Security Threats and Investment: North Korean Threats and the South Korean Stock Market

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Abstract

Do external security threats shy away from foreign investors? While classical political economy theories focusing on property rights protection posit that security threats undercut financial inflows, recent empirical studies report rather mixed evidence. We add to this body of research by investigating the effect of North Korean military provocation on financial inflows in South Korean stock markets. We contend that 1) foreign investors favor conservative over liberal governments, and 2) investors have learned over time that North Korean threats lead to electoral gains for the conservative party. Our time-series analysis of the monthly Korean stock market data in the post-liberalization period (2000–2018) reveals that North Korean threats led to increases in capital inflows if these threats were made under liberal governments or in the period before parliamentary elections.

Keywords: Korean Stock Market; Party Politics; North Korea; Military Threats

Introduction

Do security threats always destabilize financial markets? Contemporary political economy scholarship offers two seemingly contradicting answers to this question. The traditional approach implies that investors are averse to the uncertainty that large-scale threats bring onto the future returns to their investment and, thus, investors will respond erratically to security threats.[1] The well-established 'capitalist peace' literature builds on this approach.[2] However, recent empirical studies find that the evidence for this intuition is surprisingly mixed. For example, while Wolfers and Zitzewitz find only modest support for the destabilizing effect of the Iraq War's anticipated expectations on the US financial market, Chen and Siems report that the 9/11 attack did little damage to Wall Street.[3]

Why do investors not necessarily panic upon security threats that could seriously compromise their interests? We offer an answer to this question by focusing on the effect of North Korea's military provocation on foreign investments in the South Korean stock market. We posit that foreign investors favor conservative over liberal governments and that investors have learned over time that North Korean threats lead to electoral gains for the conservative party. Based on these two propositions, we develop two conditional arguments that foreign portfolio investments to South Korea are likely to increase 1)

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[1] Douglass C. North, John Joseph Wallis, and Barry R. Weingast, *Violence and Social Orders: A Conceptual Framework for Understanding Recorded Human History* (New York: Cambridge University Press, 2009).

[2] For example, Erik Gartzke, "The capitalist peace," *American Journal of Political Science,* 51-1 (2007), pp. 166–191.

[3] Andrew H. Chen, and Thomas F. Siems, "The Effects of Terrorism on Global Capital Markets," *European Journal of Political Economy,* 20-2 (2004), pp. 349–366; Justin Wolfers, and Eric Zitzewitz, "Using Markets to Inform Policy: The Case of the Iraq War," *Economica,* 76-302 (2009), pp. 225–250.

when North Korean threats occur under a liberal government and 2) in the period leading up to elections. In these two situations, the electoral implications of North Korean security threats are amplified.

To test these hypotheses, we analyze monthly stock market data of South Korea in the post-liberalization period (2000–2018). Our empirical analysis draws on generalized autoregressive conditional heteroskedasticity (GARCH) models, a standard approach to financial time series data. The empirical findings support our argument and are proven robust to an alternative estimator.

The remainder of this paper is comprised of five sections. The following section briefly reviews existing studies on security threats' effects on domestic politics and financial markets. The third section delineates the conditions with which security threats can encourage financial inflows by affecting the perceived electoral landscapes and discusses why the Korean case is particularly significant in testing this argument. The fourth and fifth sections present our statistical model and the result of the data analysis, respectively. We conclude by summarizing our central findings and discussing their implications.

Literature review

The argument we put forth in this paper is that security threats affect investors' priors about the chances of a political landscape preferable to them—a conservative government. This argument speaks to two bodies of literature, one on military threats, the other on the financial market's partisan preference. In this section, we first review these two seemingly unrelated groups of studies. We then explain how we connect our argument to them in an innovative way.

Military Threats and Financial Market

The notion that military conflicts, or the possibility thereof, destabilize financial markets is as old as the Napoleonic Wars.[4] This idea essentially draws on the economic and political uncertainties the threats generate. The possibility that these threats could materialize into physical conflicts—which often incur prohibitively high costs—may drive investors away from the market. However, this intuition has not been followed by many empirical inquiries until relatively recently.

More importantly, evidence is decidedly mixed regarding the rare strand of literature in which such effects are investigated. A group of empirical studies focusing on the Iraq War's effects on the US financial market offers some evidence consistent with this approach on various financial fronts.[5] However, other studies navigating different empirical domains have demonstrated that security threats do not necessarily lead to financial instability. For instance, Chen and Siems find that the financial market did not react to Iraq's 1990 invasion of Kuwait and the 9/11 terrorist attacks on the United States in 2001—at least not as tumultuously as it did to previous conflicts.[6] The authors suggest that developing a financial infrastructure and adequate policy responses can explain this resilience. Kim and Roland and Dibooglu and Cevik also report that the effect of North Korean threats—and specifically the threats of the use of nuclear weapons—on South

[4] Michael D. Bordo, and Eugene N. White, "British and French Finance During the Napoleonic Wars," in Norio Tamaki, ed., Monetary Regimes in Transition (Cambridge University Press, 1993), pp. 241–273.

[5] Justin Wolfers, and Eric Zitzewitz, *op. cit*., pp. 225–250; Marc Chesney, Ganna Reshetar, and Mustafa Karaman, "The Impact of Terrorism on Financial Markets: An Empirical Study," *Journal of Banking & Finance*, 35-2 (2011), pp. 253–267; Roberto Rigobon, and Brian Sack, "The Effects of War Risk on US Financial Markets," *Journal of Banking & Finance*, 29-7 (2005), pp. 1769–1789.

[6] Andrew H. Chen, and Thomas F. Siems, *op. cit*., pp, 349–366.

Korean and/or Japanese financial markets are limited if any.[7] The sanctions literature also suggests that economic sanctions' effect is limited while studies on multinational corporations report that the military conflicts have a multi-pronged effect on financial market reactions to cross-border acquisitions.[8] Taken together, multiple strands of the literature suggest that security threats might have certain effects on financial markets but the ways in which such effects unfold are largely underspecified. The literature, therefore, can benefit from a careful identification of the conditions with which such an effect may or may not occur as well as empirical evidence supportive of such an identification.

Partisanship and Foreign Investors

Unlike the relationship between security threats and financial markets, there exist relatively well-developed studies on investors' partisan preferences, particularly in portfolio investment. In general, stock markets are expected to heat up more easily under a conservative government than under a liberal one. To the extent that returns to portfolio investment are heavily affected by the overall stock prices, investors' baseline preference is the election of a conservative government.[9] Conservative governments are expected to

[7] Byung-Yeon Kim, and Gérard Roland, "How Credible is the North Korean Threat?" *Economics of Transition*, 22-3 (2014), pp. 433–459; Sel Dibooglu, and Emrah I. Cevik, "The Effect of North Korean Threats on Financial Markets in South Korea and Japan," *Journal of Asian Economics*, 43-1 (2016), pp. 18–26.

[8] Glen Biglaiser and David Lektzian, "The effects of economic sanctions on targeted countries' stock markets," *International Interactions*, 46-4 (2020), pp. 526-550; Chengguang Li, Ilgaz Arikan, Oded Shenkar, and Asli Arikan. "The impact of country-dyadic military conflicts on market reaction to cross-border acquisitions," *Journal of International Business Studies* 51-3 (2020), pp. 299-325.

