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The Real-Time Impact of Political Risk on Market Valuations: Evidence from Peru

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Abstract: This study examines the impact of political risk on financial markets by leveraging high-frequency (minute-by-minute) price data and precise event timestamps from media outlets' Twitter feeds during Pedro Castillo's failed coup attempt in Peru. Unlike previous research that relies on low-frequency data and protracted political changes, our analysis demonstrates that daily closing prices may misleadingly suggest negligible impact. In contrast, high-frequency data reveal that markets promptly and accurately incorporated news of the coup attempt and, in turn, its failure into asset prices. Our analysis shows that breakdowns in democratic governance negatively affect asset prices, while the restoration of the rule of law, in the form Congressional checks on the Executive branch, boosts them. Moreover, our analyses suggest that domestic companies and sectors with less mobile assets are more vulnerable to these political risks. Our findings underscore the crucial role of high-frequency data in accurately capturing how institutions and political risk affects equity markets.

Keywords: political risk; financial markets; high-frequency data; Peru

1. Introduction

On 7 December 2022, Peru's President Pedro Castillo attempted to close Congress and establish a "government of exception". However, by the end of the day, Castillo was ousted from power by Congress and subsequently arrested. These events had a significant impact on the Peruvian stock market reflected in a sharp drop intraday stock prices when Castillo announced the closure of Congress and a sharp recovery of the stock market when Constitutional rule was restored. In contrast, the S&P 500 barely reacted to the violent protests in the United States on 6 January 2020, where pro-Trump rioters stormed the Capitol building. These two examples highlight the differing perceptions of political risk between Peru, a country historically prone to political upheaval, and the United States. While Castillo's failed coup was considered a significant source of political risk, financial markets did not view the attack on the Capitol as posing a genuine threat to the political stability of the United States.

The relationship between political risk and financial markets has received significant scholarly attention, with numerous studies investigating how policy uncertainty arising from political instability—such as wars, revolutions, and coups—can impact stock prices, exchange rates, bond yields, and investor behavior. Most of the existing research, however, uses low-frequency financial data as well as protracted political changes. While this conventional approach may provide valuable insights, it is ill-suited to capture the rapid incorporation of information about sources of political risk into asset prices.

We leverage Pedro Castillo's failed coup attempt by employing high-frequency (minute-by-minute) price data from Peru's broad stock market index and precise event timestamps

from media outlets' Twitter feeds to assess the real-time impact of political risk on market valuations. Our analysis shows that relying solely on daily closing prices may erroneously suggest that political risk had a negligible impact on market valuations. In contrast, our examination of high-frequency data demonstrates that the market promptly and effectively incorporated news of the coup attempt and its failure in Peru into asset prices. In this sense, our methodological innovation may shed light on more precise theoretical and empirical approaches to the understanding the impact of political institutions and politics on financial markets.

This study bridges the fields of finance and political economy by providing evidence of real-time price discovery in response to political events. Acknowledging that political uncertainty may affect economic and financial volatility, our analysis demonstrates that political instability does indeed impact equity risk premiums. Counter to previous research our findings reveal that democratic breakdowns, such as the removal of Congressional checks on the Executive branch, negatively affect asset prices, while the restoration of the Congress boosts them. Additionally, we find that domestic companies and sectors with less mobile assets are more vulnerable to political risks. In this sense, by endogenizing real-world market performance to politics we contribute to the emerging literature on non-market financial risk. Our findings also have practical implications for market participants. Sam Bankman-Fried's experience at Jane Street Capital, where he designed advanced prediction systems during the 2016 U.S. presidential election, is a case in point Lewis (2023). Furthermore, our analysis provides a strong lesson about the importance of relying on high-frequency data to accurately assess the impact of political institutions and political dynamics on financial markets.

The remainder of the paper is organized as follows. In the next section, we provide a brief account of the historical events that took place in Peru leading to the 7 December 2022 attempted coup. In Section 3, we discuss the connection between political risks resulting from the breakdown of democratic governance and asset prices, and derive our testable hypotheses. Next, we describe our data, discuss our estimation strategy, and report our main empirical findings. In Section 5 we further analyze the implications of our main results. A final section concludes.

2. Castillo's Coup Attempt

In this section we provide a brief overview of the political crisis in Peru leading to Castillo's actions and removal from power on 7 December 2022. The main goal of this narrative is to provide supporting evidence regarding the information available to investors as the institutional crisis unfolded.

On 28 July 2021 Pedro Castillo, a rural schoolteacher and union activist who ran as the head of the ticket for a far-left party, was inaugurated as Peru's 63rd President. Castillo's tenure in office was marked by political turmoil and instability. Despite having a presidential form of government, Cabinet changes in Peru need to be ratified by the country's unicameral Congress. In his first six months in office, Castillo went through three appointments for position of President of the Council of Ministers. In February of 2022, Castillo appointed Anibal Torres to this office. Torres, an experienced politician, remained in office for 9 months. However, there was a frequent turnover in other Cabinet positions, with one Minister being dismissed on average every three weeks. By the time of the failed coup, Castillo had fired two finance ministers.

Castillo alleged that the fragmentation of Congress, where no party holds a majority and party switching is common, was the cause of relentless political instability. In an effort to strengthen his government's position over Congress, Castillo forced a confidence vote on Torres in March of 2022. According to the Peruvian constitution, when presidents fail to receive a confidence twice, they can dissolve the Congress and call for new elections. By threatening to dissolve the Congress, Castillo aimed to exert pressure and gain political advantage. But the gambit failed when Torres survived the vote of confidence. As a result, Castillo did not significantly enhance his power position.

