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Examining the Impact of Economic Policy Shocks on Investment: Evidence from Pakistan and its Trade Partners

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ABSTRACT

The objective of this study is to investigate the effect of both internal and external policy ambiguity on aggregate investment in Pakistan and its bilateral trade partners from the fourth quarter of 2010 to the fourth quarter of 2021. To achieve this, study uses economic policy uncertainty index for each country as a proxy for internal policy volatility. External policy volatility is measured by constructing a compound index that accounts for the trade weight of each country's policy uncertainty index. Further to find out the relationship, Panel PMG-ARDL model used and findings indicate that investment decrease with increase in uncertainty. Additionally, the research delves into the nonlinear relationship between investment and uncertainty and results demonstrate a U-shaped relationship between uncertainty and investments. Furthermore, Specific values were calculated to determine whether the effects of policy shocks are positive or negative, showing that internal policy shocks are more harmful than external ones. The study also provides policy implications based on these findings. Since internal policy insecurity has a stronger negative impact on investment than external factors, it is essential for policymakers in Pakistan to prioritize reducing ambiguity in internal policies. Implementing clear, consistent, and stable economic policies can help alleviate the negative effects of uncertainty on investment.

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1. Introduction

In the wake of financial crisis at world level and the most recent COVID-19 epidemic, debates about the effects of uncertainties and macroeconomic shocks have gained momentum. Uncertainty is a critical concept which reveals the inability of the economic agent's to predict future events (Knight, 1921). Uncertainty may take various forms, for example, disagreements among economic analysts, financial market instability, political instability, unpredictability in macroeconomic variable and economic policy shocks. For policymakers and financial institutions, it is important to understand the sources and dynamics of this uncertainty for effectively managing its impact on the economy. Firms in particular are vulnerable to uncertainty when making investment decisions. Investment decisions influenced by uncertainty not only negatively impact future investment plans but also hinder economic growth in emerging economies (Bloom, Bond, & Van Reenen, 2007). Firms in return to uncertainty shock decrease their investments, hiring, and orders from foreign intermediaries, leading to a slowdown in aggregate investment and trade. Investment and its components play a crucial role in economic growth and stability. It includes spending on capital assets and other long-term commitments, which heavily impact a firm's performance, competitiveness, and capacity (Xu, 2023). Short-run investment fluctuations often align with the business cycle, while long-run investment is a fundamental driver of economic development. Research by Wang, Chen

and Huang (2014), shows that uncertainty can impact economic growth through its effect on investment. Thus, understanding the patterns of investment is essential for managing economic fluctuations and promoting sustainable growth. Lucas and Prescott (1971) outlined that investment decisions depend on anticipated future demand, anticipated future demand, and past decisions. Jorgenson (1971) further pointed out that uncertainty in future demand poses significant challenges for modeling and analysis.

The relationship between uncertainty and investment has been studied extensively (Caballero, 1991). This research emphasizes the 'real options theory of investment,' which focuses on the irreversible nature of investment decisions and the associated sunk costs This framework encourages firms to weigh the cost change between investing immediately and holding off for potentially better future opportunities, placing value on the option to delay. As a result, firms often reduce investment in current capital projects (Bloom, Bond, & Van Reenen, 2007; Schwartz, 1985). Previous research has utilized various indicators of uncertainty, such as GDP fluctuations, exchange rate changes, and political instability, to study investor behavior (Knight, 1921; Le, 2004). Additionally, shifts in regulatory, economic, and political policies significantly influence investment patterns, making it crucial to assess how policy uncertainty specifically affects overall investment. Economic Policy Uncertainty (EPU) states the variability in fiscal, monetary, or regulatory policy and examines how these shifts can influence future economic activities (Al-Thaqeb & Algharabali, 2019). Several studies have analyzed that EPU has a negative influence on firm investment decisions (Jumah et al., 2023; Gulen & Ion, 2016). Furthermore, Farooq et al. (2022) and Chen, Lee and Zeng (2019) also examined similar findings at aggregate level of investment. However, Ren et al. (2020) and Wu et al. (2020) observed a positive interaction between investment and EPU in China and Australia respectively. They argued that positive relationship is due to the firms having large amount of cash flow, high return on investment, substantial tangible assets and being located near to small towns.

In addition, policy shocks not only constrain the domestic economy but also have spill-over impacts that can damage other economies. Only hands of the study examined the spillover effects like Fujitani, Hattori and Yasuda (2023), and Trung (2019) examined that US EPU spillover effects negatively affect the investment of other developed countries. The above discussion indicates that EPU has a significant impact on investment. These studies often highlighted the spillover effects from the US to other developed economies, while the impact on developing countries has been largely neglected. The present study tries to fill this gap by analyzing the impacts of internal and external economic policy shocks on aggregate investment in Pakistan and trade partners.

