When Volatility Begins at Home: Globalization, Elections, and Financial Volatility in Emerging Markets

Raphael Cunha Florida State University[*†]

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Abstract: What drives financial market volatility in emerging markets? Existing scholarship disagrees over the relative importance of global and country-specific factors in determining emerging market volatility. Unpacking the dynamics and mechanisms of volatility generation and transmission is crucial for understanding national governments' policy dilemmas in a financially-integrated world economy. I argue that local and global investors operate in different information environments when assessing politics in developing nations. Local investors' information advantage leads to (1) volatility contagion from domestic to international markets and (2) more volatile reactions to electoral uncertainty from foreign investors than from local market actors. I find support for these hypotheses using price data for country funds that capture differences in foreign and local investor sentiment towards emerging markets. The results affirm the information asymmetry model and highlight the importance of disaggregating market behavior in global capital markets.

[*]Department of Political Science, Florida State University, Tallahassee, FL 32306 (rcunha@fsu.edu).

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1 Introduction

Understanding interactions between markets and democratic processes is a central task of contemporary political economy. As developing countries have liberalized their capital accounts and slashed barriers to cross-border capital flows in the past three decades, scholars and policymakers have grappled with the question of whether and how much the combination of financial openness with high levels of political uncertainty in weakly institutionalized, developing democracies has been a perennial force for economic instability in these countries. Indeed, electoral uncertainty has been a frequent trigger of financial instability in the developing world. For example, it was a major factor in the onset of the 1997 Asian financial crisis (Haggard 2000), and as Santiso (2013) documents, since the 1990s liberalization wave in Latin America, nearly all financial crises in the region have taken place during election years.

The turbulent interaction between political uncertainty and financial openness has spawned debates over the relative importance of global ("push") and country-level ("pull") factors in driving financial volatility in developing markets. Push factors, such as advanced economy monetary policy, global risk appetite, and global current account imbalances, have been shown to cause volatility in peripheral economies (Bauerle Danzman, Winecoff, and Oatley 2017; Aizenman, Chinn, and Ito 2016; Rey 2015; Forbes and Warnock 2012; Calvo, Leiderman, and Reinhart 1996). Indeed, much of the volatility in emerging markets can been explained by spillovers from international financial centers and contagion from other emerging economies (Ng 2000; Forbes and Rigobon 2002; Bekaert, Harvey, and Ng 2005; Gagnon and Karolyi 2006; Rey 2015; Brooks, Cunha, and Mosley 2015), leading to instability not only in financial markets but also in the real economy (Eichengreen 2001; Agénor 2003; Stiglitz 2000; Bacchetta and van Wincoop 2000). In other words, emerging markets are often seen as importers of volatility.

Yet, country-level pull factors also play a large role in generating market volatility. Of special interest to political economists is the effect of domestic political risk on the volatility of financial markets and capital flows. A number of studies show that elections, by their nature, introduce unpredictability in political outcomes. Higher unpredictability leads to higher variation in market

expectations around the resolution of these political processes. In other words, elections and other uncertainty-inducing political events cause shifts in the volatility of financial markets (Leblang and Mukherjee 2004; Bernhard and Leblang 2006; Freeman, Hays, and Stix 2000). In particular, electoral uncertainty in young or consolidating democracies can be a powerful trigger of erratic market behavior. In weakly institutionalized developing countries, where politics and policy are distinctively uncertain, democratic processes are bound to trigger large reactions from risk-averse market actors. The rise of left-wing candidates (Jensen and Schmith 2005; Hardie et al. 2013), the unpredictability of elections (Hays, Freeman, and Nesseth 2003; Aggarwal, Inclan, and Leal 1999), and commitment problems in economic policymaking (Leblang 2002), for example, are all important sources of capital market volatility.

While scholars have debated whether global or country-level factors matter more in explaining financial volatility, less is known about how these factors interact. I argue that this dichotomous view that opposes global and country-level variables obscures important dynamics and heterogeneity in how markets collect and process political information and, in turn, respond to politics in emerging markets. I draw on models of asymmetric information from financial economics to argue that foreign and domestic investors operate with different levels of information and thus under different levels of subjective uncertainty, with local investors in emerging markets having an information advantage when it comes to evaluating domestic political risk. This information asymmetry leads to two main observable implications. First, less well-informed foreign investors experience higher levels of subjective uncertainty with respect to politics in emerging economies. Therefore, their to political uncertainty are more volatile than those of better-informed domestic actors. Second, information asymmetry creates contagion in the behavior of international and domestic investors. International investors obtain information from local asset prices, which reflect the information available to local investors. Therefore, changes in the volatility of domestic markets—a result of changes in the confidence of domestic actors in their expectations—are transmitted to international markets in a process of "uncertainty contagion."

The evidence presented supports these conclusions. I use data on closed-end country funds to

disaggregate the market behavior of international and domestic investors operating in major emerging markets. Results from exponential GARCH models confirm that national elections increase the volatility of stock markets, and that such volatile reactions are more typical of foreign investors than local, emerging-market investors. Moreover, a series of multivariate GARCH models of volatility transmission across markets show that volatility spillovers from emerging equity markets to international financial centers are more typical than spillovers in the opposite direction.

This study bridges the literature on financial market responses to politics and that on the political and economic consequences of financial globalization. It contributes to our understanding of core-periphery interactions in international financial markets while advancing our knowledge of the mechanisms and dynamics of market reactions to national elections in the emerging world. As such, it furthers our understanding of how the behavior of portfolio investors affects political and policy choice in consolidating democracies.

2 Electoral Sources of Financial Market Volatility

Electoral uncertainty in young or consolidating democracies can be a powerful trigger of erratic market behavior. As already discussed, financial investors worry about elections to the extent that election outcomes can result in policy changes that affect the return to capital. Elections do not only matter to investors when particular parties or candidates are expected to be elected, but also because of the uncertainty they typically create. Even seemingly predictable races introduce some degree of unpredictability around election outcomes and the future composition of government.

The uncertainty created by democratic processes can induce financial market volatility in different ways. First, it affects the ability of market actors to predict policy outcomes. Electoral uncertainty widens the confidence intervals around investors' policy predictions, as they make room for greater variance in the potential outcomes. Second, electoral uncertainty widens the space for disagreement and for heterogeneity of expectations among investors. And third, the political risk of investing in emerging markets implies that investors closely monitor these countries and continuously respond to new information (Mosley 2003; Hays, Freeman, and Nesseth 2003), creating the

potential for sharp market reactions as elections unfold.

Electoral uncertainty thus leads to larger variation in market expectations around future policies, which translates into more volatile market prices. In other words, elections and other uncertainty-inducing political events cause a shift in the volatility of financial markets (Leblang and Mukherjee 2004; Bernhard and Leblang 2006; Freeman, Hays, and Stix 2000). Particularly in young democracies and ones with weakly institutionalized party systems, where politics and policies are distinctively uncertain, democratic processes are bound to trigger large reactions from risk-averse market actors (Haggard 2000; Hays, Freeman, and Nesseth 2003). For example, the rise of left-wing candidates (Jensen and Schmith 2005; Hardie 2006), the unpredictability of elections (Aggarwal, Inclan, and Leal 1999; Hays, Freeman, and Nesseth 2003), and commitment problems in economic policy-making (Leblang 2002) have all been shown to be important sources of capital market volatility in developing countries.

Political scientists, however, have yet to take seriously the role of information constraints in determining market reactions to politics. How do global investors collect and process costly information about politics in often distant and opaque developing countries? What strategies do they use to deal with such constraints when assessing country-level risks? In what follows, I posit that domestic and international investors operate in different information environments and that this difference matters for how they respond to political risk in emerging markets. I argue that differences in information bring about contagion processes from domestic to foreign investors, and that these interdependencies help predict important patterns in the way global financial markets exert pressure on national governments.

3 Differential Uncertainty and Volatility in Local and Global Markets

A long research tradition in finance and macroeconomics has examined the impact of information frictions on price formation in financial markets. This research shows that the existence of fixed information costs give rise to information asymmetries among market participants. In turn, information asymmetry gives rise to contagion dynamics within financial markets. Grossman and

Stiglitz developed the seminal model of asymmetric information that describes the information transmission role of prices in capital markets (Grossman 1976; Grossman and Stiglitz 1976, 1980). Two of the fundamental assumptions of the model are that information is costly and that market participants decide on whether or not to become informed based on the expected utility of acquiring new information. Informed investors, who pay the fixed costs of information, make investment allocation decisions based on fundamentals. In turn, uninformed investors observe the signals from market prices and trading activity to learn from informed investors and decide on their own portfolio allocations. Information, therefore, flows from informed to uninformed investors, and the market behavior of informed investors helps predict that of uninformed ones.

When it comes to investment allocation decisions on a global scale, fixed information costs can be especially pronounced. Investing abroad requires the routine collection and processing of detailed information about the countries involved, such as macroeconomic data and political indicators (Calvo and Mendoza 2000*a*; Frankel and Schmukler 1996). Assessing political risk can be particularly challenging, as investors need to take into account political institutions, practices, and the interests and preferences of local politicians, businesses, and voters. Furthermore, much of that information cost is fixed—that is, it is independent of country size and the amount of capital involved, which means that as investors diversify their portfolios internationally, their incentives to collect information on each country in their portfolio decrease (Calvo and Mendoza 2000*b*).

