type (S) at representative values of the other model covariates. Next, we compute the marginal effect as the difference between the predicted outcomes at different combinations of factor levels. Standard errors can be obtained using the delta method. Table 4 below shows how the revelation of the winning candidate's identity affects financial volatility across the different types of elections (i.e., *decisive* versus *indecisive*, and predictable versus unpredictable). We constructed these measures using our baseline specification (reported in column 1 of Table 3). We report our measures of additive interaction for stocks (top) and bond (bottom) markets.

Consider the change in stock market volatility in predictable, *indecisive* elections. Our estimates indicate that, on average, learning the winning candidate's identity increases the annualized volatility by about 27%. The chi-squared statistic of 13.31 shows that the difference is significantly different from zero. The estimated change in the stock market volatility in the days immediately following unpredictable, *decisive*, elections is significantly larger, at about 80%. The effect of the learning identity of the winning candidate on bond market volatility shows a somewhat similar pattern. Learning the winning candidate's identity increases the annualized volatility by about 45% in the days immediately following an unpredictable, *decisive*, election. In the case of predictable, *indecisive* elections, however, our estimates indicate that learning the winning candidate's identity has no effect on bond market volatility.

In the case of stocks, an examination of the marginal effects for the model estimated using a 2-day event window (reported in column 5 of Table 3's top panel) indicates that financial volatility would increase by roughly 35% in the day immediately following a predictable, *indecisive* election. In addition, financial volatility doubles in the day after the identity of the winning candidate is revealed when elections are *decisive* and unpredictable. These findings are consistent with the patterns shown in Figure 1: Volatility tends to spike in the day immediately following these types of elections and then tapers off in the subsequent days.

Note that the estimated marginal effect of learning the identity of the winning candidate is the within-country average treatment effect (ATE) once we control for temporal variation in financial volatility. In addition, recall that each country's index represents a well-diversified portfolio. As such,

TABLE 4 Marginal effects

Election type	Election outcome	Before election	After election	Treatment effect (Std. dev.)	Percent change (Std. dev.)	Chi-square ($P >$ chi2)
		Predicted volatility (Std. dev.)				
Stocks						
Indecisive	**Predictable**	**17.127 (0.975)**	**21.728 (0.798)**	**4.600 (1.261)**	**26.858 (8.601)**	**13.310 (0.001)**
Indecisive	Unpredictable	16.305 (1.433)	15.948 (1.713)	−0.357 (2.234)	−2.188 (13.579)	0.030 (0.873)
Decisive	Predictable	19.587 (0.762)	20.671 (0.409)	1.084 (0.865)	5.533 (4.607)	1.570 (0.210)
Decisive	**Unpredictable**	**32.465 (2.756)**	**58.741 (4.828)**	**26.276 (5.559)**	**80.935 (21.381)**	**22.340 (0.000)**
Bonds						
Indecisive	Predictable	5.947 (0.241)	6.118 (0.208)	0.170 (0.318)	2.861 (5.441)	0.29 (0.593)
Indecisive	Unpredictable	3.605 (0.259)	3.551 (0.266)	−0.055 (0.372)	−1.515 (10.239)	0.02 (0.883)
Decisive	Predictable	5.194 (0.110)	5.663 (0.227)	0.469 (0.252)	9.024 (4.938)	3.46 (0.063)
Decisive	**Unpredictable**	**5.852 (0.349)**	**8.503 (0.395)**	**2.651 (0.527)**	**45.294 (10.994)**	**25.25 (0.000)**

Note: Standard errors in parentheses. Bold face indicates $p < .001$.

