Does the @realDonaldTrump Really Matter to Financial Markets?

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Abstract: *Does the @realDonaldTrump really matter to financial markets? Research shows that new information about the likely future policy direction of government affects financial markets. In contrast, we argue that new information can also arise about the likely future government's resolve in following through with its policy goals, affecting financial markets as well. We test our argument using data on U.S. President Donald J. Trump's Mexico-related policy tweets and the U.S. dollar/Mexican peso exchange rate. We find that Trump's Mexico-related tweets raised Mexican peso volatility while his policy views were unknown as well as thereafter, as they signaled his resolve in carrying out his Mexico-related agenda. By helping politicians disseminate policy information to voters, and since voters hold governments accountable for their policy performance, social media allows investors to gather information about the likely policy direction and policy resolve of government, especially those of newcomers whose direction and resolve are unknown.*

Verification Materials: The data and materials required to verify the computational reproducibility of the results, procedures, and analyses in this article are available on the *American Journal of Political Science* Dataverse within the Harvard Dataverse Network, at: https://doi.org/10.7910/DVN/8JHA2X.

Does the @realDonaldTrump really matter to financial markets? Anecdotal evidence suggests that economic policy statements made by U.S. President Donald J. Trump via microblogging website Twitter have the power to rattle financial markets. As one market report notes, it is "important for market participants to be aware of the potential for increased volatilities facing individual equities related to a [Trump] Twitter release."[1] As another observes, "with Trump's approach to governance via Twitter, it's no wonder that [currency market] volatility has increased."[2] Yet, other analysts claim that Trump's economic policy tweets have no impact on financial markets, with asset price values and volatility reflecting information about economic fundamentals rather than Trump's Twitter feed. Some even note that firms targeted in his tweets often outperform their markets.[3]

Whereas market analysts present two contrasting views about the impact of Trump's economic policy tweets on financial markets, the academic literature suggests that his tweets should not matter to investors. Financial economists argue that financial markets are efficient, with asset prices reflecting all publicly available information (Fama 1970, 1991). Political economists build on this

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[1] https://www.fxcm.com/uk/insights/president-trumps-twitter-impact-forex-markets-stocks/.

[2] https://www.bloomberg.com/news/articles/2017-04-28/fx-traders-finding-trump-s-first-100-days-are-good-for-business.

[3] http://www.wsj.com/graphics/trump-market-tweets/.

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to suggest that only new and unanticipated information about the future political and economic policy direction of government should affect investors' views about the future value of their assets (e.g., Bechtel 2009; Bernhard and Leblang 2006; Fowler 2006; Freeman, Hays, and Stix 2000; Garfinkel, Glazer, and Lee 1999; Leblang and Bernhard 2006; Mosley and Singer 2008; Pantzalis, Stangeland, and Turtle 2000; Sattler 2013). By this logic, Trump's economic policy tweets should have only mattered to financial markets while his policy agenda was unknown; once the direction of his economic policy views was clear, his tweets would not have provided any new information to investors, leaving financial markets untouched.

Yet, research also clarifies the conditions under which news about the likely future political orientation of government affects financial markets, suggesting another way that Trump's economic policy tweets might matter. Distinguishing politicians' policy agenda from policy capacity, scholars argue that news about the likely future policy direction of government triggers stronger financial market reactions when governments enjoy greater political institutional capacity to implement policy change (Bechtel 2009; Bernhard and Leblang 2006; Fowler 2006; Freeman, Hays, and Stix 2000; Mosley and Singer 2008; Sattler 2013). In a distinct line of study, scholars argue that news about the likely future political orientation of government triggers stronger investor reactions when it concerns lesser-known nonincumbent candidates or political newcomers (Bernhard and Leblang 2006; Fowler 2006; Jensen and Schmith 2005). The policy pledges of newcomers are less credible than those of incumbent candidates and experienced politicians, who have previously revealed their policy preferences and willingness to follow through when in office (Fowler 2006; Jensen and Schmith 2005).

However, this last line of research treats politicians' expected policy direction and policy credibility as interchangeable—two things that we argue should be treated as distinct. It is possible for both newcomers and seasoned politicians to clarify their economic policy goals and shift in their resolve to follow through. With this in mind, we introduce two theoretical innovations. First, we disentangle investors' concern with the likely economic policy direction of government from their concern with its likely economic policy resolve. Second, we allow both policy direction and policy resolve to vary with new information. We argue that just as new and unanticipated information about the policy direction of government affects investors' views about the future value of their assets, so too does news about the resolve of government to carry out its stated economic policy goals. By our logic, Trump's economic policy tweets would have mattered to financial markets before his economic policy agenda was known (as investors adjusted their holdings to news about his policy views) as well as after his policy agenda was clear (as investors adjusted to news about his likely resolve in following through).

We test our argument by examining the impact of Trump's Mexico-related policy tweets on the U.S. dollar/Mexican peso (USD/MXN) exchange rate. These data are ideal for three reasons. First, Trump was a newcomer to national U.S. politics, raising the chances that his economic policy statements contained new information about his economic policy views and his economic policy resolve. Second, during the period under examination (January 2015 to February 2018), Trump restated what are clearly negative views about the effect of the cross-border movement of people and production between the United States and Mexico on the U.S. economy. Third, Trump frequently expressed his Mexico-related policy views via Twitter. Politicians use social media to disseminate policy news, establish issue positions, and engage in national policy debates (Gainous and Wagner 2013; Kreiss 2016; Stier et al. 2018), forcing traditional media outlets to respond to (rather than drive reports of) politicians' policy views. It is the speed through which social media transmits information directly from politicians to voters (Gainous and Wagner 2013) that, we argue, raises its value to investors seeking timely, market-relevant news.

If investors only respond to news about the likely future economic policy direction of government, then Trump's Mexico-related policy tweets should have affected the USD/MXN exchange rate early in his campaign, before his Mexico-related agenda became clear. If, as we argue, investors respond to news about both the future economic policy direction and the future policy resolve of government, Trump's Mexico-related tweets would have affected the exchange rate both before and after his Mexico-related policy views were known. Analysis of daily USD/MXN exchange rates shows that Trump's Mexico-related policy tweets mattered to financial markets in both periods, in line with our argument. In making this claim, we contribute to research on politics and financial markets by revealing that two types of economic policy information matter to investors: information about likely government policy direction and information about likely government policy resolve. Although we focus on a political newcomer to make this point, incumbent candidates and experienced politicians can also surprise investors with shifts in policy preferences and in their resolve in following through. As such, we argue that investors will seek out news about all potential future and current governments' likely future policy direction and policy resolve, regardless of the level of experience of the politicians in them.

Two Arguments about Government Economic Policy Information and Financial Markets

Information about Economic Policy Direction

The (semi-strong form) efficient markets hypothesis (EMH) states that asset prices reflect all publicly available information, including historic prices and any additional relevant, publicly available information (Bernhard and Leblang 2006; Fama 1970, 1991). Scholars have interpreted this to mean that new and unanticipated information about the likely future political orientation—and thus economic policy direction—of government leads investors to adjust their expectations about the future value of their holdings. Known and anticipated information leaves financial markets untouched (Bernhard and Leblang 2006).

Empirical evidence—often based on highly disaggregated (daily, hourly) time-series data—supports this view (Bernhard and Leblang 2006; Freeman, Hays, and Stix 2000; Goodell and Vähämaa 2013; Kelly, Pástor, and Vernonesi 2016; Leblang and Bernhard 2006; Leblang and Mukherjee 2004, 2005). Cross-national time-series analyses of highly aggregated data (monthly, quarterly) also indicate that government selection periods produce greater financial market volatility (Bechtel 2009; Bernhard and Leblang 2006; Białkowski, Gottschalk, and Wisniewski 2008; Boutchkova et al. 2012; Fowler 2006; Frot and Santiso 2013; Garfinkel, Glazer, and Lee 1999; Pantzalis, Stangeland, and Turtle 2000; Waisman, Ye, and Zhu 2015). It is during these periods that news tends to arrive about the likely future economic policy direction of government, raising the frequency and magnitude of investor adjustment.[4] By this logic, news about the likely future economic policy direction of government will affect investors' views about the value of their assets.

Information about Economic Policy Resolve

Yet, a related line of research shows that news about the future political orientation of government triggers stronger financial market reactions when governments enjoy greater political capacity to implement policy change. Fewer veto players (as a result of majority or unified government; Bechtel 2009; Bernhard and Leblang 2006; Fowler 2006; Sattler 2013) and weaker regulatory frameworks (as a result of weak monetary policy commitment or shareholder protections; Freeman, Hays, and Stix 2000; Mosley and Singer 2008) produce greater volatility during and after government selection. For these scholars, the impact of news about the likely future economic policy direction of government on financial markets is distinct from news about its political capacity to follow through. In another, related line of work, scholars argue that news about the likely future political orientation of government triggers stronger investor reactions when it concerns lesser-known nonincumbent candidates or political newcomers (Bernhard and Leblang 2006; Fowler 2006; Jensen and Schmith 2005). For these scholars, the economic policy promises of newcomers are less credible, that is, less likely to be implemented—and their governments thus more uncertain and risky for investors—than those of experienced politicians who have already revealed their policy agenda and demonstrated their resolve in following through when in office (Fowler 2006; Jensen and Schmith 2005).

Interestingly, this last line of research treats the likely policy direction and likely policy credibility of government as interchangeable and constant through time. Yet, it is possible for politicians to clarify their policy positions and to shift in the credibility of their intention in following through. We argue that a potential future or current government's likely future economic policy goals should be considered separately from its policy resolve. By "policy resolve," we refer to the level of certainty surrounding or strength in a government's intention of following through with its policy goals (Weeks 2008). When governments are resolute, they adhere to their policy goals with precision and implement them to the fullest extent. When they are not resolute, they may deviate in some way or fully renege. We choose the term *policy resolve* for two reasons. First, we seek to capture a politician's intention of following through with her stated policy goals in a way that is conceptually distinct from her stated policy positions, similar to Callander (2008). Second, we seek to distinguish policy resolve from policy salience (i.e., the importance a politician places on her policy goals) as well as policy capacity (i.e., the political or institutional capacity of a politician to follow through).

With this in mind, we argue that news can arise about both a government's likely economic policy direction as well as its likely economic policy resolve, with each affecting investors' views about their assets through distinct causal paths. Research shows that incumbent politicians establish the credibility of their policy agenda and intention of following through by building a reputation for faithfully implementing prior policy promises (Aragonès, Postlewaite, and Palfrey 2007; Shepsle 1991).

[4]News also arises during cabinet changes (Bernhard and Leblang 2008; Kelly, Pástor, and Vernonesi 2016; Leblang and Bernhard 2006).