Global investors looking to diversify their portfolios into emerging markets face particularly high information costs. Politics is distinctively uncertain in developing countries, since these countries tend to have weakly institutionalized parties and party systems (Mainwaring and Scully 1995; Dix 1992; Kuenzi and Lambright 2001). Party systems in developing countries tend to be more unstable and volatile than in developed nations (Mainwaring and Zoco 2007; Mozaffar and Scarritt 2005; Roberts and Wibbels 1999). Moreover, parties are less cohesive and disciplined (Ames 1995, 2002), and because party systems tend not to be structured along salient social cleavages (Dix 1989; Kitschelt et al. 2010), patterns of representation are more personalistic and less programmatic (Keefer 2007; Kitschelt et al. 2010).

Institutionalization affects uncertainty in different ways: as a source of credible commitments and as a source of information about politicians' ideological and programmatic preferences. As a commitment device, party organization enforces coordination among politicians and creates credible commitments of parties to policy positions (Carey 2007; Kitschelt et al. 2010; Lupu and Riedl 2013). As an informational device, institutionalized party systems reduce information costs by making party affiliation informative of politicians' ideologies and policy preferences (Kitschelt et al. 2010; Mainwaring and Torcal 2006; Mainwaring and Zoco 2007). Weak institutionalization, therefore, increases political uncertainty and, more importantly, makes it costlier for investors to form accurate risk assessments.

Moreover, information costs are especially salient for foreign investors when compared to domestic investors. Proximity and familiarity with the local political environment give local investors an advantage in terms of information costs. As Obstfeld (1998) points out, "unfamiliarity with foreign products, firms, business practices, accounting standards, political trends, and regulatory environments" plays a role in investors' decisions to diversify towards foreign markets. Domestic investors often have more favorable access to locally available information, and foreign investors may need to incur extra costs to obtain the same information (Frankel and Schmukler 1996, 2000).

While differences in information costs can bring about information asymmetries between foreign and domestic investors, another set of incentives should reinforce these asymmetries. As Calvo and Mendoza (2000*c*) show, financial globalization reduces incentives for information gathering, since the expected gains accrued by paying fixed information costs tend to fall as the number of countries where the wealth can be invested grows. This occurs because, as the number of countries in a global portfolio increases, the contribution of each country to the portfolio risk decreases, thereby reducing the marginal return of information on any given country. The existence of home bias in portfolio allocation implies that this decrease in the incentives to collect information will affect domestic and foreign investors differently. Home bias means that investors tend to hold a larger fraction of their investment portfolios in the form of domestic securities than would be optimal under standard portfolio theory (French and Poterba 1991; Tesar and Werner 1995; Lewis

1999). It also implies that, for any given country, local investors will tend to hold a greater share of their portfolio in that country's assets than foreign investors will. Under home bias, local investors' interests should be more closely tied to the performance of the local market. As a result, domestic investors should derive higher gains from collecting and processing local information. In the presence of home bias, financial globalization reduces overall incentives for information gathering, while it increases the incentive gap between domestic and foreign investors, thus reinforcing information asymmetries between the two groups.

Information asymmetry and market volatility during elections. The information disadvantage at which foreign investors tend to operate implies that at any given time they will make less accurate predictions—that is, they will form expectations with wider confidence intervals—than local market actors. Therefore, political events that induce greater uncertainty around future economic policy, such as elections, should have a proportionally greater impact on international financial actors. By having better access to information and knowledge of the domestic political environment, domestic actors are better equipped to form accurate risk assessments and devise effective hedging strategies against heightened risk and uncertainty. Therefore, local investors should demonstrate less erratic behavior than foreign investors in uncertain times. In other words, national elections should cause greater shifts in the volatility of international investor behavior than in the market activity of domestic investors.

Information asymmetry and volatility contagion. What does information asymmetry mean for how shocks are transmitted across borders? Existing research suggests that investors often devise cost-efficient strategies to deal with information constraints, and that these strategies have implications for how markets respond to policy and political change (Brooks, Cunha, and Mosley 2015; Mosley 2003; Gray and Hicks 2014). When it comes to foreign-domestic asymmetries, an efficient strategy is to extract signals from the market itself (Grossman 1976; Calvo and Mendoza 2000*b*; Mele and Sangiorgi 2015). Less well-informed international investors will observe signals from market prices and trading activity and learn about country fundamentals from local investors.

This means that whenever political uncertainty affects domestic investors' ability to predict pol-

icy outcomes, that uncertainty will be transmitted to foreign investors through volatility in market prices. In such turbulent times, the confidence intervals around investors' predictions of future policy widen. Greater variability in their predictions translate into more volatile market prices. Foreign investors trying to pick up signals from local prices receive noisier information as a result, thus reducing their own ability to estimate future risks and returns. Information asymmetry, therefore, creates dynamics of volatility contagion—or transmission—from domestic to international investors. Changes in the volatility of domestic markets—resulting from changes in the confidence of domestic actors in their expectations—are transmitted to international markets in a process of "uncertainty contagion." In observational terms, this implies that the volatility of domestic investor behavior should help predict the volatility of international investor behavior toward the country in question.

4 Data and Methods

Studies of financial market responses to politics and policy in emerging markets have typically focused on the activity of international investors. Mosley (2003) and Hardie (2006), for example, focus on international bond market investors, while Santiso (2013) looks at international bankers and fund managers. Others have examined outcomes in currency markets (Leblang 2002) and domestic stock markets (Jensen and Schmith 2005; Mosley and Singer 2008) that result from the aggregate behavior of both foreign and domestic investors alike. Traditional outcome measures of international capital market behavior focus on aggregate market behavior and thus are not suitable for assessing the extent to which international and domestic investors differ and interact.

Telling apart the reactions of foreign and domestic investors requires a measure of market activity that can capture the differential market sentiment of each group. Data on closed-end country funds provide just such a measure. Closed-end funds are investment vehicles that allow investors in developed economies to diversify their portfolios into emerging-market stocks (Chang, Eun, and Kolodny 1995; Bekaert and Urias 1996, 1999). These funds—henceforth country funds—are publicly-traded investment companies that trade on the open market and manage portfolios

concentrating in the stock market of a particular country. In other words, the funds are made up of shares that are invested in a basket of stocks from a particular country—in the present case, an emerging market. Once a country fund is established, new fund shares cannot be issued and, in contrast to conventional mutual funds, existing shares cannot be redeemed by investors. Investors wishing to contribute to or withdraw from a given country fund need to trade the fund shares on secondary markets like regular stocks (see Frankel and Schmukler 1996; Levy-Yeyati and Ubide 2000).

I use data on closed-end country funds to measure and model contagion dynamics between foreign and local investors, as well as test differences in the way these two classes of investors respond to electoral uncertainty in emerging economies. Country funds are traded in developed-country stock exchanges and allow investors to diversify their portfolios internationally without needing specific knowledge of particular industries or firms (Hardouvelis, La Porta, and Wizman 1995; Bekaert and Urias 1996; Anderson et al. 2001). In the New York Stock Exchange, for example, they trade at their U.S. dollar price. Moreover, country funds report not only their share price, but also their net asset value. A fund's net asset value—NAV—is defined as the per-share dollar value of the fund's underlying assets. That is, the NAV is the aggregate value of the fund's constituent stocks. The country fund premium is then defined as the difference between the fund price and its NAV.

In a perfectly efficient market, country fund premia would be zero, since the fund price and NAV are essentially two market values of the same assets (Hardouvelis, La Porta, and Wizman 1995; Frankel 1995). In practice, fund premia and discounts (negative premia) can be large and variable. Table 1 lists emerging-market country funds along with summary statistics on the weekly return on the fund, weekly return on the NAV, and the weekly percentage premium. As can be seen, country funds typically trade at a discount, but the discount is far from constant, as the large standard deviations indicate. Indeed, country fund premia vary considerably across countries and over time. Variation in premia appear to reflect both common shocks that simultaneously affect different country funds at a given point in time, as well as country-specific factors that enter investors' risk-return calculations.

Country funds allow one to observe two different market prices for the same set of assets—a portfolio of stocks from a particular emerging market. The fund price is determined in international financial centers such as New York and London, while the net asset value (NAV) is determined in the local stock markets of emerging economies. As such, country funds offer an opportunity to observe differences and interactions in the market activity of international and domestic investors. Because country fund prices and NAVs reflect how fund holders value their assets relative to holders of the individual shares, they capture differences in the sentiment of foreign and domestic investors towards a particular country (Frankel and Schmukler 1996, 2000; Cohen and Remolona 2008). Frankel and Schmukler (1996, 512), for example, argue that the price of the country fund reflects relatively better the information and expectations held by international investors, while the NAV reflects the information and expectations held by local investors. In other words, the discount or premium on a country fund serves as a measure of the relative pessimism or optimism with which international investors perceive a given emerging market relative to local investors (Frankel 1995; Hardouvelis, La Porta, and Wizman 1995, 17). A premium signals that foreign investors have more favorable expectations, relative to domestic investors, toward a given country, while a discount indicates that domestic investors have more favorable expectations relative to foreign investors.

