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Institutional factors and economic policy uncertainty: An asymmetric analysis

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Abstract: This study examines the relationship between economic policy uncertainties and institutional infrastructure or institutional quality. Countries with strong institutional quality may reduce economic policy uncertainty. In the effectiveness of this situation, it is particularly important that well-functioning institutions make economic decision-making processes more predictable, stable, and reliable. Institutional quality can help build confidence, stability, and predictability in the economy. This condition may decrease economic policy uncertainty, resulting in improved growth and prosperity. Strong institutional quality in European Union countries may additionally serve to promote long-term growth by lowering economic policy uncertainty. In the study, the effect of economic policy uncertainty was analyzed using the ARDL nonlinear analysis method and data from eight European countries for the period 2002-2021. As a result of the analysis, it was concluded that there is an asymmetric relationship between corruption control and economic policy uncertainty. Negative shocks to the quality of regulation positively affect economic policy uncertainty. Positive shocks to voice, accountability, political stability, and the absence of violence positively affect economic policy uncertainty.

Keywords: *ARDL panel analysis, European countries, Economic policy uncertainty, Institutional factors.*

1. Introduction

Uncertainty can arise in situations such as unexpected policy changes, economic recession, or economic crises. Whatever, circumstances reveal uncertainty which affects the country's economy in various ways. Therefore, both producers and consumers are negatively affected by the conditions that arise in the event of uncertainty and the concerns of society about the future get gloomy. The financial crisis that emerged in the USA in 2008 and then spread to the entire world caused economies around the world to enter into a gradual recession. Uncertainties, arising from the problems experienced in the economy due to the current COVID-19 epidemic, can prevent companies and individuals from looking into the future clearly and understandably.

Baker, et al. [1] developed a new policy related to the economic uncertainty index, which includes the terms economy, uncertainty and policy. After it was thought that uncertainties about taxes, government purchases, and other policy issues in the US economy had deepened the 2007-2009 recession and slowed the recovery. This study looked into the effect of economic policy uncertainty on output, employment and investment. The economic policy uncertainty (EPU) index was designed to reveal uncertainty regarding who is responsible for economic policy decisions and what economic policy steps are going to be taken and when, in addition to the monetary consequences of these activities and the economic implications of non-economic policy issues [1].

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EPU is defined as the risk of economic policy change that market participants cannot accurately predict, causing economic recessions and changes in the macroeconomic area [2]. For firms and individuals, the future is seen as variable, complex, and difficult to be predicted in the case of EPU. As a result, EPU has a direct impact on firm and household decisions. Therefore, better governance can reduce the negative effects of unstable economic situations arising from EPU [3].

Six basic indicators, also called good governance indicators, were created by Kaufmann, et al. [4] within the scope of the World Bank Governance Indicators project. These indicators can be expressed as control of corruption, government effectiveness, regulatory quality, rule of law, political stability and absence of violence and voice and lastly accountability. Those are the factors that provide us with information about the political and institutional structure of the country and increase institutional quality. Therefore, the existence of institutions in a society can be effective in minimizing uncertainties by ensuring that the economic policy to be implemented is maintained in a more clear, understandable and auditable manner. In general, institutions can be expressed as rules and restrictions that shape economic, social and political relations between people and they are created to facilitate daily life. As a result, institutions can be characterized by the framework of regulations that determine how the game is played. Institutions can directly or indirectly impact the economy by influencing production, investment and technology decisions. The main objective of this study is to use theoretical and practical analysis methods to investigate the interaction of EPU and institutional factors. The empirical and theoretical literature on EPU and institutional factors were reviewed in the first part of the study. The empirical application that looks into the relationship between EPU and institutional factors is presented in the second part. The last part explains the conclusion and discussion according to theoretical explanations and empirical practice.

2. Theoretical and Empirical Literature

There is a constant change in the economic environment, political structure and the roles played by countries in the foreign market. This may lead to an uncertain environment for investment and resource allocation for societies [5]. Competition and regulatory authorities aim to improve social and economic well-being by monitoring the behavior of public and private entities to encourage more equitable competition in market economies [6]. But strict regulatory measures such as tightening and regulatory policies, capital buffers, strengthening financial incentives and structural and institutional arrangements implemented by countries to strengthen their economic foundations in the face of the crises in today's world can create uncertainties in monetary and fiscal policies and have negative consequences on the economic structure [7]. These uncertain situations can cause recessions in both the supplying and the demanding sides of the economy by bringing together an increase in the concerns of companies and individuals about the future. Therefore, they can delay their investment decisions. According to the Keynesian model, investments have an important place in ensuring economic growth and balancing national income. Therefore, delaying investments can hurt the recovery of the economy. In addition, policy uncertainty increases borrowing costs as it significantly increases the risk in the markets [7].

