

Article

Machine Learning-Based Systemic Assessment of Political Instability Effects on Firm Performance

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Abstract

This study rigorously examines the impact of political instability (*POI*) on firm performance (*FPER*) using high-dimensional panel data from 2006 to 2022, drawn from the World Bank Enterprise Survey (WBES) for 60 economies. Using advanced machine learning-based econometric techniques, including Double-Selection LASSO Regression (DSLRS) and Partialing-Out LASSO Regression (POLR), the analysis reveals that *POI* significantly reduces *FPER* across the sampled countries. These findings remain robust across a series of validation tests, including alternative estimation approaches such as Cross-Fit Partialing-Out LASSO Regression (CF-POLR) and Bayesian Model Averaging (BMA), the use of alternative *FPER* proxies—employment growth (*FEMG*), innovation (*IINN*), and labor productivity (*FLP*)—and the substitution of *POI* with government regulation (*REG*). Mediation analysis further indicates that operational costs (*OCOST*) and firm investment (*FINV*) significantly and partially mediate the total effect of *POI* on *FPER*. In contrast, financial constraints (*FCST*) do not emerge as a significant mediator. The moderation analysis shows that political connections (*PC*) substantially attenuate the negative impact of *POI* on *FPER*. Heterogeneity analyses demonstrate that small, young, and capital-intensive firms are more severely affected by *POI* than medium and large, older, technology-intensive, and labor-intensive firms. Additionally, firm ownership-based heterogeneity indicates that state-owned enterprises experience slightly stronger adverse effects from fluctuations in *POI* than non-state-owned firms. Based on these empirical insights, policymakers need to promote institutional stability and provide direct support for vulnerable young and small firms to reduce the adverse effects of *POI* on *FPER*. Ultimately, this boosts economic flexibility in politically unstable markets by managing key growth drivers.

Keywords: political instability; firm performance; mechanism analysis; machine learning algorithms



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1. Introduction

The world is currently experiencing widespread political unrest, including global violence, domestic conflicts, and government changes. This instability can significantly impact business operations and investments in affected countries, as industries often hesitate to operate in uncertain economic conditions [1]. Political instability remains one of the biggest challenges facing firms in the modern business environment [2]. When governments face frequent policy changes, an uncertain transfer of power, and institutional weakness, firms operating in these regions face unprecedented threats to their operational

continuity and strategic planning [3]. The volatility inherent in unstable political environments disrupts business operations at multiple levels, exerting a cascading effect that weakens both short-term performance and long-term competitive positioning [4]. In regions marked by geopolitical tensions and political conflicts, such as Eastern Europe during the Russia-Ukraine war, firms challenge instant financial threats alongside enduring strategic vulnerabilities that fundamentally alter their prospects for survival and growth [2].

The concept of firm performance is multidimensional, extending beyond traditional financial metrics [5]. The current understanding of firm performance includes financial indicators such as return on assets and a profitability composite, as well as non-financial factors such as operating efficiency, market competitiveness, employee satisfaction, and stakeholder value addition [6]. Pathways that drive firm performance are complex at both the organizational and environmental levels, involving internal capabilities and external contextual factors [7]. Internal drivers consist of investments in human capital, technological innovation, R&D spending, and the level of strategic decision-making autonomy [8]. External drivers include macroeconomic indicators, competitive market dynamics, regulatory frameworks, and the quality of the institutional environment [9,10]. The relationship between political uncertainty and firm performance has gained increased attention recently, as scholars and policymakers seek to understand how instability affects firms' activities [11,12]. Recent research has explored factors affecting firm performance from geographical [13,14], corporate governance [15,16], and institutional [17,18] perspectives, whereas only a few studies have considered political factors [19]. While economic research has traditionally focused on how political instability affects macroeconomic growth [20,21], there is a rising need to investigate how political instability influences micro-level firm activities, where economic and political conditions are tightly linked. Several studies have analyzed how political uncertainty affects firm investment [22], cash holdings [23], stock market liquidity [24,25], and, less frequently, firm performance. These studies employed the political uncertainty index as a proxy for instability, following [26]. Furthermore, existing research often centers on specific regions, such as the Middle East [27], South America [28], or African countries [29]. Consistent findings indicate that political instability impairs firm performance across various dimensions, including sales, productivity, and innovation—mainly by increasing uncertainty and disrupting operations. Moreover, this study fills a significant gap in the current literature by examining political uncertainty beyond its macroeconomic implications, focusing on its direct effect on firm performance [30], and highlighting the complex relationship between economic and political factors and their influence on firm performance.

This study advances the literature by introducing a detailed, layered mechanism that illustrates how political instability affects firm performance, specifically highlighting operational costs, investment capabilities, and financial constraints.

First, we explore the moderating influence of political connections, suggesting that these ties can offer privileged access to resources and mitigate the adverse effects of Political instability. Utilizing firm-level data from the World Bank Enterprise Surveys across 60 economies, our analysis disaggregates results by firm size, age, ownership type (private vs. state-owned), and sector (capital-intensive, labor-intensive, and technology-driven).

Second, this research uniquely integrates three operational mechanisms—investment behavior, financial constraints, and operational costs—to explore how institutional deterioration impacts measurable firm performance, filling a significant empirical theoretical gap.

Third, methodologically, the study employs advanced machine learning-based econometric techniques, including Double-Selection LASSO Regression (DSLRS) and Partialing-Out LASSO Regression (POLR), baseline analysis, accompanied by robustness checks that incorporate Cross-Fit Partialing-Out LASSO Regression (CF-POLR) and Bayesian Model

Averaging (BMA). It uncovers previously hidden heterogeneity in how the effects of political instability on firm performance vary across the distribution of firm performance. By integrating these new aspects—mechanistic pathways, political connections, firm diversity, robustness analysis, and advanced econometric methods—our research offers unmatched explanatory depth and practical insight into the relationship between political instability and firm performance in global economies. This study contributes to the literature on political unrest and firm performance by combining transaction cost theory, institutional theory, and the resource-based view. It clarifies how political instability restricts firms' access to resources and increases transaction costs, while also highlighting that it heightens policy uncertainty, leading firms to pursue short-term, risk-averse strategies and to reduce long-term investments.

This paper is structured as follows: The pertinent literature and the development of the study's hypotheses are reviewed in Section 2. The empirical approach, including the variables and data sources employed, is described in Section 3. The empirical results are presented in Section 4, and Section 5 concludes, offers recommendations, and provides policy implications for further reading.

2. Literature Review and Hypothesis Development

2.1. Political Instability and Firm Performance

This study explores the economic impacts of political conflict, drawing on a range of research findings. Dalyop [11] examined the relationship between political instability and economic growth in Africa, focusing on factors like government spending and inflation. Hosny [26] found that political unrest negatively influences firm productivity in the Middle East. Ref. [31] demonstrated that uncertainty about public debt reduces consumer and business confidence, which, in turn, affects output and investment. Ref. [32] observed that political uncertainty in Brazil leads to wider credit spreads and currency depreciation. Montes & Nogueira [28] emphasized that political instability hampers business performance in South America by reducing investment. Orlova & Sun [33] confirmed that political risk diminishes the efficiency of U.S. firms. Trakarnsirinont et al. [12] linked political instability to investment and employment challenges in Thailand. Ultimately, countries facing political uncertainty struggle to foster economic growth and attract investors [34]. This is illustrated by Cazals & Léon [29], who found that election-related instability increases trade regulation and corruption in Africa. Both internal and external factors influence performance. Another study across African countries Found That Political unrest has a significant and adverse influence on investment, primarily affecting larger firms' capital provision decisions [35]. Political interference is detrimental primarily to firm performance in Pakistan's highly uncertain political environment; mitigation of operational risks strengthens the effect [36], and also for Ethiopia, significant negative links have been reported where 'high levels of political instability have strong negative associations with economic growth and firm-level outcomes' [37]. The channels through which political unrest harms firm performance include lower capital expenditure, limited access to the capital market, and higher perceived expropriation risk as well as reduced innovation investments and discouraged human capital accumulation, where geopolitical settings such as Eastern Europe suffer particularly severe underperformance in firms facing both short-run financial stress from conflict and longer-term strategic exposure that significantly erodes profitability [2]. Export-oriented companies are particularly susceptible to political upheavals; for instance, Bangladeshi manufacturing organizations experience significantly lower export sales and probabilities when political uncertainty rises [38], while such negative implications become more pronounced in developing markets due to weak

institutional infrastructure and poor enforcement of property rights as well as regulatory predictability [3,39].

However, a widespread body of empirical evidence has shown that the negative relationship between political instability and firm performance is not universal nor immutable, but that quality of corporate governance, firm-level adaptive capabilities, ownership identity, and institutional context heavily moderate or even reverse the anticipated detrimental effects, pointing to the theoretical inadequacy of simple institutional determinism. Evidence from Pakistan shows that corporate governance reforms introduced in 2012 had a positive impact on firm performance, especially in an environment characterized by intense political instability and shifts in ideology, demonstrating that effective governance structures can significantly mitigate the performance-suppressing effects of political unrest [40]. In addition, a study by Zhang et al. [41] demonstrates that firm ownership, firm size, the international investment community, and government connections function as powerful defensive barriers. A recent study from China shows that overseas firms with significant scale, government links, and unified investment connections effectively mitigate the adverse political turnover effects that overcome smaller local competitors—indicating that political instability’s performance influence depends on whether firms have resources and associations that permit adaptive responses. Local suggestions further complicate the aggressive relationship, with studies on North Macedonia finding both direct adverse effects and delayed positive changes through economic reallocation mechanisms that eventually benefit well-positioned firms [42].