This empirical strategy relies on the assumption that the populations of investors in the two markets—the international financial centers where country funds are traded and the local emerging markets where NAVs are determined—differ to some extent (Cohen and Remolona 2008). The influence of international and domestic investors in the determination of fund prices and NAVs is assumed to be proportional to their participation in those markets. While there is no well-established source of comparative data on foreign participation in equity markets, Bekaert, Harvey, and Lundblad (2003) estimate it to range between 5-35% in major emerging markets.[1] The present measurement strategy would be problematic, therefore, if the information and expectations of foreign investors had a disproportionately large impact on local market prices. The accumulated evidence in the international finance literature, however, suggests that this is not the case (see Choe, Kho,

[1] Various other estimates of foreign participation in emerging equity markets fall within that same range (e.g., Choe, Kho, and Stulz 1999; Kaminsky, Lyons, and Schmukler 2001; Kim and Wei 2002; Wang 2007).

Table 1. Description of the emerging-market closed-end country fund data (daily frequency).

		Percent Premium			
Fund	*Symbol*	*Mean*	*Std. Dev.*	*N*	*Period*
Argentina Fund	AF	−21.86	7.24	1042	12/18/1997 – 12/14/2001
Brazilian Equity Fund	BZL	−14.64	7.66	1861	03/13/1998 – 04/29/2005
Brazil Fund	BZF	−16.45	6.67	2207	12/18/1997 – 06/02/2006
JPMorgan Brazil Investment Trust	JPB	−3.41	4.81	1367	04/26/2010 – 07/21/2015
Chile Fund	CH	−6.77	12.21	4094	02/03/1999 – 10/13/2014
India Fund	IFN	−9.05	3.39	1292	10/30/2009 – 10/13/2014
Indonesia Fund	IF	−0.01	16.69	4093	02/04/1999 – 10/13/2014
Jakarta Growth Fund	JGF	17.00	25.18	861	02/20/1998 – 06/08/2001
Korea Equity Fund	KEF	−10.35	4.14	3552	03/02/2001 – 10/13/2014
Korea Fund	KF	−9.26	9.67	4638	01/02/1997 – 10/13/2014
Malaysia Fund	MF	−3.01	18.95	5367	01/28/1992 – 08/22/2012
Mexico Equity & Income Fund	MXE	−10.49	4.72	3410	09/17/2001 – 10/10/2014
Mexico Fund	MXF	−13.23	7.79	4944	11/01/1995 – 10/13/2014
Taiwan Fund	TWN	−9.33	2.74	2687	06/25/2004 – 10/13/2014
Turkish Investment Fund	TKF	−2.57	10.63	3552	03/02/2001 – 10/13/2014

Data from Bloomberg and Lipper/Thomson Reuters. The percent premium is calculated as $Premium_t = (Price_t/NAV_t - 1) \times 100$.

and Stulz 1999; Karolyi and Stulz 2003).[2] I thus leverage country fund prices and NAVs to examine contagion dynamics between international and local investors, respectively, and capture differences in how they respond to elections in emerging economies.

Table S2 describes the fifteen country funds focused on individual emerging economies for which data with a daily frequency are available. The set of funds has wide geographic coverage and extensive temporal coverage. The data are available from 1992 to 2015, with actual coverage varying by fund. As can be gleaned from the table, country fund premia show considerable variation over time and across countries.

[2]In the most detailed study of the price impact of foreign trades in emerging stock markets, Choe, Kho, and Stulz (1999) show that during the 1997 Asian financial crisis, foreign investors in the Korea Stock Exchange did not trade disproportionately relative to their ownership. More importantly, large sales by foreign investors had no more of a price impact than sales by Korean traders. They conclude that foreign investors had no distinctive destabilizing effect during the crisis.

4.1 Modeling Election-Induced Market Volatility: Exponential GARCH

I begin by examining the differential reactions of local and global markets to electoral uncertainty. To do that, I use exponential GARCH (EGARCH) models for the analysis of the variance, or volatility, of country fund and NAV returns. The family of generalized autoregressive conditional heteroskedastic (GARCH) models allows one to model jointly the mean and variance of asset returns. In particular, exponential GARCH models capture two important features of financial markets: (a) volatility clustering, that is, the tendency of large price changes to be followed by other large changes (Mandelbrot 1963; Fama 1965; Bollerslev, Chou, and Kroner 1992); and (b) asymmetric shocks, that is, tendency of volatility to rise in response to "bad news" and fall in response to "good news" (Nelson 1991; Bollerslev, Chou, and Kroner 1992; Campbell and Hentschel 1992; Leblang and Mukherjee 2004). Volatility clustering is immediately apparent in Figure 1. Large country fund returns are followed by other large movements in either direction, while small changes also tend to cluster in time.

The exponential GARCH model can be represented as:

$$R_t = \delta_0 + \delta_1 R_t^* + \varepsilon_t, \quad \varepsilon_t \sim N(0, h_t) \tag{1}$$

$$ln(h_t) = \omega + \alpha z_{t-1} + \gamma(|z_{t-1}| - E(|z_{t-1}|)) + \beta ln(h_{t-1}) + \theta X_t. \tag{2}$$

In the conditional mean equation (Eq. 1), R_t is the return on the country fund or NAV, computed as the log change in the closing price at time t; R_t^* is a vector of global market factors; and ε_t is the country-specific return. To ensure that the analysis captures market reactions to country-specific political events net of potentially confounding global economic shocks, R_t^* includes the return on a series of global factors: an index of developed stock markets (MSCI World), emerging stock markets (MSCI Emerging Markets), large US stocks (S&P 500), and small-capitalization US stocks (Russell 2000) (Hardouvelis, La Porta, and Wizman 1995; Levy-Yeyati and Ubide 2000; Anderson et al. 2001).

In assessing the impact of elections on market volatility, the conditional variance equation is