Frequent changes in government policies create uncertainties and can hurt the behavior of both public administrators and politicians [8]. In the face of problems, such as an ineffective court mechanism, widespread criminal activity many kinds of government corruption, excessive taxes, unsuccessful management of taxes, illegal actions taken by informal companies, diminished utilization of financing, and unstable politics that arise as a result of policy uncertainty, the environment of uncertainty may also increase [9]. Economic uncertainty stems from the uncertainty and discontinuity of government policies, exacerbated by the government's senseless feedback on changing conditions and policy objectives [5]. When there is uncertainty in the economy, firms and banks increase their saving tendencies by keeping extra cash as a precautionary measure. As a result, companies delay their investment decisions. The decision of banks to increase their mandatory assets and the tendency of

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investments to decrease may result in an economic recession by impeding the cash flow in the market. Therefore, the economy as a whole is adversely affected. In developing countries, economic uncertainties arising due to asymmetric information, low production levels and inadequacies in technological development are experienced more intensely [5]. Developing countries are more dependent on economically developed countries and international financial institutions due to the effect of the globalization environment. For this reason, in the event of a crisis in the global environment, an environment of uncertainty may arise as the risk environment is more experienced in the economic and political situations of developing countries. The reason why policymakers' economic policy decisions are the focal point of macroeconomic uncertainty is that they have recently become one of the most important agenda topics [10]. The economic body's inability to predict clearly how and under what conditions the government's economic policy will change gives birth to EPU [11]. Negative conditions and uncertainties in macroeconomic variables like economic output, unemployment rate, and price increases affect consumer and business expectations for the future. As a result, the impact of economic policies plays an important role in economic units' future decisions. Therefore, accurate estimation and understanding of EPU have recently become an important concern.

EPU affects the country's economy at micro and macro levels. Firms that are more exposed to government purchases at the micro level may resort to practices that will lead to a decrease in investment and employment rates, as the volatility of stocks becomes more pronounced in the event of EPU [1]. For this reason, economic performance may be adversely affected as a result of low investment and reductions in commercial activities. At a macro scale, firms may postpone risk-taking and investment (particularly long-term investment) decisions in the event of EPU due to an increase in their expenses of funding [12]. Depending on the decrease in investments, the production and employment structure are also adversely affected. Furthermore, according to Baker, et al. [1] when there is high uncertainty, individuals may reduce their spending, especially on durable consumer goods and decide to increase their liquid assets. In the case of EPU, the perspective of individuals and firms on economic events may appear biased and unrealistic. For this reason, they may be indifferent to make strong decisions in order to take action in the next period. At the same time, investors from abroad may decide to delay their investments if they think that adverse conditions, such as EPU, will reduce the efficiency of their investments. As a result, an increase in EPU can be detrimental to the market in terms of both supply and demand. Institutions are intricate systems, which influence and constrain society's socioeconomic foundations [13]. According to the new corporate economy, since firms operate in an environment of uncertainty concerning the success or failure of their business methods, they lack insight into how the economy works in its entirety, so they trust institutions to make their decisions and seek credibility in their activities [14]. Therefore, when the performance values of the institutions increase, the uncertainties arising from human interactions can be minimized [15-17]. Institutions aim to put social relations and the activities of economic actors in a certain order as a result of changing economic and social conditions. Companies are about to develop strategies suitable for the situation that can cope with the difficulties and decision-making problems that may occur in situations of risk and uncertainty that may occur in the economy [18]. One way to do this is to align with institutions to legitimize implemented strategies Tamanaha [18]. Rodrik [19] refers to the new institutional economics can be defined as institutional rules and useful constraints that desire to maximize the interests of economic agents within these constraints, minimizing risks and unpredictability.

The purpose of institutions is to determine how the game will be played. For example, in situations where commercial costs are high and social behavior is unpredictable, institutions can provide structural support to minimize the uncertainty [15, 20]. Institutions can ensure that investment decisions are made at less expense, thereby preventing information inequalities and ensuring legal security [21]. At the same time, institutions can make the future clearer and more understandable by making improvements in social and economic fields such as protecting property rights, imposing restrictions on

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powerful groups and politicians, protecting the rule of law and ensuring that everyone has equal rights before the law. Institutions are structures that help economic actors to take action on what to do or how to decide in a market with uncertainties and incomplete information [22].

In this context, institutions are in a structure to prevent the negative shocks that may occur in the economy within the rules they create and the structural order they provide and the measures they will take in an environment of uncertainty. Robust institutions and policy regimes can reduce the escalation and spread of other shocks due to policy uncertainty activities or uncertain policy responses, through the determination of predictable policy choices even in the face of major negative shocks [1].