This research is based on three key foundational theories: (1) Institutional Theory suggests that firms operate within formal and informal rules—such as laws, norms, and cultural expectations—that shape their behavior. Political instability disrupts these institutions by creating uncertain regulatory environments, weak property rights, and unpredictable policies. This instability increases compliance costs, leads to arbitrary contract enforcement, and raises expropriation risks. (2) Resource-Based View suggests that valuable, rare, and inimitable resources accumulated over time (e.g., brand equity, long-term contracts, and financial reserves) can become a source of competitive advantage, especially during systemic shocks. (3) Transaction Cost Economics suggests that firms choose governance structures such as markets, hierarchies, or hybrids to minimize costs of contracting, monitoring, and enforcement. Political instability increases transaction costs due to legal enforcement uncertainty, opportunistic behavior (e.g., suppliers demanding renegotiations due to inflation or policy shifts), and higher business costs (e.g., tariffs and sudden regulations). As a result, it discourages long-term investments, reduces operational efficiency, and harms overall performance [43]. For example, sudden changes in taxation or nationalization can erode investor confidence, leading to capital outflows and a decline in productivity. Based on previous studies and foundational theories, we propose a hypothesis:

H1: *Political instability significantly undermines firms’ performance.*

2.2. The Mechanism Through Which Political Instability Shakes Firm Performance

A mechanism analysis is critical because it distinguishes between verifying that political instability damages firm performance and explaining why. It isolates the particular channels, such as operational Costs, investment decisions, or financial constraints, through which the effect on firm performance operates. This is more than a correlation and elevates sluggish reward processing into an explanation, not just something we see as a function of that region. It also shows why some companies suffer more than others, and offers practical ideas for managers and policymakers to create focused strategies rather than

issuing generic warnings. Ultimately, it is the key to making the research both academically rigorous and practically valuable.

2.2.1. Operational Cost

Political instability significantly increases operational costs. When a country faces political instability, unpredictable conditions can raise business expenses [34]. Political uncertainty may also increase due to changes in government regulations. Ongoing government shifts can introduce new policies, and taxes can increase a firm's operating costs. New tax policies and controls on imports and exports can raise expenses for companies that rely on international trade. These substantial changes can be costly and time-consuming for businesses [44]. Conflicts create unclear production and operating costs, elevating the risk of firms exiting the market. Mwatu [45] examined the connection between the intensity of election periods in Kenya and the exports of flower companies. The findings show that exports decreased by 38 percent in volume that year, while more advanced production methods led to a 16 percent rise in operating costs. Additionally, a study by Cazals and Léon [29] found that firms in African countries face challenges in accessing credit before and after elections. This research indicates that elections influence costly decisions such as investments. Evidence from developed nation's shows that political instability, political risks, and firms' awareness of these factors affect their long-term growth and behavior [46]. Another study by Baker et al. [47] found that during election seasons and periods of political uncertainty, many small firms face financing difficulties. They struggle to maintain their market presence and to secure credit due to political instability and a lack of political connections. Transaction Cost Economics theory [48] suggests that firms choose governance structures such as markets, hierarchies, or hybrids to minimize the costs of contracting, monitoring, and enforcement. Political instability increases transaction costs due to legal enforcement uncertainty, opportunistic behavior (e.g., suppliers demanding renegotiations due to inflation or policy shifts), and higher business costs (e.g., tariffs and sudden regulations). After going through the related literature and on Transaction Cost Theory, our hypothesis is

H2a: *Political instability significantly increases firms' operational costs, resulting in a clear negative impact on their performance.*

2.2.2. Investment Decision

The institutional theory holds that society's formal and informal institutions, such as rules and regulations, shape firms' behavior. Political instability can weaken these institutions, increasing uncertainty and leading to a decline in firm performance. Politically unstable conditions harm investment in the contest for access to credit, preventing potential firms from capitalizing on the latest technology and hiring skilled employees to increase production [28]. Firms face a decline in investment and a lower investment-attractiveness ratio, along with a decrease in return on investment, due to instability within the state. In the same way, political instability weakens and distracts from FDI flows by increasing operational costs [49]. Finance is vital for business performance and sales growth [50]. During crises and periods of political uncertainty, financial firms often restrict operations, slowing growth for those struggling to access credit. Agency theory indicates that this political instability can significantly reduce a firm's value. Rashid and Jabeen [51] found a positive relationship between a firm's performance and its access to credit, highlighting the challenges many companies face. Additionally, Khan and Upadhayaya [52] revealed that business assurance encourages long-term investment growth, while political instability creates obstacles that diminish business confidence. Thus, according to the above-mentioned

previous studies on how political instability affects investment and following institutional theory, we hypothesize the following:

H2b: *Political instability may lead to a decline in firm investment and, consequently, a decrease in firm performance.*

2.2.3. Financial Constraints

The RBV theory [53] recommends that firms gain a competitive advantage by utilizing valuable, rare, unique, and non-substitutable assets. However, political instability hampers access to critical resources, such as skilled labor and financing [53]. Firms in such environments face difficulties retaining talent and securing loans, often reallocating resources to managing political risks rather than innovation, thereby weakening their competitive edge [42]. Therefore, political instability undermines firm performance by depleting or misallocating essential resources. Previous studies have shown that financial hurdles to innovation and investment are strongly correlated with agency costs [54]. Several firms with significant free cash flows are expected to invest in unproductive projects. In contrast, financially distressed firms will face agency cost problems due to insufficient funds to invest in productive projects [55]. A study by Ming and Liu [56] found that political instability affects the tourism sector, leading to declines in firms' performance. This study examines how the long-term financial development of the tourism industry dropped following anti-corruption efforts. This study explains that, due to unstable political conditions, tourism industry demand declined, affecting firms' financial performance. This study proves how political instability influences the travel industry and its performance in developing countries. The research by Wellalage and Locke [57] examined the influence of official credit on financial constraints in small and medium-sized businesses in developing countries. This research study stated that financing is a crucial factor in finance. Bakhouch [58] finds a connection between investment and external finance in the Gulf region. The study found that external finance is disinclined to provide funding. When firms lack finance, their operations and development decline in the market. Oudgou [59] examines the factors of financial constraint in MENA region companies by focusing on the current situation and challenges, and finds that political instability is one of the main practical constraints on firm performance. In countries with political unrest, the main effect is that it hinders businesses from advancing. Thus, our hypothesis of the study is

H2c: *Political instability increases financial constraints for firms, resulting in a decline in their performance.*

2.3. The Moderator Role of Political Connections

When firms aim to enter a new market, they often prioritize building relationships with the local government, particularly when the business environment is politically unstable. However, research suggests that relying heavily on government links can harm a firm's performance [60]. Firms seek political connections because they can help mitigate political instability and increase the chances of firm growth [61]. Earlier studies have indicated that moderate political networks can help businesses establish good standing and achieve growth [62]. These studies also show that politically aligned companies have greater market power than independent businesses. Additionally, local governments control key resources, such as land and credit, and wield discretionary power. Therefore, forming political connections with government officials can alleviate financing constraints and improve firm performance [63]. The RBV theory is distinctive in showing that firms with political resources are better positioned to continue their operations in politically

unstable conditions [53,64]. Firms with strong political resource foundations can invest in political risk-mitigating strategies, such as insurance, diversification, and raising awareness, to protect their interests [53,65]. Finally, politically associated businesses can access relevant information about policy changes and use resources to avoid risks stemming from political uncertainty, thus ensuring self-protection, compared to non-politically associated companies [66]. Therefore, we propose the following hypothesis.

H3: *Political connections can help alleviate the adverse effects of political instability on a firm's performance.*

3. Method and Materials

3.1. Econometric Model Specification

In this study, following Cazals & Léon [29], Ali et al. [36], Hosny [27], Orlova & Sun [33], and Kpari [67], we construct the baseline econometric model as follows:

$$FPER_{ict} = \beta_0 + \beta_1 POI_{ict} + \beta_k \sum_{k=2}^n X_{ict} + \delta_i + \mu_c + \sigma_t + \varepsilon_{ict} \quad (1)$$

where *FPER* and *POI* act as primary dependent and independent variables of the study, respectively, the subscripts *i*, *c*, and *t* denote firm *i* belonging to country *c* in period *t*, respectively. *X* Denotes the selected country-level and firm-level control variables that affect *FPER* alongside *POI*. Factors such as δ_i , μ_c , and σ_t show firm, country, and time-specific fixed effects, respectively. These specific fixed effects are used to isolate all firms, country, and time-varying factors, such as political environment, institutional quality, and macroeconomic conditions, that confound the relationship between *POI* and *FPER*. Finally, ε_{ict} is the error term of the specified econometric model.

3.2. Estimation Strategy

This study employs advanced machine learning methods to estimate Equation (1) and examine the impact of *POI* on *FPER*. This approach is adopted to address key limitations inherent in traditional econometric models—such as overfitting, inefficiency, and violations of statistical assumptions, including multicollinearity and heteroskedasticity—in high-dimensional settings [68]. To mitigate these issues, the study uses regularization-based techniques that enable robust variable selection across diverse data structures [69].

To robustly estimate *FPER* using the specified explanatory variables, this study employs advanced regularization techniques from the LASSO family. Standard LASSO, Adaptive LASSO, and Elastic Net LASSO are first applied to visualize coefficient paths and evaluate model stability via cross-validation. Subsequently, to estimate the long-run impact of *POI* on *FPER* in the selected nations, the analysis implements advanced inferential LASSO methods—including Double Selection LASSO Regression (DSLRL), Partialing-Out LASSO Regression (POLR), and Cross-Fit Partialing-Out Regression (CF-POLR)—following the methodological framework of Ofori et al. [70].

3.2.1. Double-Selection LASSO Regression (DSLRL)

The Double Selection LASSO Regression (DSLRL) model, following the approach of Belloni et al. [71], provides the primary analytical framework for this study. Its mathematical formulation is expressed as follows:

$$E[Y|d, x] = \phi\omega + \psi\xi \quad (2)$$

In this specification, φ represents a set of J focal explanatory variables of primary analytical interest, distinct from ψ , which denotes a set of p control covariates. The Double-Selection LASSO Regression (DSLRL) methodology provides coefficient estimates, standard errors, and confidence intervals for the J focal predictors, while rigorously accounting for the high-dimensional complexity introduced by the p control variables.