Economic policy uncertainty is challenging to measure directly. Few studies used political change and election years as the proxy of EPU (Jens, 2017; Xie et al., 2021). However, these proxies do not offer a thorough understanding of investor behavior and concerns under varying conditions of EPU. The current study utilizes the EPU index by Baker, Bloom and Davis (2016) for internal policy shocks. This EPU index captures a wide range of uncertainties within a country, including economic, financial, regulatory, and political aspects. The reason for choosing Pakistan is that it is an emerging economy which faces economic, political problems and financial instability, along with budget and trade deficits (Akbar, Bashir, & Tariq, 2021; Zahid, 2018). In the context of Pakistan, only a few studies, including (Abbas, Ahmed, & Husain, 2019; Akbar, Bashir, & Tariq, 2021; Choudhary, Pasha, & Waheed, 2020; Farooq & Yasmin, 2017; Wen et al., 2022; Zahid et al., 2023), have examined the impact of uncertainty on different economic factors by using different techniques. None of them have explored the effects of external policy shocks. Following Balli et al. (2017), who highlighted the significant role of bilateral trade in cross-country spillovers, present study addresses this gap by considering the impacts of policy volatility from 21 bilateral trade economies. This study contributes to the literature in two ways: first, it examines quadratic impacts of both internal and external policy uncertainty on aggregate investment in Pakistan and its trade allies. Second, it observes which policy have more significant impacts. This study is prescribed as follows: review of literature is provided in Section 2, Section 3 discusses the theoretical framework and model specification, Section 4 explains the data and methodology, while Section 5 presents the results and Section 6 elaborates on the conclusion and policy implications.

2. Literature Review

Theoretically economists have identified three important channels by which uncertainty impacts investment decisions. First, according to real option theory, firms delay irreversible investments under high uncertainty to wait for more information (Bloom, Bond, & Van Reenen, 2007; Rodrik, 1991). Second, heightened uncertainty increases the risk premium, raising borrowing costs and discouraging investment (Gilchrist, Sim, & Zakrajšek, 2014). Third, precautionary saving theory suggests that uncertainty alters individual consumption patterns, which in turn affects firm investment (Basu & Bundick, 2017; Coibion et al., 2021).

Due to the lack of theoretical consensus on the subject, several studies have examined the connection between uncertainty and investment using various models and econometric techniques. This section reviews the empirical literature that investigates the connection between different measures of uncertainty and investment, particularly focusing on studies utilizing policy uncertainty measures or nonlinear approaches. Abel and Eberly (1996) consider uncertainty in terms of a firm's profit, while Bo and Lensin (2005) consider it in terms of stock return volatility. However, Aysan, Nabli and Véganzonès-Varoudakis (2007); Le (2004) argued that decisions related to investment are not only influence by cost and volatility of returns but also on spirit, risk and expectations.

Aizenman and Marion (1999) investigate the link between investment and uncertainty using panel data from 46 developing economies for the period 1970-1992. They considered Uncertainty through the volatility in the variables of fiscal, monetary and exchange rate. The regression analysis by using various volatility measures indicates a strong negative impact of uncertainty on private investment, while it has no significant effect on total investment. The studies by Bleaney and Greenaway (2001); Clausen (2008); Feng (2001); Rozeei, Akhondzadeh and Sameei (2014), have used various macroeconomic variables i.e. exchange rate, term of trade, inflation, real effective exchange rate, interest rate for volatility as measure of uncertainty, reported the consistent results that uncertainty is inversely related to investment.

Another stream of the literature relates uncertainty with macroeconomic policy shocks. Wang, Chen and Huang (2014) found that increased uncertainty reduces investment but noted that this impact is less significant for firms with higher returns on capital, non-state-owned firms, those in less marketized areas, and those with substantial internal financing. Gulen and Ion (2016) reported a negative relationship between firm-level capital and EPU, particularly for U.S. firms that rely heavily on government spending. Liu and Zhang (2020) found similar results in China, where EPU negatively affects private firms' cooperative investments, especially those with financial constraints. Chen et al. (2020) observed that this negative effect on Australian firms' investment can last up to four years. However,Wu et al. (2020) found a positive relationship between EPU and investment for Australian firms with high cash flow, tangible assets, and those in smaller towns. Ren et al. (2020) supported similar findings in China, where fixed asset and real estate investments benefit from higher returns despite uncertainty.