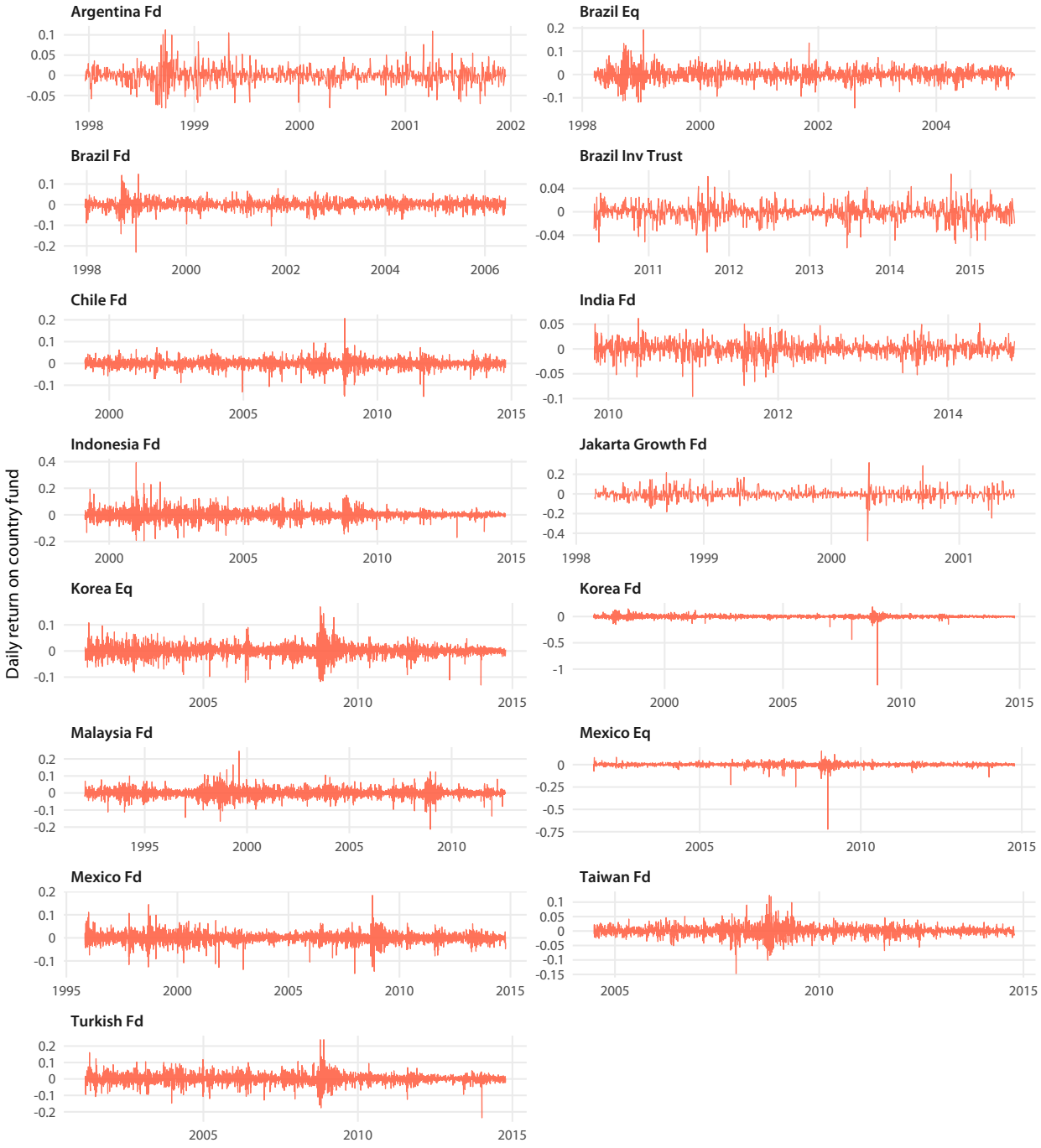

Figure 1. Volatility clustering in daily country fund returns

the main interest. The defining feature of GARCH models is that they specify how the conditional variance evolves over time in response both to its own past values and exogenous shocks. In Eq. 2, the conditional variance, h_t, is a function of its own past (h_{t-1}); an asymmetric component of exogenous shocks (z_{t-1}), where z_t represents standardized innovations (ε_t/σ_t); a symmetric component ($|z_{t-1}| - E(|z_{t-1}|)$); and a vector of exogenous variables, X_t, that shift the return volatility.

To see that the term $|z_{t-1}| - E(|z_{t-1}|)$ represents a symmetric (or magnitude) effect, assume that $\gamma > 0$ and $\alpha = 0$. The shock in $ln(h_t)$ is positive when the magnitude of z_{t-1} is larger than its expected value, and negative when the magnitude of z_{t-1} is smaller than its expected value. Now assume that $\gamma = 0$ and $\alpha < 0$. The shock in the conditional variance is now positive when shocks to returns are negative, and vice-versa. The αz_{t-1} term thus captures the asymmetric (or sign) effect. The EGARCH model thus allows for asymmetric responses of the return volatility to shocks of different signs, providing a good representation for the observed tendency of the volatility to respond differently to good and bad news.

To model the response of the country fund and NAV volatility to electoral uncertainty, I test different specifications for the election-induced component of the conditional variance. I start with a baseline test of investors' reactions to pre-electoral uncertainty by adding a dummy variable, $Election_t$, coded one in the period preceding an election and zero otherwise. Using election dates from Bormann and Golder (2013) and based on the typical length of campaign periods identified in the literature (Leblang 2002; Block and Vaaler 2004; Vaaler, Schrage, and Block 2005; Bernhard and Leblang 2006; Campello 2007), I code a pre-election window of 90 days. This term captures the average response of the country fund and NAV volatility during electoral periods relative to non-electoral ones.

However, not all elections involve equal amounts of uncertainty over the outcome. While all competitive elections introduce the potential for future changes in policy and thus involve some degree of uncertainty, close races induce greater uncertainty in investors' expectations about the future course of economic policy. The inability to accurately anticipate future returns should cause equity prices to behave more erratically under close elections than under predictable ones. More-

over, the information asymmetry hypothesis posits that local and global investors operate under different levels of subjective uncertainty when it comes to elections. As such, I expect global market volatility to be more sensitive to electoral uncertainty than domestic market volatility.

I incorporate polling data into the analysis to assess how local and global markets respond to changes in electoral uncertainty throughout the campaign. To capture the evolution of uncertainty throughout the election process, I use Freeman, Hays, and Stix (2000)'s measure of entropy, which quantifies uncertainty during the campaign period according to the formula: $Entropy_t = 1 - 4[(p_t - 0.5)^2]$, where p_t is the frontrunner's share of the two-party vote (see also Leblang and Mukherjee 2004; Jensen and Schmith 2005). Entropy has a maximum value of 1 when $p = .5$ and a minimum value of 0 when either $p = 0$ or $p = 1$. Thus, entropy is highest when the two leading candidates have an equal probability of winning and lowest when the election outcome is most certain. I compute entropy using polling data from Jennings and Wlezien (2016) for those elections in which both polling and daily country fund data are available. In addition, I use polling data for the 2002 Brazilian election from Jensen and Schmith (2005) and collect additional data for the 1998 and 2014 Brazilian elections. For each election, the model covers a period of up to one year prior to the election, with the actual data coverage in each case varying with the availability of polling data.

The entropy measure as proposed by Freeman, Hays, and Stix (2000) may not capture the qualitative difference in uncertainty between close and non-close races. Entropy rises rapidly but at a decreasing pace as the vote share of the two leading candidates approach equality. In particular, it assigns a large weight to changes in the extremes of the p scale: for example, a decrease in the frontrunner's share of the two-party vote from 95% to 75% results in a 0.56 increase in entropy (from 0.19 to 0.75), while a change in the vote share from 70% to 50%—which turns a fairly predictable race into an uncertain one—increases entropy by only 0.20. To account for this qualitative difference in uncertainty between close and non-close races, I create a binary uncertainty indicator, coded one when the frontrunner's margin over the runner-up is less than 10 percentage points and zero otherwise. While a dichotomous measure is stark, it captures the more intuitive qualitative distinction between certain and uncertain elections.

To ensure that the estimates are unpolluted by global volatility shocks, but rather reflect variation in country-specific volatility, I include the VIX index in the conditional variance equation as a proxy for global uncertainty and risk aversion (Forbes and Warnock 2012; Rey 2015). The VIX expresses the 30-day implied volatility generated from S&P 500 traded options and is widely used as a benchmark by global investors. As such, it represents a consensus view of short-term volatility in the US market and serves as a measure of global risk and uncertainty.

4.2 Volatility Contagion from Local to Global Markets: A Multivariate GARCH Approach

It has been often assumed that peripheral countries import financial market volatility from global financial centers. The information asymmetry hypothesis posits that, when it comes to market reactions to electoral uncertainty, volatility transmission, or contagion, might work in the opposite direction. If local investors have an information advantage, then volatility should be transmitted from local to global markets.

I examine the direction of volatility contagion between local and global markets using multivariate GARCH models for the analysis of volatility transmission. Multivariate GARCH models are commonly used in international finance to study the relationship between the volatilities and co-volatilities across different markets. Does volatility in one market lead to volatility in other markets? Do shocks in one market increase the volatility in other markets?

I begin by specifying a model for the interaction of country fund and NAV returns, as it is important to capture any confounding relationships that might occur through the conditional mean. I use a vector autoregression (VAR) representation in which changes in the fund price and the NAV are a function of their own past values and past values of each other, plus a set of global exogenous factors (Karolyi 1995; Ng 2000). Given this model for the conditional mean, the multivariate GARCH model can be generally written as:

$$\varepsilon_t | \Omega_{t-1} \sim N(0, H_t), \tag{3}$$

where ε_t is the country-specific return conditional on past information, Ω_{t-1}, and H_t is the conditional variance-covariance matrix of country fund and NAV returns.

A general multivariate GARCH representation for the conditional variance-covariance matrix, H_t, was proposed by Bollerslev, Engle, and Wooldridge (1988). In this representation, each element of H_t is a linear function of the lagged squared errors and cross-products of errors and lagged values of the elements of H_t. In other words, each variance and covariance in the system is a function of its own past and of past shocks (the volatility clustering component), as well as past shocks and the past volatility of the other series in the system (the volatility transmission component).

A bivariate GARCH(1,1) model for the country fund and NAV return can be written as:

$$h_t = \begin{bmatrix} h_{11,t} \\ h_{12,t} \\ h_{22,t} \end{bmatrix} = \begin{bmatrix} c_{01} \\ c_{02} \\ c_{03} \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \begin{bmatrix} \varepsilon^2_{1,t-1} \\ \varepsilon_{1,t-1}\varepsilon_{2,t-1} \\ \varepsilon^2_{2,t-1} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix} \begin{bmatrix} h_{11,t-1} \\ h_{12,t-1} \\ h_{22,t-1} \end{bmatrix}, \quad (4)$$

where $h_{11,t}$ is the conditional variance of the country fund return, $h_{22,t}$ is the conditional variance of the net asset value return, and $h_{12,t}$ is the covariance between country fund and NAV returns. This model poses two difficulties for estimation: a very large number of parameters and the requirement that H_t be positive definite, which can be difficult to check and to impose during estimation.

Engle and Kroner (1995) propose a more parsimonious representation. The GARCH-BEKK(1,1) model, as it is known[3], is defined as:

$$H_t = C'C + A'\varepsilon_{t-1}\varepsilon'_{t-1}A + B'H_{t-1}B. \quad (5)$$

[3]The acronym BEKK comes from an earlier version of Engle and Kroner (1995), which synthesized the work on multivariate ARCH models by Baba, Engle, Kraft, and Kroner.