Lesser-known nonincumbents and political newcomers cannot leverage previous policy reputations, but they can signal the credibility of their policy agenda and resolve in following through with publicly made statements (Aragonès, Postlewaite, and Palfrey 2007; Callander 2008). By making clear, precise domestic policy promises, politicians raise the "reputational" costs of deviation by enabling voters to hold them accountable (Aragonès, Postlewaite, and Palfrey 2007; Asako 2015). By making clear, progressively stronger foreign policy promises, incumbent governments raise the domestic "audience" costs of backing down (Fearon 1994; Tomz 2007; Weeks 2008).[5] Even if such domestic and foreign policy promises are not binding—as they do not disable future policy discretion (Shepsle 1991)—they create a benchmark against which politicians' future policy performance can be compared (Aragonès, Postlewaite, and Palfrey 2007; Fearon 1994; Tomz 2007; Weeks 2008) and thereby act as a signal of their policy resolve in following through.

Building on this logic, we argue that just as politicians' economic policy statements initially provide information to investors about the likely future economic policy direction of government, these same economic policy statements continue to provide investors with incremental evidence of the sincerity of politicians' intentions of following through once their policy views are known. It is in solidifying this benchmark—against which their future policy implementation can be compared—that politicians signal their economic policy resolve to investors. In response, investors update their expectations about the future value of their assets to both types of economic policy news, affecting financial markets in turn. New and unanticipated statements revealing the potential economic policy orientation of government as well as new and unanticipated statements signaling the potential economic policy resolve of government (once its policy views are known) should therefore matter to investors. In making this argument, we extend traditional applications of the EMH in two ways. First, we extend it from news about economic policy direction to news about economic policy resolve. Second, we clarify the role of politicians' economic policy statements in providing information about policy direction as well as policy resolve.

[5]Because voters pay attention to politicians' (domestic and foreign) policy promises and punish them for deviation, such reputational or audience costs should be of concern to politicians (Naurin, Soroka, and Markwat 2019; Tomz 2007). Voters more harshly judge the deviation of politicians whose policy agenda (direction) is closest to their own (Naurin, Soroka, and Markwat 2019) and whose escalation (resolve) seemed greatest (Tomz 2007).

Empirical Strategy: Trump's Mexico-Related Tweets and Mexican Peso Volatility

Why Examine Trump's Mexico-Related Tweets?

We evaluate support for our argument through an examination of Trump's Mexico-related policy tweets and U.S. dollar/Mexican peso (USD/MXN) exchange rate volatility. We choose this focus for several reasons.

Trump was a newcomer to the U.S. national political arena, raising the chances that his economic policy statements contained new information about his policy views and resolve in following through. Testing our argument would be difficult using data on seasoned politicians whose economic policy statements might be devoid of news about their policy agenda or resolve.

Trump's Mexico-related policy agenda was consistently negative for the Mexican economy. On immigration, Trump stated: "When Mexico sends its people, they're not sending their best. . . . I will immediately terminate President Obama's illegal executive order on immigration." On the border: "I will build a great, great wall on our southern border." On jobs: "I'll bring back our jobs . . . from Mexico."[6] On economic cooperation: "I intend to immediately renegotiate the terms of that [NAFTA] agreement to get a better deal . . . If they do not agree . . . America intends to withdraw from the deal."[7] Testing our argument would be difficult using data from politicians making only vague policy statements.

Trump's capacity to enact his Mexico-related policy agenda was unequivocal. A border wall needs congressional funding, but increased patrols and deportations need only presidential orders to the Department of Homeland Security (Noland et al. 2016). Under NAFTA, the president need only proclaim the return of Mexico to "Most Favored Nation" status and can raise duties in consultation with Congress. The president also enjoys other executive tools to justify tariffs or quotas (Noland et al. 2016). Testing our argument would be difficult using data from political contexts preventing policy change.

Trump regularly stated his Mexico-related policy goals via Twitter, sending over 400 Mexico-related policy tweets from January 1, 2015, to February 2, 2018, the period we examine. Market analysts often noted that these tweets rattled the Mexican peso market. For example, a January 2017 border wall tweet ("Big day planned on

[6]http://time.com/3923128/donald-trump-announcement-speech/.

[7]https://assets.donaldjtrump.com/DJT_DeclaringAmericanEconomicIndependence.pdf.

NATIONAL SECURITY tomorrow . . . we will build a wall")[8] and two August 2017 NAFTA tweets (NAFTA is the "worst trade deal ever made") were thought to have sent the peso tumbling.[9] Testing our argument would be difficult using economic policy statements disseminated via traditional media because such reporting likely responds to Trump's Twitter feed.

Why Examine Mexican Peso Volatility?

We examine the impact of Trump's Mexico-related tweets on USD/MXN exchange rate volatility, not value. Financial economists have difficulty forecasting exchange rate values due to investor heterogeneity (Cheung et al. 2018; Dominguez and Panthaki 2006; Lyons 2001). Currency investors often hold different expectations about the impact of the same political and economic news on their holdings (Lyons 2001). They also often differ in their trading strategies in response. Technicals-oriented traders (driven by short-term price history) buy (sell) when asset prices rise (fall), whereas fundamentals-oriented investors (driven by long-term economic fundamentals) sell (buy) (Lyons 2001). Currency investors also differ in their portfolio strategies (Glen and Jorion 1993); some hold currencies for speculative purposes, but others for managing currency exposure in other assets (Campbell, Medeiros, and Viceira 2010). Whether news translates into currency price shifts often depends on the balance among heterogeneous investors at that point in time (Cheung et al. 2018; Dominguez and Panthaki 2006).

Investor heterogeneity is relevant for the Mexican peso. Even though many currency investors are guided by Mexico's macroeconomic fundamentals, others with heterogeneous trading and portfolio strategies confound the impact of news on peso value (García-Verdú and Zerecero 2014; Sidaoui, Ramos-Francia, and Cuadra 2011). Further complicating forecasts, the Mexican peso is one of three emerging market currencies (with the South African rand and the Turkish lira) traded 24 hours a day, 5 days a week, and plays a crucial role in expressing concern about emerging markets. Instead of trading in or out of emerging market assets, many investors take long (optimistic) or short (pessimistic) positions on the Mexican peso to hedge local currency exposure.[10]

Even so, the arrival of political and economic news raises currency volatility, precisely because of investor heterogeneity. Currency volatility reflects the bounds around which some investors anticipate appreciation and others depreciation of a currency, with greater volatility capturing greater dispersion and greater market uncertainty. News that simultaneously reinforces some investors' optimistic and other investors' pessimistic views about future currency prices leads them to reevaluate their reserve prices and to buy and sell currencies, respectively (Epps 1975; Tauchen and Pitts 1983), raising trading volume and price volatility (Bauwens, Rime, and Sucarrat 2008; Dominguez and Panthaki 2006).[11] Traders' activities also provide currency dealers with private information about these views, triggering additional trading and volatility (Bauwens, Rime, and Sucarrat 2008; Dominguez and Panthaki 2006). Investors' heterogeneous trading and portfolio strategies in response to this activity further raise trading volume and volatility. We thus expect news about both Trump's economic policy direction and economic policy resolve to affect USD/MXN exchange rate volatility, even if we do not expect it to affect exchange rate value (although we allow for this possibility below).

Currency volatility is important for investors and governments. It harms companies when settling foreign transactions, hurting profits and valuations (Papaioannou 2006). It harms international trade and investment, given investors' aversion to currency risk (Guzman, Ocampo, and Stiglitz 2018). Excess volatility can lead to speculative currency attacks and devaluations, with macroeconomic and distributional effects (Leblang 2002). Firms can hedge currency exposure, but only larger ones enjoy this capacity (Papaioannou 2006). Portfolio investors can hedge as well, but this requires costly planning (Campbell, Medeiros, and Viceira 2010). Governments mindful of the impact of currency volatility can intervene, but this depletes foreign reserves and has macroeconomic and distributional consequences (Frieden 2015). Mexican central bank officials complained that Trump's tweets forced them to undertake costly measures to defend the peso, with traders joking that it would be cheaper for them to buy Twitter and shut it down.[12]

[8] http://www.independent.co.uk/news/business/news/donald-trump-mexican-peso-value-weaken-mexico-border-wall-comment-us-president-currency-us-dollar-a7544951.html.

[9] https://www.reuters.com/article/emerging-markets-latam/emerging-markets-mexico-peso-tumbles-as-trump-renews-nafta-threats-idUSL2N1LE0ZL.

[10] https://www.cnbc.com/2017/03/03/trumps-fallout-effect-on-the-mexican-peso.html.

[11] Currency volatility can also result from homogenous investors shifting their expectations together, although this is less likely in larger markets.

[12] http://www.reuters.com/article/us-mexico-peso-trump/mexican-central-banker-says-trumps-tweets-modified-peso-strategy-idUSKBN17803N.

How Trump's Tweets Signal Policy Direction

Most prior studies argue that news about the economic policy direction of government affects financial markets, with known and anticipated information having no effect. Accordingly, Trump's Mexico-related policy tweets should have affected the USD/MXN market until he launched his bid for the GOP nomination on June 16, 2015; during this period, his views were first being considered.[13] Investors would have examined his tweets for news about his Mexico-related agenda and updated their holdings—however remote the possibility he would win—raising USD/MXN exchange rate volatility. The impact of Trump's Mexico-related policy tweets would have disappeared by the time he launched his GOP bid on June 16, 2015, in a policy speech (and again on June 28, 2015) during which he outlined his Mexico-related goals. His Mexico-related tweets would have also provided no new information after his GOP bid launch, GOP nomination on July 19, 2016, election win on November 8, 2016, and inauguration on January 20, 2017.

We consider the impact of Trump's Mexico-related tweets across these periods because investors might have expected Trump to deploy different policy strategies during the presidential selection process. Models of electoral competition note that primary election voters tend to be staunch party supporters with more extreme policy views, so primary candidates tend to choose more extreme positions to maximize the chances of selection (Burden 2004). General election voters tend to be more moderate, so candidates tend to moderate positions during general elections to maximize their appeal (Burden 2004). Investors' interest in anticipating Trump's most likely economic policy orientation (should he win) would have raised their sensitivity to the fact that he might strategically shift policy positions at different points to maximize support.

However, even if investors anticipated Trump would adopt extreme policy stances during the primary period, the impact of his Mexico-related tweets on the Mexican peso would have remained the same. Because Trump's Mexico-related views remained unchanged, his tweets offered no new information during the primary campaign. Even if investors were surprised to find Trump's Mexico-related policy views unchanged after he won the GOP nomination, the impact of his Mexico-related tweets on the USD/MXN exchange rate during this period would have remained largely the same as well. The EMH predicts that investors immediately adjust their holdings to new information, something that would have left the lion's share of Trump's Mexico-related tweets during his four-month-long general election campaign devoid of news about his views. Therefore, by the logic of the EMH for news about policy direction, Trump's Mexico-related tweets should have had no discernible impact on the USD/MXN exchange rate during any period after he announced his candidacy (i.e., during the GOP primaries, the general election period, the post-election period, and after he took office). We thus expect (see Table 1) the following:

H1: Donald Trump's Mexico-related policy tweets will raise USD/MXN exchange rate volatility before his July 16, 2015 bid for the GOP presidential nomination, but will have no effect on volatility thereafter.