[9] Michael C. Herron, James Lavin, Donald Cram, and Jay Silver, "Measurement of political effects in the United States economy: A study of the 1992 presidential election," *Economics & Politics* 11-1 (1999), pp. 51-81.

commit themselves to low inflation and limited corporate tax rates as well as lax capital control policies, all of which can directly boost the returns to portfolio investment.[10] The commitment might be reasonably credible given the capital inflow's effect on their traditional support base. For example, Hibbs argues that an inflow of foreign capital implies an increase in the capital resources accessible to domestic capital owners who are the core supporters of a conservative government.[11]

While the conservative parties offer these 'pull factors' for portfolio investors, a left-leaning government is known to create a 'push factor'—political risks that investors hedge against. Such policies would include increases in government spending and taxes on capital gains. Left-leaning parties' general inclination to impose strict capital control in particular would generate a grave concern to portfolio investors.[12] The importance of this political risk is more pronounced in emerging markets where investors grow sensitive to signs of changes in the political environment than in advanced economies.[13] Therefore, it is reasonable to posit that cross-border investors prefer the election of a conservative government in the host country.[14]

Empirical literature offers extensive evidence for this partisan preference. Vaaler, Scharge, and Block as well as Brooks, Cunha, and Mosley report a positive relationship

[10] Geoffrey Garrett, "Capital Mobility, Trade, and the Domestic Politics of Economic Policy," *International Organization,* 49-4 (1995), pp. 657–687.
[11] Douglas A. Hibbs, Jr., "Political Parties and Macroeconomic Policy," *American Political Science Review,* 71-4 (1977), pp. 1467–1487.
[12] Thomas Oatley, "How constraining is capital mobility? The partisan hypothesis in an open economy," *American Journal of Political Science* 43-4 (1999), pp. 1003-1027.
[13] John. S. Ahlquist, "Economic policy, institutions, and capital flows: Portfolio and direct investment flows in developing countries," *International Studies Quarterly,* 50-3 (2006), pp. 681-704.
[14] Geoffrey Garrett, and Peter Lange, "Internationalization, Institutions, and Political Change," *International Organization,* 49-4 (1995), pp. 627–655.

between a conservative government---or the probability of its election---and portfolio investment inflow.[15] Bernhard, Broz, and Clark as well as Leblang present a similar partisan preference in foreign exchange markets which often operate in parallel with portfolio markets.[16] Jensen and Schmith, Girardi and Bowles, and Herron et al. demonstrate that an electoral victory of a left-leaning candidate, or an increase in the possibility thereof, drives down stock market prices in the context of Brazil, Chile, and the United Kingdom, respectively.[17]

It is important to note that some of the recent political economy studies contend that this general partisan preference does not necessarily hold across all international financial markets. For example, Pandya finds that domestic labor—and particularly skilled labor groups—are likely to support FDI, as they expect a relatively higher level of income from this type of investment.[18] Pinto similarly argues that conservative governments are more likely than left-leaning governments to restrict the entry of FDI

[15] Paul M. Vaaler, Burkhard N. Schrage, and Steven A. Block, "Elections, opportunism, partisanship and sovereign ratings in developing countries." *Review of Development Economics* 10-1 (2006), pp. 154-170.; Sarah M. Brooks, Raphael Cunha, and Layna Mosley. "Categories, creditworthiness, and contagion: how investors' shortcuts affect sovereign debt markets." *International Studies Quarterly* 59- 3 (2015), pp. 587-601.

[16] Bernhard, William, J. Lawrence Broz, and William Roberts Clark. "The political economy of monetary institutions." *International Organization*, 56-4 (2002), pp. 693-723; Leblang, David. "To devalue or to defend? The political economy of exchange rate policy." *International Studies Quarterly* 47-4 (2003), pp. 533-559.

[17] Nathan M. Jensen and Scott Schmith. "Market responses to politics: The rise of Lula and the decline of the Brazilian stock market," *Comparative Political Studies* 38-10 (2005), pp. 1245-1270; Daniele Girardi and Samuel Bowles, "Institution shocks and economic outcomes: Allende's election, Pinochet's coup and the Santiago stock market," *Journal of Development Economics* 134-1 (2018), pp. 16-27. Herron et al., "Measurement of political effects in the United States economy."

[18] Sonal S. Pandya, "Labor Markets and the Demand for Foreign Direct Investment," *International Organization*, 64-3 (2010), pp. 389–409.

given FDI's distributional effects on domestic actors.[19] This implies that FDI investors would not always; find the election of conservative party candidates desirable, as MNCs' activity could contract under right-wing governments.

The differences between these two bodies of literature stem from the types of investment. First, FDI has long-term horizons, as its investors intend to engage in management control of the business operations in which they are invested in the long-term. MNCs are expected to operate businesses in their host countries, or at least become involved in corporate governance through fixed assets, which significantly affects the labor market. However, other types of financial inflows such as portfolio investments do not generate such effects on the labor market, as they do not aim at corporate controls. Portfolio investors intend to achieve economic returns by acquiring stocks and bonds, which are the kind of investments with a short-term horizon. This type of investment tends to be more sensitive to an investment environment that is subject to frequent changes and often updates its investment portfolio following news.[20] In a nutshell, the theoretical mechanism that explains each type of investment may differ.

Our research is primarily concerned with the latter type of investment. As trans-border stock exchanges can be better characterized as portfolio investments than as direct investments, we can safely assume that foreign stock market investors respond sensitively

[19] Pablo M. Pinto, *Partisan Investment in the Global Economy: Why the Left Loves Foreign Direct Investment and FDI Loves the Left* (New York: Cambridge University Press, 2013).

[20] Ahlquist demonstrates that while portfolio investors are more sensitive to short-term fiscal policy changes, FDI is more affected by changes in the long-term investment environment, such as political and institutional conditions. John. S. Ahlquist, "Economic policy, institutions, and capital flows: Portfolio and direct investment flows in developing countries."

to the signs of short-term changes in political environments and therefore find electoral gains of conservative governments in host countries generally positive.

Military threats and conservative electoral advantages: the South Korean Peculiarity

Thus far we have established that the relationship between military threats and financial markets reported in the literature is rather inconclusive whereas there seems to be a reasonably stable empirical regularity between electoral advantages to right-wing governments and portfolio investment. We propose that the peculiar security and political context of South Korea makes a unique case where these two groups of studies can be linked. The key assumption we make for this argument is that North Korean security threats are seen as a boon to the electoral chances of the conservative parties in South Korea.

The partisan electoral effect of external threats is not unfound in the literature. Although the rally-round-the-flag effect in theory might not necessarily distinguish the partisanship of the incumbent government[21], empirical studies tend to point to the partisan effect. For example, a large body of studies focusing on the Israeli-Palestinian conflict uses public opinion polls as well as general election results to demonstrate that Palestinian attacks on the Gaza Strip have boosted support for the right-wing party.[22]

[21] John R. Oneal, and Anna Lillian Bryan, "The Rally 'round the Flag Effect in US Foreign Policy Crises, 1950–1985," *Political Behavior*, 17-4 (1995), pp. 379–401; William D. Baker, and John R. Oneal, "Patriotism or Opinion Leadership? The Nature and Origins of the 'Rally Round the Flag' Effect," *Journal of Conflict Resolution*, 45-5 (2001), pp. 661–687.