Zaghdane (2024) also observed that EPU has a positive effect on investment in India and a negative effect on investment in Brazil. In Brazil, vulnerable firms are more affected, while larger and more leveraged firms in India take benefit from investment possibilities during periods of heightened EPU. Zhang et al. (2024) argued that strong performance in the Environmental, Social, and Governance (ESG) sector positively impacts investment, and that firms focused on ESG can alleviate the negative effects of EPU. In contrast, Sarkar (2000) demonstrates that negative correlation between uncertainty and investment is not always true. In some cases, increased uncertainty can lead to a higher probability of investment. Bo and Lensink (2002) examined that the impact of uncertainty on investment is not linear and inverted U shaped interaction exists between them. Bahmani-Oskooee and Maki-Nayeri (2019) also confirmed the existence of nonlinear relationship between aggregate investments and EPU in G-7 countries. Similarly, Chen, Lee and Zeng (2019) observed a U shaped connection between policy shocks and all types of investment. They stated that with the different characteristics firms can bear a certain level of uncertainty.

The other stream of literature relates investor's behavior with spillover effects of foreign policy changes. Trung (2019) pointed out that analyzed that US policy shocks adversely affect the investment of 14 emerging economies. Zhang et al. (2024) also argued that EPU in the host country makes firms hesitant to invest in other countries. They further explained that during periods of high EPU, firms are unable to make final decisions. Suh and Yang (2021) also found that global policy shocks have more significant effects on domestic investment than non-global policy shocks. Variations in global policy uncertainty affect the firms' expected behavior; they hold more cash and invest less due to these policy shocks (Fujitani, Hattori, & Yasuda, 2023). A large body of research of on the link between investment and economic policy changes in developed countries, often at the firm level. State-owned firms are influenced by government policies, while private investment varies by sector and firm characteristics. A few studies have explored investment at the aggregate level, especially in developing countries. This research tries to bridge the research gap by analyzing the impact of internal and external policy uncertainty on aggregate investment in Pakistan and its trade partners.

3. Research Methodology

3.1. Data

For analysis purpose, the study uses panel data of 22 countries (Australia, Belgium, Brazil, Canada, China, Denmark, France, Germany, Hong Kong, India, Italy, Japan, Mexico, Netherlands, Pakistan, Russia, Singapore, South Korea, Spain, Sweden, UK and US) from 2010Q4 to 2021Q4. The quarterly data has been accumulated from Federal Reserve Bank of St. Louis, International Financial Statistics (IFS), several issues of Economic Survey of Pakistan and Hand Book of Statistics of Pakistan Economy.

3.2. Model Specification

Macroeconomic studies[1] have employed macro econometric models for analysis purpose. The analysis conducted at the representative firm level can be extended to the aggregate level. In this generalized aggregate model, aggregate investment becomes the predicted variable, while the explanatory variables consist of expected return and various shocks measures including political, macroeconomic policies and economic factors. Additionally, other control variables can be incorporated at the aggregate level to more comprehensively study investment behavior. The model can be expressed as

$$I_{h\tau} = \Upsilon_{h0} + \Upsilon_{h1}EPU_{i,h\tau} + \Upsilon_{h2}EPU_{e,h\tau} + \Upsilon_{h3}Y_{h\tau} + \Upsilon_{h4}r_{h\tau} + \Upsilon_{h5}inf_{h\tau} + \Upsilon_{h6}ex_{h\tau} + \delta_{h\tau}$$

$$I_{h\tau} = \Upsilon_{h0} + \Upsilon_{h1}EPU_{i,h\tau} + \Upsilon_{h2}EPU_{e,h\tau} + \Upsilon_{h3}Y_{h\tau} + \Upsilon_{h4}r_{h\tau} + \Upsilon_{h5}inf_{h\tau} + \Upsilon_{h6}ex_{h\tau} + \delta_{h\tau}$$

(1)

Where, $I\ I$, $EEPU_i\ EEPU_i$, $EPU_e\ EPU_e$, $Y\ Y$, $r\ r$, $inf\ and\ ex\ inf\ and\ ex$ indicate aggregate investment, domestic and foreign economic policy shocks, income, interest rate, inflation and exchange rate respectively. Investment is measured as a gross fixed capital formation, while domestic policy shocks are quantified using the EPU index. Following Davis (2016), and Trung (2019), the present study constructs a composite index for each country based on the weightage of its trade relations with the domestic country to measure foreign policy shocks. Additionally, the industrial production index is used as income and denoted by Y. simultaneously, the study considers the three-month government bond yield rate (r), the real effective exchange rate (ex), and the consumer price index (used as a measure of inflation). $\tau\tau$ = 1,2,3…….,T, are symbolize for time and hh = 1,2,3,…, ii for cross section units.