How Trump's Tweets Signal Policy Resolve

Recent research suggests that information about government economic policy resolve might also matter to investors. We argue that Trump's Mexico-related policy tweets provided news not just about his likely policy direction but also about his likely policy resolve. Our argument is twofold. First, in line with the argument above, Trump's Mexico-related policy tweets would have affected the Mexican peso market in the run-up to his bid for the GOP nomination in June 2015, when his Mexico-related policy views were first becoming known. Second, in contrast to the argument above, we argue that Trump's Mexico-related policy tweets would have affected the USD/MXN exchange rate after his June 2015 campaign launch (i.e., during the GOP nomination, presidential election, and inauguration). After his views were known, Trump's Mexico-related tweets clarified the benchmark against which his future policy performance could be compared. By gradually raising the reputational costs of deviation, Trump's Mexico-related policy tweets progressively raised investors' expectations about his Mexico-related policy resolve, repeatedly raising USD/MXN exchange rate volatility in turn.

It is investors' concern not just with government policy direction but also with its policy resolve that raises their awareness of the potential for strategic policy shifts. If investors anticipated Trump would adopt an extreme policy stance during the primary process, they would not have considered his Mexico-related tweets for news about his policy resolve. Trump's tweets would thus have had no effect on the peso during this period. If investors were later surprised by the lack of moderation of Trump's Mexico-related policy stance after his GOP nomination,

[13] It was suspected by early 2015 that Trump was considering a run for president. He had a political team in place in 2013 and chose not to renew his television contract for *The Apprentice* in February 2015 (http://www.tvguide.com/news/donald-trump-presidential-campaign-timeline/).

Table 1 Competing Hypotheses about Trump's Mexico Tweets and the USD/MXN Exchange Rate

	Preprimary Candidate	Primary Candidate	GOP Nominee	President-Elect	POTUS
H1	Volatility	No Effect	No Effect	No Effect	No Effect
H2	Volatility	No Effect	Volatility	Volatility	Volatility

they would have immediately adjusted their views in response. Most of Trump's Mexico-related tweets during the 16 week general election campaign would have been devoid of any news about his policy position.

However, in contrast to the argument above, we argue that investors seeking information about Trump's Mexico-related policy resolve would have considered his post-GOP nomination tweets for such evidence, triggering bouts of USD/MXN exchange rate volatility throughout the general election period. Moreover, even though Trump's Mexico-related policy views were well known after his November 2016 election and January 2017 inauguration, his Mexico-related policy tweets would have continued to provide incremental information about his policy resolve during these periods as well, raising exchange rate volatility. Of course, some investors might have believed that Trump sent his Mexico-related policy tweets during these latter two periods to influence Congress (on the border wall or immigration), foreign direct investors (considering operations in Mexico), or the Mexican government (on NAFTA). But it is precisely in anticipation of these negotiations that he would have sought to strengthen the credibility of his policy resolve through repeated, consistent policy statements, leading to USD/MXN exchange rate volatility in the way we argue here. We thus expect (see Table 1) the following:

H2: Donald Trump's Mexico-related policy tweets will raise USD/MXN exchange rate volatility before his July 16, 2015 bid for the GOP presidential nomination and will raise USD/MXN exchange rate volatility after his July 19, 2016 GOP primary election victory.

Data

Our main dependent variable is the percentage change in the daily USD/MXN exchange rate from January 1, 2015, to February 2, 2018. We transformed the series into the daily percentage change in the USD/MXN exchange rate, such that rising (falling) values reflect the depreciation (appreciation) of the Mexican peso relative to the U.S. dollar. Unit root tests in Appendix 1 in the supporting information (SI) indicate that the dependent variable is stationary. Exchange rate data are available for all days markets are open. All data sources are noted in SI Appendix 2.

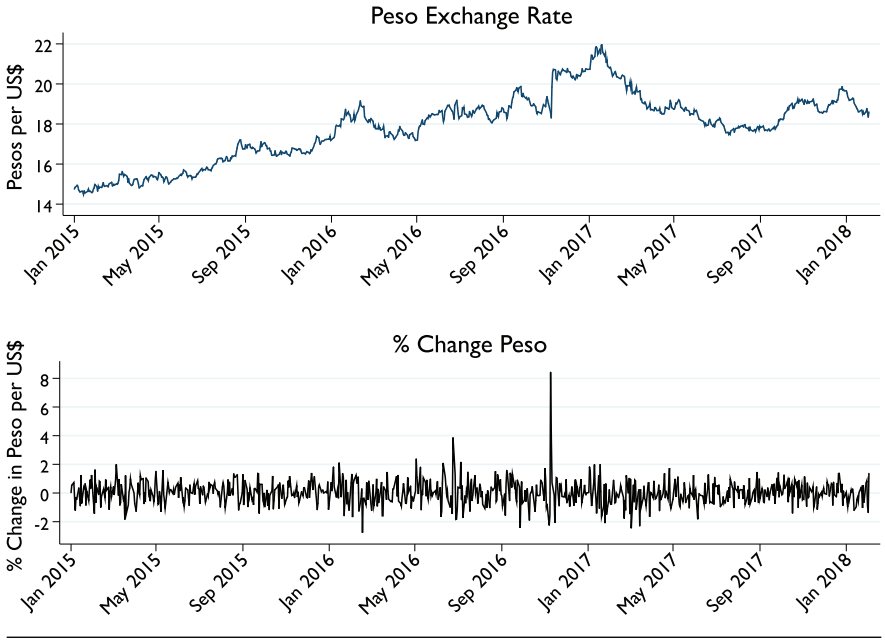
Figure 1 plots the raw peso–dollar exchange rate and the transformed % Change Peso. The exchange rate faced periods of substantial volatility, with the most notable spike just after the 2016 U.S. presidential election. We examine USD/MXN exchange rates in nominal rather than real (or other adjusted) rates since investors' short-term currency expectations are based on the former, and research shows that they do not consider purchasing power parity, interest and inflation rate differentials, or productivity when taking currency positions (Cheung and Chinn 2001; Chinn and Quayyum 2012). Mexico's foreign exchange commission (the secretary and two deputy secretaries of the finance ministry, the governor and two subgovernors of the central bank) also bases its interventions (implemented by the central bank) on short-term nominal exchange rates (García-Verdú and Zerecero 2014).

Our main explanatory variable is the daily presence of a Mexico-related policy tweet. We use information from the Trump Twitter Archive, which archives all tweets sent by @realDonaldTrump on GitHub. Trump sent over 14,500 tweets from January 1, 2015 to February 2, 2018. We searched these tweets for topics related to Trump's Mexico-related policy agenda based on 17 relevant keywords (see Figure 2a), yielding 438 Mexico-related tweets sent on 239 days in our sample. Figure 2a shows the proportion of days when a Mexico-related term was mentioned for each of the 17 keywords. Figure 2b shows the monthly count of keywords. There is a large spike in mid-2015—after Trump announced his bid for the GOP nomination on June 16, 2015—but he regularly sent Mexico-related tweets before, during, and after the U.S. presidential selection process.

Modeling Strategy

We use generalized autoregressive conditional heteroskedasticity (GARCH) models for our analysis. These have been used to model a variety of political economy

FIGURE 1 Peso-Dollar Exchange Rate



applications concerning unanticipated shocks to markets (e.g., Gronke and Brehm 2002; Hellwig 2007; Leblang and Bernhard 2006), although other approaches such as event study designs with synthetic controls are also possible (e.g., Bechtel and Schneider 2010). We rely on the GARCH approach because we are interested in understanding how tweets affect volatility in the USD/MXN exchange rate, while allowing for the possibility that they might affect its value. GARCH models allow us to model both the conditional mean and the conditional error variance as a function of lagged variance, lagged stochastic shocks, and exogenous covariates. Our model appears as

$$\text{Pct. Peso}_t = \beta_0 + \phi \text{Pct. Peso}_{t-1} + \mathbf{x}_t\boldsymbol{\beta} + \epsilon_t + \psi\,\sigma^2_{t-1}, \quad (1)$$

where the dependent variable—the daily percentage change in the USD/MXN exchange rate—is modeled by a constant, its own lag, a vector of exogenous independent variables $\mathbf{x}_t$, a stochastic error term with mean zero and variance that may be conditional on t: $\epsilon_t \sim N(0, \sigma^2_t)$, and the lagged error variance itself, σ^2_{t-1}, since greater volatility in previous periods may affect current changes in the USD/MXN exchange rate.

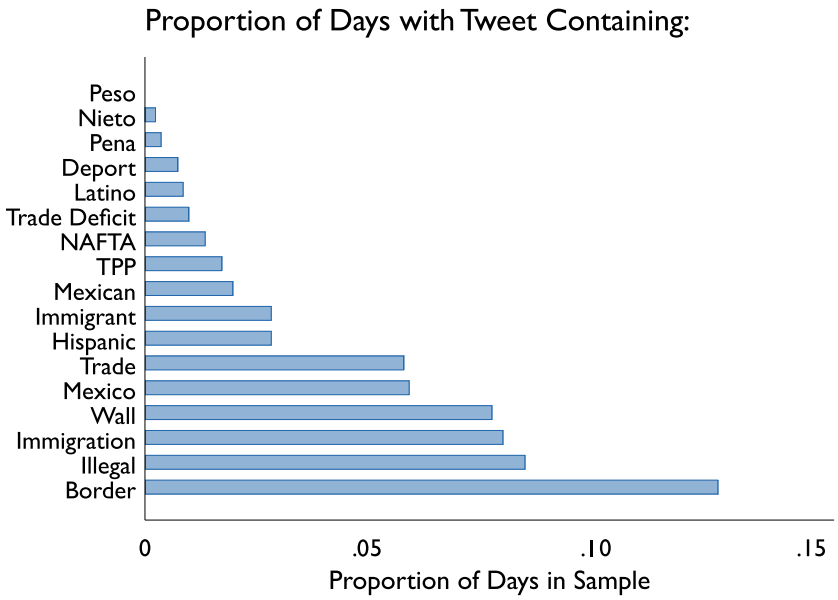
We include the following explanatory variables:

- *Tweet Dummy* is a dummy variable equal to one if Trump sent any Mexico-related tweets on a particular day, and zero otherwise.
- *Trump Preprimary Candidate* is a dummy variable equal to one from January 1 to June 15, 2015, and zero otherwise, indicating the days until Trump launched his GOP nomination bid.
- *Trump Primary Candidate* is a dummy variable equal to one from June 16, 2015, to July 18, 2016, and zero otherwise, indicating the days during Trump's GOP candidacy until his GOP nomination.
- *Trump GOP Nominee* is a dummy variable equal to one from July 19, 2016, to November 8, 2016, and zero otherwise, indicating the days from Trump's GOP nomination through the November 8 presidential election, since the election was decided after the most active trading hours.
- *President-Elect* is a dummy variable equal to one from November 9, 2016, to January 20, 2017, and zero otherwise, indicating the period after Trump won the U.S. presidential election until his inauguration.
- *Trump Presidency* is a dummy variable equal to one starting the day after Trump took office on January 21, 2017, and zero otherwise, indicating the period under his presidency.