In 25 November 2022, Castillo made a new attempt to trigger a dissolution of the Peruvian Congress through constitutional means. This time, he sought to acquire two no confidence votes almost simultaneously. First, he dismissed Torres after the legislature refused to hold a no confidence vote, and then replaced him with Bessy Chavez, a 33-year-old legislator from Tacna. Chavez had been involved in various scandals during her short political career and was impeached by Congress in May 2022, a few months after being appointed as Minister of Labor. Castillo was gambling on the fact that Congress would not confirm Chavez, and as a result, he could claim that the legislature had given him a second consecutive vote of no confidence. This would have enabled him to order the dissolution of Congress and call for legislative elections, forcing incumbent legislators out of the new Congress because immediate re-election is prohibited in Peru. Facing such dire prospects, Peruvian legislators did not cave in. Instead, they announced that they would launch an impeachment motion against the president. This was certainly not the first time that Castillo faced a removal attempt. He had successfully survived two impeachment attempts in December 2021 and March 2022, with no major political consequences for him. This time was different. Most observers anticipated that instead of facing another stand-off with muted repercussions, Peru was bound for a constitutional crisis that would result in Castillo's removal from office. Thus, the prevailing view in the opening days of December 2022 was that Castillo's days were numbered and that his Vice-President Dina Boluarte—a 60-year old lawyer with an unimpressive career as a bureaucrat, who had served as his Minister of Development and Social Inclusion without meaningful accomplishments would ascend to the presidency.

No one expected, however, that on 7 December 2022—at 11:42 AM, just hours before the Peruvian Congress was scheduled to vote on a third impeachment motion against him—Castillo would go on national TV and announce the establishment of a "government of exceptional emergency". Indeed, as the president's former legal advisor, Benji Espinoza pointed out, the dissolution of Congress was never discussed during his six-hour long meeting with Castillo on December 6 to plan his legal defense strategy against the impeachment proceedings. Espinoza was also unaware of Castillo's plans on the morning on 7 December. In a state of shock, Espinoza publicly denounced the president's actions and resigned his position of legal adviser shortly after Castillo's televised announcement.

The events following the coup attempt also took an unpredictable turn. In response to Castillo's speech, several ministers resigned, intensifying the political turmoil. The Constitutional Court denounced Castillo as an usurper, and the Armed Forces openly rejected his actions, calling for the restoration of the constitutional order. Simultaneously, the Peruvian Congress swiftly gathered and voted decisively to remove Castillo from office, with an overwhelming majority in favor. In addition, the vice-president, Dina Boluarte, who opposed Castillo's actions, was scheduled to take the presidential oath of office at 3:00 pm. While the Congress was in session, Castillo left the governmental palace and sought refuge at the Mexican embassy in Lima. Learning that his own officers were responsible for transporting Castillo, the chief of the Peruvian National Police (PNP) ordered them to apprehend him. Under the guise of an emergency detour, the PNP officers diverted Castillo to the Prefecture, where he was arrested *in flagrante delicto* on charges of rebellion.

The swift and tumultuous sequence of these events demonstrated the fluid nature of the situation and the uncertainties that accompanied it. Castillo's televised address, the resignation of the cabinet ministers, the Constitutional Court's condemnation, the Armed Forces' rejection, the Congress's decisive vote, and the subsequent arrest of Castillo all unfolded extremely rapidly in span of approximately 140 min, between 11:42 AM and 2:02 PM.

3. Related Literature, Argument and Hypotheses

Political shifts, such as elections, changing government policies and political institutions, or foreign interventions in third countries, can significantly impact investor sentiments and perceptions of risk. For instance, a change in government leadership might alter

fiscal policy, regulations, or international relations, which can influence market expectations about future economic conditions and investment prospects. Under the Intertemporal Capital Asset Pricing Model (ICAPM), such political changes can affect asset prices by altering investors' expectations of future market conditions and risk premiums. Investors might revise their estimations of future cash flows, market volatility, or regulatory environments effected by political events Cochrane (2005).

Political shocks can have both positive and negative impacts on asset prices, depending on the nature of the event and the market's perception of its economic and political consequences Incerti (2024). Earlier studies highlight the relationship between regime changes and asset prices. For instance, Girardi (2018) report an increase in share values in the Santiago stock exchange following the 1973 military coup against Salvador Allende. Dube (2011) examine the timing of authorizations of top-secret US covert operations aimed at overthrowing foreign governments and their effects on the share prices of exposed US firms. Their findings reveal a positive reaction in share prices following US-backed coups or coup authorizations. Another illustrative example is the movement of asset prices in Indonesia between 1995 and 1997. Fisman (2001) demonstrates that the Jakarta Composite Index (JCI) experienced consistent declines during this period whenever rumors about Suharto's health circulated. This compelling evidence indicates that even rumors or uncertainty regarding the tenure of leading political figures can significantly influence market dynamics and asset prices, suggesting that politics can have significant impact on financial markets.

An important feature of financial agents is their ability to quickly incorporate new information into asset prices Anderson (2003); Ederington (1993); Fleming (1999). The expectation that market agents have a incentive to assimilate information and adjust their behavior implies that prices of financial assets should adjust swiftly in response to political events. Most of the existing work linking political changes and asset prices, however, relies on low-frequency financial data and often overlooks the immediate effects of political events Acemoglu (2006); Dasgupta (2015); Girardi (2018). But daily market moves may miss the swift and volatile reactions that occur within a trading day Baker (2021). In contrast, high-frequency data provides a precise and powerful measure of the immediate impact of political events on asset prices. Higher data frequency prevents information loss that happens when prices fluctuate wildly but revert to near previous levels by day's end. These data also accounts for opposing movements caused by multiple political events occurring throughout a day. Therefore, we propose the following hypothesis:

Hypothesis 1. *Significant price movements in response to sudden political events may not be detectable using daily closing prices, but should be detectable using intra-day data.*

In terms of the price movements associated with the political events that took place in Peru on 7 December 2022, we conjecture that Castillo's coup attempt led to a decrease in asset prices due to heightened risk and uncertainty regarding future policies and economic conditions resulting from the closing of Congress. Conversely, we believe that the restoration of the Constitutional order constraining the Executive had a positive impact on asset prices. When investors perceive a return to orderly governance and legal norms, their confidence in the country's economic and political environment is restored, reducing perceived risks and potentially leading to an increase in asset prices. Therefore, we propose the following hypothesis:

Hypothesis 2. *The breakdown of democratic rule had a negative effect on asset prices, while the restoration of the constitutional order led to an increase in asset prices.*

4. Data, Measurement, and Results

To estimate the impact of Castillo's coup attempt on market valuations, we analyze equity returns in the Lima Stock Exchange (Bolsa de Valores de Lima, BVL).[1] We rely on daily

data as well as one-minute prices returns for the Morningstar Peru Index (MSPEUSDP). Launched on December of 2014, the index measures the performance of Peru's equity markets targeting the top 97% of stocks by market capitalization.[2] In addition, the constituents of the Morningstar Peru Index are listed on major global exchanges, implying that there are no stale quotes as market activity is not affected by local trading holidays. Hence, the index's returns offer an opportunity to assess the arguments linking regime change and asset prices using the information contained in intraday data.