Empirical studies in literature show that uncertainty has a dire effect on investment and find out the linear relation. But changes in uncertainty do not always lead to proportional changes in investment. This observation suggests that the option approach to investment under ambiguity, which emphasizes flexibility and strategic decision-making, is more realistic. With this approach, investors acknowledge that their investment decisions are influenced by various factors and uncertainties. So, they might need to adjust their strategies dynamically to navigate uncertain environments effectively. However, according to some theoretical studies, this relationship may not follow a simple linear pattern (Bahmani-Oskooee & Maki-Nayeri,

[1] The models are not based on fundamental microeconomic principles (see; Feng, 2001; Aysan et al., 2006; Clausen, 2008; Rozeei et al., 2014)

2019; Bo & Lensin, 2005; Chen, Lee, & Zeng, 2019; Lensink, 2002). These studies have highlighted various factors that can influence the direction of uncertainty's impact on investment. These factors include the business cycles, financial constraints, firm's risk behavior, irreversibility, regulatory and institutional environment, and the value of investment opportunities, as well as market competition. Sarkar (2000) suggested a non-linear or inverted U shaped interaction between investment and shock. This means that at low levels of uncertainty, investment increases, but as uncertainty rises, the likelihood of investment decreases (Bo & Lensin, 2005).

Additionally, Bahmani-Oskooee and Maki-Nayeri (2019) found that the interaction between aggregate investment and internal EPU is nonlinear which exhibits a U shaped pattern (Chen, Lee, & Zeng, 2019). Furthermore, due to global interdependence, the spillover effects of EPU influence other economies as well (Yuan et al., 2023). A few research studies have shown the possibility that economic policy shocks originating in the US could have a detrimental impact on internal investment through spillover (Biljanovska, Grigoli, & Hengge, 2021; Fujitani, Hattori, & Yasuda, 2023). But such spillover effects are linear and exhibit negative relation between domestic investment and foreign EPU, while non-linear relation of these spillover effects is missing. Therefore, following equation is estimated to fills this gap.

$$I_{h\tau} = \Upsilon_{h0} + \Upsilon_{h\tau} EPU_{i,h\tau} + \gamma_{h2} EPU^2_{i,h\tau} + \gamma_{h3} EPU_{e,h\tau} + \gamma_{h4} EPU^2_{e,h\tau} + \gamma_{h5} Y_{h\tau} + \gamma_{h6} r_{h\tau} + \gamma_{h7} inf_{h\tau} + \gamma_{h8} ex_{h\tau} + \varepsilon_{h\tau}$$

$$I_{h\tau} = \Upsilon_{h0} + \Upsilon_{h\tau} EPU_{i,h\tau} + \gamma_{h2} EPU^2_{i,h\tau} + \gamma_{h3} EPU_{e,h\tau} + \gamma_{h4} EPU^2_{e,h\tau} + \gamma_{h5} Y_{h\tau} + \gamma_{h6} r_{h\tau} + \gamma_{h7} inf_{h\tau} + \gamma_{h8} ex_{h\tau} + \varepsilon_{h\tau}$$

(2)

In equation (2), II is considered nonlinear, and its optimal values are used for division. Optimal values are determined using cutoff values, which signify a specific level.

3.3. Estimation Technique

The current study empirically explores how investment reacts to both internal and external policy shocks using dynamic panel econometric methods. Within this framework, the study conducts tests for panel cross-sectional dependency, panel unit root, panel cointegration, and employs a panel Auto Regressive Distributed Lag (ARDL) model.

3.3.1. Cross-sectional dependency (CD)

In panel data analysis, interactions among cross-sectional units are prevalent. Cross-sectional dependence (CD) emerges from unobserved aspects and shared shocks, posing challenges to statistical estimations in panel data models (Rodríguez-Caballero, 2016). Therefore, present study employs Pesaran (2021)'s CD test to ascertain the existence of CD within a given series, as indicated by the following equation estimation

$$CD_{h\tau} = \left[\frac{Tj(h-1)}{2}\right]^{\frac{1}{2}} \rho_h$$

Where, $\rho_h \rho_h$ represents the coefficient of pair wise correlation, TT indicates the time span and $h\ h$ signifies units of cross-section.

3.3.2. Panel Unit Root Tests

Previous studies have highlighted the difficulties faced by panel data models due to cross-sectional dependency. Levin, Lin and James Chu (2002) contend that conventional unit root tests fail to account for dependencies among cross-sectional units. Conversely, second-generation unit root tests address these dependencies, mitigating the risk of incorrectly rejecting the null hypothesis (Pesaran, 2004). For analysis purpose, the present study employs (Pesaran, 2004) second-generation unit root test.