[22] Claude Berrebi, and Esteban F. Klor, "On Terrorism and Electoral Outcomes: Theory and Evidence from the Israeli-Palestinian Conflict," *Journal of Conflict Resolution*, 50-6 (2006), pp. 899–925; Anna Getmansky, and Thomas Zeitzoff, "Terrorism and Voting: The Effect of Rocket Threat on Voting in Israeli Elections," *American Political Science Review*, 108-3 (2014), pp. 588–604; Yuval Feinstein, "One flag, two rallies: Mechanisms of public opinion in Israel during the 2014 Gaza war," *Social Science Research*, 69-1 (2018), pp. 65-82.

Underlying these studies is the insight that safety-seeking electorates lean towards them when threats are made because right-wing parties tend to espouse explicitly hawkish security policies.

We note that this insight is particularly pronounced in the studies on South Korea. The country offers underlying conditions for both factors of interest in this study—military threats and portfolio market. A number of military disputes, ranging from threats to provocations to actual—though limited—use of force, have occurred between North and South Korea, as they have shared a border for over 60 years under an armistice agreement.[23] Not surprisingly, the partisan electoral consequence of military threats is notably conspicuous in scholarly and public discussions on inter-Korean relations. The term 'North Wind' is widely used to indicate North Korean threat factors that may affect the South's election outcomes, usually in favor of the conservative candidates. Jung defines the 'North Wind' as direct, open military actions and similar threats that can have electoral consequences.[24] One of the reasons for the partisan effect of the threats is that they amplify the electoral salience of the pre-existing security concerns of certain voters. The increased salience of security concerns has proven to help rally right-leaning electorates in the literature.[25] Having recognized this advantage early on, the military juntas of South Korea in the 1970s and 80s actively utilized—and even created on certain occasions—North Korean military threats in semi-competitive elections. Korean-

[23] According to the Council on Foreign Relations, 1,436 military crashes occurred on the Korean peninsula from 1955 to 2010, and among the 193 incidents in which these disputes' locations were reported, more than 50% (103 incidents) occurred in the Demilitarized Zone (DMZ). See http://www.cfr.org/conflict-prevention/military-escalation-korea/p23344.

[24] Junpyo Jung, "Bukpungeui Jungchihak ('Politics of North Wind')," *Hankukkwa kukjejungchi ('Korea and International Politics')*, 14-1 (1998), pp. 111–151.

[25] Jisuk Woo, "Television News Discourse in Political Transition: Framing the 1987 and 1992 Korean Presidential Elections," *Political Communication*, 13-1 (1996), pp. 63–80.

language sources affirm that this 'North Wind' effect persisted into the post-democratization era.[26] Given the perennial salience of the 'North Wind' effect, the literature implies that North Korean military threats might feature prominently in foreign investors' view of the South Korean stock market primarily as an indicator of conservative parties' electoral advantage.

The Argument

Our review of the extant literature points to two empirical regularities. First, security threats offer disproportionate electoral advantages for conservative parties, particularly in the South Korean context. Second, foreign investors prefer conservative governments to liberal ones in their host countries. Synthesizing these two bodies of literature offers a simple proposition that North Korean threats to South Korea affect financial markets via their perceived electoral implications. A simple testable hypothesis we can glean from this synthesis can be written:

Hypothesis 1: North Korean military threats increase portfolio investment.

It is worth noting here, however, that this proposition stands on an assumption that North Korean security threats *always* render security issues electorally salient and provide electoral advantages for conservative parties. If this assumption holds, we should be observing a straightforwardly strong relationship between North Korean threats and the South Korean portfolio market. As the null results that the empirical literature reports

[26] Sungsim Won, and Yungchul Ko, "Je 20 dae Chongsoneseo Yugwonja Tupyohangetaee Younghyangeul Michin Yoine Kwanhan Yeonku (Study on Factors Affecting Behaviors of Voters at the Republic of Korea's 20th Legislative Election)," *Chungchi Communication Yeonku (Political Communication Research)*, 44 (2007), pp. 49–83.

imply, such an assumption might not necessarily be tenable.[27] It would be plausible, instead, to presume that there are circumstances where North Korean threats' electoral salience is more pronounced than others.

We identify two such circumstances. First, the threats' effect should be stronger during the period before the elections than in other periods. The salience of politically sensitive issues dramatically increases in the run-up to elections. Observers in general and investors, in particular, would view the partisan effect of military threats as more significant during these politically sensitive times than in times when elections are scheduled much down the road. Indeed, the aforementioned studies on the electoral effect of the Israel-Palestine conflict focus on the run-up to elections.[28] Similarly, in the South Korean context, the North Wind is rarely invoked even if North Korean military provocations take place as long as the election is scheduled much down the road.[29]

Second, we expect that the effect of threats to be stronger while liberal parties are in power than when conservative parties are in power. Military threats made under a liberal rule can be easily framed as the government's failure in adopting a naïve, 'progressive' security policy, which can effectively translate into the conservative opposition's electoral advantage. By contrast, as extant literature demonstrates, military threats made while conservative parties are in power would not have such a dramatic effect and could even be perceived as a consequence of the government's tough foreign

[27] Kim and Roland, "How Credible is the North Korean Threat?"; Dibooglu, and Cevik, "The Effect of North Korean Threats on Financial Markets in South Korea and Japan."
[28] Berrebi and Klor, "On Terrorism and Electoral Outcomes: Theory and Evidence from the Israeli-Palestinian Conflict"; Getmansky and Zeitzoff, "Terrorism and Voting: The Effect of Rocket Threat on Voting in Israeli Elections."
[29] Jung "Politics of North Wind."

policies. [30] Indeed, the effect of the North Wind is found to be notably weaker in an election during a conservative government despite a serious military provocation.[31]

To the extent that portfolio investors perceive North Korean threats as a factor contributing to the emergence of political environments they prefer (a conservative government), these circumstances that can condition the electoral salience of North Korean threats should make a meaningful difference in the portfolio market. When North Korean threats are deemed strongly effective in creating an electoral edge for a conservative candidate, portfolio investors should be more willing to invest in the Korean market. Two conditional hypotheses can be generated from this line of reasoning:

Hypothesis 2: North Korean military threats increase the volume of foreign portfolio investment inflow when a liberal president is in place.

Hypothesis 3: North Korean military threats increase the volume of foreign portfolio investment inflow in the period immediately prior to elections.

Research design

This study explores the relationship between North Korean military threats and the changes in foreign investments in the Korean stock market using monthly stock exchange

[30] John Orman, *Comparing presidential behavior: Carter, Reagan, and the Macho presidential style* (New York: Greenwood Press, 1987); Stephen Ducat, *The wimp factor: Gender gaps, holy wars, and the politics of anxious masculinity* (Boston: Beacon Press, 2004); Nicholas J. G. Winter, "Masculine Republicans and Feminine Democrats: Gender and Americans' Explicit and Implicit Images of the Political Parties," *Political Behavior*, 32-4 (2010), pp. 587–618.