3.2.2. Partialing-Out LASSO Regression (POLR)

The Partialing-Out LASSO Regression (POLR) method offers a significant advantage by enhancing the precision of statistical inference, particularly as model complexity increases. Following the approaches of Belloni et al. [71] and Chernozhukov et al. [72], the POLR estimator is formulated as follows:

$$E[Y|d, x] = \vartheta\omega + X\tilde{\xi} \quad (3)$$

where ϑ represent the set of j focal predictors of primary interest, distinct from X , which comprises p high-dimensional confounding factors, mirroring the DSLRL framework, the POLR yields valid coefficient estimates, computes robust standard errors, and constructs confidence intervals for these j key regressors, while effectively controlling for the potentially large set of p nuisance variables.

3.2.3. Cross-Fit Partialing-Out LASSO Regression (CF-POLR)

The Cross-fit Partialing-Out LASSO Regression (CF-POLR), often termed double/debiased machine learning, enhances inference by integrating penalized estimation with orthogonal moment conditions to mitigate the regularization bias inherent in standard LASSO procedures. By relaxing strict sparsity requirements, this cross-fitting approach reduces the risk of excluding relevant confounders, permitting the inclusion of a broader, theory-informed covariate set. It is operationalized through sample splitting and cross-validation, in which parameters are iteratively estimated on complementary subsets and then used to debias the final estimator, thereby improving stability and expanding the admissible covariate space [73]. The model is formally specified as follows:

$$E[Y|d, x] = d\hat{\alpha} + \zeta_0 + X\tilde{\xi} \quad (4)$$

This specification distinguishes between the fixed set of J target variables, denoted by d , and the potentially high-dimensional set of p control variables in x , whose dimensionality may grow with the sample size. To preserve a sparse representation essential for regularization, the parameter vector γ is constrained such that the number of its non-zero coefficients remains bounded. For a comprehensive technical exposition of the LASSO framework, see [73].

3.3. Bayesian Model Averaging (BMA) Technique

To enhance the robustness of empirical results, this study applies BMA to evaluate the impact of selected predictors on FPER. BMA addresses model uncertainty by systematically considering various combinations of explanatory variables and weighing each model according to its posterior probability. This probability is derived using Bayes' Theorem, in which the posterior distribution incorporates both the model's prior probability and the likelihood of the observed data. The posterior probability of model MD_j given the data y is defined as

$$P(M_j|FPER) = \frac{l_{FPER}(M_j)P(M_j)}{\sum_{h=1}^{2^k} l_{FPER}(M_h)P(M_h)} = \left(\sum_{h=1}^{2^k} \frac{l_{FPER}(M_h)P(M_h)}{l_{FPER}(M_j)P(M_j)} \right)^{-1} \quad (5)$$

where $L_Y(M_j)$ denotes the marginal likelihood of the data under model M_j , obtained by integrating the likelihood over the parameter space with respect to the model-specific prior ($l_{AEP}(M_j) = \int p(AEP|\alpha, \beta_j, \sigma, M_j)p(\alpha, \beta_j, \sigma, M_j)d\alpha d\beta_j d\sigma$). The denominator ensures that the posterior probabilities sum to one over the space of all 2^k possible models. For complete derivations and implementation details, we refer to [74]. A uniform prior is assigned across all candidate models to ensure impartiality in evaluation, thereby giving each specification equal weight [75]. This is consistent with earlier work of [74], where he employed Zellner's g-prior, with the hyperparameter calibrated as

$$g = \frac{1}{\max(N, K^2)} \quad (6)$$

The research design is summarized visually in two complementary diagrams. Figure 1 provides a procedural overview of the analytical workflow, from data processing to final heterogeneity analysis. Figure 2 illustrates the study's conceptual model, delineating the hypothesized causal pathways, direct effects (H1), indirect effects (H2a, H2b, H2c, and H3), and control structures that define the core relationships examined.

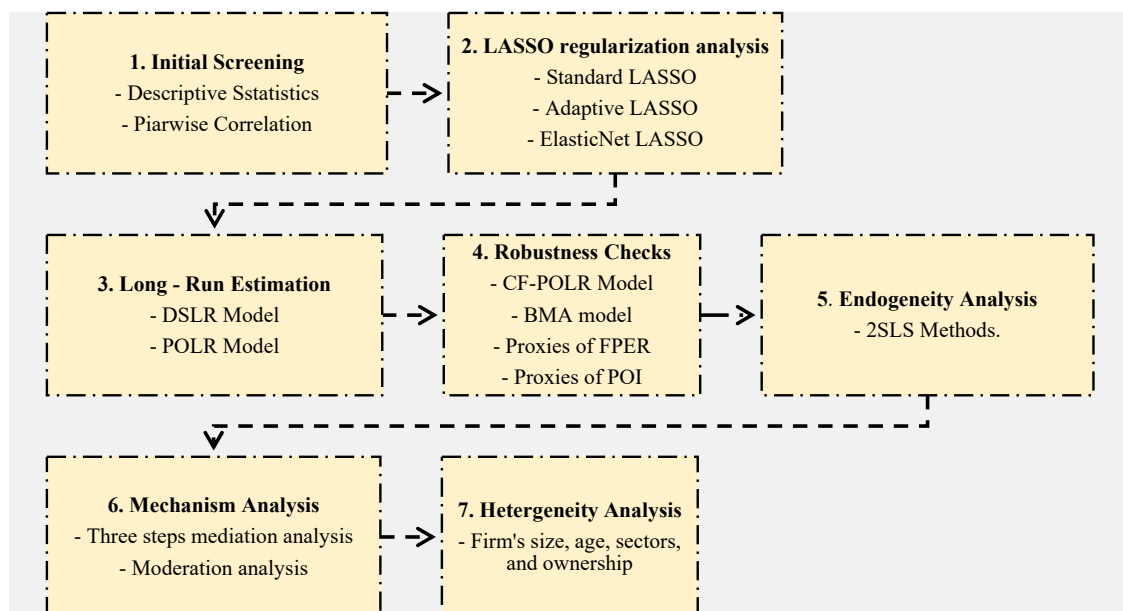


Figure 1. Empirical analysis steps of the study.

3.4. Data

This study utilizes a high-dimensional, firm-level panel dataset derived from the WBES database. The sample spans 60 economies over the period 2006–2022 and comprises 28,894 observations, constructed based on country-year aggregation. The WBES dataset covered many aspects of the firm level, such as labor productivity, total annual sales, political instability, the legal structure, and demographic factors, all detailed by the survey [76]. The duration of the data collection is chosen based on the convenience of the data for the study's selected variables. We restricted our analysis to these waves to ensure consistency in the measurement of political instability across survey rounds and countries. The selected years feature uniform question phrasing and comparable survey methodologies, reducing measurement error and enhancing comparability across time. Data is used exclusively from the manufacturing sector to determine the influence of the key factor of POI on FPER. Manufacturing firms typically face more direct and acute effects of POI on operations and investment decisions due to their capital intensity and longer project horizons compared to service or retail sectors. This homogeneity improves internal validity by reducing Sectoral

heterogeneity that might confound analysis. We examine our hypotheses using firm-level data from the WBES, which are linked to FPER and POI across selected economies. This is one of the most complete and consistent cross-country surveys conducted in countries.

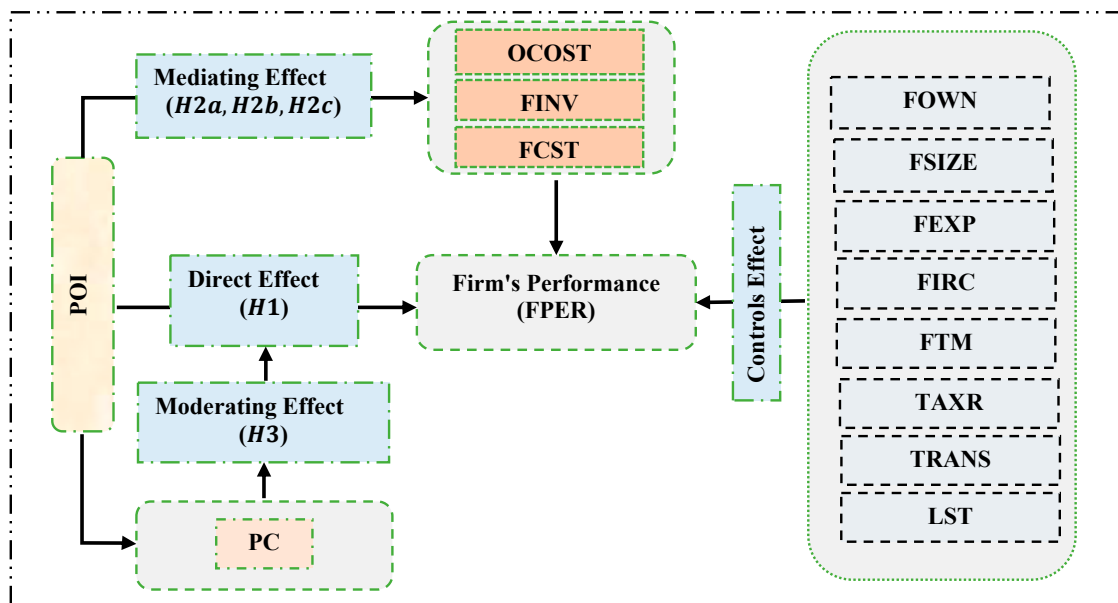


Figure 2. Conceptual Framework of the Study.