3.3.3. Panel Cointegration Test

The present study applied Kao (1999) cointegration test to assess the existence of long run relationship between variables. Kao test assumes a homogeneous cointegration relationship across cross-sectional units and provides a single statistic to evaluate the null hypothesis of no cointegration.

3.3.4. PMG Panel ARDL

The pooled mean group (PMG) regression approach of ARDL is utilized to evaluate the long-term and short-term associations between internal investment and shocks of economic policies. Using the PMG estimator, the intercept, short-term coefficients, and error variances are permitted to vary freely (heterogeneous) across cross-sectional units in the short-term. However, over the long-term, they are required to be the homogeneous across the units or countries. This framework suggests that the long-term interaction between the variables is identical across countries (Pesaran, Shin, & Smith, 1999). The PMG-ARDL methodology combines the PMG estimator with ARDL models, making it ideal for analyzing panel data. The PMG-ARDL model is stated by the following equation as

$$I_{h\tau} = \psi_h + \sum_{\theta=1}^{P} \psi_{1,h\tau} (I)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{2,h\tau} (EPU_i)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{3,h\tau} (EPU_i^{\,2})_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{4,h\tau} (EPU_e)_{ht-\theta} + \sum_{\theta=0}^{p} \psi_{5,h\tau} (EPU_e^{\,2})_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{6.ht} (Y)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{7ht} (r)_{ht-\theta} + \sum_{\theta=0}^{P} \psi_{8,ht} (ex)_{ht-\theta} + \sum_{\theta=0}^{P} \psi_{9,ht} (\pi)_{ht-\theta} + \nu_{1,ht}$$

$$I_{h\tau} = \psi_h + \sum_{\theta=1}^{P} \psi_{1,h\tau} (I)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{2,h\tau} (EPU_i)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{3,h\tau} (EPU_i^{\,2})_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{4,h\tau} (EPU_e)_{ht-\theta} + \sum_{\theta=0}^{p} \psi_{5,h\tau} (EPU_e^{\,2})_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{6.ht} (Y)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{7ht} (r)_{ht-\theta} + \sum_{\theta=0}^{P} \psi_{8,ht} (ex)_{ht-\theta} + \sum_{\theta=0}^{P} \psi_{9,ht} (\pi)_{ht-\theta} + \nu_{1,ht}$$

(3)

$\psi\psi$, indicates the slope coefficients

$$\Delta I_{h\tau} = \sum_{\theta=1}^{P} \psi_{1,h\tau} \Delta(I)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{2,h\tau} \Delta(EPU_i)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{3,h\tau} \Delta (EPU_i^{\,2})_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{4,h\tau} \Delta(EPU_e)_{h\tau-\theta} + \sum_{\theta=0}^{p} \psi_{5,h\tau} \Delta(EPU_e^{\,2})_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{6,h\tau} \Delta(Y)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{7,h\tau} \Delta(r)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{8,h\tau} \Delta(ex)_{h\tau-\theta} + \sum_{\theta=0}^{P} \psi_{9,h\tau} \Delta(\pi)_{jn-\theta} + \upsilon_h ECM_{h\tau-1} + \nu_{2,h\tau} \quad (4)$$

Where, $\Delta\ \Delta$ represents the first difference, while $ECM_{jn-1} ECM_{jn-1}$ signifies the error correction term, reflecting the speed at which the system adjusts towards its long-term equilibrium. Negative sign and significance of coefficient of error correction term "$\upsilon_h\ \upsilon_h$" confirms the presence of a long-term relationship.

4. Empirical Results and Interpretation

4.1. Descriptive Statistic

Table 1 reveals that none of the variables follow a statistically normal distribution. However, they tend towards asymptotic normality due to the dataset comprising over 30 observations, as specified by the central limit theorem.

Since cross-sectional dependency has been identified among the series, as shown in Table 2, the present study is unable to utilize the first-generation panel unit root tests. Instead, it assesses integration levels using (Pesaran, 2004) second generation unit root test (the CIPS test). The outcomes are presented in Table 2.