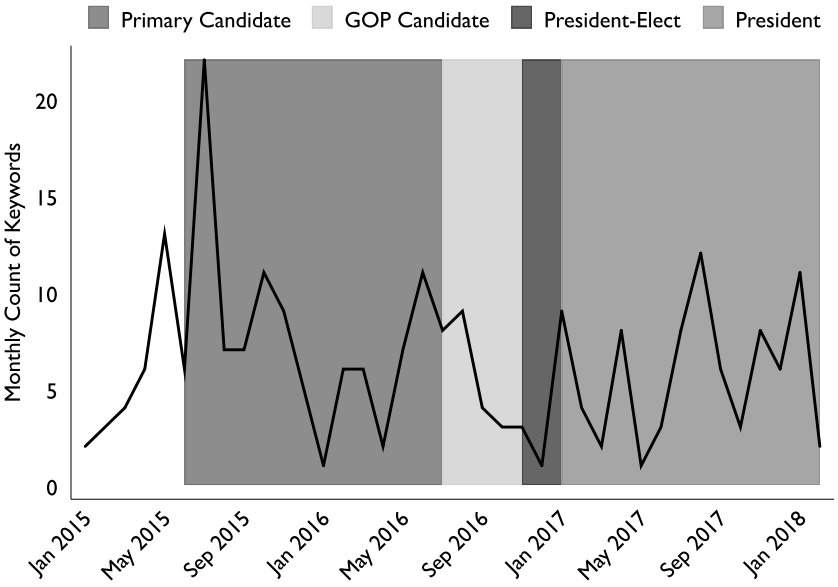
Since the Mexican economy is vulnerable to U.S. political events (Nippani and Arize 2005; Schaub 2017), we include the following:

- *U.S. Presidential Election* is a dummy variable equal to one on November 9, 2016, the day after the November 8, 2016, U.S. presidential election, and zero otherwise. We also include its lag.

FIGURE 2 Details on Tweets



(A) Subject of Mexico-Related Tweets



(B) Mexico-Related Tweets Are Consistent Over Time

- *NAFTA* is a dummy variable equal to one during NAFTA-related events (U.S. public hearings, announced NAFTA negotiations and negotiating objectives, four NAFTA rounds in 2017), and zero otherwise.

Since the Mexican peso is susceptible to U.S. and Mexican macroeconomic performance and policy shocks (Nippani and Arize 2005; Schaub 2017), we include the following:

- $S\&P\ 500_{t-1}$ is the lagged percentage change in the U.S. S&P 500 stock market index, capturing shifts in expectations about U.S. economic performance that affect views about the

Mexican economy and the USD/MXN exchange rate.[14]

- *Bond Spread*$_{t-1}$ is the lagged percentage change in the 10-year Mexico–United States bond spread.
- *Banxico US$ Sales* is a dummy variable equal to one if Mexico's central bank (at the behest of the foreign exchange commission) offered U.S. dollar auctions or dollar futures contracts that day, and zero otherwise.
- $\Delta\ln($*Banxico US$ Stock*$_t)$ is the change in the log of the Mexican central bank's reported weekly U.S. dollar reserves.
- Δ *Overnight Rate Difference*$_t$ is the difference between the Mexican central bank's overnight interest rate and the U.S. federal funds rate.

GARCH models allow us to account for heteroskedasticity as a function of lagged values of the error and its variance. One of the most common models is a GARCH(1,1):

$$\sigma_t^2 = \omega\epsilon_{t-1}^2 + \alpha\sigma_{t-1}^2 + \exp(\mathbf{z}_t\boldsymbol{\gamma}), \quad (2)$$

where the variance at time t is a function of the previous residual squared ϵ_{t-1}^2 (the ARCH(1) term, since it shows how previous shocks—such as unanticipated news—affect the variance over time), the lagged variance σ_{t-1}^2 (the GARCH(1) term, since it allows volatility to persist across time), and a vector of variables $\mathbf{z}_t$ (including a constant) thought to influence the error variance. GARCH models allow us to examine whether tweets affect exchange rate volatility, while also allowing them to affect exchange rate value.

Results

We begin the statistical analysis by examining the impact of Trump's Mexico-related tweets (*Tweet Dummy*) on the percentage change in the USD/MXN exchange rate, in Table 2, Model 1. We first estimate a dynamic regression with no ARCH effects in Equation (1), where we assume $\epsilon_t \sim N(0, \sigma_t^2 = \sigma^2)\ \forall\ t$. A Lagrange multiplier (LM) test for autoregressive conditional heteroskedasticity rejects the null hypothesis of no ARCH process for up to five lags in Model 1, suggesting that we should use the GARCH approach to relax the assumption that the error variance is constant over time.[15]

[14]We use this rather than the Mexican stock market index since the two are highly correlated, and vector error-correction models in SI Appendix 8 suggest that the S&P 500 drives the Mexican stock market, rather than the reverse.

[15]The LM statistic was 2.68 (p-value: .10), 5.83 (.054), 27.26 (.00), 27.23 (.00), and 27.99 (.00) for the first five lags, respectively.

Given that there appear to be periods of low and high volatility in the USD/MXN exchange rate (Figure 1), we next examine the effect of Trump's tweets on the USD/MXN exchange rate using a GARCH(1,1) model that includes one ARCH term ϵ_{t-1}^2 and one GARCH term σ_{t-1}^2, shown in Table 2, Model 2. For this model (and all others), we ensure that the resulting scaled residuals are white noise using the approach suggested by Enders (2010, 150).[16] Recall that we suspect Trump's tweets will have no impact on the percentage change in the USD/MXN exchange rate (the "mean equation" in Table 2). This is the case: *Tweet Dummy* does not achieve statistical significance in Table 2, Model 2, nor does its lag. The parameter on the lagged dependent variable in the mean equation in Model 2 is positive but not statistically significant, suggesting that there is no persistence in fluctuations in the USD/MXN exchange rate over time.

Importantly, both the ARCH and GARCH terms in Table 2, Model 2 are statistically significant, suggesting that the conditional variance is a function of lagged unanticipated shocks (the ARCH effect), as well as the previous value of the conditional variance (the GARCH effect). The GARCH parameter is closer to one than to zero, suggesting that the conditional variance is highly persistent over time; days of high (low) volatility are followed by days of similarly high (low) volatility. The ARCH term also suggests that unanticipated information may affect volatility in the USD/MXN exchange rate. To ascertain whether Trump's Mexico-related tweets affect USD/MXN exchange rate volatility, we next examine their impact on both value and volatility in the USD/MXN exchange rate in Table 2, Model 3. We include dummy variables for the U.S. election cycle periods, as well as two macroeconomic variables—the S&P 500 and 10-year bond spreads—since they might affect volatility as well. The results for the mean equation show that *Tweet Dummy* has no impact on the value of the USD/MXN exchange rate. The results for the variance equation show that *Tweet Dummy* also has no statistically significant effect on conditional variance during the day in which a Mexico-related tweet occurs, at least across the entire sample.

To test the competing hypotheses, however, we must examine the impact of Trump's tweets on the USD/MXN exchange rate by different periods during the government selection process, in order to distinguish periods when investors would have been searching Trump's Mexico-related tweets for information about

[16]This involved calculating the Ljung-Box Q statistic on the residuals—and residuals squared—scaled by the conditional standard deviation to check for remaining autocorrelation and ARCH effects, respectively. All GARCH models fail to reject the null hypothesis of white noise for both tests.

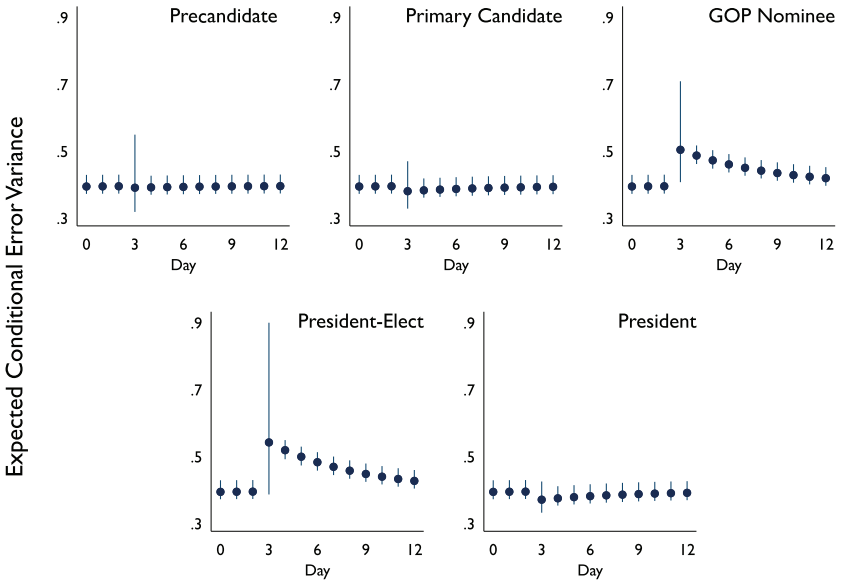
TABLE 2 ARCH Effects and GARCH(1,1) Models Using *Tweet Dummy*