Regarding the diffusion of information associated with the political events on the morning of 7 December 2022, it is crucial for our analysis to identify the incidents' precise timestamp. Investors have traditionally relied on multiple business media outlets to procure information on financial and commercial activities, such as Reuters, Bloomberg, and the Associated Press. These days they can also keep up with significant developments reported in real-time on social media Agarwal (2021); Yousaf (2022).

Consider Castillo;s televised address on 7 December 2022. The broadcast started approximately at 11:42 am Peru Standard Time (GMT-05:00). During the first few minutes, Castillo pleaded his case, but he did not explicitly state his intention to close Congress. The announcement came at approximately 11:48:26; and it was only at that point that his intentions became clear, but not earlier. The news was reported almost immediately on Twitter by the newspaper Perú 21, at 11:49:11 am, but it was only picked up by Reuters almost three minutes later, at 11:51:59 am. Therefore, to obtain a precise measurement (down to the second) of when the news surrounding Castillo's actions as well as the events that took place in the aftermath of his announcement, we rely on Twitter rather than traditional business news providers. Specifically, we selected the top-5 local media outlets in Peru with major Twitter presence: the newspapers *La Republica*, *El Comercio*, *Peru 21*, and *Gestion*, as well as the radio and television broadcasting company *Radio Programas del Peru* (RPP).

Using the library *academictwitteR*, we scraped all the Tweets posted by the selected Peruvian media organizations' accounts on 7 December 2022. We recompiled the 1363 tweets delivered throughout that day. Notably, a significant majority of these tweets were posted within six hours after Castillo's televised announcement. The information collected includes the precise timing of each message, its content, and supplementary details such as retweets, likes, and hashtags. Of particular importance is the fact that each tweet includes a timestamp in hours, minutes, and seconds, providing us with a highly accurate estimate of when specific news became publicly available. For instance, considering Castillo's televised speech, at 11:47:58 am, the Twitter account of Radio Programas del Peru (RPP) tweeted, "President Castillo Addresses the Nation". A mere thirteen seconds later, Perú 21 tweeted, "Pedro Castillo Dissolves Congress". As this example shows, we can use the data included in Twitter feeds to pinpoint the revelation of information associated with all the incidents sparked by Castillo's attempted coup, including the resignation of his cabinet ministers, the Constitutional Court's condemnation, the Armed Forces' rejection, the Congress' decisive vote, and his subsequent arrest. We triage the information obtained from the Twitter accounts of the five different Peruvian media outlets and select the earliest news release as the most appropriate timestamp of each event.

4.1. Daily Returns

We first examine if the events that took place in Peru on 7 December 2022 can be detected using daily closing prices. To test the null hypothesis of no political effects, we use a form of extreme-value analysis Cutler (1989). As Baker (2021) note, large daily jumps typically attract coverage in leading national newspapers. Therefore, one could use next-day newspaper accounts to identify the proximate causes of stock market movements. In our case, we proceed in the opposite direction, asking if the constitutional crisis associated with Castillo's actions triggered a significantly large market move.

We examine all daily market moves in the BVL between 28 June 2022 and 28 June 2023. Following Baker (2021), a daily change of 2.5 percent or more, up or down is considered

to be a large market move (i.e., "jump"). This characterization yields 24 jumps in the period under examination. These jumps account for only 9 percent of trading days but approximately 31.5 percent of total daily variation (sum of absolute returns) and more than half (57 percent) of daily quadratic variation (sum of squared returns). The average daily return is 0.074 percent with a standard deviation of 1.49.

Figure 1 shows the distribution of daily returns. The change in the Morningstar Peru Index (MSPEUSDP) on 7 December 2022 (shown in Figure 1) amounted to −0.96 percent, hardly a large market move. Based on this evidence one would erroneously conclude that there was no impact of political risk on market valuations.
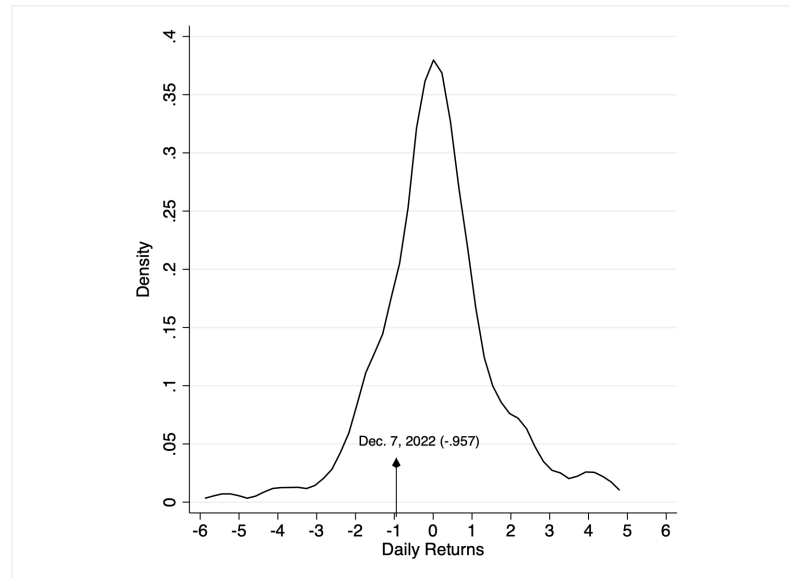

Figure 1. Morningstar Peru Daily Returns (28 June 2022 to 28 June 2023).

4.2. Intra-Day Return Variability

We now turn our attention to whether significant price movements in response to political events in Peru can be detected using intra-day data. To test this hypothesis, we partition the Morningstar price series into 1-min intervals, and compare the returns' variability during the *crisis* period (i.e., between 11:42 AM and 2:02 PM on 7 December 2022) with that of *normal* times (i.e., before and after the traumatic events associated with Castillo's coup attempt).