Table 1: Summary Statistics

	LI	$LEPU_i$	$LEPU_e$	Y	ex	r	Π
Mean	11.484	4.899	5.108	4.676	98.440	-0.294	2.621
Median	11.455	4.849	5.049	4.658	97.901	-0.528	1.958
Maximum	15.684	6.560	6.631	5.504	132.017	7.353	16.207
Minimum	9.064	2.866	4.408	4.229	51.584	-6.549	-1.763
Std. Dev.	1.286	0.498	0.337	0.145	13.173	2.069	2.603
Skewness	1.155	0.015	0.948	2.055	-0.056	0.519	1.810
Kurtosis	4.901	3.470	4.357	10.380	3.794	3.864	7.259
Jarque-Bera	369.213	9.162	224.106	2943.924	26.512	75.280	1288.781
Probability	0.000	0.010	0.000	0.000	0.000	0.000	0.000

Table 2: Cross Sectionals Dependency Test

Variables	Breusch-Pagan LM	Bias-corrected scaled LM	Pesaran CD
I	2462.178*	103.554*	19.400*
EPU_i	2016.790*	82.832*	37.137*
EPU_i^2	2050.542*	84.403*	37.624*
EPU_e	8646.319*	391.266*	92.416*
EPU_e^2	8648.328*	391.359*	92.413*
Y	2851.800*	121.681*	121.681*
r	1893.667*	77.104*	26.645*
ex	3824.824*	166.950*	5.389*
Π	2818.967*	120.153*	38.564*

Note: * indicates1 % level of significance

The outcomes in Table 3 exhibit that the null hypothesis of the unit root (non-stationary) is not accepted for the domestic and foreign EPU, interest rate and inflation, whereas the same hypothesis is rejected for the investment, income, and exchange rate. Using the same test for first differences indicates that the variables become stationary. The mixed order variables lead to use PMG-ARDL estimation technique for analyzing the long run relationship between the variables.

Table 3: CIPS Unit Root Test

CIPS test				
Variables	Levels		First difference	
	Intercept	Intercept & trend	Intercept	Intercept& trend
I	-1.772	-2.336	-5.380**	-5.613**
EPU_i	-2.483**	-3.465**	-7.248**	-6.998**
EPU_i^2	-2.518**	-3.505**	-7.154**	-6.691**
EPU_e	-2.489**	-2.799*	-7.693**	-7.522**
EPU_e^2	-2.488**	-2.976**	-7.472**	-7.354**
Y	-1.738	-2.167	-4.186**	-3.565**
R	-2.171	-2.557	-3.698**	-4.199**
Ex	2.164	-2.707	-4.128**	-4.218**
Π	-2.318**	-2.385	-3.581**	-3.259**

Note: ** and * denote 5% and 1% level of significance respectively

Table 4 indicates that Kao's panel cointegration tests did not accept the null hypothesis of no cointegration between investment and other variables at the 5% significance level. Therefore, cointegration exists in given model. Furthermore, it shows that cointegration occurs among the variables in model. Hence, panel ARDL model is used for analysis purpose.

Table 4: Kao Residual Cointegration Test

	Statistics	P value
ADF	-1.8903	0.0294**
`Residual variance	0.0039	
HAC variance	0.0019	

Note: ** 5% significance level

Table 5 indicates that all the variables are statistically significant and display the anticipated signs. The coefficient of EPU is inversely related to investment, which supports the real option value theory and is in align with the findings (Yan & Shi, 2021) and (Gulen & Ion, 2016). It suggests that with the increase in uncertainty investment tends to decline at a certain level. As, coefficient of EPU_i^2 EPU_i^2 has positive influence on investment, implies that investors bear the cost of uncertainty at a certain level. Beyond that threshold, they increase investment in response to higher uncertainty. This U shaped interaction with domestic investment is depicted in Figure which is aligned with the findings of Chen, Lee and Zeng (2019), conflicting (Sarkar, 2000). On the other side, coefficient of foreign policy shocks negatively influence the investment, which is consistent with the findings of (Fujitani, Hattori, & Yasuda, 2023; Suh & Yang, 2021; Trung, 2019). The coefficient of quadratic foreign policy uncertainty is positive and describes the U shaped relation with investment, as visualized in figure 2. It implies that foreign EPU may influence investment decisions by changing, business expectations, financial conditions and market dynamics.

Table 5: Panel ARDL (1, 1, 1, 1, 1, 1, 1, 1, 1)

Variable	Coefficient	Statistic	P value
LDEPU	-1.962848	-4.086433	0.0000*
LDEPU2	0.200764	4.129148	0.0000*
LFEPU	-0.730376	-1.698733	0.0898***
LFEPU2	0.073653	1.850277	0.0647**
Y	1.190842	7.195487	0.0000*
R	-0.050133	-4.901698	0.0000*
Ex	0.035823	19.29342	0.0000*
Π	-0.060331	-5.511506	0.0000*

Note: ***, **and * represent significance level of 10, 5% and 1% respectively

The coefficient of income (Y) shows a positive and significant impact on aggregate investment, confirming the accelerator principle (Naa-Idar, Ayentimi, & Frimpong Magnus, 2012). This finding supports the argument that a favorable economic situation boosts investment activity. Improved economic conditions, indicated by higher income levels, signal optimism and lead to increased investment rates (Krishna, Ozyildirim, & Swanson, 2003). The sign of interest rate coefficient is negative which affects investment negatively. Thus results are consistent with the findings of Muhammad et al. (2013) and Khurshid (2015). The coefficient of inflation negatively impacts investment, supporting the argument that inflation raises costs and, as a result, investment declines. This finding aligns with the results of BHUTTO, SHAIKH and Parveen (2018). Furthermore, the coefficient of the exchange rate has a positive sway on investment, which coincides with (Alejandro, 1963) argument that in economies which are dependent on imported capital goods, investment tends to increase when the domestic currency appreciates.