	(1)		(2)		(3)		(4)	
Mean Equation								
Pct. Peso$_{t-1}$	0.036	(0.039)	0.013	(0.043)	0.006	(0.040)	0.007	(0.039)
Tweet Dummy$_t$	0.012	(0.062)	−0.001	(0.059)	−0.023	(0.058)		
S&P 500$_{t-1}$	0.078*	(0.041)	0.060	(0.043)	0.064	(0.044)	0.065	(0.043)
Bond Spread$_{t-1}$	0.045*	(0.023)	0.034	(0.023)	0.030	(0.023)	0.028	(0.023)
Δ ln(Banxico US$ Stock$_t$)	17.948	(17.842)	11.572	(16.271)	12.695	(16.615)	11.320	(16.715)
Δ Overnight Rate Diff$_t$	−1.095*	(0.580)	−1.269**	(0.590)	−1.277**	(0.615)	−1.278**	(0.625)
Banxico US$ Sales$_t$	0.162**	(0.069)	0.106*	(0.064)	0.079	(0.065)	0.064	(0.066)
U.S. Presidential Election$_t$	−1.558*	(0.797)	−1.548	(2.265)	−1.563	(1.072)	−1.518	(1.099)
U.S. Presidential Election$_{t-1}$	8.398***	(0.798)	9.722***	(1.283)	8.389***	(1.169)	8.471***	(1.196)
Trump Primary Candidate$_t$	0.055	(0.088)	0.046	(0.080)	0.062	(0.089)	0.010	(0.107)
Trump GOP Nominee$_t$	0.089	(0.121)	0.033	(0.123)	0.102	(0.151)	0.096	(0.170)
President-Elect$_t$	0.203	(0.137)	0.187	(0.133)	0.266	(0.182)	0.197	(0.175)
Trump Presidency$_t$	−0.035	(0.092)	−0.067	(0.083)	−0.109	(0.089)	−0.085	(0.110)
NAFTA Rounds$_t$	0.169	(0.188)	0.168	(0.161)	0.202	(0.153)	0.223	(0.153)
Tweet Dummy$_t$ × Precandidate$_t$							−0.061	(0.156)
Tweet Dummy$_t$ × Primary Candidate$_t$							0.072	(0.094)
Tweet Dummy$_t$ × GOP Nominee$_t$							0.144	(0.217)
Tweet Dummy$_t$ × President-Elect$_t$							0.401	(0.368)
Tweet Dummy$_t$ × Presidency$_t$							−0.156*	(0.091)
Constant	−0.064	(0.083)	0.137	(0.125)	0.256	(0.157)	0.294*	(0.176)
ARCH-in-Mean$_{t-1}$			−0.272	(0.196)	−0.441*	(0.255)	−0.482*	(0.268)
Variance Equation								
ARCH(1)			0.099***	(0.033)	0.055**	(0.026)	0.046*	(0.025)
GARCH(1)			0.754***	(0.071)	0.822***	(0.058)	0.840***	(0.051)
Tweet Dummy$_t$					−0.340	(0.512)		
Trump Primary Candidate$_t$					0.030	(0.228)		
Trump GOP Nominee$_t$					0.415	(0.281)		
President-Elect$_t$					0.119	(0.382)		
Trump Presidency$_t$					−0.085	(0.220)		
Tweet Dummy$_t$ × Precandidate$_t$							−0.333	(0.969)
Tweet Dummy$_t$ × Primary Candidate$_t$							−0.436	(0.683)
Tweet Dummy$_t$ × GOP Nominee$_t$							0.972**	(0.431)
Tweet Dummy$_t$ × President-Elect$_t$							1.088*	(0.617)
Tweet Dummy$_t$ × Presidency$_t$							−0.594	(0.576)
S&P 500$_{t-1}$					−0.294	(0.234)	−0.422**	(0.166)
Bond Spread$_{t-1}$					0.332***	(0.088)	0.335***	(0.076)
Constant			0.091***	(0.032)	−2.706***	(0.430)	−2.848***	(0.410)
AIC	1910.45		1894.20		1891.23		1889.09	
Ljung Box-Q of $\frac{\epsilon_t}{h_t}$	–		0.601		0.543		0.624	
Ljung Box-Q of $(\frac{\epsilon_t}{h_t})^2$	–		0.060		0.225		0.744	

Note: Dependent variable is the daily percentage change in USD/MXN exchange rate. $T = 804$. Standard errors are in parentheses. *p<.10, **p<.05, ***p<.01 (two-tailed tests).

his policy direction, policy resolve, or neither of the two. We thus add interactions between our dichotomous *Tweet Dummy* variable and each of the U.S. presidential election period dummy variables to both the mean and the variance equations in Table 2, Model 4. In the mean equation, the interaction terms are not statistically significant, as expected, with the exception of the negative coefficient for the term capturing the period after Trump

FIGURE 3 Predictions from Table 2, Model 4



Note: Expected means are shown with 95% confidence intervals. Tweet occurs at $t = 3$.

became president, suggesting that post-inauguration tweets might have raised peso value.

However, in Table 2, Model 4's variance equation, we observe two time periods during which Trump's Mexico-related tweets drove substantial increases in USD/MXN exchange rate volatility: after Trump secured the GOP nomination and after he was elected U.S. president but before he took office. These are periods during which Trump's policy views would have been widely known. Even so, the coefficients in the variance equation cannot be easily interpreted because they affect variance in multiplicative exponentiated form (see Equation 2). We thus developed a new technique to probe the impact of Trump's tweets on USD/MXN exchange rate volatility based on stochastic simulation methods and created plots of the expected conditional error variance over time. Stochastic simulation methods have been developed to assess statistical and substantive significance of time-series models (e.g., Jordan and Philips 2018a, 2018b; Williams and Whitten 2011), but we are the first to extend this approach to GARCH models. Full details of our innovation are available in SI Appendix 4.

Figure 3 shows the posterior densities of 6,000 simulated predictions of the expected conditional error variance over time from Table 2, Model 4, setting all continuous variables to their means and assuming that a tweet occurs on the third day ($t = 3$) and on that day only. During the GOP nominee and president-elect periods—the two periods with positive and significant coefficients in the variance equation—Trump's tweets produced a statistically significant increase in USD/MXN exchange rate volatility, with this effect taking over a week to dissipate thanks to the large GARCH effect. Since variance is strictly positive, the confidence intervals exhibit upwardly skewed behavior, as can be seen on the third day ($t = 3$). Figure 3 thus shows that Trump's Mexico-related tweets raised USD/MXN volatility after he became the GOP nominee and that this volatility continued after he became president-elect, periods when Trump's Mexico-related policy views would have been known to investors.

Because we argue that repeated, consistent policy promises raise the costs of policy deviation, thereby raising evidence of politicians' policy resolve, we must also show that greater tweet intensity—captured in terms of frequency and tone—leads to greater investor adjustments and greater peso volatility. We thus conduct three additional analyses. First, we create an ordinal tweet variable to capture whether there were none (0), one (1), or two or more (2) tweets in a day.[17] As above, we find no evidence in Table 3, Model 5, that tweets affect exchange rate value or exchange rate volatility across the entire sample. However, in Table 3, Model 6 (depicted in Figure 4), we see that there is a statistically significant increase in volatility when Trump posts Mexico-related tweets after he became the GOP nominee as well as after he became president-elect, with this effect greatest on

[17] Models with additional orders would not converge.

TABLE 3 Intensity of Tweets, Weighting by Retweets and Favorites

	(5) 0, 1, 2+ Tweets		(6) 0, 1, 2+ Tweets		(7) Weight by ln(Retweet)		(8) Weight by ln(Retweet)		(9) Weight by ln(Favorite)		(10) Weight by ln(Favorite)	
Mean Equation												
Pct. Peso$_{t-1}$	0.007	(0.040)	0.010	(0.039)	0.007	(0.040)	0.007	(0.039)	0.007	(0.040)	0.007	(0.039)
Tweet$_t$	−0.014	(0.039)			−0.003	(0.007)			−0.003	(0.006)		
S&P 500$_{t-1}$	0.067	(0.043)	0.068	(0.043)	0.069	(0.043)	0.069	(0.043)	0.070	(0.043)	0.070	(0.043)
Bond Spread$_{t-1}$	0.030	(0.023)	0.030	(0.023)	0.030	(0.023)	0.028	(0.023)	0.030	(0.023)	0.028	(0.023)
Δ ln(Banxico US$ Stock$_t$)	12.809	(16.656)	11.535	(16.646)	12.495	(16.651)	10.832	(16.770)	12.519	(16.654)	10.764	(16.760)
Δ Overnight Rate Diff$_t$	−1.250**	(0.615)	−1.256**	(0.622)	−1.219**	(0.615)	−1.227**	(0.618)	−1.212**	(0.615)	−1.218**	(0.617)
Banxico US$ Sales$_t$	0.078	(0.066)	0.058	(0.067)	0.085	(0.065)	0.074	(0.066)	0.087	(0.065)	0.074	(0.066)
U.S. Presidential Election$_t$	−1.562	(1.064)	−1.540	(1.101)	−1.565	(1.040)	−1.527	(1.065)	−1.566	(1.037)	−1.530	(1.061)
U.S. Presidential Election$_{t-1}$	8.395***	(1.165)	8.497***	(1.214)	8.401***	(1.146)	8.483***	(1.163)	8.403***	(1.145)	8.477***	(1.160)
Trump Primary Candidate$_t$	0.062	(0.090)	0.002	(0.105)	0.068	(0.093)	0.040	(0.109)	0.069	(0.094)	0.039	(0.109)
Trump GOP Nominee$_t$	0.107	(0.153)	0.090	(0.165)	0.130	(0.155)	0.147	(0.172)	0.134	(0.155)	0.136	(0.171)
President-Elect$_t$	0.271	(0.187)	0.158	(0.170)	0.290	(0.195)	0.232	(0.177)	0.292	(0.196)	0.230	(0.176)
Trump Presidency$_t$	−0.115	(0.089)	−0.093	(0.106)	−0.115	(0.092)	−0.072	(0.107)	−0.115	(0.092)	−0.073	(0.108)
NAFTA Rounds$_t$	0.198	(0.153)	0.213	(0.151)	0.206	(0.154)	0.224	(0.152)	0.208	(0.154)	0.230	(0.152)
Tweet$_t$ × Precandidate$_t$			−0.037	(0.109)			−0.006	(0.033)			−0.007	(0.031)
Tweet$_t$ × Primary Candidate$_t$			0.048	(0.057)			0.011	(0.012)			0.010	(0.011)
Tweet$_t$ × GOP Nominee$_t$			0.074	(0.152)			0.013	(0.024)			0.014	(0.021)
Tweet$_t$ × President-Elect$_t$			0.400	(0.282)			0.039	(0.037)			0.034	(0.032)
Tweet$_t$ × Presidency$_t$			−0.129**	(0.062)			−0.016*	(0.009)			−0.015*	(0.008)
Constant	0.276*	(0.152)	0.305*	(0.161)	0.307**	(0.147)	0.311*	(0.161)	0.312**	(0.146)	0.314*	(0.163)
ARCH-in-Mean$_{t-1}$	−0.473*	(0.251)	−0.481*	(0.248)	−0.536**	(0.243)	−0.558**	(0.252)	−0.545**	(0.242)	−0.559**	(0.253)