TABLE 5 Robustness test

	Argentina	Brazil	Chile	Colombia	Peru
Bonds					
Monday	−0.004 (0.022)	0.005 (0.025)	0.012 (0.031)	−0.003 (0.019)	−0.007 (0.014)
Tuesday	−0.006 (0.022)	−0.003 (0.025)	0.006 (0.033)	−0.013 (0.018)	−0.005 (0.014)
Wednesday	−0.004 (0.022)	−0.002 (0.025)	0.004 (0.032)	−0.009 (0.018)	−0.003 (0.014)
Thursday	−0.004 (0.022)	−0.003 (0.025)	−0.000 (0.032)	−0.009 (0.018)	−0.002 (0.014)
Constant	2.032*** (0.048)	2.173*** (0.067)	1.661*** (0.036)	2.467*** (0.044)	2.516*** (0.021)
Pseudo *R*-squared	0.3487	0.2426	0.24	0.2405	0.3305
Observations	5,217	5,217	5,217	5,217	5,217
Stocks					
Monday	−0.006 (0.017)	−0.002 (0.012)	−0.002 (0.009)	−0.003 (0.013)	−0.002 (0.009)
Tuesday	−0.002 (0.017)	−0.001 (0.012)	0.001 (0.009)	−0.008 (0.013)	−0.002(0.009)
Wednesday	−0.005 (0.017)	−0.002 (0.012)	0.003 (0.009)	−0.003 (0.013)	−0.004 (0.009)
Thursday	−0.007 (0.016)	−0.004 (0.012)	0.002 (0.009)	−0.004 (0.013)	−0.002 (0.009)
Constant	3.387*** (0.031)	3.007*** (0.023)	2.764*** (0.018)	3.314*** (0.022)	2.971*** (0.015)
Pseudo *R*-squared	0.2259	0.2362	0.0705	0.1382	0.1097
Observations	5,217	5,217	5,217	5,217	5,217

Note: Poisson regression of annualized risk. Includes year and month FE.

Robust standard errors in parentheses ***$p < .01$, **$p < .05$, *$p < .1$.

our findings indicate that the increased risk associated with learning the identity of the winning candidate in the three days immediately following unpredictable, *decisive*, elections is quite substantial. For example, consider a hypothetical USD 100 investment in the stock market index. A simple value at risk (VAR) calculation indicates that the probability that it would lose more than USD 4 in the three days immediately preceding an unpredictable and *decisive* election is <2%. But, there is a 15% chance that the investment would lose more than USD 4 in the three days following an unpredictable and *decisive* election. To put this figure in perspective, consider a USD 100 investment in the MSCI Latin American composite benchmark over the period from January 1, 1999, to January 1, 2019. The average annual total excess return for this period was 3.19%.

The results presented in Table 4 also provide a statistical test of our argument regarding traders' optimal waiting time. The estimated effect of learning the winning candidate's identity on financial volatility is statistically different from zero when: (a) The winner is predictable ex-ante, but the election is indecisive in the case of stocks; and (b) the winner is unpredictable ex-ante, and the election is decisive in both cases. In contrast, the effect is indistinguishable from zero when: (c) The winner is unpredictable ex-ante, but the election is indecisive, and (d) the election is decisive, but the winner is predictable ex-ante. As such, these results validate our view of how electoral uncertainty affects traders' behavior.

4.1 | Robustness test

Recall that all the elections in our sample were held on weekends. Therefore, our treatment always occurred on the Monday–Wednesday (3-day window) or the Monday–Tuesday (two-day window) period. It is thus possible that our results may be susceptible to the so-called *day-of-the-week* effect, so that the distribution of stock returns may vary according to the day of the week.[20]

To address this potential issue, we use the GARCH(1,1) specification described in Section 2.2. In this case, we use our full sample, consisting of 5,218 daily observations between January 1, 1999, to January 1, 2019, as our estimation period. Next, we regress the first lag of our volatility forecast, $h_{i,t}$, on four dummy variables for Monday, Tuesday, Wednesday, and Thursday (thus leaving Friday as our baseline category). As in our previous analysis, we express our dependent variable in annualized terms and use a Poisson regression with the Huber/White/Sandwich linearized estimator of variance. To account for temporal variation in financial volatility, we include both year and month fixed effects.

Table 5 reports the day-of-the-week effects on the volatility of stock (top panel) and bond (bottom panel) markets for the five countries in our sample markets. The estimated coefficients of the daily dummy variables are all statistically indistinguishable from zero. As such, these results indicate that our main findings reported in Table 3 are not confounded by a days-of-the-week effect. Given our narrow event window, the fact that electoral outcomes are publicly observable, and the role played by the type of election, we are confident that the relationship between volatility and postelectoral trading is driven by the revelation of the winning candidate's identity.