Our main interest is not on the returns *per se*, but rather on the second moment of the return distribution. Larger swings in price are riskier than smaller swings in price; and more frequent price changes are riskier than less frequent price changes. We model the joint process governing stock-market returns and the variance of those returns using a generalized autoregressive conditional heteroskedasticity (GARCH) framework. This statistical approach incorporates in each period the most recent forecast error as well the previous period's forecasted variance. We adopt the following GARCH(1,1) model of the return-generating process:

$$r_t = c + \phi r_{t-1} + \epsilon_t \tag{1}$$

$$\epsilon_t = \sigma_t z_t \tag{2}$$

where: r_t is the return at time t, c is a constant term (intercept), ϕ is the coefficient for the lagged return, ϵ_t is the error term at time t, and z_t is a white noise process with mean zero and variance one. The variance equation is given by:

$$\sigma_t^2 = \omega + \alpha \epsilon_{t-1}^2 + \beta \sigma_{t-1}^2, \tag{3}$$

where σ_t^2 is the conditional variance at time t, ω is a constant term, α s the coefficient for the lagged squared error term (ARCH term), and β is the coefficient for the lagged conditional variance (GARCH term).

We are mainly interested in ϵ_t, the innovation at time t. These residuals have a straight-forward interpretation: they represent unexpected changes in the index performance, given all the prior available information. Therefore, one can use them to determine the presence of unexpected shocks. The Q-Q (quantile-quantile) plot in Figure 2 shows the quantiles of the residuals corresponding to the crisis period with the quantiles of the non-crisis period residuals. For ease of interpretation, and following Dungey (2005), the residuals are scaled by their standard deviation from the non-crisis period.
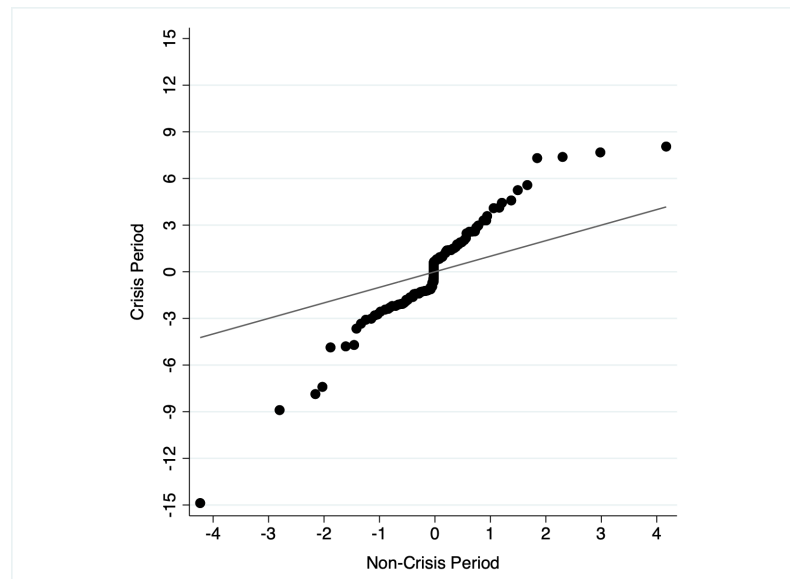

Figure 2. Q-Q Plot: Intra-Day Innovations.

Compared to normal times, asset prices should be more unpredictable during a crisis. Therefore, if market participants perceived an increase in Peru's political risk, we should observe larger forecast errors (i.e., outliers) during the crisis period compared to the non-crisis period. The evidence in Figure 2 reveals that a significant difference between crisis and non-crisis periods exists. The lowest (highest) quantiles of the crisis distribution show much larger losses (gains) than the corresponding quantiles in the non-crisis distribution.[3] These findings are thus consistent with the view that market participants dealt with Castillo's coup attempt as if they perceived a substantial threat to their investments in Peruvian assets. They also suggest that the resolution of the crisis led to an increase in asset prices.

4.3. Structural Breaks

The findings presented in the previous section notwithstanding, we aim to further examine the immediate impact of Peru's political events on asset prices on 7 December 2022. The high-frequency (minute-by-minute) index series for the tree-day period of 6–8 December 2022, is displayed in Figure 3. The solid vertical black lines indicate each day's trading period, spanning from the beginning of the BVL's session until closing (i.e., from 9:30 am to 4:00 pm Peru Standard Time). It is clear from Figure 3 that the Peruvian stock market reacted negatively and significantly to the events surrounding Castillo's coup attempt. On that date, when the market opened, the index prices were lower than those registered at the market close on the previous day. Then, they stabilized, but dropped significantly with Castillo's televised address, only to bounce back when news of his arrest became known. From peak to trough, between 11:40 am and 1:02 pm, the change in prices amounted to a 3.95% decline. Then, from trough to peak—between 1:03 pm, and

1:58 pm—the index rose by approximately 4.2%. To place these figures in perspective, the index return for the whole year in 2022 was 9.23%.
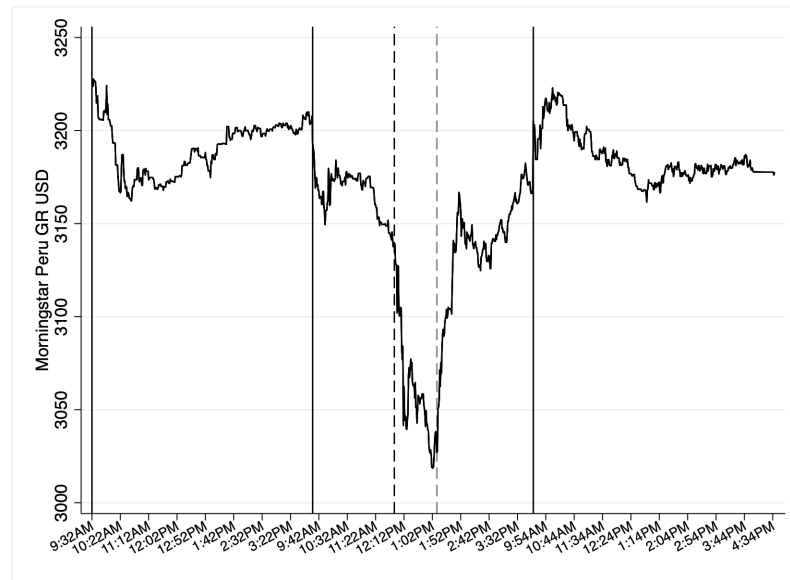

Figure 3. Morningstar Peru Historical Performance (1-Min Data).