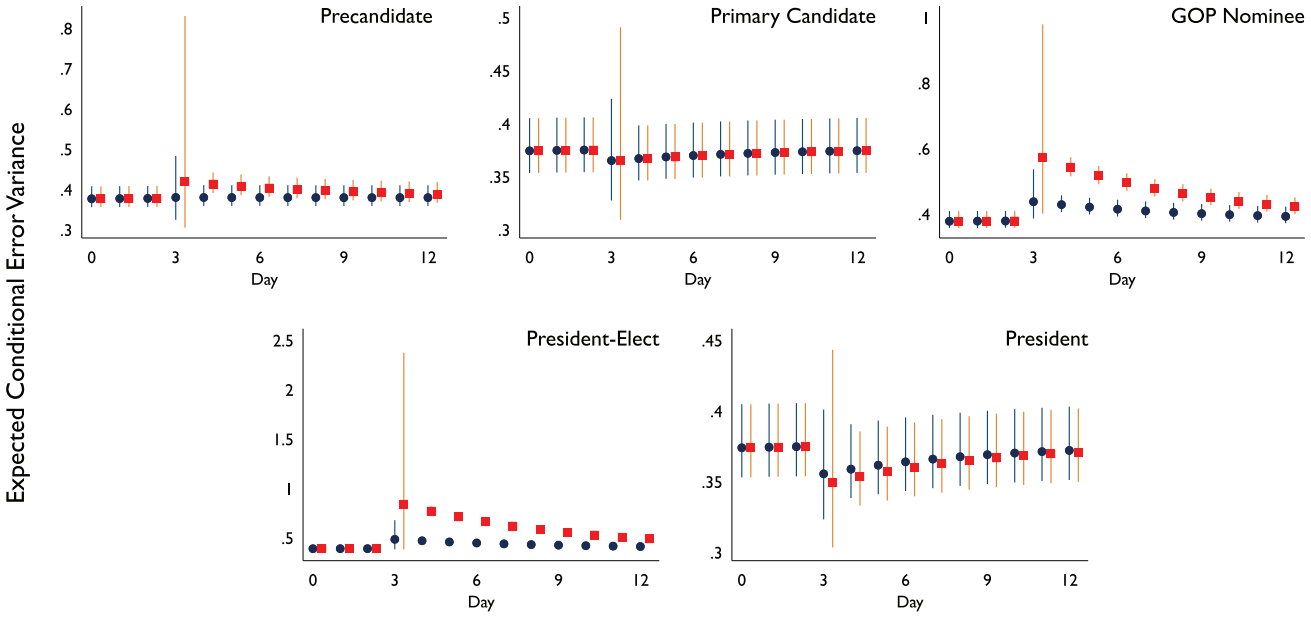
(Continued)

TABLE 3 Continued

	(5) 0, 1, 2+ Tweets		(6) 0, 1, 2+ Tweets		(7) Weight by ln(Retweet)		(8) Weight by ln(Retweet)		(9) Weight by ln(Favorite)		(10) Weight by ln(Favorite)	
Variance Equation												
ARCH(1)	0.053**	(0.025)	0.048*	(0.025)	0.050**	(0.024)	0.044*	(0.024)	0.050**	(0.024)	0.044*	(0.024)
GARCH(1)	0.831***	(0.055)	0.843***	(0.049)	0.833***	(0.055)	0.838***	(0.050)	0.835***	(0.055)	0.838***	(0.050)
Tweet_t	−0.184	(0.342)			−0.008	(0.047)			−0.003	(0.041)		
$\text{Trump Primary Candidate}_t$	0.020	(0.229)			0.001	(0.234)			−0.008	(0.233)		
$\text{Trump GOP Nominee}_t$	0.410	(0.283)			0.401	(0.289)			0.394	(0.288)		
President-Elect_t	0.114	(0.386)			0.140	(0.390)			0.134	(0.391)		
$\text{Trump Presidency}_t$	−0.091	(0.220)			−0.090	(0.231)			−0.099	(0.230)		
$\text{Tweet}_t \times$ Pre-Candidate_t			−0.084	(0.668)			−0.077	(0.207)			−0.059	(0.180)
$\text{Tweet}_t \times$ $\text{Primary Candidate}_t$			−0.263	(0.431)			−0.017	(0.074)			−0.012	(0.068)
$\text{Tweet}_t \times$ GOP Nominee_t			0.684**	(0.281)			0.111**	(0.043)			0.101**	(0.040)
$\text{Tweet}_t \times$ President-Elect_t			0.900*	(0.501)			0.107*	(0.059)			0.095*	(0.052)
$\text{Tweet}_t \times$ Presidency_t			−0.477	(0.480)			−0.053	(0.054)			−0.045	(0.049)
$\text{S\&P 500}_{t-1}$	−0.320	(0.216)	−0.429**	(0.172)	−0.323	(0.204)	−0.387**	(0.164)	−0.327	(0.201)	−0.389**	(0.164)
Bond Spread_{t-1}	0.336***	(0.088)	0.332***	(0.079)	0.333***	(0.089)	0.334***	(0.073)	0.334***	(0.089)	0.337***	(0.073)
Constant	−2.789***	(0.410)	−2.904***	(0.391)	−2.835***	(0.418)	−2.842***	(0.381)	−2.850***	(0.418)	−2.861***	(0.389)
AIC	1891.44		1887.35		1891.66		1889.41		1891.58		1889.33	
Ljung Box-Q of $\frac{\epsilon_t}{h_t}$	0.54		0.72		0.59		0.71		0.59		0.71	
Ljung Box-Q of $(\frac{\epsilon_t}{h_t})^2$	0.29		0.88		0.28		0.72		0.28		0.67	

Note: Dependent variable is the daily percentage change in USD/MXN exchange rate. $T = 804$. Standard errors are in parentheses. Two-tailed tests. $^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$ (two-tailed tests).

FIGURE 4 Coding the Intensity of Tweets (Model 6)



Note: Expected means are shown with 95% confidence intervals. Blue circles indicate 1 tweet; red squares indicate 2+ tweets. Tweet occurs at $t = 3$. Time is slightly staggered for clarity.

days when there were two or more tweets. Figure 4's "Precandidate" plot also reveals a small increase in volatility associated with Mexico-related tweets in the preprimary period, with this effect greatest when there were two or more Mexico-related tweets. Moreover, the increase in volatility takes over a week to dissipate due to the large GARCH term. Greater numbers of Mexico-related tweets thus led to greater USD/MXN exchange rate volatility during periods when Trump's policy views were unclear as well as when they were known.

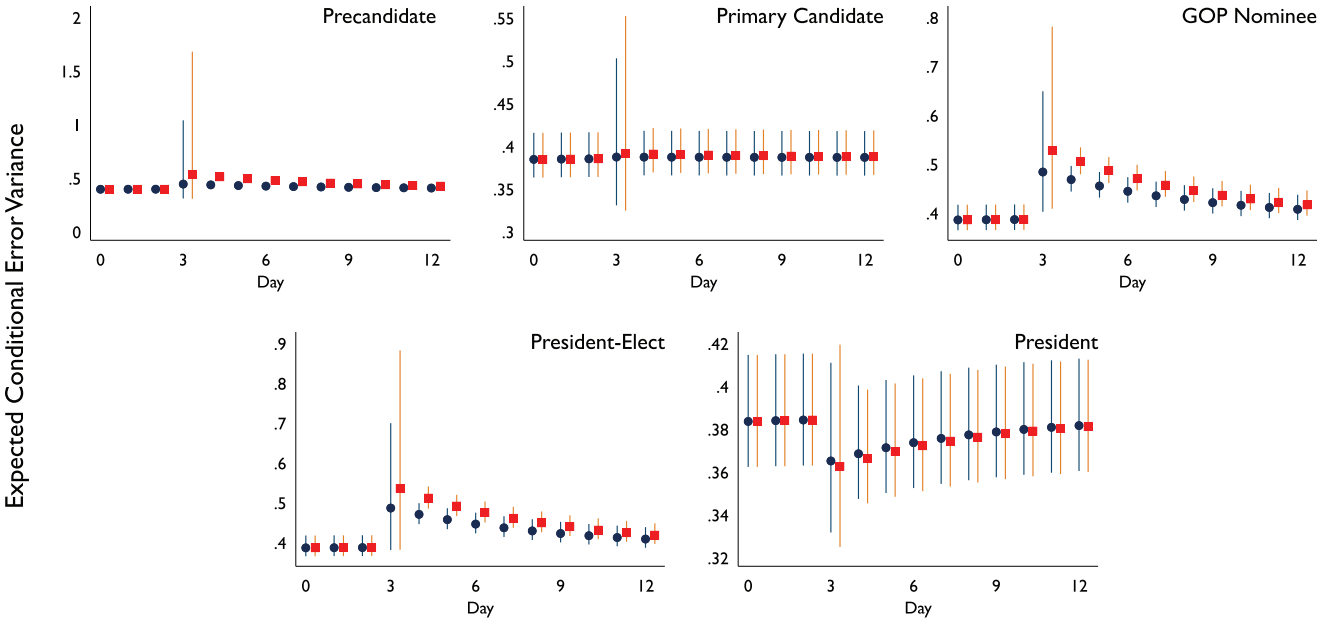
Second, we examine "retweets"—when a user reposts a tweet from another source to his or her followers—and "favorites"—when a user expresses agreement with a tweet from another source, two continuous measures. Retweets averaged 3,700 and favorites 9,860 across the sample (see SI Appendix 3 for time-series plots). Retweets and favorites should matter to peso volatility because such secondary sources would have provided additional information to investors. Retweets and favorites might also serve as a proxy for the extent to which investors act on Trump's policy tweets. Table 3, Models 7 and 8, show the impact of the log number of retweets of Trump's Mexico-related tweets (i.e., where the tweet variable equals the log of retweets, and zero otherwise) on the USD/MXN exchange rate.[18] Table 3, Models 9 and 10, show the impact of favorites of Trump's Mexico-related tweets on the USD/MXN exchange rate.

Using our stochastic simulation technique, Figure 5 presents the expected value of volatility under two scenarios using our continuous retweet measure from Table 3, Model 8. A Mexico-related tweet with the average number of retweets produced substantial increases in volatility during the "GOP Nominee" and "President-Elect" periods. This effect is even stronger among tweets that had retweets in the 90th percentile (about 27,500). Figure 6 shows the results using the continuous favorites measure from Table 3, Model 10. Mexico-related tweets with the average and the 90th percentile (about 111,000) favorites also affected USD/MXN exchange rate volatility after Trump became the "GOP Nominee" and "President-Elect." Economic policy news thus appears to affect financial markets most when investors are paying greatest attention to it.