5 | CONCLUSIONS

In this paper, we conduct a cross-national examination of how political uncertainty and an election's decisiveness affect financial volatility. Our analysis focuses on two-round presidential elections in 5 Latin American countries between 1999 and 2018. Using a triple difference-in-difference approach, we provide credible evidence indicating that investors' trading strategies respond to both the decisiveness of an election and the accuracy of the pre-election forecasts. While we focus on well-diversified portfolios, our approach also offers researchers an innovative way to study the effects of political uncertainty and electoral decisiveness on industry-specific stock returns.

The extent to which returns are affected by presidential elections likely varies by how much public policies influence the profitability of different sectors. One could thus examine the postelectoral volatility of securities backed by different types of assets—commodities, public utilities, banking, etc. By focusing on these assets' differential mobility/expropriability, one could advance our knowledge of how capital markets respond to political risk. In addition, having such knowledge may allow investors to adjust their portfolios by considering postelectoral variations in volatility. For example, investors who dislike risk may adjust their portfolios by reducing their investments in those assets whose postelectoral volatility is expected to increase.

How much do our results support the general claim that elections inject volatility into financial markets? To address this question, note first that as per the efficient market hypothesis, asset prices should only react to new information. Therefore, if the electoral outcomes are fully predictable, the identity of the winning candidate should already be priced ahead of the electoral contest. In this paper, we argue traders' optimal investment strategies depend on their ability to make an accurate electoral forecast and the prospective losses associated with placing a bet on the wrong candidate. There will be little difference in financial volatility around elections if the electoral outcomes are unpredictable, but the election is indecisive, or if the election is decisive, but the winner is ex-ante predictable.

This general point is illustrated in the cases we analyze. Financial volatility is highest in the three days immediately following unpredictable, *decisive*, elections. Significant postelectoral volatility also occurs following predictable, *indecisive* elections. Yet, the effect of learning the identity of the winning candidate on financial volatility is null when the election is unpredictable but indecisive, and when the electoral outcomes are decisive but predictable. All told perhaps the best way to restate the argument linking elections and financial markets would be that the more decisive the election is, the more critical does the predictability of the outcome become.

It should be noted that our focus on two-round elections was primarily driven by instrumental/methodological concerns. By restricting our analysis to these electoral contests, we sought to minimize the amount of unobserved heterogeneity in our sample. The logic laid out in the theoretical part of this paper, though, is general enough to accommodate single-round elections whenever their decisiveness and predictability can be accurately measured and any potential confounders can be accounted for.

A key contribution of this study is the use of pre-election polling data to gauge investors' expectations, as ex post vote margins do not always accurately reflect pre-election beliefs. In the case of the elections under study, most public opinion polls provided reasonable electoral predictions. Uncertainty was thus confined to the actual competitiveness of the elections themselves. This was not the case, however, in the recent Argentine elections discussed in the introduction. Nor was it the case in the infamous Brexit referendum or Donald Trump's victory. Therefore, another significant implication from our study is that postelectoral financial volatility should be even more severe when public opinion polls are unreliable.

Finally, even though we focus on financial volatility, the results in this paper also have implications for the analysis of market returns and risk pricing. When the price of an asset falls, investors will often sell positions today until the expected return rises to compensate for the risk. An increase in volatility, however, requires an even lower price to generate a sufficient return to compensate an investor for holding a volatile asset. Therefore, as long as competitive elections trigger volatility bouts, we should consider their second-order effects on the public's material wellbeing (Przeworski, 2018) as well as the overall economic costs of democracy (Keech, 2013).

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ENDNOTES

[1] See https://www.clarin.com/economia/ultima-rueda-paso-bolsa-sube-5-riesgo-pais-cae-874_0_fiYbQbTR6.html and https://www.clarin.com/opinion/intrigas-casa-rosada-pases-factura-city-lunes-negro_0_jnggAIsh5.html

[2] We thank Gary Cox for pointing out this important distinction to us.