3.5. Variable Selection Procedure

3.5.1. Dependent Variable

Firm performance (*FPER*) is our primary dependent variable in this study. *FPER* is defined as the real annual sales growth rate of firm *i*, calculated as the difference between real sales in the current period *t* and those in the previous period *t* − 3. We use the question from the World Bank Enterprise Survey: “In the fiscal year, what were this establishment’s total annual sales for all products?” A similar method for measuring firm real annual sales growth has been used by Kalyuzhnova and Belitski [77], Priya and Sharma [76], Chaoyi Chen, et al. [78], Diogo Lourenço and Jorge Cerdeira [79], and Hosny [27].

3.5.2. Independent Variable

Our primary independent variable is Political Instability (*POI*). *POI* happens when a country’s government, political system, and institutions face uncertainty. The subjective assessment used by the firm manager measures how *POI* affects current operations for surveyed firms. Responses range from 0 (no obstacle) to 4 (severe obstacle), with categories and codes as follows: (i) no obstacle = 0; (ii) minor obstacle = 1; (iii) moderate obstacle = 2; (iv) major obstacle = 3; and (v) very severe obstacle = 4. The higher the codes, the more political instability the firm may experience. We use the survey question: “To what degree is political instability an obstacle to the current operations of this establishment?” A similar approach is used by Cazals A, Léon F [29], Bahri M, et al. [80], Ouédraogo E, et al. [81], and Ibrahim, and Ngahane [35].

3.5.3. Control Variables

The selection of control variables is informed by the Literature. Additionally, to accurately estimate the impact of *POI* on *FPER*, we add firm-level and country-level control variables: (1) Firm Age (*FAG*), which we measure as a firm’s duration and incorporate into the regression in logarithmic form; Priya P and Sharma C adopt the same measure [76], and Xu and Yang [82]. (2) Firm Ownership (*FOWN*), which is differentiated, permitting the share

of companies paid-in capital by each type of stakeholder in that year. If the state's paid-in capital exceeds 50% of the firm's total paid-in capital, the firm is state-owned. We assign a value of 1 to state-owned firms and 0 otherwise. Priya and Chandan Sharma adopt the same measure [35]. (3) Firm Size (*FSIZE*), quantified as the logarithm of the number of employees, following Diogo Lourenço and Jorge Cerdeira [78] and Xu and Yang [82]. (4) Firm Exports (*FEXP*), measured by the proportion of total sales that are exported directly, following Lourenço and Cerdeira [79]. (5) Firm Internationally Recognized Quality Certification (*FIRC*), a dummy variable that equals 1 if the firm has an internationally recognized quality certification, and zero if otherwise, following Kul Kapri [67]; (6) Percentage of female top managers (*FTM*), which is measured by the percentage of females in the total number of top managers, following Kapri [67]; (7) Tax Rate (*TAXR*), a categorical variable identifying tax rate as a major or very severe obstacle to firm operations. We categorized the nature of the obstacle and coded it as (i) No obstacle = 0; (ii) minor obstacle; (iii) moderate obstacle = 2; (iv) major obstacle = 3; (v) very severe obstacle = 4. Following Lourenço and Cerdeira [79]. (8) Infrastructure (*TRANS*), which is measured by the question "the degree to which transport is an obstacle to the current operations of this establishment"? A percentage of the firm's reports indicate that transportation is a key obstacle to limiting the firm's operations. The degrees are divided into different codes: as (i) No obstacle = 0; (ii) minor obstacle; (iii) moderate obstacle = 2; (iv) major obstacle = 3; and (v) very severe obstacle = 4. According to Kalyuzhnova and Belitski [77]. (9) The legal status (*LST*) categorical variable indicates the legal status of the firm. 0—shareholding firm with shares traded in the stock market; 1—shareholding firm with non-traded shares or shares traded privately; 2—sole proprietorship; 3—partnership; 4—limited; and 5—Others, following Priya and Sharma [76].

The definitions of all variables are provided in Appendix A. Table 1 presents the detailed descriptive statistics. As reported, the *FPER* has a mean of 57.327 and a standard deviation of 41.988, with values ranging from −9 to 650. The *POI* shows a mean of 0.894 and a standard deviation of 1.131, ranging from 0 to 4. The variance inflation factor (VIF) for all regression variables is 1.09, well below the conventional threshold of 10, indicating that multicollinearity does not pose a significant concern in the econometric specification. Table 2 reports the pairwise correlation coefficients among the selected variables. The results reveal a negative correlation between *FPER* and *POI*, which preliminarily suggests that higher *POI* is associated with lower *FPER*. Overall, the correlations among the variables are modest in magnitude.

Table 1. Descriptive statistics analysis results.

Panel A: Descriptive Statistics Results.							
Variables	Obs.	Mean	Std. Dev.	Min	Max	VIF	1/VIF
<i>FPER</i>	28,894	3.595	1.217	0.000	6.476	-	-
<i>POI</i>	28,894	0.895	1.132	0.000	4.000	1.000	0.844
<i>FAG</i>	28,894	3.354	0.544	1.098	4.595	1.130	0.886
<i>FOWN</i>	28,894	0.0278	0.330	0.000	50.000	1.120	0.895
<i>FEXP</i>	28,894	0.232	0.422	0.000	1.000	1.100	0.906
<i>FIRC</i>	28,894	19.664	11.628	0.000	74.000	1.100	0.907
<i>FTM</i>	28,894	3.838	1.328	3.000	9.048	1.080	0.922
<i>FSIZE</i>	28,894	8.273	22.226	0.000	100.000	1.110	0.904
<i>TAXR</i>	28,894	1.472	1.278	0.000	4.000	1.020	0.977
<i>TRANS</i>	28,894	1.120	1.192	0.000	4.000	1.000	0.997
<i>LST</i>	28,894	1.831	1.085	0.000	5.000	1.180	0.998
Mean VIF							1.090

Note: This table reports the descriptive statistics and multicollinearity test results.

Table 2. Pairwise correlation analysis results.

Variables	<i>FPER</i>	<i>POI</i>	<i>FAG</i>	<i>FOWN</i>	<i>FEXP</i>	<i>FIRC</i>	<i>FTM</i>	<i>FSIZE</i>	<i>TAXR</i>	<i>TRANS</i>	<i>LST</i>
<i>FPER</i>	1.000										
<i>POI</i>	−0.051 *** (0.000)	1.000									
<i>FAG</i>	−0.190 *** (0.000)	0.007 (0.239)	1.000								
<i>FOWN</i>	−0.043 *** (0.000)	0.003 (0.604)	0.033 *** (0.000)	1.000							
<i>FEXP</i>	−0.130 *** (0.000)	0.015 *** (0.009)	0.033 *** (0.000)	0.003 (0.624)	1.000						
<i>FIRC</i>	0.035 *** (0.000)	0.014 ** (0.016)	0.133 *** (0.000)	0.004 (0.472)	0.217 *** (0.000)	1.000					
<i>FTM</i>	−0.066 *** (0.000)	0.000 (0.994)	0.330 *** (0.000)	0.006 (0.330)	0.039 *** (0.000)	0.057 *** (0.000)	1.000				
<i>FSIZE</i>	−0.013 ** (0.022)	0.012 ** (0.035)	0.132 *** (0.000)	0.027 *** (0.000)	0.208 *** (0.000)	0.228 *** (0.000)	0.033 *** (0.000)	1.000			
<i>TAXR</i>	−0.187 *** (0.000)	0.024 *** (0.000)	0.118 *** (0.000)	0.028 *** (0.000)	−0.009 (0.144)	−0.024 *** (0.000)	0.021 *** (0.000)	−0.014 ** (0.019)	1.000		
<i>TRANS</i>	−0.122 *** (0.000)	0.008 (0.167)	0.060 *** (0.000)	0.013 ** (0.023)	0.025 *** (0.000)	−0.002 (0.782)	−0.037 *** (0.000)	0.011 * (0.054)	0.302 *** (0.000)	1.000	
<i>LST</i>	0.108 *** (0.000)	−0.008 (0.159)	−0.116 *** (0.000)	−0.031 *** (0.000)	−0.070 *** (0.000)	−0.043 *** (0.000)	−0.028 *** (0.000)	−0.078 *** (0.000)	−0.038 *** (0.000)	−0.023 *** (0.000)	1.000

Note: This table reports the pairwise correlation matrix of the selected variables. *p*-values are presented in parentheses below the correlation coefficients. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

4. Empirical Analysis Results

4.1. Baseline Analysis Results

Before implementing the inferential LASSO ML procedures, this study applied three variable-selection algorithms—Standard LASSO, Adaptive LASSO, and Elastic Net LASSO—to identify the most relevant determinants of *FPER* in the selected economies. Table 3 reports the selection process outcomes and lists the variables retained by each of the three estimators. The comparison of Mean Squared Error (MSE) values further indicates the relative predictive performance of the models; in this case, the Standard LASSO and Elastic Net LASSO exhibit lower MSEs than the Adaptive LASSO, suggesting superior predictive accuracy.

Table 3. Variables Selection Procedure.

Variables	Standard LASSO	Adaptive LASSO	ElasticNet Estimator
<i>FPER</i>	✓	✓	✓
<i>POI</i>	✓	✓	✓
<i>FAG</i>	✓	✓	✓
<i>FOWN</i>	✓	✓	✓
<i>FEXP</i>	✓	✓	✓
<i>FIRC</i>	✓	✓	✓
<i>FTM</i>	✓	✓	✓
<i>FSIZE</i>	✓	✓	✓
<i>TAXR</i>	✓	✓	✓
<i>TRANS</i>	✓	✓	✓
<i>LST</i>	✓	✓	✓
MSE	1.023	1.035	1.023

Note: This table lists all selected drivers of *FPER* based on the Standard, Adaptive and ElasticNet LASSO approaches, and the notation ‘✓’, show the identified explanatory variables. At first, we have included a large set of explanatory variables as main influential factor of *FPER* in Standard, Adaptive and ElasticNet LASSO models, then, we just reported those factors which are classified as important influential variables on *FPER*, and we have removed from the above list those variables which are not identified as significant driver of *FPER*.