In the bivariate case, a GARCH-BEKK(1,1) model for the country fund and NAV becomes

$$H_t = C'C + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}' \begin{bmatrix} \varepsilon^2_{1,t-1} & \varepsilon_{1,t-1}\varepsilon_{2,t-1} \\ \varepsilon_{2,t-1}\varepsilon_{1,t-1} & \varepsilon^2_{2,t-1} \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}' H_{t-1} \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{bmatrix}. \tag{6}$$

To make this representation more intuitive, the conditional volatility of each series can be expanded as follows (the covariance equation is omitted for clarity):

$$\begin{aligned} h_{11,t} &= c_{11} + a^2_{11}\varepsilon^2_{1,t-1} + 2a_{11}a_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + a^2_{21}\varepsilon^2_{2,t-1} \\ &\quad + b^2_{11}h_{11,t-1} + 2b_{11}b_{21}h_{12,t-1} + b^2_{21}h_{22,t-1}, \end{aligned} \tag{7}$$

$$\begin{aligned} h_{22,t} &= c_{13} + a^2_{12}\varepsilon^2_{1,t-1} + 2a_{12}a_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + a^2_{22}\varepsilon^2_{2,t-1} \\ &\quad + b^2_{12}h_{11,t-1} + 2b_{12}b_{22}h_{12,t-1} + b^2_{22}h_{22,t-1}. \end{aligned} \tag{8}$$

Eqs. 7 and 8 describe how shocks and volatility are transmitted over time and across the two series.[4] For example, the volatility of the country fund return, $h_{11,t}$, is a function of: (1) its own lagged squared errors, $\varepsilon^2_{1,t-1}$; (2) the cross-product of the errors of the two series, $\varepsilon_{1,t-1}\varepsilon_{2,t-1}$; (3) the lagged squared errors of the NAV return, $\varepsilon^2_{2,t-1}$; (4) its own past volatility, $h_{11,t-1}$; (5) the past covariance between country fund and NAV returns, $h_{12,t-1}$; (6) and the past volatility of NAV returns, $h_{22,t-1}$.

The parameters c_{ij}, b_{ij}, and a_{ij} of the GARCH-BEKK model cannot be interpreted individually. Instead, the functions of the parameters which form the coefficients on the lagged variance, covariance, and error terms that appear in Eqs. 7 and 8 are of interest. For instance, for the volatility of the country fund, $h_{11,t}$, a^2_{21} gives us the effect of shocks to the NAV on the volatility of the country fund, and b^2_{21} represents the direct transmission of volatility from the NAV to the country fund. The model thus allows one to test hypotheses about the direction of volatility transmission between local and global markets.

Two terms in the model are of particular substantive interest. In the country fund equation,

[4] An important feature of this specification is that it is sufficiently general, allowing the conditional variances and covariances of country fund and NAV returns to influence each other without the need to estimate too many parameters.

$b_{21}^2 h_{22,t-1}$ captures the direct transmission of volatility from the NAV to the country fund. If the information asymmetry hypothesis is correct, then the effect of past NAV volatility ($h_{22,t-1}$) on country fund volatility ($h_{11,t}$), as captured by b_{21}^2, should be significant. Moreover, in the NAV equation, $b_{12}^2 h_{11,t-1}$ captures the direct transmission of volatility from the NAV to the country fund. Because the information asymmetry hypothesis predicts no such effect, I expect estimates of b_{12}^2 to not be significant.[5]

The GARCH-BEKK model provides a conservative approach to detecting volatility transmission across markets. The large number of parameters in the model, combined with the fact that the quantities of interest depend on the parameters in a nonlinear fashion, generates considerable uncertainty over the estimated quantities of interest (Lanne and Saikkonen 2007). Moreover, because volatility transmission may occur indirectly through the conditional covariances, the quantities capturing the direct transmission of volatility—such as b_{21}^2 and b_{12}^2—may underestimate the actual extent of volatility contagion.

5 Results

5.1 Are global market reactions to electoral uncertainty more volatile than local reactions?

I estimate exponential GARCH models to assess the effect of elections on the volatility of emerging-market country fund and net asset value returns. The analysis controls for exogenous variation in global risk and uncertainty by including the VIX index in the conditional variance equations. Table 2 presents the estimation results for each country fund in the sample using a dummy variable for the pre-election window, which is coded one on the ninety days preceding an election and zero oth-

[5] Because the coefficient terms in Eqs. 7 and 8 are a nonlinear function of the elements from Eq. 6, performing statistical inference on the coefficients of interest requires obtaining the expected value and standard error of these nonlinear functions. The expected value of a nonlinear function of a random variable, such as b_{21}^2, can be obtained as the function of the expected values of the constitutive parameters—e.g. we can get an estimate of b_{21}^2 by squaring the estimate of b_{21}. Computing standard errors for the coefficient of interest—e.g., b_{21}^2—involves a first-order Taylor expansion of the function around its mean. This procedure linearizes the function and allows one to estimate the standard error by using the estimated covariance matrix of the constitutive parameters (Kearney and Patton 2000; Ewing and Malik 2005; Bauwens, Laurent, and Rombouts 2006). Inference on the coefficients capturing the direct transmission of volatility between country funds and NAVs is performed using this procedure.

erwise. Beginning with the dynamic properties of the volatility of fund and NAV returns, the results confirm a high degree of volatility clustering for all country funds. The GARCH parameter (β) is large and significant in virtually all cases, indicating that volatility in country fund and NAV returns is influenced by its own past and tends to cluster in time. Moreover, estimates of the symmetric and asymmetric ARCH parameters indicate that past shocks significantly affect the present conditional variance of fund and NAV returns. As expected, this effect is asymmetric: in the vast majority of cases, the negative estimates of the asymmetric ARCH parameter (α) indicate that negative shocks ("bad news") increase the volatility of fund and NAV returns, while positive shocks ("good news") decrease it.

Comparing the sensitivity of country fund and net asset value return volatility to elections, I find that 9 out of the 15 country funds analyzed show a shift in the volatility of fund returns in anticipation of elections. While in two of those cases fund volatility declines on average during electoral periods, in most cases elections induce higher volatility in country fund returns as expected. In contrast, the volatility of the net asset value responds to elections in only 4 out of 15 funds. In all four cases, elections increase the volatility of the NAV. These results are consistent with the hypothesis that international investors operate under higher subjective uncertainty than local market actors, such that international investor behavior tends to become more volatile during elections more often than local investor behavior.

Table 2. Elections and volatility in local and global financial markets. Exponential GARCH models of the effect of elections on the volatility of country fund and net asset value (NAV) returns. The variable $Election_t$ is a dummy variable coded one on the ninety days before an election, including election day, and zero otherwise. The estimated conditional variance equations for each country fund are:

Fund: $ln(h_{1,t}) = \omega_1 + \alpha_1 z_{1,t-1} + \gamma_1(|z_{1,t-1}| - E(|z_{1,t-1}|)) + \beta_1 ln(h_{1,t-1}) + \theta_{1,1} Election_t + \theta_{1,2} VIX_t$
NAV: $ln(h_{2,t}) = \omega_2 + \alpha_2 z_{2,t-1} + \gamma_2(|z_{2,t-1}| - E(|z_{2,t-1}|)) + \beta_2 ln(h_{2,t-1}) + \theta_{2,1} Election_t + \theta_{2,2} VIX_t$

	Fund Price						*Net Asset Value*						
		Volatility Clustering			*Exogenous*			*Volatility Clustering*			*Exogenous*		
Country Fund	*Intercept*	α_1	γ_1	β_1	*Election*	*VIX*	*Intercept*	α_2	γ_2	β_2	*Election*	*VIX*	*N*
Argentina Fd	**−1.10**	**−0.08**	**0.11**	**0.89**	**−0.09**	**0.008**	**−0.83**	**−0.15**	**0.28**	**0.92**	0.00	**0.005**	1041
Brazil Eq	**−0.31**	**−0.03**	**0.15**	**0.96**	**0.04**	0.001	**−1.22**	**−0.11**	**0.20**	**0.87**	0.00	**0.006**	1860
Brazil Fd	**−0.34**	**−0.04**	**0.14**	**0.96**	**0.04**	**0.001**	**−0.57**	**−0.12**	**0.09**	**0.94**	0.01	**0.002**	2206
Brazil Inv Trust	**−0.10**	**−0.04**	**0.10**	**0.99**	**0.02**	0.000	**−0.14**	**−0.04**	**0.13**	**0.99**	**0.03**	0.000	1366
Chile Fd	**−0.63**	0.01	**0.27**	**0.93**	0.02	**0.002**	**−0.22**	−0.01	**0.16**	**0.97**	**0.07**	0.000	4093
India Fd	**−1.13**	**−0.08**	**0.15**	**0.88**	**0.07**	0.002	**−0.27**	**−0.09**	**0.04**	**0.97**	0.01	0.000	1291
Indonesia Fd	**−0.06**	0.01	**0.13**	**0.99**	−0.01	0.000	**−0.34**	**−0.05**	**0.14**	**0.96**	0.01	**0.001**	4092
Jakarta Growth Fd	**−4.35**	0.03	**0.56**	**0.50**	**0.35**	**0.049**	**−1.27**	−0.06	**0.42**	**0.83**	−0.03	0.002	860
Korea Eq	**−0.31**	**0.06**	**0.26**	**0.97**	**0.09**	**0.001**	**−9.00**	−0.02	**0.36**	0.09	0.17	**0.041**	3551
Korea Fd	**−0.19**	**0.09**	**0.16**	**0.98**	**0.13**	**0.001**	**−0.09**	**0.04**	**0.07**	**0.99**	**0.08**	**0.000**	4637
Malaysia Fd	**−0.31**	0.01	**0.21**	**0.96**	0.02	**0.001**	**−0.16**	**−0.02**	**0.10**	**0.98**	0.00	**0.001**	5366
Mexico Eq	**−0.75**	**0.04**	**0.12**	**0.91**	**−0.06**	**−0.001**	**−1.06**	**−0.13**	**0.07**	**0.88**	0.01	**0.003**	3409
Mexico Fd	**−0.13**	−0.01	**0.10**	**0.98**	0.00	**0.000**	**−4.55**	**−0.05**	**0.28**	**0.54**	**0.24**	**0.021**	4943
Taiwan Fd	**−0.31**	0.02	**0.21**	**0.97**	0.00	**0.002**	**−0.14**	**−0.04**	**0.15**	**0.99**	0.00	**0.001**	2686
Turkish Fd	**−0.25**	0.02	**0.27**	**0.97**	0.01	**0.001**	**−0.17**	0.00	**0.23**	**0.98**	−0.01	0.000	3551