[31] Eunjung Choi, "Political issues, generation gap, and voting behavior in South Korea: The 2010 Seoul mayoral election," *East Asia*, 30-4 (2013), pp. 237-254.

data. We propose that foreign investors in the Korean stock market make a prime empirical subject with which we test our hypotheses. The majority of foreign capital inflows into the Korean stock market are driven by portfolio investments with substantially small FDI. For example, our sample includes only 5.5% FDI in 2012, and the remaining 94.5% of foreign investments were comprised of portfolio investments. As noted above, portfolio investments are much more sensitive to short-term political changes than FDI is. As our hypotheses involve political changes in the relatively short-term, conflating portfolio investments with non-portfolio investment would be misleading. Our focus on foreign investors addresses this potential empirical problem. Indeed, the Korean Institute of Finance reports that foreign security purchases in Korea are strongly risk-averse, and thus, are highly sensitive to the introduction of new risk factors.[32]

The temporal coverage of our data (from January 2001 to December 2017) corresponds to the Korean stock market's post-liberalization period. Until the 1997 Asian financial crisis, the developmental state of South Korea had maintained a firm grip on the country's financial market, and foreign actors' equity investments were significantly limited.[33] It was only in the midst of the crisis, and particularly in 1998 when state control over financial inflows was curtailed and the limit was lifted on amounts of foreign access

[32] Korean Institute of Finance, "Oekukin Jungkwontujaga Kuknaegyeongjee Michineun Yunghyang (The Effect of Foreign Investment in Stock Market on the Domestic Economy)," (2009), at <http://www.prism.go.kr/homepage/researchCommon/downloadResearchAttachFile.do;jsessionid=2CBCB39D0B22F191FEBFC5FB35CB5327.node02?work_key=001&file_type=CPR&seq_no=001&pdf_conv_yn=N&research_id=1051000-200900098> (searched date: 21 May 2019).

[33] Jikon Lai, *Financial Crisis And Institutional Change in East Asia* (New York: Palgrave Macmillan, 2012).

to Korean securities.[34] Therefore, it would be misleading to include foreign investment data from before this transition.

Dependent variable

The dependent variable is the monthly changes in the total of foreign portfolio investment inflows, in the form of a natural log. This variable's time-series data are obtained from Korea's Financial Supervisory Service (FSS), which releases detailed information on foreign capital access to the South Korean stock market. The dependent variable includes the foreign assets in South Korea's two stock markets, namely, the Korea Composite Stock Price Index (KOSPI) and the Korean Securities Dealers Automated Quotations (KOSDAQ).

Our choice of monthly series is driven by two considerations. First, the data of foreign inflows into these markets at a higher frequency (i.e., weekly or daily) are not available for the long period of temporal coverage that we want to exploit for the various North Korean military threats. Second, our use of temporal lags is better served by monthly data. Since the ways in which investors update their priors on the security situations of South Korea might vary, it is possible that what investors perceive of a military threat might mean very different things if observations are recorded on a weekly—let alone daily—basis: merely after a week from a rocket launch, some might interpret it as a decisively aggressive action of the North Korean regime while others view it as part of routine military provocations. This concern can be alleviated to a certain

[34] Financial Supervisory Service, "Oekukin Toojadonghyang Bunsuk 2000 (Analysis on Foreign Investment Patterns in 2000)," Press Release of Financial Supervisory Service (2001), at <http://www.fss.or.kr/download.bbs?bbsid=1207397030605&fidx=10000001654> (searched date: 21 May 2019).

extent when monthly data are observed. After extensive media coverage and, more importantly, reactions from the South Korean and the US governments, what the rocket launch means among investors might be more homogeneous.

Financial time series are known to be non-stationary. Given the temporal dependence and trending, the literature establishes that financial time series data are prone to biased inferences when used without caution.[35] Indeed, an augmented Dickey-Fuller (ADF) test suggests that our data is not an exception (MacKinnon approximate p-value = 0.4652). One standard solution to deal with this problem, which we adopt here, is to use the change, not the level, of the dependent variable: the dependent variable is differenced to obtain stationarity following a practice common in the existing literature, such that it represents the monthly percentage of change.[36] More formally, the dependent variable $\Delta ln(Total)$ is:

$$\Delta ln(Total) = ln(Foreign_t) - ln(Foreign_{t-1})$$

where *Foreign* is the amount of foreign portfolio investment inflows in the KOSPI and KOSDAQ markets in Korean won (KRW). In effect, the ADF test on the differenced series confirms stationarity problem is addressed (MacKinnon approximate p-value = 0.000).

[Figure 1]

[35] Ryan Flanagan, and Lucas Lacasa, "Irreversibility of Financial Time Series: A Graph Theoretical Approach," *Physics Letters A*, 380-20 (2016), pp. 1689–1697.
[36] David Leblang, and William Bernhard, "Parliamentary Politics and Foreign Exchange Markets: The World According to GARCH," *International Studies Quarterly*, 50-1 (2006), pp. 69–92.

Figure 1 plots the temporal trend of *Total*; the dashed line represents the level of foreign investments *ln(Foreign)*, and the solid line denotes the monthly difference *ΔTotal*. The trend is largely consistent with our common understanding of the Korean financial market. Overall foreign investments in the Korean stock market have increased since the liberalization, with a temporal but dramatic reduction in the aftermath of the 2008 global financial crisis when mobile capital worldwide took refuge in the safe havens by leaving emerging markets. The period between 2006 and just prior to the crisis as well as the years after 2011 can be characterized as relatively 'tranquil' times when capital inflows into the Korean market have steadily increased.

Independent variables

This research's primary independent variable is the North Korean military threat. This variable draws on event data provided by the Center for Strategic and International Studies (CSIS), or namely, Beyond Parallel, which identifies three different categories of North Korean military provocations: 1) missile tests, 2) nuclear weapon tests, and 3) other military activities.[37] We create two dummy variables using this dataset. One captures whether any North Korean military provocation(s) were observed in a given month (*NK Provocation*), and the other indicates whether the provocation was specifically a nuclear weapons test (*Nuke Threat*).

Three variables reflect the institutional factors in South Korean political processes. *Liberal President* is a dummy variable that captures whether the incumbent

[37] Center for Strategic and International Studies—CSIS, "Beyond Parallel Database," Washington, DC: Center for Strategic and International Studies (2018), at <https://beyondparallel.csis.org/databases/> (searched date: 21 May 2019).

president in a given month was from a liberal party. Kim Daejung (1998–2002), Rho Muhyun (2002–2007), and Moon Jaein (2017–) are widely accepted as liberal presidents, and the variable is coded accordingly. *General Election* and *Presidential Election* are dummy variables that identify the month when the election was held. Each of the election variables also offers the period prior to the election month ($Election_{t+1}$). Lastly, to test hypotheses 2 and 3, we create two interaction variables - *Nuke Threat* × *Liberal President* and *NK provocation* × *Gen Election*, respectively.

Control variables

We employ several control variables to avoid omitted variable biases. First, our model includes a lagged value for economic policy uncertainty in the United States (*US Policy* $Uncertainty_{t-1}$) as well as its monthly difference ($\Delta US\ Policy\ Uncertainty_t$). The data are taken from the Economic Policy Uncertainty Index (Baker, Bloom, and Davis, 2016), which is based on a content analysis of news coverage on national economies. This accounts for US economic policies' dominant effects on emerging economies' financial markets in general and the South Korean stock market in particular.[38] Thus, we anticipate these two variables will explain the temporal variations in general economic climates, in South Korea as well as worldwide. Notably, we do not include a South Korean uncertainty index in our model. Although including this does not meaningfully alter the benchmark results, we believe the effect of our independent variable may operate through the index, which is essentially endogenous to the dependent variable, and including such a variable would lead to post-treatment biases.