Figures 5 and 6 also reveal that USD/MXN exchange rate volatility rose in response to retweets and favorites during the "Precandidate" period, as found with ordinal tweet intensity. Investors thus updated their views about the possible future direction of Trump's Mexico-related policy in response to his tweets prior to the GOP primaries, although this effect was small because he was still an unlikely contender and unlikely presidential victor at this point. In sum, peso volatility rose in response to greater numbers of Mexico-related retweets and favorites,

[18]If multiple Mexico-related tweets occurred on the same day, we took the average number of retweets.

FIGURE 5 Weighting by ln(Retweet) (Model 8)



Note: Expected means are shown with 95% confidence intervals. Blue circles depict a tweet with an average number of retweets; red squares depict 90th percentile of retweets. Time is slightly staggered across two scenarios for clarity.

both before Trump's policy views were known (during the "Precandidate" period)—as investors responded to news about his policy direction—and after (during the "GOP Nominee" and "President-Elect" periods)—as investors responded to news about his policy resolve—in line with our argument.

Third, we examine the tone of Trump's Mexico-related tweets. Investors might pay more attention to tweets that are particularly negative. We create a new "Tweet" variable equal to one if the net tone of a tweet is negative, and zero otherwise, using the sentiment analysis package `syuzhet` (Jockers 2015).[19] The results in Table 4, Models 1 and 2, are similar to those above: Particularly negative tweets raise volatility during the "GOP Nominee" and "President-Elect" periods. We also examine tweets coded as "positive." In contrast to "negative" tweets—which tended to be anti-Mexican—"positive" tweets tended to be pro-United States. For example, the February 24, 2015 tweet "The Mexican legal system is corrupt, as is much of Mexico. Pay me the money that is owed me now—and stop sending criminals over our border" is coded as negative, whereas the June 6, 2015, tweet "Just made the point at #NCGOPcon that we have to protect our border & I think everyone here knows, nobody can build a wall like Trump!" is coded as positive. Table 4, Models 3 and 4, show that tweets with a net positive sentiment affect volatility as above, with nearly the same magnitude. These results are robust to other sentiment codings in the SI Appendix 5. Peso volatility thus rose in response to Mexico-related tweets with stronger sentiment, after his policy views were known (during the "GOP Nominee" and "President-Elect" periods), in line with expectations.

Figures 4, 5, and 6 also suggest that, once Trump took office in January 2017, his Mexico-related tweets may have lowered USD/MXN exchange rate volatility, although this effect is not statistically significant. At first glance, this suggests that investors were no longer gathering information about his Mexico-related policy direction or resolve, with both having been established by this time. At second glance, the time period covered (January 21, 2016, to February 2, 2018) may be too broad. The impact of Trump's Mexico-related tweets on peso volatility during his presidency may have had different effects, depending on progress in NAFTA rounds with Mexico or budgetary negotiations with Congress on border wall funding. The results also show that the *U.S. Presidential Election* reduced the value of the Mexican peso across all models, although *NAFTA* negotiations had no effect. *Banxico US$ Sales* to defend the peso had no effect, although rising *Overnight Rate Difference*

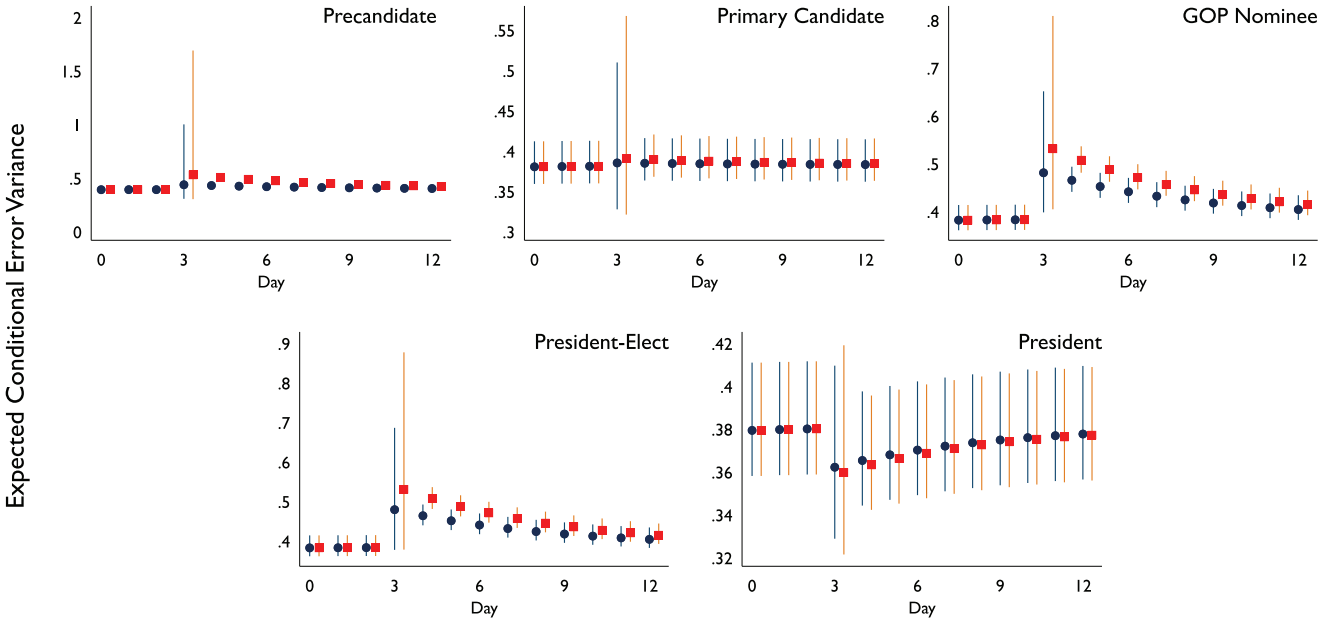
[19]We use a dichotomous rather than continuous measure due to convergence issues, although continuous results are available in SI Appendix 5.

TABLE 4 Tone of Tweets

	(1) Negative Sentiment Tweets		(2) Negative Sentiment Tweets		(3) Positive Sentiment Tweets		(4) Positive Sentiment Tweets	
Mean Equation								
Pct. Peso$_{t-1}$	0.004	(0.040)	0.006	(0.039)	0.009	(0.039)	0.016	(0.039)
Tweet$_t$	0.028	(0.038)			−0.067*	(0.037)		
S&P 500$_{t-1}$	0.062	(0.043)	0.066	(0.043)	0.067	(0.042)	0.067	(0.042)
Bond Spread$_{t-1}$	0.032	(0.023)	0.028	(0.023)	0.031	(0.023)	0.033	(0.023)
Δ ln(Banxico US$ Stock$_t$)	11.772	(16.563)	11.643	(16.675)	17.115	(17.081)	12.989	(16.749)
Δ Overnight Rate Diff$_t$	−1.286**	(0.607)	−1.283**	(0.624)	−1.176*	(0.640)	−1.248**	(0.637)
Banxico US$ Sales$_t$	0.061	(0.064)	0.056	(0.066)	0.074	(0.065)	0.054	(0.065)
U.S. Presidential Election$_t$	−1.552	(1.078)	−1.480	(1.127)	−1.544	(1.067)	−1.562	(1.046)
U.S. Presidential Election$_{t-1}$	8.385***	(1.162)	8.515***	(1.217)	8.379***	(1.127)	8.392***	(1.103)
President-Elect$_t$	0.237	(0.174)	0.226	(0.171)	0.291	(0.194)	0.172	(0.175)
Trump Presidency$_t$	−0.124	(0.087)	−0.114	(0.088)	−0.120	(0.088)	−0.076	(0.093)
Trump Primary Candidate$_t$	0.032	(0.088)	0.025	(0.096)	0.062	(0.088)	0.016	(0.096)
Trump GOP Nominee$_t$	0.064	(0.145)	0.144	(0.164)	0.116	(0.144)	0.026	(0.141)
NAFTA Rounds$_t$	0.197	(0.154)	0.188	(0.154)	0.179	(0.149)	0.209	(0.153)
Tweet$_t$ ×Precandidate$_t$			−0.014	(0.232)			−0.063	(0.159)
Tweet$_t$ × Primary Candidate$_t$			0.099	(0.102)			0.043	(0.103)
Tweet$_t$ × GOP Nominee$_t$			0.133	(0.265)			0.220	(0.288)
Tweet$_t$ × President-Elect$_t$			0.808	(0.660)			0.486	(0.391)
Tweet$_t$ × Presidency$_t$			−0.025	(0.118)			−0.250**	(0.106)
Constant	0.245*	(0.135)	0.298**	(0.128)	0.284**	(0.139)	0.233*	(0.123)
ARCH-in-Mean$_{t-1}$	−0.400*	(0.211)	−0.505**	(0.231)	−0.460**	(0.217)	−0.359*	(0.189)
Variance Equation								
ARCH(1)	0.055**	(0.026)	0.043*	(0.023)	0.037*	(0.020)	0.042*	(0.022)
GARCH(1)	0.821***	(0.058)	0.853***	(0.042)	0.884***	(0.041)	0.868***	(0.044)
Tweet$_t$	−0.310	(0.281)			−1.429	(1.692)		
Trump Primary Candidate$_t$	0.074	(0.226)			−0.019	(0.226)		
Trump GOP Nominee$_t$	0.447	(0.284)			0.378	(0.287)		
President-Elect$_t$	0.134	(0.381)			0.104	(0.394)		
Trump Presidency$_t$	−0.069	(0.221)			−0.110	(0.228)		
Tweet$_t$ × Precandidate$_t$			−1.325	(4.679)			−2.123	(5.503)
Tweet$_t$ × Primary Candidate$_t$			−0.476	(0.887)			−1.755	(1.652)
Tweet$_t$ × GOP Nominee$_t$			1.351***	(0.412)			1.156*	(0.614)
Tweet$_t$ × President-Elect$_t$			1.620**	(0.684)			1.545**	(0.778)
Tweet$_t$ × Presidency$_t$			−0.703	(1.121)			−1.508	(2.158)
S&P 500$_{t-1}$	−0.297	(0.234)	−0.436***	(0.162)	−0.474**	(0.200)	−0.500***	(0.166)
Bond Spread$_{t-1}$	0.346***	(0.088)	0.341***	(0.079)	0.330***	(0.089)	0.349***	(0.081)
Constant	−2.768***	(0.398)	−2.992***	(0.333)	−3.089***	(0.399)	−3.052***	(0.368)
AIC	1889.05		1890.49		1887.48		1886.10	
Ljung Box-Q of $\frac{\epsilon_t}{h_t}$	0.55		0.64		0.63		1.08	
Ljung Box-Q of $(\frac{\epsilon_t}{h_t})^2$	0.19		1.23		0.39		0.48	

Note: Dependent variable is the daily percentage change in USD/MXN exchange rate. $T = 804$. Standard errors are in parentheses. *p < .10, **p < .05, ***p < .01. (two-tailed tests).