Cell entries are maximum likelihood parameter estimates. Estimates in bold are statistically significant at the 5% level.

Figure 2 shows the fitted volatilities of global and local markets based on the EGARCH models from Table 2 for selected cases. A few patterns can be observed across the cases. As expected, volatility typically increases in the months leading up to the election. This is usually observed in both international and local financial markets. However, electoral uncertainty causes the volatility of international and local markets to diverge. While the volatility of country funds and NAVs is about the same in non-election periods, the increase in global market volatility is larger than that of local markets during elections. Country fund volatility typically remains higher than NAV volatility until the election outcome is revealed, at which point they converge back to similar levels.

In the 1997 presidential election in South Korea, for example, the volatility of the Korea Fund increased faster than the NAV in the 2 to 3 months before the election. The 1997 election took place amidst the Asian financial crisis. Early in 1997, a number of large South Korean groups had gone bankrupt, and government intervention to rescue their creditors accentuated severe weaknesses in the banking sector. Currency crises in the region put pressure on the Korean Won, turning the attention of investors to the limits of the government's willingness and ability to defend the fixed exchange rate. As Haggard (2000, 55) points out, election-induced uncertainty played a critical role in triggering the crisis: "As in Thailand, pressures from business were compounded by broader political factors, including in South Korea the impending presidential election scheduled for December and the fragmentation of the ruling party; in combination, these factors blocked the passage of an important set of financial reforms and contributed to a more general uncertainty about the capacity of the government to respond to the crisis."

The crisis reached Brazil in 1998-1999. As in the Korean case, the impending presidential election in October 1998 helped call into question the sustainability of the pegged exchange rate. The Cardoso administration's unwillingness to tackle the public sector's fiscal deterioration amidst successive interest rate hikes to defend the currency turned the credibility of the exchange rate commitment into a major issue during the political campaign period (Harvey, Lundblad, and Valderrama 1999; Ferreira and Tullio 2002). The case is a good illustration of the credibility problems in fiscal and monetary policy that arise out of electoral cycles (Leblang 2002, 2003; Bonomo and Terra 2001,

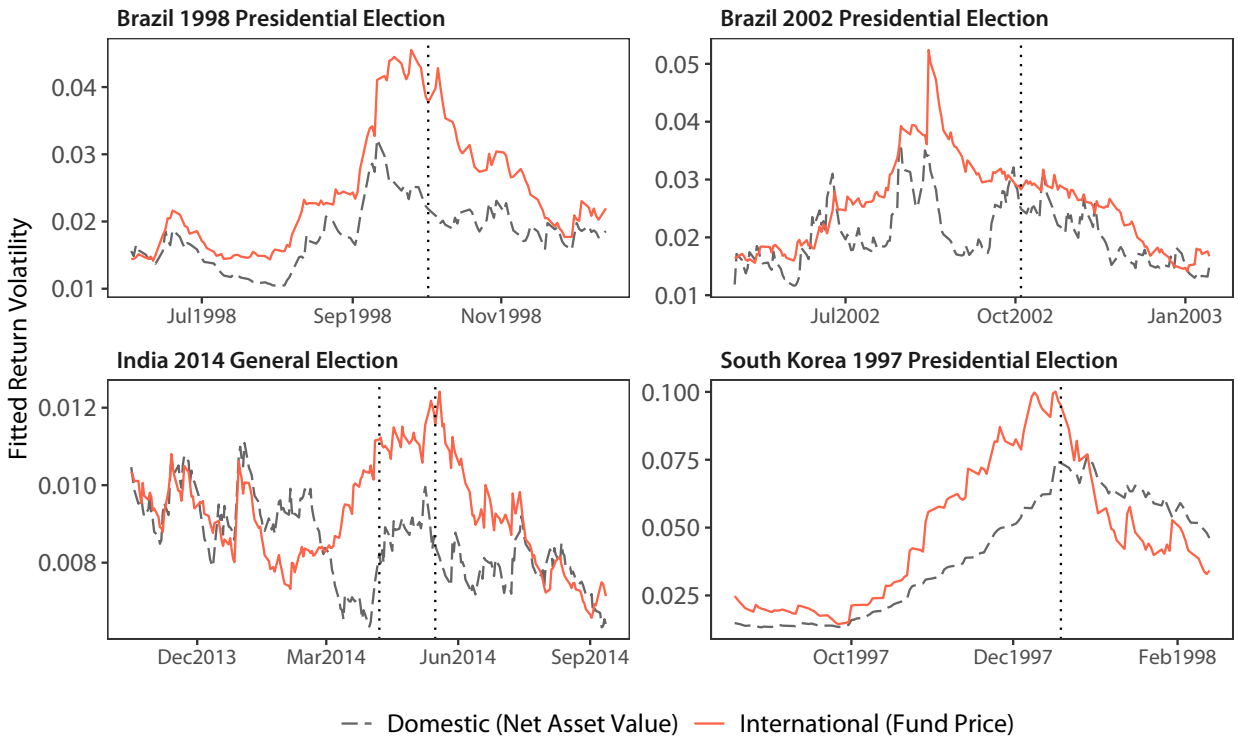

Figure 2. Country fund and NAV return volatility around selected elections. Fitted values from exponential GARCH models (Table 2). Vertical dotted lines indicate election dates.

2005).

In comparison, the 2002 Brazilian election is a classic example of election-induced uncertainty surrounding the policy objectives of a rising challenger. The prospect of an unprecedented victory by the left-wing Workers' Party and the attendant risk of discontinuity in the outgoing administration's market-friendly policies triggered an acute market reaction (Martínez and Santiso 2003; Jensen and Schmith 2005; Santiso 2013). Both in 1998 and 2002, market volatility increased in the run-up to the presidential election. Moreover, volatility in global markets experienced a sharper increase than volatility in local markets, as shown in Figure 2.

The 2014 Indian election saw a similar pattern in the market's response. Financial market volatility initially decreased in the couple of months before the election, likely due to early expectations of a victory by Narendra Modi from the Bharatiya Janata Party (BJP). Modi ran on a platform focused on attracting foreign investment and passing business-friendly reforms, such as simplification of

the tax code and labor laws.[6] In the month before the election, the country fund and NAV volatilities diverged sharply. Both domestic and international volatility increased again as election process began. Even though investors expected a BJP victory, uncertainty about whether Modi would be able to form a solid legislative majority, giving him the ability to implement reforms, remained significant until the very last moments of the nine-phase election that unfolded over six weeks. Indeed, volatility remained high throughout the process, especially in international markets. The volatility subdued when early results indicated that the BJP would likely be able to secure a majority in the lower house of parliament.[7] Together, these examples show that international markets were more volatile during the election, consistent with hypothesis that international investors operate under higher uncertainty.

While the above results offer a general take on the aggregate effect of elections on the volatility of domestic and international investors, they can also obscure heterogeneity at the election level, as they offer a single parameter estimate for the market response to multiple elections. A more disaggregated analysis of within-election variation in uncertainty should offer more precise answers about how the arrival of new information about the degree of predictability of different races affects local and foreign markets. Table 3 reports estimates of EGARCH models including Freeman, Hays, and Stix (2000)'s measure of entropy, which quantifies the degree of uncertainty at any given point in an electoral race using presidential polling data for fourteen individual elections. In 8 out of 14 elections analyzed, the volatility of the country fund return is significantly affected by entropy. In 6 of those cases, entropy induces higher volatility in fund returns, and the effects are large overall. In contrast, entropy significantly affects NAV returns in 7 of the 14 cases. Moreover, in 3 of those cases, entropy reduces NAV volatility, leaving 4 cases in which entropy increases the volatility of NAV returns. Overall, the volatility of international investors' reactions tends to be more sensitive than that of local investors to changes in the level of uncertainty in the course of an election.