[38] Eugene Hwang, Hong-Ghi Min, Bong-Han Kim, and Hyeongwoo Kim, "Determinants of Stock Market Comovements among US and Emerging Economies during the US Financial Crisis," *Economic Modelling,* 35 (2013), pp. 338–348.

We also control for the duration of an absence of each of the North Korean military threat variables. We assume that investors would find a threat that occurs after a long non-threat period much more surprising than a threat that immediately following the previous one. This should affect investors' decisions to allocate their assets, which would affect our dependent variable. Table 1 summarizes these variables' descriptive statistics.

[Table 1 here]

Model

Econometrics and political economy literature has firmly established that generalized autoregressive conditional heteroskedasticity (GARCH) models are best suited for examining high-frequency financial time series.[39] GARCH's effectiveness in analyzing financial time series is most pronounced in estimating both the 'level' and 'stability' of a time series, which are crucial in understanding investor behaviors. Unlike traditional estimators, it takes into account the previous variabilities of the series that usually carry on the current period in addition to showing the changes in the series. In our data, for example, GARCH can show both the volume and volatility of portfolio investment into the Korean stock market. Accordingly, this study adopts a standard GARCH model to estimate the level and variance of $\Delta ln(Total)$.[40]

[39] Nathan S. Balke, and Thomas B. Fomby, "Large Shocks, Small Shocks, and Economic Fluctuations: Outliers in Macroeconomic Time Series," *Journal of Applied Econometrics*, 9-2 (1994), pp. 181–200; Richard T. Baillie, and Tim Bollerslev, "The Message in Daily Exchange Rates: A Conditional-Variance Tale," *Journal of Business & Economic Statistics*, 20-1 (2002), pp. 60–68. William Bernhard, and David Leblang, "Polls and Pounds: Public Opinion and Exchange Rate Behavior in Britain," *Quarterly Journal of Political Science*, 1-1 (2006), pp. 25–47; David Leblang, and Bumba Mukherjee, "Presidential Elections and the Stock Market: Comparing Markov-Switching and Fractionally Integrated GARCH Models of Volatility," *Political Analysis*, 12-2 (2004), pp. 296–322.

[40] We also experimented error correction models as an alternative and found that the benchmark result is not meaningfully altered. See online appendix.

More formally, the benchmark GARCH model is composed of two parts: mean and variance equations. The model's mean component explains the 'level' of the dependent variable, and is simply defined as:

$$\Delta ln(Total) = \lambda + \beta_i X_t + \varepsilon_t,$$

where λ is a constant, *X* is a vector of *i* number of independent variables, and ε_t is an error term normally distributed with a zero-mean and variance of σ_t^2. Alternatively, the model's conditional variance component is written as:

$$ln(\sigma_t^2) = \omega + \alpha\varepsilon_{t-1}^2 + \beta_1 ln(\sigma_{t-1}^2) + \gamma_j \boldsymbol{I}_t,$$

where ω is a constant;σ_{t-1}^2 is the GARCH term, or the variance forecast from the previous period; ε_{t-1}^2 is the ARCH term, or the new information on volatility based on the previous volatility information; ***I*** is the *j* number of exogenous variables that account for the variance; and α, β, and γ are parameters to be estimated in the model.[41]

As we test interactive hypotheses, the model can be written as:

$$\Delta ln(Total) = \lambda + \beta_1 X_1 + \beta_2 Z_1 + \beta_3 X_1 Z_1 + \varepsilon_t,$$

According to our hypotheses, the marginal effects of the independent variables (i.e., $\frac{dy}{dx} = \beta_1 + \beta_3 Z_1$) is positive and increases as the conditional variables Z is 1; thus we expect that

[41] *Ibid*., pp. 307

both $\beta_1 + \beta_3$ and $\beta_3 > 0$. Since the significance of the interaction term is not a necessary condition for the marginal effects to be significant,[42] we report the marginal effects plot.

While our decision of including independent variables in both mean and variance equations is primarily guided by Akaike information criteria (AIC), computational efficiency and parsimony are also considered strong criteria. As Zivot's extensive literature survey affirms, computational difficulties are a perennial problem in financial time-series analyses, and particularly in GARCH models.[43] Much of the problem lies in the large number of independent variables included on the right-hand side of equations. While this specification complexity is conducive to convergence issues, the estimates are also likely to be inaccurate.[44] To avoid this problem, the benchmark model does not include the right-hand variables that 1) are found to be consistently insignificant, and 2) have little effect on other variable results across permutations of specifications while posing computational challenges.

As reported in Table 2, the Jarque-Bera test indicates that the residuals are not normally distributed. Therefore, Bollerslev-Wooldridge semi-robust standard errors are used as a conventional measure.[45] Similarly, autoregressive terms are applied, as the squared residuals are serially correlated.

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[42] Brambor, Thomas, William Roberts Clark, and Matt Golder, "Understanding interaction models: Improving empirical analyses," *Political analysis, 14*-1 (2006), pp. 63-82.

[43] Eric Zivot, "Practical Issues in the Analysis of Univariate GARCH Models," in Torben Gustav Andersen, Richard A. Davis, Jens-Peter Kreiss, and Thomas V. Mikosch, ed., *Handbook of Financial Time Series* (Berlin: Springer-Verlag, 2009), pp. 113-155.

[44] Chris Brooks, Simon P. Burke, and Gita Persand, "Benchmarks and the Accuracy of GARCH Model Estimation," *International Journal of Forecasting*, 17-1 (2001), pp. 45–56.

[45] Tim Bollerslev, and Jeffrey M. Wooldridge, "Quasi-Maximum Likelihood Estimation and Inference in Dynamic Models with Time-Varying Covariances," *Econometric Reviews*, 11-2 (1992), pp. 143–172; David Leblang, and William Bernhard, *op.cit*., pp. 69–92.

Empirical analysis

Benchmark result

[Table 2]

[Figure 2]

Table 2 presents the results of the four GARCH models. The first two columns, which do not include interaction terms, report the results for testing Hypothesis 1 and the third and fourth columns test Hypotheses 2 and 3, respectively. The results of the baseline additive models (Models 1 and 2) do not support Hypothesis 1. While the coefficients of the key independent variables are positive, they are not statistically significant. These null findings are consistent with previous research that the effects of external threats are inconclusive.[46] However, as we predicted in Hypotheses 2 and 3, the effects of the external threats have positive effects on foreign portfolio investment inflows under the circumstances where North Korean threats' electoral salience is more pronounced than others. In Models 3 and 4, the coefficients of the interaction variables are positive as we expected, and the marginal effects of the key independent variables in each model are significant, supportin both Hypotheses 2 and 3. We begin with Model 3, which tests Hypothesis 2. The marginal effects of the nuclear threats are illustrated on the left panel in Figure 2. The 95 percent confidence interval for the effects of nuclear threats under liberal governments is distinguishable from zero while it does not under conservative ones; this indicates that North Korea's nuclear threats under the liberal presidents

[46] Andrew H. Chen, and Thomas F. Siems, "The Effects of Terrorism on Global Capital Markets," *European Journal of Political Economy,* 20-2 (2004), pp. 349–366; Justin Wolfers, and Eric Zitzewitz, "Using Markets to Inform Policy: The Case of the Iraq War," *Economica,* 76-302 (2009), pp. 225–250.

increase the volume of foreign portfolio investment inflow, whereas they have no effects on the capital inflow under the conservative governments. Besides, the negative coefficient of *Nuke Threat* in the model's conditional variance component reveals that nuclear threats stabilize rather than destabilize financial inflows to the Korean stock market.[47]

Next, Model 4 in Table 2 reports the result of the GARCH model testing Hypothesis 3. The significantly positive interaction term (*NK provocation* × *Gen Election*$_{t+1}$) implies that North Korean threats made in the period prior to general elections affect the volume of foreign capital inflows to the Korean stock market. The marginal effects plot on the right panel in Figure 2 confirms this result. The marginal effects of NK threats on foreign capital inflow are positive and significant only when the election variable is one, thereby supporting Hypothesis 3. Similar to the results from nuclear threats, the strongly significant, negative coefficient of *NK Provocation* in the conditional variance equation suggests that North Korean military threats decrease the volatility in financial inflows into Korean stock markets.