While the visual patterns in Figure 3 are quite striking, a more rigorous test of Hypothesis 2 is necessary. As stated above, two structural breaks in the series—one associated with the breakdown of democratic rule and the other one with the restoration of the rule of law,—should exist. Consider the approach proposed by Clemente (1998), extending the strategy in Perron (1992) to the case where a time series exhibits a double change in the mean with unknown break dates. The null hypothesis is that the series has a unit root with a change in its level. The alternative hypothesis is that the series is stationary and has a double structural break in the series. More formally,

$$H_0 : y_t = y_{t-1} + \delta_1 DBT_{1t} + \delta_2 DBT_{2t} + u_t \tag{4}$$

while the alternative hypothesis is given by:

$$H_A : y_t = \mu + d_1 DU_{1t} + d_2 DU_{2t} + e_t, \tag{5}$$

where DTB_{it} is a pulse variable that takes the value 1 if $t = TB_i + 1(i = 1, 2)$ and 0 otherwise; $DU_{it} = 1$ if $t > TB_i(i = 1, 2)$ and 0 otherwise; and TB_1 and TB_2 are the time periods when the mean is being modified Clemente (1998).

The test utilizes an endogenous selection procedure wherein the break date is selected when the t-statistic for testing unit roots is minimized. Specifically, if we consider that the shifts are represented as innovational outliers, then the unit root null hypothesis we can be tested by estimating the following model:

$$y_t = \mu + \rho y_{t-1} + \delta_1 DBT_{1t} + \delta_2 DBT_{2t} + d_1 DU_{1t} + d_2 DU_{2t} + \sum_{i=1}^{k} c_i \Delta y_{t_1} + e_t, \tag{6}$$

and, subsequently, by obtaining the minimum value of the pseudo t-ratio for testing whether the autoregressive parameter is 1 for all the break time combinations Clemente (1998). The results are presented in Table 1.[4]

The estimates in Table 1 indicate that the null hypothesis can be rejected at conventional levels (with a t-statistic of -5.858 relative to the 5% critical value, -5.490). They also suggest that the series is stationary with two structural breaks. In addition, the test endogenously selects the one-min interval ending at 11:55 am as the first break point (shown in a vertical

black dashed line in Figure 3), while the second one corresponds to the one-minute interval ending at 1:10 pm (shown in a vertical gray dashed line in Figure 3).

Table 1. Testing for Unit Root with Wwo changes in Mean: Morningstar Peru Performance.

	$\hat{\mu}$	$\hat{d}_1$	$t_{\hat{d}_1}$	T_{B1}	$\hat{d}_2$	$t_{\hat{d}_2}$	T_{B2}	$\hat{\rho}-1$	min $t_{\hat{\rho}}$
Morningstar	212.33	−8.44	−5.786	11:55 AM	7.79	6.211	1:10 PM	−0.067	−5.858

Sample. 6 Dec.: 9:32 AM–8 Dec.: 6:00 PM.

Based on these findings, and leveraging the precise timestamp of the incidents that took place in Peru 7 December 2022 obtained from the Twitter feeds, we can evaluate the validity of our second hypothesis presented above. We conjectured that the breakdown of democratic rule had a negative effect on asset prices. The evidence in Table 1 reveals that the first structural break in the stock market index corresponds to the selloff triggered by Castillo's televised announcement that he was shutting down Congress. The news initially broke on Tweeter at 11:49:11 am (see Table 2 below) and was confirmed by Reuters at 11:51:59 am.

We also posited that the restoration of the rule of law led to an increase in asset prices. The Twitter data indicates that the first sign that Castillo's attempt would be unsuccessful came at 11:02:31 pm, when RPP reported that the military would not offer their support. Then, in a span of a few minutes, a succession of Twitter posts relayed the news that most of the country's top officials had condemned the coup and called for a return to the constitutional order. These included the Supreme Court's Chief Justice at 1:03:43 pm, the country's Attorney General at 1:04:17 pm, the commander in chief of Peru's police forces at 1:05:19 pm, the Finance Minister at 1:06:15 pm, and the President of the Constitutional Court at 1:07:53 pm. Therefore, the surge in share prices associated with the second structural break identified in Table 1 (corresponding to the one-minute interval ending at 1:10 pm) came in the wake of these announcements in support of democratic governance.

4.4. Potential Threats to Inference

Our analysis takes advantage of the unexpected nature of the Castillo coup attempt. By dividing the price data into 1-min intervals, we ensure that our estimation window is narrow enough to capture the impact of the event while minimizing the influence of other economic and political shocks. However, it is important to note that the changes in stock market valuations we examine may not fully reflect the underlying effects of interest if Castillo's actions were somehow anticipated or if the timing of his announcement coincided with the release of other news that could impact stock market valuations.

Table 2 presents a comprehensive list of messages tweeted by Peru's top 5 local media outlets within a 10-min window surrounding the specific time when Castillo explicitly declared his intention to dissolve Congress. As noted above, the news initially broke on Twitter among these accounts precisely at 11:49:11 am, when Perú 21 tweeted, "Pedro Castillo Dissolves Congress". The eight preceding tweets, posted between 11:46:16 am and 11:47:58 am, either mentioned that Castillo was delivering a televised speech without specifically referring to the dissolution of Congress, or discussed topics that did not appear to be of concern to market participants. Similarly, among the fifteen tweets posted between 11:49:13 am and 11:56:30 am, eight focus on the dissolution of Congress, while the remaining seven discuss unrelated topics that are unlikely to have any significant impact on market valuations. These include discussions about Argentina's Lionel Messi allegedly disrespecting Mexican football and Microsoft's decision to release the video-game Call of Duty for Nintendo platforms. Therefore, based on the evidence in Table 2, it would be very hard to argue that accounted confounders are driving our results.

Table 2. Messages Tweeted by Peru's Top Media Outlets.