Finally, I estimate a set of EGARCH models that aim to capture the notion that close races are

[6] *Financial Times*. "India's BJP woos investors as world's biggest election begins." April 7, 2014.

[7] *Reuters*. "India's pro-business Modi storms to historic election win." May 16, 2014. See also *CNN Money*. "Modi win boosts Indian markets." May 16, 2014.

qualitatively different from predictable ones when it comes to uncertainty. The estimated models in Table 4 include the variable $CloseRace_t$, a binary version of $Entropy_t$ coded one when the frontrunner's lead in presidential polls is less than 10 p.p. and zero otherwise. The results again confirm the expectation that market activity becomes more erratic under heightened electoral uncertainty. Moreover, electoral uncertainty affects international market volatility more often than it affects domestic market volatility. In 7 of the 12 elections analyzed, the change from a predictable race to a close one significantly increased fund return volatility, while the same effect is seen for NAV returns in only 5 of the 12 elections. Furthermore, the dichotomized entropy measure yields more intuitive results, since a larger share of the estimates indicate a positive association between entropy and market volatility, as would be predicted by existing asset pricing models. Overall, these results are consistent with the theory that international investors face greater uncertainty relative to domestic investors when investing in emerging markets, and thus their market behavior becomes more volatile in times of heightened political uncertainty.

Table 3. Electoral uncertainty (entropy) and volatility in local and global financial markets. Exponential GARCH models of the effect of electoral uncertainty ($Entropy_t$) on the volatility of country fund and net asset value (NAV) returns. The estimated conditional variance equations for each country fund are:

Fund: $ln(h_{1,t}) = \omega_1 + \alpha_1 z_{1,t-1} + \gamma_1(|z_{1,t-1}| - E(|z_{1,t-1}|)) + \beta_1 ln(h_{1,t-1}) + \theta_{1,1} Entropy_t + \theta_{1,2} VIX_t$
NAV: $ln(h_{2,t}) = \omega_2 + \alpha_2 z_{2,t-1} + \gamma_2(|z_{2,t-1}| - E(|z_{2,t-1}|)) + \beta_2 ln(h_{2,t-1}) + \theta_{2,1} Entropy_t + \theta_{2,2} VIX_t$

			Fund Price						*Net Asset Value*						
				Volatility Clustering			*Exogenous*			*Volatility Clustering*			*Exogenous*		
Country	*Election*	*Fund*	*Intercept*	α_1	γ_1	β_1	*Entropy*	*VIX*	*Intercept*	α_2	γ_2	β_2	*Entropy*	*VIX*	*N*
Brazil	1998	Brazil Eq	**−5.37**	**−0.29**	0.03	**0.82**	**3.51**	**0.03**	−5.09	0.00	**0.63**	**0.67**	1.47	0.03	145
Brazil	1998	Brazil Fd	**−5.13**	−0.19	0.21	**0.82**	2.89	**0.03**	−7.58	0.02	**0.77**	0.58	2.71	0.05	147
Brazil	2002	Brazil Eq	**−3.54**	**−0.23**	**−0.38**	**0.73**	**1.25**	**0.01**	**−1.39**	**−0.30**	0.06	**0.87**	0.07	**0.01**	148
Brazil	2002	Brazil Fd	**−2.36**	**−0.23**	0.06	**0.83**	0.81	**0.01**	**−1.44**	**−0.27**	0.09	**0.87**	0.17	**0.01**	148
Brazil	2010	Brazil Inv Trust	−10.00	**0.25**	0.13	0.07	−0.89	0.07	**−2.75**	**0.04**	**−0.60**	**0.80**	**1.02**	**−0.01**	134
Brazil	2014	Brazil Inv Trust	**−2.45**	−0.11	−0.05	**0.80**	0.11	**0.04**	**−2.17**	**0.12**	**−0.37**	**0.89**	**0.75**	**0.04**	179
Chile	2009	Chile Fd	−10.00	0.07	**0.52**	**0.46**	4.27	**0.04**	−10.00	0.03	0.09	0.53	5.13	0.02	271
S. Korea	2012	Korea Eq	**−10.00**	0.08	−0.25	**0.38**	**2.87**	**0.06**	**−1.45**	**0.07**	**−0.36**	**0.88**	**−0.17**	**0.02**	236
S. Korea	2012	Korea Fd	**−2.16**	−0.04	−0.04	**0.86**	0.31	**0.02**	**−0.47**	**−0.04**	**−0.24**	**0.92**	**−0.46**	**0.01**	236
Mexico	2006	Mexico Eq	**−10.00**	**0.60**	**0.42**	**0.89**	**9.50**	**−0.02**	**−6.04**	**0.13**	**−0.41**	**0.89**	**4.93**	**0.01**	169
Mexico	2006	Mexico Fd	**−5.27**	**0.00**	**−0.45**	**0.87**	**3.82**	**0.02**	**−10.00**	**−0.91**	**0.45**	−0.11	−2.77	**0.20**	169
Mexico	2012	Mexico Eq	**0.24**	**0.06**	**−0.09**	**0.98**	**−0.37**	**0.00**	**−10.00**	0.08	0.21	0.14	0.31	0.06	260
Mexico	2012	Mexico Fd	**−0.82**	**0.12**	**−0.22**	**0.93**	**0.07**	**0.00**	**−1.92**	0.02	**−0.23**	**0.84**	**0.09**	**0.01**	260
Turkey	2011	Turkish Fd	**0.17**	**−0.03**	**−0.12**	**0.97**	**−0.48**	**0.00**	**0.04**	**−0.04**	**−0.16**	**0.95**	**−0.44**	**0.00**	259

Cell entries are maximum likelihood parameter estimates. Estimates in bold are statistically significant at the 5% level.

Table 4. Close elections and volatility in local and global financial markets. Exponential GARCH models of the effect of close elections on the volatility of country fund and net asset value (NAV) returns. The variable $CloseRace_t$ is a binary version of $Entropy_t$, coded one when the frontrunner's lead in presidential polls is less than 10 p.p. and zero otherwise. The estimated conditional variance equations for each country fund are:

Fund: $ln(h_{1,t}) = \omega_1 + \alpha_1 z_{1,t-1} + \gamma_1(|z_{1,t-1}| - E(|z_{1,t-1}|)) + \beta_1 ln(h_{1,t-1}) + \theta_{1,1} CloseRace_t + \theta_{1,2} VIX_t$
NAV: $ln(h_{2,t}) = \omega_2 + \alpha_2 z_{2,t-1} + \gamma_2(|z_{2,t-1}| - E(|z_{2,t-1}|)) + \beta_2 ln(h_{2,t-1}) + \theta_{2,1} CloseRace_t + \theta_{2,2} VIX_t$

			Fund Price						*Net Asset Value*						
				Volatility Clustering			*Exogenous*			*Volatility Clustering*			*Exogenous*		
Country	*Election*	*Fund*	*Intercept*	α_1	γ_1	β_1	*Close Race*	*VIX*	*Intercept*	α_2	γ_2	β_2	*Close Race*	*VIX*	*N*
Brazil	1998	Brazil Eq	**−2.75**	**−0.31**	0.07	**0.74**	**0.33**	**0.030**	**−6.14**	0.03	**0.51**	0.47	0.55	0.053	145
Brazil	1998	Brazil Fd	**−3.15**	−0.18	0.11	**0.75**	**0.29**	**0.039**	**−9.73**	0.01	**0.73**	0.20	**0.96**	**0.094**	147
Brazil	2002	Brazil Eq	**−7.16**	0.04	−0.16	0.19	**2.04**	0.024	**−1.27**	**−0.30**	0.07	**0.88**	−0.05	**0.009**	148
Brazil	2002	Brazil Fd	**−1.71**	**−0.22**	0.03	**0.82**	**0.58**	**0.009**	**−1.11**	**−0.26**	0.10	**0.89**	−0.11	**0.009**	148
Brazil	2010	Brazil Inv Trust	**−6.49**	**0.34**	0.03	0.44	0.32	0.035	**−1.34**	**0.06**	**−0.50**	**0.84**	**0.09**	**−0.008**	134
Brazil	2014	Brazil Inv Trust	**−1.89**	**−0.12**	−0.02	**0.84**	0.08	**0.031**	**−0.68**	**−0.04**	**−0.26**	**0.94**	**0.26**	**0.006**	179
Chile	2009	Chile Fd	**−6.87**	0.07	**0.54**	0.36	0.29	**0.043**	**−10.00**	−0.02	0.36	0.05	0.27	**0.036**	271
S. Korea	2012	Korea Eq	**−10.00**	0.02	−0.42	0.13	0.43	**0.071**	−10.00	−0.16	0.20	0.26	0.04	0.151	236
S. Korea	2012	Korea Fd	**−1.51**	**−0.04**	**−0.35**	**0.88**	**0.15**	**0.013**	**−0.88**	**−0.04**	**−0.24**	**0.93**	**−0.07**	**0.009**	236
Mexico	2006	Mexico Eq	**−1.53**	**0.13**	**−0.50**	**0.86**	**0.20**	**0.012**	**−1.38**	**0.10**	**−0.45**	**0.87**	**0.15**	**0.009**	169
Mexico	2006	Mexico Fd	**−3.00**	**−0.25**	**−0.72**	**0.75**	**0.29**	**0.039**	**−0.75**	−0.01	0.00	**0.92**	**0.21**	−0.011	169
Turkey	2011	Turkish Fd	**−0.21**	**0.00**	**−0.13**	**0.97**	**−0.31**	**−0.004**	**−0.56**	**−0.02**	**−0.28**	**0.92**	**−0.07**	**−0.009**	259

Cell entries are maximum likelihood parameter estimates. Estimates in bold are statistically significant at the 5% level.