Figure 3 presents the coefficient path plots (a), (c), and (e) and the cross-validation curves (b), (d), and (f) for the Standard, Elastic Net, and Adaptive LASSO models, respectively. The coefficient paths illustrate how each variable’s coefficient evolves as the penalization parameter changes, with coefficients shrinking toward zero as the optimal

lambda increases. The cross-validation plots show model performance across a range of penalty values, identifying the minimum MSE (green line) and the optimal lambda (red dashed line). In contrast, the remaining dashed lines represent the individual cross-validation folds.

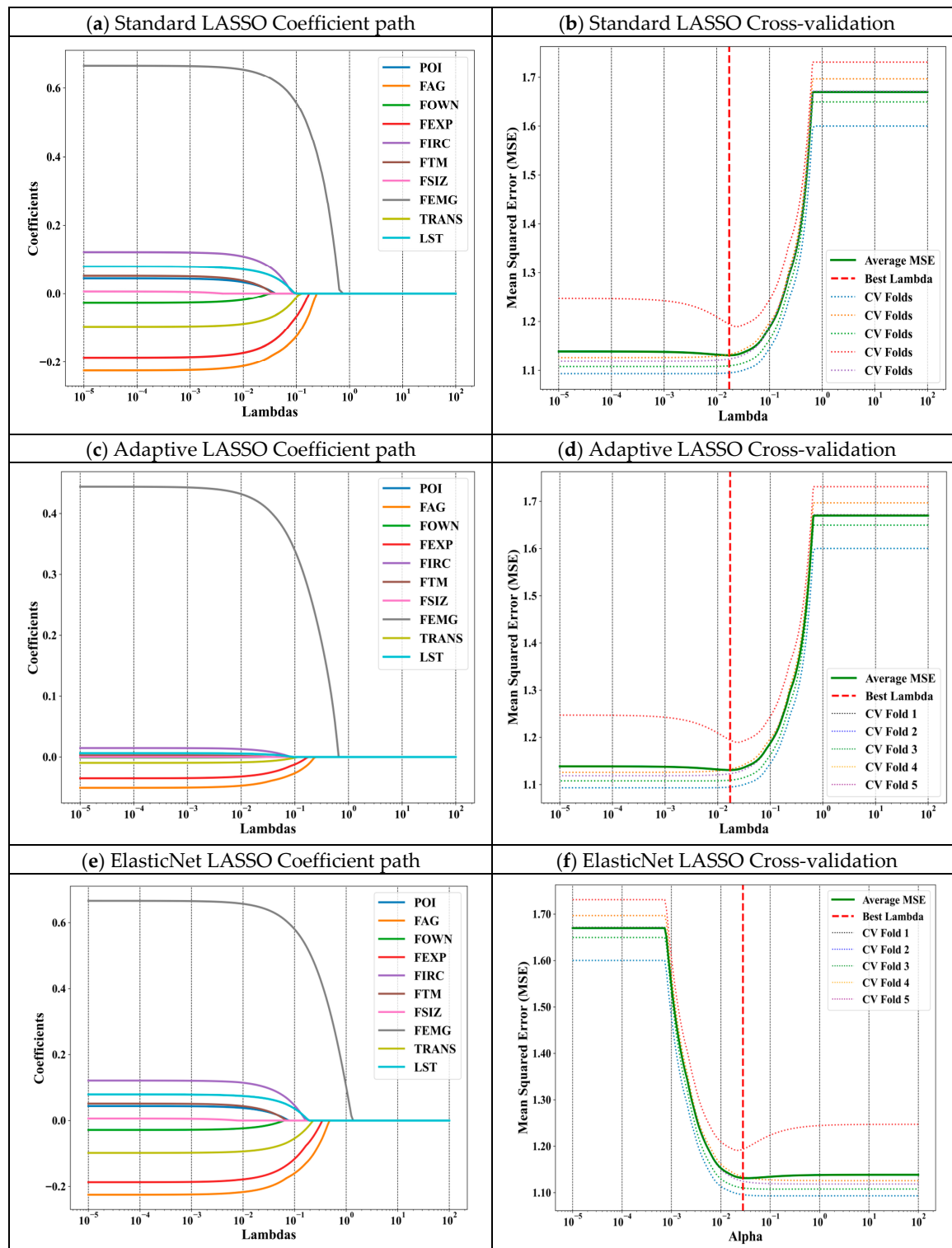


Figure 3. The coefficient path plots (a,c,e) and the Cross-validation plot (b,d,f) based on the Standard, ElasticNet, and Adaptive LASSO techniques, respectively.

Table 4 presents the baseline regression results estimated using DSLR and POLR. The findings are remarkably consistent across both approaches, with nearly identical coefficient estimates and standard errors, underscoring the robustness and stability of the empirical results. While both models, including DSLR and POLR, indicate a negative and statistically significant relationship between *POI* and *FPER*, this study focuses on the results of the POLR ML technique. According to the outcomes POLR techniques in column (6), political instability decreases the firm-level sales growth rate, as indicated by its negative and significant coefficients. Notably, 1% increase in the level of *POI* led to 0.601% increase in *FPER*, at 1% significance level.

Table 4. Baseline analysis results.

Variables	DSLR ML Results			POLR ML Results		
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>FPER</i>	<i>FPER</i>	<i>FPER</i>	<i>FPER</i>	<i>FPER</i>	<i>FPER</i>
<i>POI</i>	−1.192 *** (0.181)	−0.573 *** (0.179)	−0.579 *** (0.172)	−1.188 *** (0.181)	−0.555 *** (0.179)	−0.601 *** (0.172)
<i>FAG</i>		−0.003 (0.013)	0.005 (0.013)		−0.005 (0.013)	0.004 (0.013)
<i>FOWN</i>		−2.326 *** (0.715)	−0.777 (0.587)		−2.406 *** (0.745)	−0.790 (0.535)
<i>FSIZ</i>		−0.002 ** (0.001)	−0.003 *** (0.001)		−0.002 ** (0.001)	−0.003 *** (0.001)
<i>FEXP</i>		−0.256 *** (0.013)	−0.262 *** (0.013)		−0.254 *** (0.013)	−0.259 *** (0.013)
<i>FIRC</i>		1.267 *** (0.491)	0.969 ** (0.486)		1.186 ** (0.490)	0.880 * (0.485)
<i>FTM</i>		−0.028 (0.018)	−0.051 *** (0.018)		−0.026 (0.018)	−0.045 ** (0.018)
<i>TAXR</i>		12.340 *** (0.451)	13.743 *** (0.447)		12.235 *** (0.451)	13.576 *** (0.445)
<i>TRANS</i>		0.229 (0.179)	0.101 (0.174)		0.224 (0.178)	0.116 (0.174)
<i>LST</i>		−0.402 ** (0.195)	−0.881 *** (0.194)		−0.393 ** (0.196)	−0.900 *** (0.194)
Country FE	YES	YES	YES	YES	YES	YES
Time FE	NO	NO	YES	NO	NO	YES
Firm FE	NO	NO	YES	NO	NO	YES
Wald X ²	43.31	1214.12	1414.93	42.99	1191.15	1393.01
Prob. X ²	0.000	0.000	0.000	0.000	0.000	0.000
N	28,894	28,894	28,894	28,894	28,894	28,894

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The robust negative relationship between *POI* and *FPER*, as estimated by the advanced ML models, can be interpreted through key economic mechanisms. First, *POI* increases policy uncertainty, deterring long-term capital investment and strategic planning as firms face unpredictable changes in regulation, taxation, and property rights. Second, it elevates operational risk by disrupting supply chains, contractual enforcement, and access to essential public services, thereby raising transaction costs and eroding productivity. Third, *POI* often triggers macroeconomic volatility—including currency fluctuations and inflationary pressures—which directly compromises firm profitability and sales growth. Consequently, the estimated 0.601% decline in *FPER* per 1% increase in *POI* quantifies the tangible economic cost of a volatile governance environment, where firms are compelled to

prioritize short-term survival over value-creating activities, ultimately stifling aggregate economic growth.

Our main findings are consistent with the most recent empirical studies. For instance, study by Ouédraogo et al. [81] supports our results. Ouédraogo et al. [81] use data from the WBES 2016 dataset, covering 361 firms from the Ivory Coast, and find that political instability has a statistically significant negative correlation with firm performance. The study by Hosny [27] also supports our results. Hosny [27] used firm-level data from the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), and the World Bank, which include more than 6000 private firms across eight countries in the MENA region. The author found that political instability has a negative relationship with firm performance. Our main findings are also consistent with Montes & Nogueira [28], who ascertain that political uncertainty decreases firm performance, thereby negatively influencing it. Furthermore, the findings from Cazals & Léon [29], Ali et al. [36], Hosny [27], Orlova & Sun [33], and Kpari [67] also support our findings. Thus, Hypothesis H1 is verified.

4.2. Robustness Checks

To verify the robustness and validity of the main findings derived from the inferential LASSO models—including DSLR and POLR—this study conducts a series of robustness checks using alternative econometric specifications, as well as alternative proxies for the primary dependent and independent variables.

4.2.1. Robustness Checks Using Alternative Econometric Specifications

To assess the validity of the initial findings, we conduct robustness checks using two advanced econometric techniques: Cross-fit Partialling-out LASSO Regression (CF-POLR) and Bayesian Model Averaging (BMA). The CF-POLR ML approach integrates robust LASSO procedures and corrects for estimation bias inherent in conventional LASSO models by leveraging moment conditions [73]. In addition, BMA provides a systematic framework for addressing model uncertainty. It applies Bayesian inference for model selection, estimation, and prediction, thereby yielding more reliable and low-risk forecasts [74,75]. The robustness check results obtained from CF-POLR and BMA, reported in Columns (1) and (2) of Table 5, show that both approaches yield findings consistent with the baseline estimates presented in Table 3, thereby reinforcing the robustness and credibility of the main results.