FIGURE 6 Weighting by ln(Favorites)



Note: Expected means are shown with 95% confidence intervals. Blue circles depict a tweet with an average number of favorites; red squares depict 90th percentile of favorites. Time is slightly staggered across two scenarios for clarity.

contributed to rising peso value. Neither the *S&P 500* nor the United States Mexico *Bond Spread* appears to have affected Mexican peso value, although they both affected peso volatility (negatively and positively, respectively). The ARCH-in-mean term is negative and statistically significant across nearly all models, suggesting that increased volatility one day results in a stronger peso the next.

That our different tweet measures produced the same results—including those for the GOP primary interlude when we expected no effect—strengthens our conclusion that investors reacted to Trump's preprimary tweets as a source of news about his likely policy direction and his post-GOP nominee and post-election tweets as a source of news about his likely policy resolve. Had the competing argument found support, we would have observed only precandidate period volatility.

Alternative Arguments and Robustness

The impact of Trump's Mexico-related policy tweets on USD/MXN exchange rate volatility after Trump's official GOP nomination might be due to their role in providing news about his Mexico-related policy goals instead of news about his resolve in seeing them implemented. Yet, Trump's Mexico-related tweets, retweets, and favorites raised USD/MXN exchange rate volatility after his November 8, 2016, election victory. Even if investors had only been informed about Trump's Mexico-related views via Twitter during the U.S. presidential campaign, they would have been fully informed by his presidential victory. The impact of Trump's tweets on peso volatility after the presidential race could only be the result of their role in providing information about his policy resolve. It could also be that the impact of Trump's tweets was driven by irrational, uninformed "noise" traders (Black 1986) reacting to his tweets without consideration of their content. However, that Trump's tweets did not rattle the peso during the GOP primary shows that rational, informed investors dominated the peso market.

There could also be a mismatch between the time tweets are sent and when they are examined by investors. The Mexican peso is traded from Sunday at 5:00 p.m. (eastern standard time [EST]) to Friday at 5:00 p.m. (EST), but most trades occur during New York and London market hours. If Trump tweets after these markets close, they may impact USD/MXN volatility the next day. We deploy two additional tweet codings in Table 5. Models 1 and 2 examine 7:00–21:00 (coordinated universal time [UTC]; 3:00 a.m.–5:00 p.m. EST), when either the London or New York markets are open, with later tweets coded as occurring the following day. Models 3 and 4 examine 12:00–16:00 (UTC; 8:00 a.m.–12:00 p.m. EST), when both markets are open, with later tweets coded the

TABLE 5 Active Trading Times

	(1) 7:00–21:00 UTC		(2) 7:00–21:00 UTC		(3) 12:00–16:00 UTC		(4) 12:00–16:00 UTC	
Mean Equation								
Pct. Peso$_{t-1}$	0.006	(0.040)	0.008	(0.039)	0.008	(0.040)	0.011	(0.039)
Tweet$_t$	−0.004	(0.058)			−0.016	(0.058)		
S&P 500$_{t-1}$	0.065	(0.044)	0.066	(0.043)	0.067	(0.043)	0.062	(0.042)
Bond Spread$_{t-1}$	0.030	(0.023)	0.029	(0.023)	0.030	(0.023)	0.031	(0.023)
Δ ln(Banxico US$ Stock$_t$)	12.439	(16.598)	13.549	(16.732)	12.986	(16.746)	14.400	(16.820)
Δ Overnight Rate Diff$_t$	−1.268**	(0.616)	−1.269**	(0.626)	−1.236**	(0.616)	−1.261**	(0.630)
Banxico US$ Sales$_t$	0.078	(0.064)	0.065	(0.067)	0.076	(0.063)	0.061	(0.064)
U.S. Presidential Election$_t$	−1.557	(1.070)	−1.602	(1.088)	−1.556	(1.070)	−1.629	(1.065)
U.S. Presidential Election$_{t-1}$	8.395***	(1.171)	8.469***	(1.170)	8.374***	(1.142)	8.413***	(1.108)
Trump Primary Candidate$_t$	0.059	(0.089)	−0.003	(0.107)	0.061	(0.087)	−0.023	(0.102)
Trump GOP Nominee$_t$	0.101	(0.152)	0.167	(0.167)	0.095	(0.144)	0.123	(0.157)
President-Elect$_t$	0.267	(0.184)	0.194	(0.177)	0.269	(0.178)	0.156	(0.174)
Trump Presidency$_t$	−0.112	(0.089)	−0.099	(0.109)	−0.105	(0.088)	−0.110	(0.102)
NAFTA Rounds$_t$	0.198	(0.153)	0.210	(0.152)	0.196	(0.152)	0.203	(0.154)
Tweet$_t$ × Precandidate$_t$			−0.063	(0.157)			−0.106	(0.153)
Tweet$_t$ × Primary Candidate$_t$			0.120	(0.095)			0.075	(0.091)
Tweet$_t$ × GOP Nominee$_t$			−0.133	(0.221)			−0.196	(0.219)
Tweet$_t$ × President-Elect$_t$			0.407	(0.369)			0.617	(0.383)
Tweet$_t$ × Presidency$_t$			−0.106	(0.091)			−0.090	(0.093)
Constant	0.260	(0.161)	0.292*	(0.177)	0.237	(0.147)	0.251*	(0.150)
ARCH-in-Mean$_{t-1}$	−0.453*	(0.264)	−0.478*	(0.276)	−0.414*	(0.228)	−0.368*	(0.214)
Variance Equation								
ARCH(1)	0.054**	(0.026)	0.043*	(0.025)	0.048**	(0.023)	0.038*	(0.020)
GARCH(1)	0.824***	(0.059)	0.844***	(0.051)	0.838***	(0.048)	0.864***	(0.040)
Tweet$_t$	−0.257	(0.494)			−0.580	(0.638)		
Trump Primary Candidate$_t$	0.019	(0.228)			0.028	(0.220)		
Trump GOP Nominee$_t$	0.406	(0.281)			0.408	(0.277)		
President-Elect$_t$	0.120	(0.385)			0.116	(0.376)		
Trump Presidency$_t$	−0.089	(0.220)			−0.081	(0.218)		
Tweet$_t$ × Pre-Candidate$_t$			−0.266	(0.936)			−0.601	(1.004)
Tweet$_t$ × Primary Candidate$_t$			−0.287	(0.667)			−1.173	(0.980)
Tweet$_t$ × GOP Nominee$_t$			0.962**	(0.431)			0.758	(0.514)
Tweet$_t$ × President-Elect$_t$			1.119*	(0.605)			1.025	(0.737)
Tweet$_t$ × Presidency$_t$			−0.528	(0.569)			−0.817	(0.799)
S&P 500$_{t-1}$	−0.300	(0.233)	−0.403**	(0.168)	−0.343	(0.209)	−0.483***	(0.163)
Bond Spread$_{t-1}$	0.332***	(0.089)	0.339***	(0.077)	0.329***	(0.087)	0.346***	(0.079)
Constant	−2.738***	(0.435)	−2.879***	(0.414)	−2.756***	(0.359)	−2.944***	(0.362)
AIC	1891.57		1890.43		1890.55		1889.56	
Ljung Box-Q of $\frac{\epsilon_t}{h_t}$	0.57		0.71		0.56		0.79	
Ljung Box-Q of $(\frac{\epsilon_t}{h_t})^2$	0.23		0.83		0.28		0.49	

Note: Dependent variable is the daily percentage change in USD/MXN exchange rate. $T = 804$. Standard errors are in parentheses. Two-tailed tests. *p < .10, **p < .05, ***p < .01(two-tailed tests).

next day. The 7:00–21:00 (UTC) results are nearly identical to those above. The 12:00-16:00 UTC results are similar but not statistically significant, probably due to the brevity of the period.

We provide additional evidence of the robustness of our findings in the SI. Tweets disaggregated by trade and immigration produce similar results, with topics usually considered within the foreign policy realm (immigration) also affecting financial markets (SI Appendixes 5.3 and 5.4). Prediction market data on the probability of Trump's presidential victory show that his tweets mattered more to USD/MXN exchange rate volatility when his chance of winning was less clear, mostly in the months leading up to the election (i.e., the "GOP nominee" period; SI Appendix 5.1). Various "placebo" tweet subjects—like China or Ted Cruz—do not affect the peso (SI Appendixes 6.1 and 6.2), though future research might examine whether Trump's Mexico-related tweets also affect NAFTA partner Canada or whether China-specific tweets matter to that nation's currency. We find that tweets affect Mexican–U.S. bond spreads, but not the Mexican stock market (SI Appendixes 6 and 7). Future work might address this difference using a small-scale model (e.g., Sattler, Brandt, and Freeman 2010), as well as incorporating GARCH terms in a vector autoregressive approach (Bollerslev, Engle, and Wooldridge 1988). Alternative exchange rate measures—the percentage change daily high or daily low—produce similar results (SI Appendix 5.4).

Conclusion

The original aim of this study was to contribute to research on politics and financial markets, but it also contributes to research on politics and social media. Politicians use social media to disseminate campaign information; to establish issue positions, competence, and reputations; and to engage in policy debates (Gainous and Wagner 2013; Parmelee 2014; Stier et al. 2018). This allows citizens to hold politicians accountable (Kang et al. 2018; Vanhommerig and Karré 2014), by establishing a benchmark against which performance can be compared. We argue that politicians' social media policy posts are similarly useful to investors. Not only do social media posts allow investors to determine the likely future policy direction of government, they also allow investors to gather information on the benchmark against which politicians seek to be evaluated and thus on politicians' level of resolve to implement their policy goals.

We also contribute to research on social media and financial markets. Social media is unmediated (Gainous and Wagner 2013), enhancing its usefulness to investors seeking unfiltered, timely information. Financial economists have examined the impact of headline news from traditional media outlets on financial markets (e.g., Baker, Bloom, and Davis 2016), but headline news is often driven by the social media posts of political players (Gainous and Wagner 2013; Kreiss 2016; Parmelee 2014). Traditional media headlines thus might not contain much political news. Although scholars have begun to examine how social media posts by important financial market players affect market dynamics (Gholampour and van Wincoop 2017; Li, van Dalen, and van Rees 2018; Piñeiro-Chousa, Vizcaíno-González, and Pérez-Pico 2017), they have not yet examined how posts by political players might also matter to investors.[20] Our research shows this is the case.

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Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix 1: Unit Root Tests
Appendix 2: Summary Statistics
Appendix 3: Details on Retweets and Favorites Variables
Appendix 4: Details on Creating Simulated Predictions
Appendix 5: Robustness Checks
Appendix 6: Additional Results
Appendix 7: Asymmetric Shocks to the Peso
Appendix 8: VECM Analysis of the Mexican and U.S. Stock Markets