One may question if these findings are due to the possibility that foreign investors may expect that liberal leaders would do something much more to lessen the tension and facilitate international business. In South Korea, the role of dominant enterprises ('Chaebol') was underscored during the economic growth period (i.e., the 1960s to 1980s) as the driving force behind the economic growth, and governments implemented several business-friendly policies such as market protective policies, maintaining low

[47] It is noteworthy here that when *NK Provocations* were included in the benchmark model instead of *Nuke Threats*, it did not converge and we could not obtain estimates.

income, and repressing labor rights.[48] While this pro-business policy orientation was succeeded by the conservatives after the democratic transition, the liberals called for extensive reforms on Chaebol. This ideological cleavage has been deeply ingrained in South Korean politics. Although observers often point out that the liberal governments also implemented market-friendly policies in the post-crisis period,[49] the market's perception of the partisan economic policies of the South Korean government did not seem to have changed. The market in general[50] and the international financial actors, in particular,[51] have remained skeptical of liberal governments.

Lastly, the results of the control variables point to an interesting pattern and warrant a brief discussion here. In particular, the difference between the general and presidential elections is interesting. Across the models, presidential elections—unlike general elections—do not appear to have any effect on portfolio investment. This is also the case even when the presidential election variable is interacted with the threat variable. The result is consistent with the studies on the difference between presidential and general elections in South Korea that has emerged recently. As Joo and Kim note, economic issues have overwhelmingly impacted *presidential* elections after the 1997 financial crisis. Other issues—including North Korean threats—have subsequently been sidelined as of second-order importance.[52] North Korean issues still influence *general*

[48] Stephen Haggard, *Pathways from the Periphery: The Politics of Growth in the Newly Industrializing Countries*, (Ithaca: Cornell University Press, 1990).
[49] Thomas Kalinowski, "The politics of market reforms: Korea's path from Chaebol Republic to market democracy and back," *Contemporary Politics* 15-3 (2009), pp. 287-304.
[50] Maeilgyeongje, "bangiup jungsu jungmal upna (Is the anti-business sentiment really non-existent?)" September 28, 2005.
[51] Mike Bird, "Asia's Most Radical Left-Wing Economic Program Faces a Harsh Reality," Wall Stree Journal, February 20, 2019.
[52] Bong-Ho Joo, "1997 Daetongryung Seongeowa Bukhan Byunsu ('The 1997 Presidential Election and North Korea')," *Jungchijungboyeonku ('Journal of Political*

election results, however. As recently as the latest general election in 2016, Won and Ko report that the launch of a *Gwangmyung-sung* satellite mobilized specific demographic groups toward the conservative party.[53] It is plausible to assume that investors took note of these diverging voting patterns and reacted differently to North Korean military threats in presidential and general elections.

Robustness check: Markov regime-switching model

Although the two benchmark models' results strongly support our hypotheses, our confidence in this result could be bolstered if we discover similar patterns in the data using an alternative estimation technique. One such alternative is the Markov dynamic regime-switching model.[54] One notable difference between these models is that the Markov-switching model posits two 'states' in the data series in terms of the volatility and level of the dependent variable, and the model's estimated parameters highlight the transition between these two states.[55] Due to this convergence issue, our analysis includes only core independent variables.

[Table 3]

We first identify the two 'states' in our time series. State 1 is characterized by high changes in foreign access to the Korean stock markets, which exhibit a stable

Science & Communication'), 10-2 (2007), pp. 21–45; Young-Tae Kim, "2007 Daetongryung Seongeowa Bukhan Byunsu ('The 2007 Presidential Election and North Korea')," *Jungchijungboyeonku ('Journal of Political Science & Communication')*, 10-2 (2007), pp. 65–77.

[53] Sungsim Won, and Yungchul Ko, *op.cit*., pp. 49–83.

[54] Christopher M. Turner, Richard Startz, and Charles R. Nelson, "A Markov Model of Heteroskedasticity, Risk, and Learning in the Stock Market," *Journal of Financial Economics*, 25-1 (1989), pp. 3–22.

[55] *Ibid*., pp. 296–322.

variance. State 2 is the opposite, in that it identifies high volatility and low foreign capital inflows into the markets. If our benchmark result is robust to the use of the Markov-switching model, we should observe that 1) the effect of nuclear threats conditional on liberal governments is significantly positive (or negative) in State 1 (State 2); and 2) the effects of North Korean provocations in the period prior to general elections is significantly positive (or significantly negative) in State 1 (State 2).

[Figure 3]

Table 3 reports such results, as anticipated; both interaction terms are positive in State 1, implying that North Korean threats' conditional effects drive foreign inflows to the Korean stock market to become high-level and unstable. Figure 3 illustrates these effects. North Korean threats' marginal effects as represented in each graph are similar to those in Figure 2 (GARCH models), confirming our benchmark result's robustness. The diagnostic statistics suggest that the autocorrelation in the error term is not significant, and thus, the null hypothesis regarding the equality of variance is rejected at a statistically significant level. However, the equality of mean test ($\mu_1 = \mu_2$) does not reject the null hypothesis, suggesting that our inference regarding North Korean threats' effects on the level of foreign capital inflows should be tentatively accepted.

Conclusion

Extant literature on North Korean military threats' effects on financial markets in South Korea and other Asian countries report null results.[56] Given that North Korean military

[56] Chi-Wook Kim, "Inter-Korean Relations and 'Korea Discount': An Analysis of Foreign Investors' Stock Trading," *Journal of Peace and Unification Studies*, 3-1 (2011), pp. 219–252; Sel Dibooglu, and Emrah I. Cevik, *op.cit*., pp. 18–26.

provocations have not escalated into an actual war since the end of the Korean War, these results are as anticipated. In other words, many analysts have concluded that a North Korean 'threat is not credible' when it points to the possibility of an all-out war.[57] Contemporary academic debates over North Korean threats are instead centered on sanctions and nuclear disarmament, rather than the reverberation these threats create in other countries.[58]

We newly illuminate this subject by offering evidence that North Korean military threats do have notable consequences in South Korean stock markets, albeit counter-intuitively. North Korean military threats to South Korea are found to increase—not decrease—the inflows of foreign capital into the latter country's two stock markets, and particularly when liberal parties are in power or general elections are scheduled in the following month. We explain this result by connecting the literature on military threats' partisan electoral effects on the one hand, and the literature on foreign investors' partisan preferences on the other. Foreign investors are relatively mobile and constantly searching for domestic political cues that might bolster or undermine their investment returns, and generally prefer conservative over liberal governments in this matter. In the context of South Korea's post-democratization electoral politics, investors have learned that North Korean military provocations translate into electoral gains for conservative parties, and thus, higher returns on their investments. Subsequently, we argue that financial market data on South Korea should reflect this inference from foreign investors.