Table 5. Robustness checks.

Variables	CF-POLR	BMA	Proxies of FPER			Proxy of POI
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>FPER</i>	<i>FPER</i>	<i>FEMG</i>	<i>IINN</i>	<i>FLP</i>	<i>FPER</i>
<i>POI</i>	−0.591 *** (0.172)	−0.913 *** (0.208)	−0.827 *** (0.194)	−0.001 (0.002)	−0.021 (0.022)	
<i>REG</i>						−0.631 *** (0.177)
Controls	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Wald X ²	1387.39	-	1114.35	1507.59	2716.60	1391.62
Prob. X ²	0.000	-	0.000	0.000	0.000	0.000
N	28,894	28,894	28,894	28,894	28,894	28,894

Standard errors in parentheses *** $p < 0.01$.

4.2.2. Robustness Checks Using Alternative Proxies of *FPER* and *POI*

The research examines various conditions that impact firm performance, potentially leading to predetermined notions among stakeholders. Therefore, our model uses different measures of these variables to ensure its robustness. Specifically, we use alternative indicators to gauge firm performance following the methodology proposed by Jain [83]. The first one is the percentage of annual employment growth (*FEMG*), measured by the percentage increase in permanent employees. The second one is the incidence of innovation (*IINN*). We assign a value of 1 if the firm introduced new products in the last three years and zero if otherwise. The third one is labor productivity (*FLP*), measured as annual output per laborer. The estimated effects of *POI* on *FEMG*, *IINN*, and *FLP* are reported in Columns (3)–(5) of Table 5. The results indicate that *POI* exerts a significant negative effect on *FEMG* and a negative but statistically insignificant effect on *IINN* and *FLP*, further confirming the validity and direction of the baseline findings presented in Table 3.

Moreover, we also employ government-imposed labor regulations (*REG*) as an additional proxy for *POI*. *REG* is measured using responses to the survey item “law and labor regulation”, with categories coded as follows: No obstacle, Minor, Moderate, Major, and Very severe—corresponding to scores of 0, 1, 2, 3, and 4, respectively. The estimated effect of *REG* on *FPER*, reported in Column (6) of Table 5, shows that a 1% increase in *REG* is associated with a 0.631% decline in *FPER*, further verifying the robustness of the baseline findings.

4.3. Endogeneity Results

Endogeneity represents a fundamental challenge in empirical economic analysis because it undermines the credibility of regression-based inferences. Statistically, endogeneity arises when the error term is partially predictable from the explanatory variables [84]. Its most common sources include omitted variables, simultaneity, measurement error, and selection bias [85]. In applied research, endogeneity leads to model misspecification, thereby complicating and often preventing the identification of causal relationships between economic variables [84]. Moreover, in probabilistic settings, endogeneity emerges when the explanatory and outcome variables influence each other or are jointly affected by unobserved factors [86]. Such problems are pervasive in empirical studies, including those on economic growth, where incomplete measurement of key determinants and the difficulty of assuming homogeneous effects across countries or contexts make quantitative inference particularly demanding [86].

To ensure that our baseline results are not affected by endogeneity, we employ a two-stage least squares (2SLS) approach using two instrumental variables (IVs): the average level of political instability (*APOI*) and War & Conflict (*W&C*). Following Kapri [67], the use of *APOI* is justified for several reasons. First, it is highly relevant because it reflects the broader political environment that simultaneously influences multiple firms, while being less susceptible to individual firm-specific shocks, thereby reducing potential bias. Second, *APOI* captures standard political shocks that affect all firms operating under the same national conditions, helping to isolate the firm-specific impact of *POI*. Third, it mitigates omitted variable bias and improves estimation precision. A strong statistical correlation with *POI* further supports its relevance.

The 1st–2nd-stage 2SLS results, reported in Columns (1) and (2) of Table 6, indicate that *APOI* significantly increases *POI*, while *POI* significantly reduces *FPER* at the 1% significance level. This confirms that *APOI* is a strong predictor of *POI* within our sample. The logic is straightforward: if other firms in the same country, industry, and year report higher levels of *POI*, it is highly likely that firm *i* faces similar political conditions.

This shared exposure satisfies the IV relevance criterion and supports the validity of the baseline estimates.

Table 6. Endogeneity analysis results using 2SLS method.

Variables	IV = Average of POI		IV = W&C	
	1st Stage Result	2nd Stage Result	1st Stage Result	2nd Stage Result
	(1)	(2)	(3)	(4)
	<i>POI</i>	<i>FPER</i>	<i>POI</i>	<i>FPER</i>
<i>POI</i>		−0.508 ** (0.117)		−0.123 ** (0.061)
<i>APOI</i>	0.035 *** (0.010)			
<i>W&C</i>			0.059 ** 0.028	
Controls	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Kleibergen–Paap rk LM statistic	241.18 ***	241.15 ***	88.17 ***	88.17 **
Sanderson–Windmeijer F-test	531.20 ***	531.19 ***	117.801 ***	117.804 ***
Cragg–Donald Wald F statistic	124.39 ***	124.38 ***	93.38 ***	93.38 **
Anderson–Rubin Wald test	32.63 ***		45.21 ***	
Stock–Wright LM S statistic	32.39 ***		48.87 ***	
F-Stat.	55.14	58.64	58.64	40.44
F-Stat-Prob.	0.000	0.000	0.000	0.000
R ²	–	0.621	–	0.584
N	28,894	28,894	28,894	28,894

Note: This table presents results from an endogeneity analysis using the average of political instability (POI) and war & conflict (W&C) as instrumental variables (IVs), employing the 2SLS methodology. Standard errors are presented in parentheses below the coefficients. **, and *** indicate significance at 5%, and 1%, respectively.

We also employ *W&C* as a second IV, defined as whether a country engaged in armed conflict with a neighboring state within the past 20 years (coded 1 if yes, 0 otherwise). This variable fulfills the requirements of a valid IV for several reasons. Conflicts between neighboring countries often generate spillover effects that compromise internal political stability through increased migration pressures, social tension, resource strain, and heightened risks of domestic conflict. Wars also expose countries to external security threats, prompting rises in military spending, disruptions in trade and investment, and elevated political and economic uncertainty—all of which can shape firms' perceptions of political obstacles.

The results in Columns (3) and (4) of Table 6 confirm the relevance of *W&C*: the 1st stage estimates show that *W&C* significantly increases *POI*, and the 2nd stage estimates reveal that *POI* significantly reduces *FPER*. These findings indicate that *POI*, amplified by past or ongoing conflict, exerts a detrimental effect on *FPER* outcomes.

The validity of the instrumental variable approach is supported by comprehensive diagnostic tests. First, the Kleibergen–Paap LM statistic rejects the null of under identification. Second, the first-stage relevance is confirmed by an exceptionally strong Sanderson–Windmeijer F-test of excluded instruments. This is consistent with the Cragg–Donald and Kleibergen–Paap Wald F statistics, which vastly exceed the Stock–Yogo critical values, decisively ruling out weak instrument concerns. Consequently, weak-instrument-robust inference tests (Anderson–Rubin Wald test; Stock–Wright LM S statistic) confirm the statistical significance of the endogenous regressor. Overall, these results verify that the baseline estimates are robust and free from endogeneity concerns.

4.4. Mechanism Analysis Results

Building on the information presented in Sections 2.2 and 2.3, we conduct a mechanism analysis by introducing the potential channels through which POI affects FPER, using both mediating and moderating frameworks as follows.

4.4.1. Mediation Analysis Results

Given that the results of long-term estimation and robustness checks have confirmed the significant and negative effect of POI on FPER, this study uses a three-step mediation analysis, with operational cost increases (OCOST), investment (FINV), and financial constraints (FCST) as mediating variables, as discussed in Section 2.2. The OCOST is measured by the WBES question asking whether the firm's respondent considers POI to be the biggest problem affecting operational costs. A dummy variable indicates that an increase in POI will lead to higher operational costs and financial constraints. Additionally, according to the WBES survey, the FINV equals 1 if the respondent considers it a significant obstacle and 0 otherwise. Moreover, FCST is measured by categorical variables indicating the firm's financial requirements and requests applied for a loan or line of credit. If a firm has applied for a loan, then FCST equals 1; otherwise, it equals 0, following Priya & Sharma [76]. This study confirms it in parallel WBES contexts for capturing barriers to financing access. This description directly measures active claims for external finance, reflecting the true meaning of credit controlling under Political instability [76]. There are many indicators for measuring financial constraints, such as the KZ index introduced by [87], which captures internal financing frictions in public firms and requires balance sheet data, which is unavailable in WBES. For this reason, we used WBES data and created a dummy variable, a direct behavioral measure: WBES standardized, which captures Political Instability-induced rationing and aligns with RBV theory. Therefore, the mediating role of OCOST, FINV, and FCST in the link to the effect of POI on FPER can be formulated as follows:

$$Med_{ict} = \varphi_0 + \varphi_1 POI_{ict} + \sum_{k=1}^n \phi_k X_{kict} + \dot{\mu}_i + \dot{\mu}_t + \varepsilon_{ict} \quad (7)$$

$$FPER_{ict} = \vartheta_0 + \vartheta_1 POI_{ict} + \vartheta_2 Med_{ict} + \sum_{k=1}^n \psi_k X_{kict} + \delta_i + \mu_t + \varepsilon_{ict} \quad (8)$$

$$FPER_{it} = \vartheta_0 + \vartheta_2 \varphi_0 + (\vartheta_1 + \vartheta_2 \varphi_1) POI_{ict} + \left(\sum_{k=1}^n \psi_k + \sum_{k=1}^n \vartheta_2 \phi_k \right) X_{ict} + \rho_i + \tau_t + \varepsilon_{ict} \quad (9)$$

where Med_{it} represents our mediating variables, such as OCOST, INV, and FCST, ϑ_1 Shows the direct effect, $\vartheta_2 \varphi_1$ presents the indirect impact, and $\vartheta_1 + \vartheta_2 \varphi_1$ indicates the total effect of the POI on the FPER.