Figure 1:

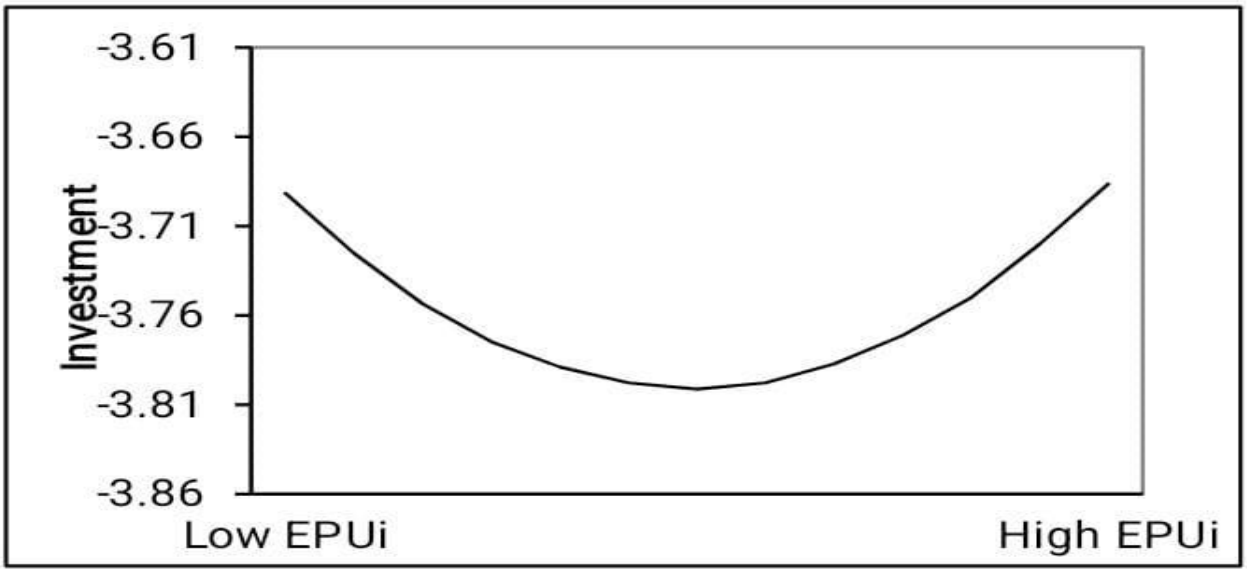
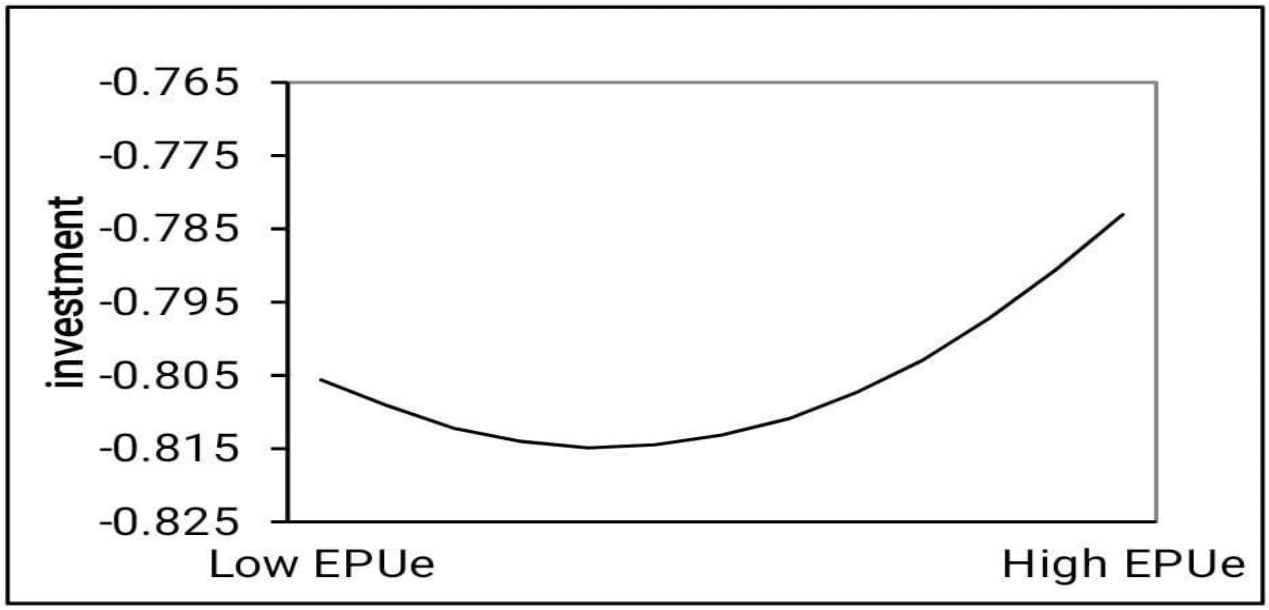