[57] Byung-Yeon Kim, and Gérard Roland, *op.cit.*, pp. 457.
[58] For example, Victor D. Cha, and David C. Kang, *Nuclear North Korea: A Debate on Engagement Strategies* (New York: Columbia University Press, 2018).

The theoretical implications of our study are not confined to the Korean Peninsula but can be applied to similar partisan political contexts across countries as long as the assumptions hold regarding foreign investors' preferences. In this sense, our findings point to an important research avenue toward the relationship between domestic politics and foreign threats' 'rally 'round the flag' effect. While empirical studies on this relationship focus on threats' monolithic, indiscriminate effects on political support for incumbent leaders, we offer a more nuanced framework in which threats' effects depend on the incumbent's partisan orientation as well as electoral calendars.[59]

[59] For example, John R. Oneal, and Anna Lillian Bryan, "The Rally 'round the Flag Effect in US Foreign Policy Crises, 1950–1985"; William D. Baker, and John R. Oneal, "Patriotism or Opinion Leadership?".

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Table 1. Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.
Δ ln(total foreign stock)	0.010093	0.0651348	-0.2508087	0.2205162
US uncertainty	122.0363	46.49384	44.78275	283.6656
Δ US uncertainty	-0.0111524	38.44893	-135.4581	177.3645
NK provocation	0.3349754	0.4731487	0	1
Nuclear threat	0.0394089	0.1950467	0	1
Liberal government	0.4433498	0.4980085	0	1
No NK threat duration	2.178218	2.440928	0	11
No nuclear duration	15.89109	14.38587	0	58
General election	0.0197044	0.1393262	0	1
Presidential election	0.0197044	0.1393262	0	1

Table 2. GARCH Model

	(1) Nuclear	(2) Military	(3) Nuclear	(4) Military
Nuke threat$_{t-1}$	0.019		0.006	
	[0.012]		[0.011]	
NK provocation		0.002		0.002
		[0.007]		[0.007]
Nuke threat$_{t-1}$× Liberal			0.041***	
			[0.011]	
Liberal president	0.016*	0.013*	0.013*	0.014*
	[0.009]	[0.007]	[0.008]	[0.008]
NK provocation × Gen Election $_{t+1}$				0.044***
				[0.013]
NK provocation × Gen Election $_{t}$				0.024
				[0.044]
No nuke threat duration$_{t-2}$	-0.001***		-0.001***	
	[0.000]		[0.000]	
No Provocation duration$_{t-2}$		-0.000		-0.000
		[0.001]		[0.001]
General election	-0.017**	-0.012*	-0.020**	-0.033
	[0.009]	[0.006]	[0.010]	[0.043]
Presidential election	0.007	0.013	0.018	0.014
	[0.021]	[0.022]	[0.020]	[0.022]
General election $_{t+1}$	0.041***	0.042***	0.042***	-0.001
	[0.012]	[0.009]	[0.012]	[0.009]
Presidential election $_{t+1}$	0.023	0.025	0.023*	0.025
	[0.017]	[0.018]	[0.013]	[0.018]
US Policy Uncertainty$_{t-1}$	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]
ΔUS Policy Uncertainty$_{t}$	-0.000	-0.000	-0.000**	-0.000
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	0.005	-0.009	0.009	-0.009
	[0.016]	[0.017]	[0.016]	[0.017]
ARMA				
AR(1)	0.000	0.025	0.007	0.028
	[0.071]	[0.083]	[0.074]	[0.084]
AR(2)	0.072		0.089	
	[0.082]		[0.084]	
Conditional Variance				
Nuke threat$_{t-1}$	-2.055		-5.639	
	[2.113]		[3.662]	
No threat Duration$_{t-2}$	-0.044		-0.046	
	[0.043]		[0.033]	
General election$_{t+1}$	-4.687***	-2.919	-5.897***	-3.310

	[0.958]	[2.983]	[1.780]	[3.937]
All NK provocation		-8.618***		-8.790***
		[1.755]		[1.730]
Liberal president		0.799	2.284	0.842
		[0.633]	[1.778]	[0.621]
Constant	-9.271***	-8.202***	-10.211***	-8.251***
	[1.066]	[0.835]	[1.503]	[0.855]
ARCH Terms				
ARCH(1)	-0.046	-0.030	-0.045	-0.033
	[0.042]	[0.030]	[0.044]	[0.035]
ARCH(2)	0.325***	0.273**	0.343***	0.259**
	[0.124]	[0.135]	[0.132]	[0.128]
GARCH(1)	0.921**	0.736**	0.742**	0.774**
	[0.467]	[0.312]	[0.359]	[0.381]
GARCH(2)	-0.193	-0.049	-0.046	-0.071
	[0.372]	[0.225]	[0.312]	[0.279]
Observations	202	202	202	202
Log-likelihood	305.832	304.793	308.928	304.972
x^2	53.625	60.931	411.027	132.475
AIC	-573.665	-571.586	-573.856	-567.943
Diagnostics (p-values)				
Jarque-Bera test	0.000	0.000	0.000	0.000
Ljung-Box(1)	0.2592	0.3184	0.2593	0.3184
Ljung-Box(3)	0.0626	0.0840	0.0626	0.0839

Generalized Autoregressive Conditional Heteroskedasticity estimates with Bollerslev-Wooldridge semi-robust standard errors in brackets. * p<0.1 ** p<0.05 *** p<0.01.

Table 3. Markov Regime-Switching Model

	State1 (low variance, high level)			**State2** (high variance, low level)		
	β	SE	P	β	SE	P
Nuclear threat	0.011	0.014	0.447	0.040	0.030	0.179
NK provocation	-0.014	0.010	0.145	0.023	0.017	0.170
Liberal government	0.006	0.014	0.685	0.018	0.015	0.227
Run-up to election	0.001	0.007	0.937	0.000	0.013	0.972
Nuclear × Liberal Gov't	**0.035**	**0.020**	**0.082**	-0.036	0.030	0.229
NK × Election	**0.061**	**0.010**	**0.000**	0.043	0.019	0.019
Constant (μ)	0.012	0.006	0.035	-0.006	0.014	0.632
Variance (σ)	0.033	0.003	0.000	0.078	0.006	0.000
Observations	203					
Log-likelihood	293.57867					
AIC	-2.7249					
Diagnostics	x^2	P				
$H_0 : \mu_1 = \mu_2$	1.50	0.2257				
$H_0 : \sigma_1^2 = \sigma_2^2$	63.67	0.000				
Ljung-Box(1)	2.020	0.1552				
Ljung-Box(3)	3.983	0.2633				

Note: The Markov dynamic regime-switching model's estimates include robust standard errors.