The mediation analysis results presented in Table 7 show that higher levels of POI are associated with increased OCOST and FCST, and reduced FINV. Columns (2) and (6) indicate that a one-unit increase in POI raises OCOST and FCST by approximately 0.007 and 0.309 units, respectively, whereas FINV decreases by 0.007 units. These findings suggest that OCOST and FINV operate as significant partial mediators in the relationship between POI and FPER. Specifically, the absolute values of the direct effects of POI (0.595 and 0.512) in Columns (3) and (5) are smaller than the absolute value of the total impact of POI (0.601) in Column (1). In contrast, the mediating role of FCST is not statistically significant, as the direct effect of POI in Column (7) remains identical to the total impact reported in Column (1). Overall, the evidence indicates that higher levels of POI increase operational and financial costs and reduce investment, thereby negatively affecting firms' economic performance. Collectively, the mediating analysis results confirm H2a, H2b, and H2c.

Table 7. Mechanism analysis results.

Variables	Baseline Result	Mediating Role of OCOST		Mediating Role of FINV		Mediating Role of FCST		Moderating Role of PC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>FPER</i>	<i>OCOST</i>	<i>FPER</i>	<i>FINV</i>	<i>FPER</i>	<i>ATF</i>	<i>FPER</i>	<i>FPER</i>
<i>POI</i>	−0.601 *** (0.172)	0.007 *** (0.002)	−0.595 *** (0.172)	−0.007 *** (0.001)	−0.512 *** (0.172)	0.309 * (0.173)	−0.601 *** (0.172)	−0.058 * (0.034)
<i>OCOST</i>			−0.797 * (0.423)					
<i>FINV</i>					12.832 *** (1.855)			
<i>FCST</i>							−0.002 (0.006)	
<i>PC</i>								0.263 *** (0.087)
<i>POI × PC</i>								0.074 ** (0.031)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Wald X ²	1393.01	67.53	1394.37	3013.10	1456.06	41.23	1396.00	1605.00
Prob. X ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	28,894	28,894	28,894	28,894	28,894	28,894	28,894	28,894

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

These results provide empirical support for transaction cost theory, institutional theory, and the resource-based view. In line with transaction cost theory, policy instability increases negotiation costs for both buyers and sellers, amplifies uncertainty about contract fulfillment, and intensifies information asymmetry. Firms operating in politically unstable environments, therefore, experience elevated transaction and operational costs, ultimately reducing profitability [83,88]. Priya and Sharma [76] similarly demonstrate that periods of political instability and crisis impose additional operational and transaction burdens on firms.

From an institutional theory perspective, *POI* is typically accompanied by frequent regulatory changes and elevated policy uncertainty [22]. A stable policy environment is essential for planning and executing long-term investments. As policy uncertainty rises, firms often postpone or scale back their investment activities [89]. Finally, firms facing high *FCST* generally have lower credit ratings, which restrict their access to financial support, including loans from government agencies or commercial banks. This limited access to external finance constrains their ability to undertake new projects or expand operations [76,77].

4.4.2. Moderating Analysis Results

To empirically analyze the moderating role of Political Connection (*PC*), this study estimates the following econometric model:

$$FPER_{it} = \zeta_0 + \zeta_1 POI_{ict} + \zeta_2 PC_{ict} + \zeta_3 POI_{ict} \times PC_{ict} + \sum_{k=1}^n \eta_k X_{kict} + \zeta_i + \nu_t + \varepsilon_{ict} \quad (10)$$

where PC_{it} represents our moderating variables, ζ_1 shows the direct effect, ζ_2 presents the direct impact of moderating factor, and ζ_3 indicates the indirect effect of the *POI* on the *FPER* through the moderating variable.

The results in Column (8) of Table 7 show that the adverse effect of *POI* on *FPER* decreases substantially—from −0.601 in Column (1) to −0.058—once *PC* is introduced as a moderating variable. In addition, *PC* itself has a positive and statistically significant impact on *FPER* at the 1% level. The interaction term (*POI × PC*) is also statistically significant,

indicating that *PC* mitigates the adverse effect of *POI* on firm performance. In other words, firms with stronger *PC* are better able to buffer or offset the negative performance consequences of *POI*. This suggests that firms operating under high levels of *POI* may benefit from strengthening their relationships with local government actors.

The significant moderating role of *PC* is consistent with previous empirical findings by Wellalage et al. [57] and Cumming et al. [90], which show that politically connected firms tend to enjoy easier access to finance, face fewer operational barriers, and exhibit superior performance. Therefore, the results provide strong support for H3.

4.5. Heterogeneity Analysis Results

We have divided our primary dataset based on the firm's size (small = 5–19 employees, medium = 20–99 employees, and large = 100 or more), firms' age (young with 10 years old, and old with more than 10 years old), sectors (technology-intensive, labor-intensive, and capital-intensive), and firms' ownership (SOFs = state-owned firms, and Non-SOFs = non-state-owned firms).

The results of the heterogeneity analysis are presented in Panels A and B of Table 8. Results in Columns (1)–(3) of Panel A show that smaller firms face the brunt of *POI* more than large firms. The cause might be that large firms have better trading efficiency, which affects public officials and firm performance. Similarly, Columns (4)–(5) in Panel A of Table 7 show that increased *POI* creates challenges for young firms, which create difficulties and disrupt their operations. During the *POI*, young firms lose investor assurance, hamper economic development, and face the main problem of lower performance. On the other hand, the old *FPER* and *POI* are positively and significantly related. The coefficient value indicates that during the period of *POI*, *FPER* is improving positively. We suggest that older firms are more recognized and own significant resources, deeper market awareness, and a stronger network, both business and political. During *POI* that cripple younger and smaller competitors, these resilient old firms may actually benefit. They can obtain distressed assets at lower prices, capture the market share of failing rivals, and leverage their established reputations to maintain customer and creditor trust. This finding aligns with the Resource-Based View, suggesting that valuable, rare, and inimitable resources accumulated over time (e.g., brand equity, long-term contracts, and financial reserves) can become a source of competitive advantage, especially during systemic shocks. According to Coad et al. [88], researchers examined the performance of firms associated with firm age from 1998 to 2006 in the Spanish manufacturing sector. They found that old-age firms have experience dealing with increasing productivity levels, profit, larger size, a lower debt ratio, and high equity ratios.

Moreover, Columns (1)–(3) in Panel B of Table 8 show the heterogeneous effect of *POI* on *FPER* based on different sectors. The results indicate that the adverse *POI* effects are more profound in capital-intensive sectors, while labor- and technology-intensive firms receive smaller effects. The reason might be that capital-intensive sectors need considerable long-term investment and are highly susceptible to *POI*. This susceptibility stems from factors such as political disorder, near-future policies, and infrastructure troubles, delicate expropriation risk, deteriorated property rights, and constrained access to finance. These aspects discourage investment and hamper the development of firms within such sectors in politically unstable conditions.

Furthermore, Columns (4)–(5) in Panel B of Table 8 depict the impacts of *POI* on *FPER* based on firms' ownership heterogeneity, indicating that the adverse effect of *POI* on *FPER* is slightly more substantial for state-owned (SOEs) firms than non-state-owned (Non-SOEs) firms. The reason might be that state-owned firms are closely associated with local governments, so government policies more easily influence their performance. However,

firms can adopt feasible strategies and better management to adjust their performance. This result is consistent with the findings of Aguilera et al. [91], who argued that non-SOEs can implement the right strategies on time and under unstable conditions, aiming to connect with adequate resources.

Table 8. Heterogeneity analysis results.

Panel A: Heterogeneity analysis based on the firm's size and the firm's age.					
Variables	Firm's size			Firm's age	
	(1)	(2)	(3)	(4)	(5)
	Small	Medium	Large	Young	Old
<i>POI</i>	−1.621 *** (0.288)	−0.271 *** (0.080)	−0.181 *** (0.308)	−1.232 * (0.606)	0.426 * (0.191)
Controls	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Wald X ²	1965.32	1487.25	1189.51	1002.28	1491.72
Prob. X ²	0.000	0.000	0.000	0.000	0.000
N	8178	11,133	9377	1232	27,658
Panel B: Heterogeneity analysis based on sectors and ownership.					
Variables	Sectors			Ownership	
	Labor	Technology	Capital	SOEs	Non-SOEs
<i>POI</i>	−0.180 *** (0.230)	−0.707 *** (0.424)	−1.770 *** (0.399)	−0.667 * (0.305)	−0.456 * (0.222)
Controls	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Wald X ²	1504.54	1087.12	1485.46	1143.82	1880.89
Prob. X ²	0.000	0.000	0.000	0.000	0.000
N	17,291	3911	7692	6660	22,233

Standard errors in parentheses * $p < 0.1$, *** $p < 0.01$.

4.6. Discussions

The comprehensive empirical results of this study substantiate a significant and multifaceted economic narrative regarding the detrimental impact of *POI* on *FPER*. The consistently negative and statistically significant relationship, rigorously validated through inferential machine learning techniques (DSLR, POLR), robustness checks with alternative estimators (CF-POLR, BMA) and variable proxies, and endogeneity-corrected models, quantifies a tangible economic cost. Specifically, a 1% increase in *POI* corresponds to a 0.601% decline in *FPER*. This core finding, aligned with recent empirical work by Ouédraogo et al. [81], Hosny [27], Montes & Nogueira [28], Cazals & Léon [29], Ali et al. [36], Orlova & Sun [33], and Kpari [67], confirms Hypothesis H1 and establishes *POI* as a critical drag on firm-level economic activity.