Media Outlet	Time Stamp	Tweet
El Comercio	11:46:16	Developing world faces a USD2.5 billion debt schock
Peru 21	11:46:16	Sergio Ramos discusses Spain's Qatar Worls Cup elimination
RPP	11:46:19	Army's Chief Commander, Walter Cordova, resigns
Peru 21	11:46:35	President Pedro Castillo addresses the Nation in anticipation of his impeachment process
RPP	11:47:19	President Castillo addresses the Nation
Gestion	11:47:22	Zelensky chosen as perosn of the year by Time magazine
La Republica	11:47:30	President Pedro Castillo addresses the Nation in anticipation of his impeachment process
RPP	11:47:58	President Castillo addresses the Nation
Peru 21	**11:49:11**	**President Pedro Castillo dissolves Congress**
La Republica	11:49:13	President Castillo dissolves Congress
RPP	11:49:31	Lionel Messi steps over a Mexican jersey in lockeroom's floor
RPP	11:50:03	President Pedro Castillo dissolves Congress
Peru 21	11:50:23	Army's Chief Commander resigns
RPP	11:50:44	President Castillo dissolves Congress
Gestion	11:51:42	Microsoft will offer its game Call of Duty for Nintendo users.
La Republica	11:53:16	President Pedro Castillo dissolves Congress
El Comercio	11:53:22	Army's Chief Commander, Walter Cordova, resigns
Gestion	11:53:39	Microsoft will offer its game Call of Duty for Nintendo users.
Peru 21	11:54:14	President Castillo dissolves Congress and announces a new Constitution. Also instates curfew.
Peru 21	11:54:22	President Pedro Castillo dissolves Congress
Gestion	11:54:40	Miraflores' beaches will reopen today
Peru 21	11:56:03	The avatars are available on WhatsApp
El Comercio	11:56:26	President Pedro Castillo dissolves Congress
RPP	11:56:30	President Pedro Castillo dissolves Congress

Source: Twitter. All the tweets were posted in Spanish. The translation is our own. The first post related to Castillo's coup attempt is indicated in bold.

One should also consider the possibility that volatility in the Peruvian stock market was influenced by investor reactions to foreign rather than domestic risks. In this case, the potential confounder that would need to be addressed is the role of financial spillovers resulting from cross-market linkages. If global factors were the cause of the observed movements in the Peruvian stock market, then it should be possible to predict the changes in the Morningstar Peru Index using a broader Latin America index. Conversely, if local price changes were driven by idiosyncratic risk, specifically associated with Castillo's coup attempt, then the event should have only affected a specific set of assets, in this case, Peruvian firms.

To examine the impact of external factors on Peruvian market valuation, we utilize the Morgan Stanley Capital International (MSCI) Emerging Market Stock Latin America Index.[5] In Figure 4, we illustrate the relationship between the 1-min return series of the intraday MSPEUSDP index data (marked in red) and those of the MSCI benchmark index (marked in blue). The two structural breaks in the MSPEUSDP series identified above are indicated by the vertical black dashed lines.

The two series are negatively correlated during the crisis period (i.e., between the two structural breaks). Furthermore, the price fluctuations in the Peruvian index between 11:55 am and 1:10 pm are significantly larger than those observed at other times throughout the trading day as well as the Latin American index. Therefore, we can confidently reject the idea that fluctuations in the prices of Peruvian assets were primarily influenced by investors' responses to foreign risks rather than domestic ones.

One final issue is whether whether the increased volatility observed on 7 December 2022, exceeded the typical fluctuations experienced in the Peruvian stock market on other days. To address this matter, we utilize the True Range (TR), a well-established technical analysis indicator. The measure provides an estimate of the expected price fluctuations for a security/index on a daily basis. The TR for a given day is determined as the largest of the following three values: (1) the difference between the day's high and the day's low; (2) the absolute value of the day's high minus the previous day's closing price; or (3) the

absolute value of the day's low minus the previous day's closing price. The True Range (TR) calculated using the Morningstar Peru Index is, however, reported as an absolute dollar value. Following Forman (2006), we normalize the TR by expressing it as a percentage of the index's closing price. This adjustment, known as the Normalized True Range (NTR), facilitates a straightforward comparison of volatility across different time periods. A low NTR value signifies a period with narrow price ranges, corresponding to relatively calm days. Conversely, a high NTR value indicates a day of substantial market volatility.
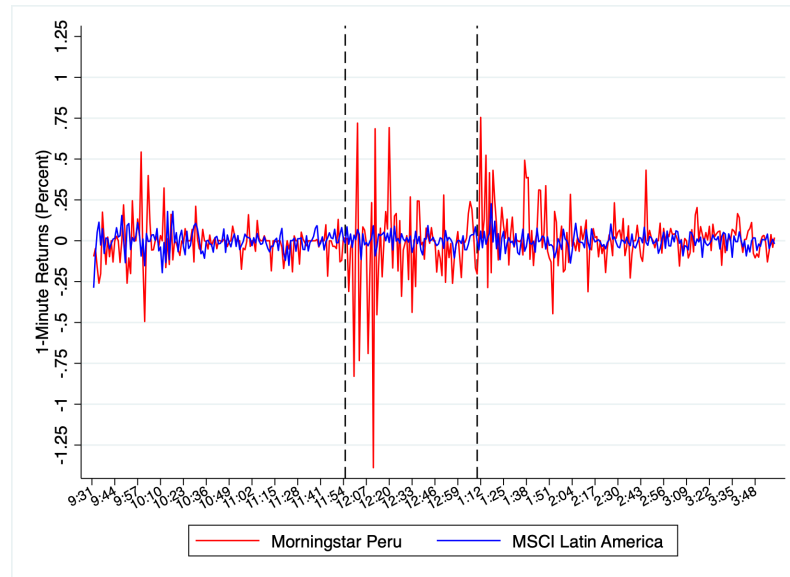

Figure 4. One Minute Returns: Morningstar Peru and MSCI Latin America).