[3] In fact, the mixed second-order partial derivative $\partial^2 n^* / \partial b \partial \alpha = (1/b\alpha ln^2(\alpha)) > 0$.

[4] A poll with a random sample of 1,000 people—the usual size for political polls—has margin of sampling error of $\pm$ 3% for the estimated percentage of the whole population. As such, when the percent of sample respondents who prefer candidate A to candidate B is within 2 points (say 50% versus 48%), the election would be too close to call, and an unexpected outcome could occur.

[5] It could be argued that the results from the first round of balloting would have the effect of reducing the electoral uncertainty in the second round. For example, in a three-way race, all three candidates could be virtually tied in the polls ahead of the first round of voting, but, once the competition is reduced to a two-candidate race, one of them could be predicted to win with 66% of the vote, minimizing any electoral uncertainty. By the same token, however, going from a three-way a two-way race could bolster electoral uncertainty (as when the leading candidate has 40% of the predicted votes, versus 30% for each of the other ones, in the first round and then has a 50–50 chance of winning in the second round).

[6] From a practical standpoint, political polarization is notoriously difficult to measure (Schmitt 2016; Druckman and Levendusky 2018). This problem is particularly acute in cross-country analyses.

[7] We consider a country to be democratic if it has a combined polity score of 6 or higher.

[8] https://www.idea.int/data-tools/data/electoral-system-design

[9] Respondents were asked a version of the following question: *"Among these candidates running for President of the Republic, which one would you vote for?"* More importantly, in all the polls under consideration, the list of candidates in the first electoral round includes all the presidential contenders and not just the two leading ones. We exclude the 2000 presidential election in Peru, as it can hardly be considered democratic.

[10] Each country's index has significant diversification and includes assets from the financial, manufacturing, consumer, agricultural, and energy sectors. See https://www.msci.com/index-methodology for full details of the index construction.

[11] For more information, see: https://www.ishares.com/us/products/239572/ishares-jp-morgan-usd-emerging-markets-bond-etf

[12] In contrast, price return only accounts for the capital gain on an investment.

[13] As of 2019, the individual countries in the MSCI Emerging Market Stock Latin America Index are weighted separately with Brazil accounting for 63.85% of the constituents, Chile 7.31%, Colombia 3.33%, Peru 3.08%, and Argentina 2.8%. The remaining 19.63% corresponds to Mexico, a country excluded from our analysis. In the case of the EMBI Latin American Bond Index, the country weights are as follows: Brazil (17.61%), Colombia (16.94%), Peru (14.87%), Argentina (13.48%), Chile (10.58%), and Mexico (26.49%).

[14] All the estimation details can be found in the Appendix.

[15] To obtain the annualized figure, we simply multiply the daily standard deviation by the square root of 252 (this calculation assumes there are 252 trading days in a year).

[16] This is the only case where someone close to our coding discontinuity lost a second round. There are two cases in our sample where the leading candidate in the first round advanced to the runoff election and then lost. None of the leading candidates in these two elections, however, had a predicted support within 3 percentage points of the winning threshold. In addition, our main statistical results remain unchanged if we recode all the first-round elections as indecisive electoral contests. We thank an anonymous reviewer for pointing this out.

[17] This happened twice in Brazil (with Luis Inácio Lula da Silva in 2006 and with Dilma Rousseff in 2014) and once in Colombia (with Juan Manuel Santos in 2014).

[18] The excluded categories are Argentina and the year 1999.

[19] In the case of bonds, the coefficient for our DDD estimate is positive, but not statistically significant when we adopt the smallest, 2-day, event window. The smaller sample size (72 observations) and the fact that bonds are less volatile than stocks likely explain why the standard error of the coefficient is larger than expected. On the other hand, in the case of stocks, the coefficient for our DDD estimate is not only positive and statistically significant but also larger in size when we adopt the smallest event window.

[20] See Kiymaz and Berument (2003) for a recent review of the literature.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

How to cite this article: Carnahan D, Saiegh S. Electoral uncertainty and financial volatility: Evidence from two-round presidential races in emerging markets. *Econ Polit*. 2020;00:1–24. https://doi.org/10.1111/ecpo.12163