5.2 Do local markets drive global market volatility?

The model of asymmetric information between domestic and foreign investors advanced here predicts that international investors, being at an information disadvantage, will respond with greater volatility to political uncertainty than domestic investors; it also predicts that domestic markets will transmit a great deal of volatility to international markets. I examine volatility transmission within a multivariate GARCH framework that allows the volatilities of country fund and NAV returns to influence each other. Tables 5 and S6 show the results of GARCH-BEKK(1,1) and multivariate GJR-GARCH(1,1,1) models that account for both volatility clustering in fund and NAV returns and volatility transmission between these series.

I am particularly interested in estimates of direct volatility transmission between country fund and NAV returns—i.e., transmission that occurs directly from past volatility in one series to present volatility in the other. Estimates of indirect transmission—i.e., transmission through covariances—are omitted for the sake of brevity. Results from the GARCH-BEKK model in Table 5 confirm the existence of significant exchange of volatility between fund and NAV returns. In addition, the results indicate that volatility transmission from NAVs to country funds is more typical than transmission in the opposite direction. Starting with the effect of past NAV volatility on present country fund volatility (b_{21}^2), I find evidence of significant transmission in 9 of the 15 country funds. In contrast, past country fund volatility significantly affects present NAV volatility in 6 of the 15 cases (b_{12}^2). The reverse pattern is apparent when looking at the effect of past shocks on volatility. In 6 of the 15 funds, past shocks to the NAV affect the present volatility of fund prices (a_{21}^2), while in 10 of the 15 funds past shocks to the fund price affect present NAV volatility (a_{12}^2). In other words, the GARCH-BEKK indicates that dependencies between country funds and NAVs flow both ways. However, when it comes to the direct transmission of volatility, there is stronger evidence of an inside-out mode of contagion—country-specific volatility often flows from emerging markets to international financial centers.

Taken together, these results paint a clear picture of the dynamics of global financial market reactions to country-level politics. The disaggregation of financial market behavior between domes-

Table 5. Volatility contagion between local and global financial markets. Multivariate GARCH-BEKK(1,1) models of volatility transmission between country fund and net asset value (NAV) returns. The estimated conditional variance equations for each country fund are:

Fund: $h_{11,t} = c_{11} + a_{11}^2\varepsilon_{1,t-1}^2 + 2a_{11}a_{21}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + a_{21}^2\varepsilon_{2,t-1}^2 + b_{11}^2 h_{11,t-1} + 2b_{11}b_{21}h_{12,t-1} + b_{21}^2 h_{22,t-1}$
NAV: $h_{22,t} = c_{13} + a_{12}^2\varepsilon_{1,t-1}^2 + 2a_{12}a_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + a_{22}^2\varepsilon_{2,t-1}^2 + b_{12}^2 h_{11,t-1} + 2b_{12}b_{22}h_{12,t-1} + b_{22}^2 h_{22,t-1}$

	Volatility Transmission				*Volatility Clustering*					
	NAV → Fund		*Fund → NAV*		*Fund*		*NAV*			
Country Fund	a_{21}^2	b_{21}^2	a_{12}^2	b_{12}^2	a_{11}^2	b_{11}^2	a_{22}^2	b_{22}^2	*N*	*AIC*
Argentina Fd	**0.41**	**0.10**	0.00	0.18	0.01	0.14	**0.21**	**0.13**	1040	−6166
Brazil Eq	0.08	0.47	**0.09**	0.00	**0.13**	0.26	**0.26**	0.02	1859	−9892
Brazil Fd	**0.42**	0.11	**0.34**	0.01	**0.45**	**0.64**	**0.53**	0.00	2205	−12589
Brazil Inv Trust	**0.15**	**0.04**	**0.05**	**0.41**	0.02	**0.06**	0.01	**0.31**	1365	−8892
Chile Fd	0.00	0.09	**0.05**	0.01	**0.33**	0.03	**0.03**	**0.13**	4092	−24596
India Fd	**0.28**	0.00	**0.17**	0.17	**0.26**	0.00	**0.28**	0.01	1290	−8630
Indonesia Fd	**0.24**	**0.89**	0.00	0.00	**0.10**	**0.87**	**0.26**	**0.56**	4091	−21194
Jakarta Growth Fd	0.00	0.12	0.00	0.18	**0.23**	0.06	**0.10**	**0.26**	859	−3328
Korea Eq	0.00	0.01	0.00	0.00	**0.17**	**0.79**	**0.30**	**0.27**	3550	−21519
Korea Fd	**1.02**	**0.14**	**1.13**	0.00	**1.20**	**0.72**	**0.99**	**0.45**	4636	−26783
Malaysia Fd	0.03	**1.17**	**0.07**	**0.34**	**0.05**	**0.11**	**0.07**	**0.18**	5365	−30430
Mexico Eq	0.03	**1.44**	0.08	**0.84**	0.04	**0.84**	**0.17**	**0.06**	3408	−19757
Mexico Fd	0.00	**1.05**	**0.24**	**0.68**	0.01	**1.15**	**0.08**	0.00	4942	−30109
Taiwan Fd	0.01	**0.54**	**0.07**	**0.55**	**0.12**	**0.83**	**0.19**	**0.06**	2685	−17049
Turkish Fd	0.00	**0.62**	**0.25**	**0.67**	0.01	**1.52**	**0.14**	**0.03**	3550	−18357

Parameter estimates in the table are a nonlinear function of the estimated elements from Eq. 6. Standard errors are calculated using a first-order Taylor expansion around the mean. Entries in bold are statistically significant at the 5% level.

tic and international investors allows us to observe contagion dynamics between these two groups and sheds light on an important mechanism of volatility transmission in globally-integrated capital markets. Domestic investors appear as major drivers of market reactions to politics in emerging economies, as their behavior anticipates that of international investors in both the short and the long run. This is consistent with a model of information asymmetry in which local investors have lower information costs and are on average better informed than foreign investors. The results show that domestic investors immediately respond to contemporaneous shocks in electoral uncertainty and transmit these shocks to international investors with a delay, as the latter observe domestic market activity and then adjust their portfolios accordingly. International investors do not seem to respond to contemporaneous shocks; rather, they follow the lead of better informed domestic

investors. Moreover, having higher exposure to domestic risks, local investors tend to respond with a greater rebalancing of their portfolios, which is reflected in greater abnormal performance during elections relative to international investors.

6 Conclusion

What are the sources of financial volatility in emerging markets? Unpacking the dynamics and mechanisms of volatility generation and transmission is crucial for understanding national governments' policy dilemmas in a financially-integrated world economy. Peripheral economies have been typically depicted as importers of volatility from financial centers. Capital account liberalization in the developing world is often seen as increasing volatility in domestic financial markets and the real economy. Most studies of asset price and capital flow volatility focus on the determination of domestic volatility by exogenous forces from the global economy. In contrast, I have shown that domestic financial investors remain key in market responses to political uncertainty in the emerging world. Financial volatility tends to flow from emerging markets to international financial centers. The evidence is consistent with a model of asymmetric information in which less well-informed foreign investors take cues from local market actors in emerging economies to form expectations of country-specific risks and returns. When the cues of local investors become less accurate due to heightened uncertainty, that uncertainty will be transmitted to international investors.

The results confirm the general expectation from the literature that markets dislike uncertainty. In general, market volatility increases with the unpredictability of election outcomes and falls with the resolution of uncertainty. But importantly, elections have a disproportionate impact on international investors. The volatility of asset returns determined in the international market suffers a steep increase in the run-up to elections—much more so than the volatility of local returns. This is consistent with the view that international investors are at an information disadvantage and thus face greater subjective uncertainty.

The findings also speak to the question of whether financial globalization can be destabilizing. The results suggest that an increased presence of foreign investors in emerging markets need

not directly increase the probability of financial turbulence initiated by political events. Rather, the contribution of international investors might be indirect, either moderating or amplifying the responses of domestic capital markets to political events. When it comes to market volatility, contagion from domestic to foreign investors can have an amplifying effect. Because foreign investors face greater subjective uncertainty, they are more sensitive to volatility shocks. Moreover, market volatility is persistent, clustering over time. The transmission of volatility from domestic to foreign investors can, therefore, lead to self-reinforcing dynamics that sustain high volatility regimes when electoral developments in emerging democracies trigger erratic responses from capital markets.

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