Figure 5 shows a histogram with the distribution of the NTR values calculated using the prices of the Morningstar Peru Index for a two-year period around Castillo's presidency; namely, between 7 September 2021 and 6 September 2023 (503 trading days). The average value of the NTR (indicated by the vertical dashed line) is 1.51, with a minimum of 0.23 and a maximum of 7.21. The NTR corresponding to 7 December 2022—explicitly shown in the graph—was 4.89 and lies in the 99% percentile of the NTR distribution.[6] Therefore, the evidence indicates that the events associated with Castillo's coup attempt caused an unusually high level of intra-day volatility.
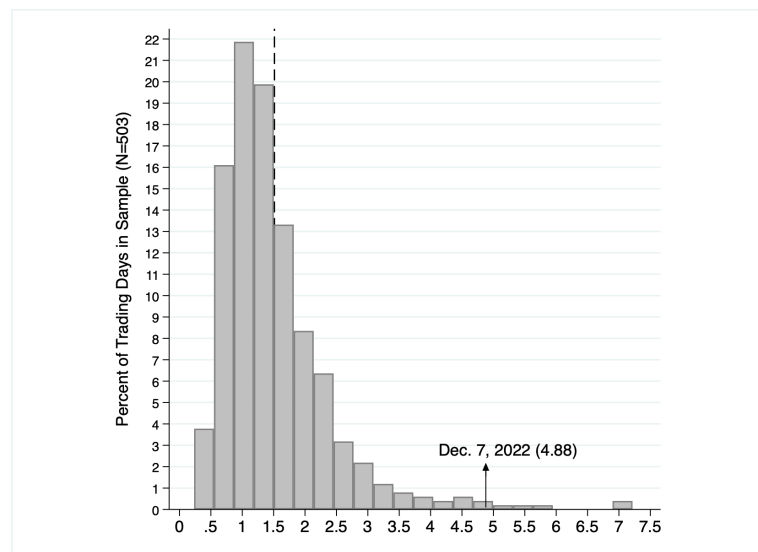

Figure 5. Normalized True Range (NTR) Value: Morningstar Peru Index.

5. Discussion

The empirical evidence reveals that the market efficiently priced in the news of the coup attempt and its failure in Peru. While the focus so far has been on a well-diversified portfolio of firms exposed to political risk, it is crucial to consider that returns may vary across different sectors and types of firms due to differing public policy impacts. Therefore, we shift our attention and examine the intra-day return variability across different portfolios and sectors, as well well as firms with large domestic versus international revenue exposure.[7]

Table 3 shows the Normalized True Range (NTR) values for ten different indices that track Peru's equity markets on 7 December 2022. The first four rows present data for broad indices with varying exposure to Peruvian risk, based on the firms' market capitalization, liquidity, and country of origin. For example, the composition of the S&P/BVL Peru General Index, designed to serve as the broad benchmark for the Peruvian stock market, is quite similar to the Morningstar Peru Index considered above. The iShares MSCI Peru ETF, in turn, includes firms that operate in Peru but have varying degrees of exposure to domestic and international revenue, such as Credicorp Ltd., a Peru-based financial services holding company, and Southern Copper Corporation, a US-based mining company conducting exploration activities in Peru, Mexico, Argentina, Chile, and Ecuador. The remaining six indices serve as benchmarks for different sectors of the Peruvian stock market, including mining, public services, consumer staples, construction, financial, and industrial sectors. Notice that, except for the Mining Index, all the other sectoral indices include only Peruvian firms.

Table 3. Political Risk Exposure for Selected Indeces.

Index	Tracking Basket	NTR	Domestic	Foreign	Total
S&P/BVL Peru General Index	Broad BVL Benchmark	4.26	29	4	33
iShares MSCI Peru ETF	Broad BVL Equity Universe	5.32	13	12	25
S&P/BVL Lima 25 Index	Most Liquid BVL Stocks	5.45	25	0	25
S&P/BVL Peru Select	Largest/Most Liquid BVL Stocks	5.79	10	0	10
S&P/BVL Mining Index	Sectoral	3.02	7	4	11
S&P/BVL Public Services	Sectoral	3.46	3	0	3
S&P/BVL Consumer Index	Sectoral	4.42	6	0	6
S&P/BVL Construction	Sectoral	5.76	6	0	6
S&P/BVL Financials/ Real Estate Index	Sectoral	5.92	5	0	5
S&P/BVL Industrials Index	Sectoral	6.34	8	0	8

Source: Refinitiv & S&P Dow Jones Indeces.

The evidence in Table 3 reveals substantial variation in the exposure to the events in Peru on 7 December 2022. As expected, the index composed of the largest and most liquid stocks listed on the Lima Stock Exchange exhibited more intra-day price variability than the broad-based index that includes most of Peru's public equities. This finding indicates that the estimated effects of political risk on the Morningstar index presented above are somewhat biased downwards due to portfolio diversification. Regarding sectoral variation, while companies in the industrial, construction, and financial sectors experienced significant intra-day variability in their stock market prices, those in the mining sector appeared to be less exposed to political risk. However, this latter finding could be confounded by the index composition, which includes both domestic and foreign companies.

The left panel of Figure 6 displays the average Normalized True Range (NTR) values and 95 percent confidence intervals for the 25 firms included in the iShares MSCI Peru ETF index. Approximately half of these companies (12) are domestic, while the remaining ones are foreign firms. As the graph shows, Peru-based companies exhibit a statistically significant larger average NTR value than their foreign counterparts.

In the right panel of Figure 6, we focus on Peru-based firms to examine the sectoral variation in political risk on 7 December 2022. The graph shows the average NTR values and 95 percent confidence intervals for various sectors. The dashed vertical line indicates the estimated NTR for the S&P/BVL Peru General Index (4.26). The graph reveals that, compared to the well-diversified portfolio of firms, domestic companies in the mining