Figure 1. Trend of Foreign-Owned Korean Securities

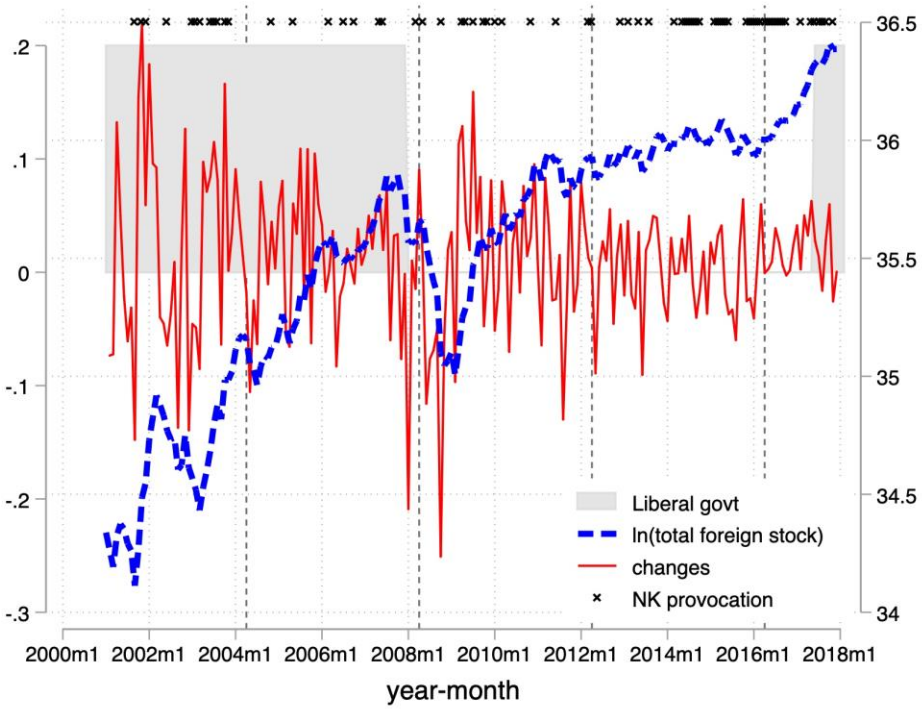
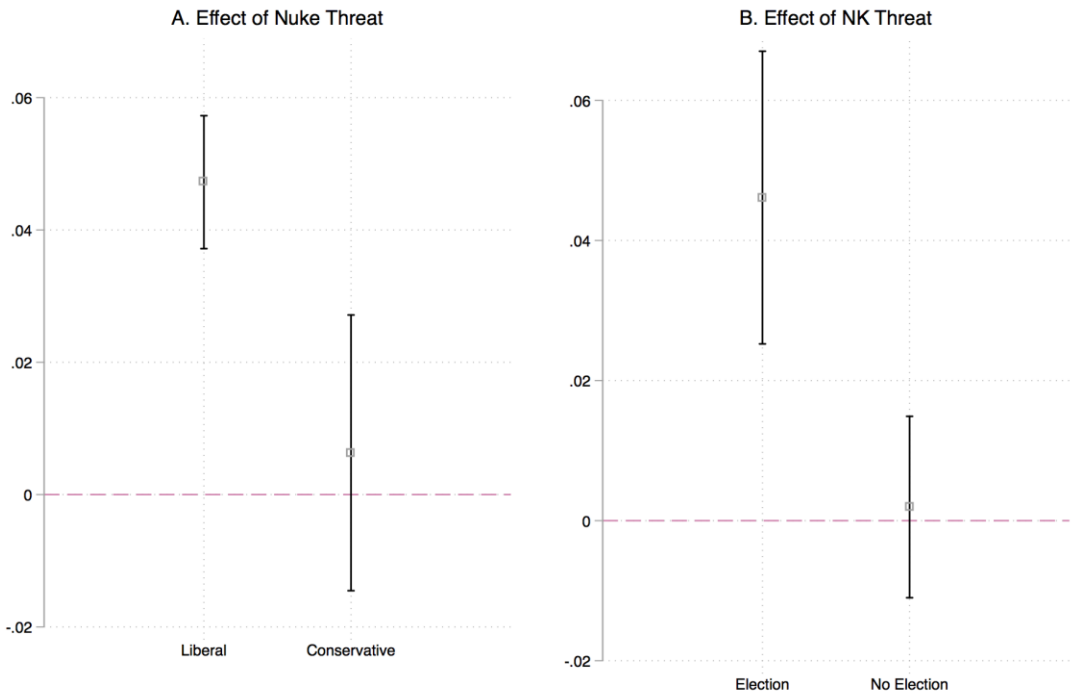
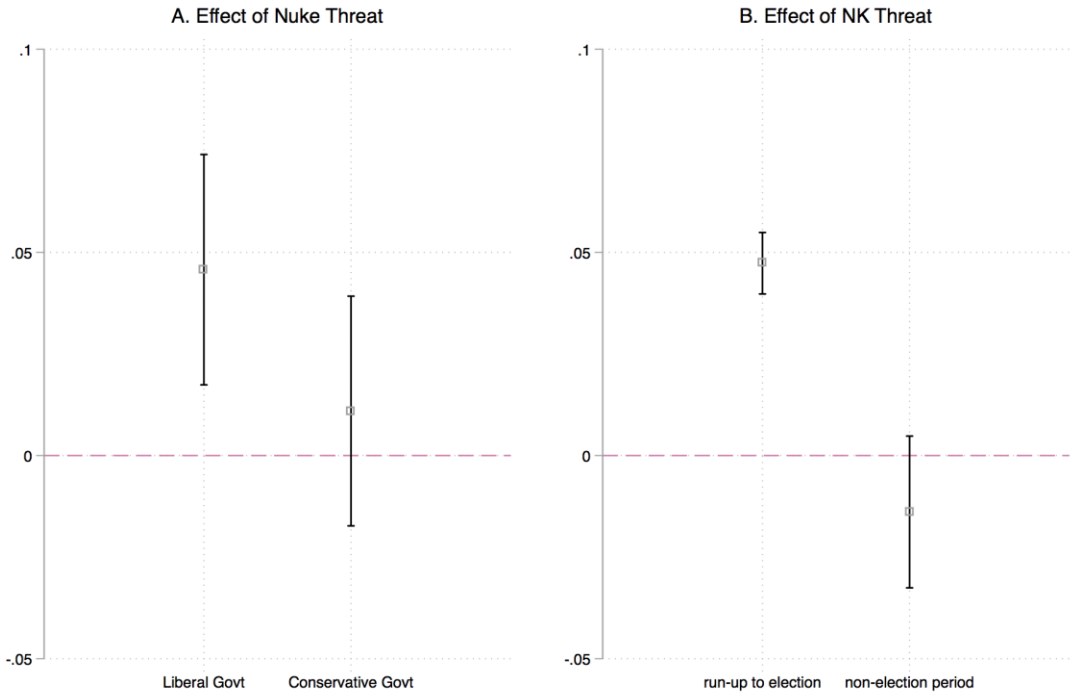


Figure 2. Marginal Effects (GARCH Model)



Note: Based on the benchmark models. The dot in the center represents the point estimate (the marginal effect of nuclear threat in the left panel and the effect of any North Korean threat in the right panel), and the bar indicates 95% confidence intervals.

Figure 3. Marginal Effect (Markov Regime-Switching Model)



Note: Based on the Markov regime-switching model. The dot in the center represents the point estimate (marginal probability of nuclear threat in the left panel and that of any North Korean threat in the right panel), and the bar indicates 95% confidence intervals.