The economic meaning of this relationship is elucidated through the identified mediation channels. The results demonstrate that *POI* elevates operational costs (*OCOST*) and financial constraints (*FCST*) while reducing investment (*FINV*), thereby eroding firm profitability. This mechanistic pathway provides empirical support for transaction cost theory [83,88] and the resource-based view. As posited by Priya and Sharma [76], *POI* imposes additional transactional and operational burdens on firms, increasing negotia-

tion costs and information asymmetry. Furthermore, the reduction in investment under high policy uncertainty aligns with institutional theory perspectives, wherein frequent regulatory changes discourage long-term capital commitments [22,89].

The heterogeneity analysis reveals that the economic burden of instability is not uniformly distributed but falls disproportionately on specific firm types. Smaller, younger, and capital-intensive enterprises exhibit greater vulnerability, a finding consistent with the Resource-Based View that highlights their relative scarcity of resilient, inimitable resources. Conversely, older firms may possess accumulated advantages—such as brand equity, financial reserves, and established networks—that enable them to withstand or even capitalize on turbulent periods, as suggested by Coad et al. [92]. This distributive effect implies that *POI* can stifle competition and innovation by disproportionately hampering the very firms that often drive market dynamism and employment growth.

The significant moderating role of political connections (*PC*) has critical real-world implications. While confirming that *PC* can buffer the negative impact of *POI*—supporting findings by Wellalage et al. [57] and Cumming et al. [90]—this result underscores a potential institutional failure. It suggests that in unstable environments, firm resilience may become contingent on informal networks rather than formal institutional quality, potentially incentivizing rent-seeking and distorting fair competition. This reinforces the need for policies that strengthen formal institutional channels.

Finally, the heightened sensitivity of state-owned enterprises (*SOEs*) to *POI* fluctuations highlights a specific governance challenge. Their performance's close linkage to the political environment suggests they may act as conduits for political risk into the economy. This underscores the necessity of governance reforms to enhance their operational autonomy and insulate them from political cycles, as their inefficiency under instability can have broad fiscal and economic repercussions.

In conclusion, the results collectively demonstrate that *POI* functions as a pervasive tax on *FPER*, transmitted through increased costs and uncertainty, and levied most heavily on the most vulnerable economic actors. The policy implication is unequivocal: fostering a predictable, transparent, and well-governed institutional environment is not merely a political virtue but an economic prerequisite for unlocking firm-level growth, encouraging equitable competition, and achieving sustainable development.

5. Conclusions and Policy Recommendations

5.1. Conclusions

This study provides a rigorous examination of the impact of political instability (*POI*) on firm performance (*FPER*) using comprehensive high-dimensional panel data from 60 economies over the period 2006–2022, drawn from the World Bank Enterprise Surveys (WBES). Using advanced machine learning-based econometric techniques, including DSLR and POLR LASSO, we find that *POI* significantly reduces *FPER* across the sampled countries. These findings remain robust across multiple verification strategies, including alternative econometric models such as Cross-fit POLR and Bayesian Model Averaging (BMA), as well as the use of alternative proxies for both *FPER*—namely, firms' employment growth (*FEMG*), innovation (*IINN*), and labor productivity (*FLP*)—and *POI*, measured through government-imposed regulations (*REG*). Collectively, these robustness checks reaffirm the adverse effect of *POI* on *FPER*.

Based on the detailed empirical results, this study presents two predominant conclusions. First, the theoretical implication is that the connection between political instability and firm performance is not merely direct but operates through detailed, measurable microeconomic mechanisms. The significant mediating roles of operational costs and firm investment confirm and cover transaction cost theory and the resource-based view,

validating that political instability acts as an institutional tax that increases the price of doing business and restrains long-term capital provision. Moreover, the moderating role of political connections poses a severe contingency, suggesting that institutional voids can be partially filled by informal networks, thereby purifying institutional and political economy theories. The heterogeneous effects, where small, young, and capital-intensive firms bear a disparate burden, provide a strong empirical foundation for the Resource-Based View, underlining how firm-specific resource endowments shape vulnerability to external shocks. Collectively, these results support a multi-theoretical framework that integrates institutional, resource-based, and transaction cost perspectives to describe firm-level outcomes in unstable political environments fully.

Second, the practical implications are both targeted and systemic. Policymakers must highlight institutional reforms that increase political probability and the rule of law to reduce operational and investment uncertainties quantified in this study. Direct, structured sustenance such as risk insurance, investment guarantees, and efficient regulatory practices should be concentrated on the most vulnerable segments: small, young, and capital-intensive firms. At the same time, the moderating effect of political connections underscores the urgent need to strengthen public-private communication channels, reduce firms' dependence on informal networks, and foster a more equitable business environment. For corporate leaders, especially in state-owned enterprises that show heightened compassion, the results highlight the essentiality of building operational resilience and strategic independence to buffer against political variations. Finally, implementing these measures will not only shield individual firms but also strengthen overall economic flexibility, supporting constant growth even in politically unstable markets.

5.2. Policy Implications

Based on the empirical findings, several targeted policy recommendations emerge. First, to mitigate the adverse effects of political instability on firm performance, a foundational priority is to establish transparent and predictable institutional frameworks that reduce policy uncertainty and reinforce the rule of law. Second, policies should explicitly aim to buffer firms from political shocks by implementing long-term conflict-prevention strategies and safeguarding institutional continuity. Third, direct interventions—such as investment incentives, operational cost reductions, and enhanced credit access—can counteract the transmission channels through which instability erodes firm-level outcomes. Fourth, the evidence underscores the need to formalize public-private engagement and policy communication, thereby reducing firms' reliance on informal political networks for resilience. Fifth, a differentiated approach to firm support is warranted, with targeted assistance including risk insurance and financial guarantees directed towards small, young, and capital-intensive enterprises that exhibit greater vulnerability. Concurrently, enhancing the governance and operational autonomy of state-owned enterprises is crucial to insulate them from political fluctuations.

5.3. Limitations and Future Research

Despite its contributions, this study faces several limitations that should be acknowledged. First, by focusing solely on manufacturing firms to maintain sample homogeneity, the findings may not extend to other sectors—such as technology or services—whose resource configurations differ under the Resource-Based View. Second, the use of a subjective measure of political instability may introduce bias, suggesting the need to incorporate more objective indicators, such as government turnover rates or geopolitical risk indices, to enhance validity. Third, although the analysis spans 60 economies, it does not account for potential regional heterogeneity, despite institutional theory's emphasis on region-specific

institutional environments. Future research could address these limitations by examining additional sectors, integrating both subjective and objective instability measures, and conducting regional comparisons to uncover contextual differences.

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Appendix A

Table A1. Variable names, definitions, and sources.

Variables	Definition [Measurement]	Source
<i>FPER</i>	The real annual sales growth rate measures firm performance [$ASG = (\text{Real_d2}/\text{Real_n3})^{1/3} - 1] \times 100$. Real_d2 is sales for the current year. Real_n3 is sales for 3 years prior. Exponent $1/3$ = annualizes the 3 year growth period].	WBES
<i>POI</i>	Political instability, subjective assessment of the degree to which political instability hinders current operations for surveyed firms [No obstacle = 0; Minor obstacle = 1; moderate obstacle = 2; Major obstacle = 3; Very severe obstacle].	WBES
<i>FAG</i>	A firm’s operation duration is incorporated into the regression in logarithmic form [Years].	WBES
<i>OWN</i>	Firm ownership, differentiated by stakeholder type, permits the share of companies’ paid-in capital held by each type of stakeholder in that year. If the percentage of paid-in capital owned by the state is greater than 50%, the firm is state-owned [State-owned = 1 Otherwise = 0].	WBES
<i>FSIZE</i>	Firm size, quantified as the logarithm of the number of employees [No. of employees].	WBES
<i>FEXP</i>	Firm exports are measured as the proportion of total sales exported directly [Percentage].	WBES
<i>FIRC</i>	A firm with an internationally recognized quality certification. A dummy variable that equals 1 if the firm has an internationally recognized quality certification, and 0 if otherwise [State-owned = 1, Otherwise = 0].	WBES
<i>FTM</i>	Percentage of female top managers [Percentage].	WBES
<i>TAXR</i>	Tax rate is a categorical variable identifying tax rate as a major or very severe obstacle to firm operations [No obstacle = 0; Minor obstacle = 1; Moderate obstacle = 2; Major obstacle = 3; Very severe obstacle].	WBES
<i>TRANS</i>	Infrastructure is measured by the subjective assessment of the degree to which transport is an obstacle to the current operations of firms [No obstacle = 0; Minor obstacle = 1; Moderate obstacle = 2; Major obstacle = 3; Very severe obstacle].	WBES

Table A1. Cont.

Variables	Definition [Measurement]	Source
<i>LST</i>	The categorical variable indicates the legal status of the firm [0-shareholding firm with shares traded in the stock market; 1-shareholding firm with non-traded shares or shares traded privately; 2-sole proprietorship; 3-partnership; 4-limited; and 5-others].	WBES
<i>FEMG</i>	Measured by the percent of Annual growth of permanent employees [AEG = $[(\text{workers}_t / \text{workers}_{t-3})^{1/3} - 1] \times 100$].	WBES
<i>FLP</i>	Annual labor output (total sales/No. of permanent workers) growth rate [ALP = $[(\text{productivity}_t / \text{Productivity}_{t-3})^{1/3} - 1] \times 100$].	WBES
<i>IINN</i>	The firm introduced new products in the last three years [Yes = 1, Otherwise = 0].	WBES
<i>OCOST</i>	Measured by the WBES question of whether the respondent of the firm considers political instability to be the biggest problem that affects the operational costs [Yes = 1, Otherwise = 0].	WBES
<i>FINV</i>	Measured by the WBES question of whether the respondents of the firm consider finance to be a major obstacle to operation and growth [Yes = 1, Otherwise = 0].	WBES
<i>FCST</i>	Measured by categorical variables indicating the firm's financial requirements and requests applied for a loan or line of credit [Yes = 1, Otherwise = 0].	WBES

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