Figure 2:



4.2. Country Wise Analysis

The current study extracted limit (cutoff) values form quadratic functions of both internal and external policy shocks for screening and diagnostic tests to categorize outcomes as either positive or negative. This analysis reveals that countries are below cut off values where domestic investment is negatively affected by internal and external (EPU). Given the U shaped nature of both EPUi and EPUe, it is apparent that country level investment generally decreases as EPU values increase up to the limit values. However, if the EPU values exceed from the cutoff values, investment starts to increase. EPUi and EPUe cutoff values are specified as 4.89 and 4.96, respectively, in Table 6. Table 6 presents the country-wise (counties are represented on the base of trade share) mean values of domestic and foreign EPU, as well as the differences calculated by subtracting the mean values from the cutoff values.

Table 6: Cutoff Values

EPUi Cutoff 4.89		**EPUe cutoff**	**4.96**	
countries	**EPU_i Mean**	**EPU_e Mean**	**EPU_i distance**	**EPU_e distance**
Pakistan	4.41	5.08	-0.48	0.12
UK	4.99	5.10	0.10	0.14
US	5.03	5.06	0.14	0.10
China	5.13	4.99	0.24	0.03
Germany	5.24	5.07	0.35	0.11
Italy	4.81	5.17	-0.08	0.21
Canada	5.49	5.02	0.60	0.06
Australia	4.74	5.05	-0.15	0.09
Japan	4.71	5.08	-0.18	0.12
Netherlands	4.59	5.85	-0.31	0.89
France	5.55	5.03	0.66	0.07
Belgium	4.77	5.11	-0.12	0.15
Spain	4.91	5.17	0.02	0.21
India	4.50	5.07	-0.39	0.11
Hong Kong	5.05	5.09	0.16	0.13
South Korea	4.60	5.07	-0.29	0.11
Sweden	4.64	5.09	-0.25	0.13
Russia	5.33	5.07	0.44	0.11
Brazil	5.20	5.08	0.31	0.12
Singapore	5.13	5.03	0.24	0.07
Denmark	4.96	5.04	0.07	0.08
Mexico	4.01	5.07	-0.88	0.11
All	4.90	5.11	0.01	0.15

Note: cut off values of both policy shocks are calculated by putting the first derivate of investment equal "0"

Table 6 indicates that few countries are experiencing a negative impact of internal uncertainty on investment. On the other hand, in all cases where external policy uncertainty has positive effects on aggregate investment.

4. Conclusion

Economic theory posits that under certain circumstances, an increase in policy shocks can cause a decrease in investment spending, as investors and firms typically respond by being more cautious and holding more cash. Many studies have empirically examined this issue in developed economies and found mix results. In contrast, this study associates with existing literature is twofold. First study quantifies how investment in a developing economy like Pakistan and its trade partners respond to unexpected change of policies. The findings support the real option value approach that volatility of the policy is negatively related to investment. Quadratic effect of policy shocks or nonlinear relation of policy shocks is also examined. The results exhibit U shaped relationship between investment and both internal and external policy shocks. It suggests that internal investors can handle a certain level of shocks, and as internal and external EPU rises further, the reduction in their investment becomes less pronounced. This result supports the outcomes of Chen, Lee and Zeng (2019), who suggested that a U shaped relationship exists due to the different characteristics of firms with high investment opportunities, high correlation with the market (little systematic risk), and negligible bankruptcy risk. Secondly, the cutoff value for country specific analysis is assessed. The results show that a few countries lie below the cutoff values of internal policy shocks. It indicates that internal policy shocks have negative effects than the external. Given that internal policy shocks are more damaging than external ones and it calls for the efforts to stabilize domestic economic policies and offer clear, consistent policy direction to lessen the negative impact on investment.

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