sector experienced significantly more price variability associated with the coup attempt and its failure. In contrast, the average NTR for domestic firms in the financial sector was quite similar to that of the S&P/BVL Peru General Index. Sectors with less mobile assets, such as natural resources, buildings, and fixed infrastructure, are inherently more vulnerable to government actions like expropriation or nationalization. Conversely, firms providing banking, insurance, consulting, and other financial services typically face lower political risk due to the nature of their operations. This finding provides additional nuance to our analysis, highlighting how sector-specific considerations influenced the intra-day price variability observed during the events surrounding the coup attempt and its subsequent failure on 7 December 2022.
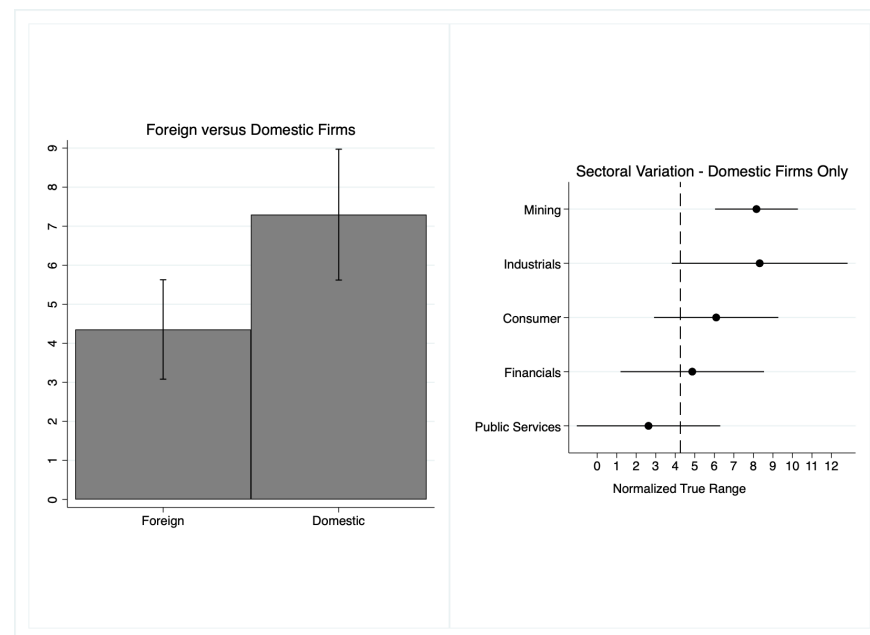

Figure 6. Intra-day Return Variability—Domestic/Foreign Firms and Sectors (Domestic Firms).

6. Conclusions

In this study, we exploited Pedro Castillo's failed coup attempt to estimate the real-time impact of political risk on market valuations. Using high-frequency data, we are able to capture the precise timing and magnitude of the market responses. Our analysis reveals significant market reactions, with a pronounced sell-off upon Castillo's announcement to dissolve Congress, followed by a subsequent rally upon news of widespread condemnation, legal challenges to his actions and removal from office through Constitutional means.

Previous research has explored how financial markets react to political risk. Yet, our study breaks new ground by offering real-time evidence of price discovery and examining how political instability influences whether stock prices rise or fall. For example, Carnahan (2021) observed heightened volatility in the Buenos Aires stock market following irregular government turnovers. Their primary focus, however, lies on the second moment of the return distribution rather than on the returns themselves. Government interventions typically have distributional effects across various sectors of the economy. Therefore, assessing the impact of regime changes on signed returns, rather than absolute returns, proves challenging. Baker (2020) argue that left-wing revolutions typically induce uncertainty and decreased returns, while right-wing takeovers often lead to increased volatility and positive returns. Similarly, Incerti (2024) suggest that market reactions hinge on the type of regime change and its perceived economic implications. For example, coups may elicit positive market responses if they promise more democratic or pro-market policies compared to the preceding regime. However, empirical evidence supporting these assertions remains mixed, primarily due to difficulties in disentangling the distinct impacts of irregular government turnovers and the ideological leanings of their leaders. The Peruvian case examined in this

study offers an opportunity to address these challenges. Pedro Castillo's self-coup and the ideological alignment between him and his successor, Dina Boluarte, with left-wing ideologies reveal that investors reacted negatively to the breakdown of democracy and positively to the restoration of institutional order, regardless of the political leaders involved.

While our study contributes valuable insights into the relationship between political risk and market valuations in Peru, we acknowledge several potential limitations. Firstly, like any analysis grounded in micro-evidence, there are concerns regarding the external validity of our findings when applied to other countries. Hence, caution is advised for both scholars and practitioners in extrapolating results from this study beyond the Peruvian context. Secondly, the reliance on high-frequency data to assess the impact of political events on financial markets may not always be feasible. Real-time data collection presents challenges, and access to precise timestamps, originally sourced from Twitter, is now restricted, limiting the ability of reproducing the analysis and using fine-grained social media data in future research. Lastly, the timing of events on 7 December 2022, in Peru was unusual. As noted by Carnahan (2021), significant policy-shifting announcements typically occur when markets are closed, such as before or after trading hours, weekends, or holidays. The fact that Castillo made his move during a trading session was favorable for our study's objectives but may not be readily applicable to other contexts such as Alberto Fujimori's dissolution of Congress on Sunday 5 April 1992, Yevgeny Prigozhin's coup attempt in Russia on Friday 23 June 2023, or the failed coup attempt in Bolivia on 26 June 2024 which occurred beyond the Bolivian Stock Exchange's trading hours.

Despite these limitations, our study opens avenues for future research. Scholars could explore whether similar short-term episodes of political instability in other countries yield comparable findings or uncover additional factors influencing equity political risk premiums. Furthermore, while we focused on democratic breakdowns, researchers may delve into alternative forms of political instability, including leadership changes due to deaths, cabinet turnovers, and highly contested elections. Such inquiries could deepen our understanding of how different types of political events impact financial markets globally.

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Data Availability Statement: All the data and replication materials can be obtained from the corresponding author upon request.

Conflicts of Interest: The authors declare no conflicts of interest.

Notes

[1] Between the first Sunday in November to the second Sunday of March, the BVL operates on Monday through Friday between 9:00 am to 4:00 pm Peru Standard Time (GMT-05:00).

[2] The Morningstar Peru Index (MSPEUSDP) data were provided by Refinitiv and covers the period from its inception in December 2014 to the present. Each data record specifies the time, to the nearest minute, and the index price level in USD.

[3] The estimated slope coefficient of a regression of quantiles corresponding to the crisis period on the ones for the non-crisis period is 0.304 (z-score = 25.04).

[4] The value of k was selected following the procedure suggested in Perron (1992) using a maximum k of 55.

[5] Launched on 31 May 1990, the MSCI Emerging Market Stock Latin America index encompasses large and mid-cap companies in Brazil, Chile, Colombia, Mexico, and Peru, representing around 85% of their free float-adjusted market capitalization.

[6] There are only five other trading days that exhibit a higher NTR during this period.

[7] Due to data frequency limitations and for consistency, we do not analyze the government bond or foreign exchange markets. However, it's worth noting that these asset classes exhibited very similar reactions to the stock market. For instance, Reuters reported that Peru's currency fluctuated by 1.38 percent to 3.875/3.890 Soles per USD at 12:38 PM, the country's stock market index dropped by over 2.5 percent at 12:46 PM, and Peru's Sovereign Dollar Bonds declined by up to 1 percent by 1:00 PM.

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