Increasing the quality and functions of institutional factors can minimize the uncertainty arising from human activities and constantly changing conditions inherent in social sciences. Institutional factors are fundamental elements in the selection of the development model and the determination of progressive policies in an environment of incomplete information and uncertainty that can occur at both macro and micro levels in a free market economy [23]. For example, according to Goel and Saunoris [24] controlling corruption, which is one of the institutional factors, has a complementary effect in ensuring macro stability by supporting economic growth in the society. The increase in corruption in society leads to the emergence of uncertainties for the future by increasing the risk in the business world, as it causes illegal acts as well as the costs of doing business. On the other hand, according to Arvin, et al. [25] in the event of policy uncertainty, traditional and corrupt units in the economic structure begin to form new alliances to protect against risk, which increases the corruption. For this reason, uncertainty in the economy and political environment and corruption trigger each other. The normal course of the economic system may slow down with the increase in illegal transactions in economic relations as a result of situations such as bribery, nepotism, abuse of power and tax evasion, which increase with corruption. For this reason, an environment of uncertainty may also be experienced in the economy. Establishing strong institutional factors in an economy can provide advantages in creating stronger macroeconomic policies to improve economic growth through efficient management of resources [26]. Due to the presence of strong institutional factors, the uncertainties in the economy can be eliminated with clear and understandable methods applied because the activities carried out are based on transparency, accountability and auditability. Similarly, if the institutional factors operate effectively, the uncertain environment in the economy can be reduced by controlling the illegal actions that may occur. The negative consequences of EPU can be reduced by protecting investor rights, eliminating information asymmetry and ensuring political stability, thanks to better governance provided by improving the quality of institutional factors [3]. On the contrary, the presence of weak institutional factors can lead to market failures due to negative externalities such as rent-seeking, moral hazard and mismanagement, and activities that increase transaction costs. At the same time, weak activities of institutional factors can create an environment of uncertainty in the economy by creating concerns such as insufficient monitoring systems and a lack of due diligence processes.

Goel and Ram [27] in one of the empirical studies in the literature, noticed an adverse and substantial connection between EPU and government effectiveness in their results for BRIC (Brazil, Russia, India and China) countries. An enhancement in EPU lowers government effectiveness. According to the empirical findings obtained from the study, ensuring economic stability resulting from the consistency of monetary and fiscal policies increases government efficiency. At the same time, macro instability is a negative economic indicator that prevents institutional activities in the economy from operating regularly. EPU has a detrimental long-term influence on institutional quality, per Goel and Saunoris [24] research on India and Pakistan. Therefore, a balanced stage of economic performance improvement and the elimination of uncertainty in economic policy provide a high degree of improvement in institutions. In the studies of Saleem, et al. [8] on China, Arvin, et al. [25] on 100 countries and Lambsdorff and Teksoz [28] on 75 countries the increase in EPU brings about a strengthening in corruption. In the case of EPU, people prefer the current situation to the future

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because the future of societies is unclear. For this reason, societies may become open to illegal actions such as corruption to control their economic situation.

In some circumstances, however, the uncertainty of economic policy can disrupt traditional legal and corrupt relations [29]. Since the payment of bribes and the provision of the agreed benefits do not occur at the same time due to reasons such as non-compliance with the contract, change of opinion or change of duty. As a result, delays may occur in the conclusion of corruption acts.

Institutional factors suffer from an adverse influence on EPU, albeit to an extremely limited degree, according [30] research on African countries. The reason for this is seen as the inability to establish a strong institutional structure in African countries. Therefore, it causes institutional factors to remain weak in stimulating the economic performance of the African continent. Farooq, et al. [3] explained in their study that the improvement in institutional factors can reduce the negative effects of unstable economic conditions. According to Farooq, et al. [3] the increase in the quality of institutional factors can minimize the spurious economic situation caused by EPU in a country, thereby protecting investor rights, preventing manipulation of investor rights and information asymmetry, legitimizing economic certainty, and increasing political stability. It can help to eliminate the negative conditions caused by it. In the study of Afzali, et al. [9] economic uncertainty is seen as an effective factor in the increase of corruption by increasing bribery and tax evasion. According to the results obtained, in cases of economic uncertainty, private firms resort to tax evasion, while public firms resort to bribery. Thus, for the public as well as privately owned firms, uncertainty is seen to be known as leading to illegal acts such as corruption and the emergence of business barriers.

As seen in the empirical and theoretical literature review, there exist a few investigations that look into the impact of institutional factors on EPU. The majority of the research has focused on the consequences of EPU on institutional factors, especially corruption. Therefore, it is thought that this deficiency in the literature will be eliminated with this study.

3. Data and Variables

According to data availability, annual data (2002-2021) for eight European countries (France, Germany, Greece, Ireland, Italy, Spain, United Kingdom and Sweden) were used for analyzing the association between institutional factors and EPU. As previously stated, institutional factors that allow us to obtain information about the country's political and institutional structure are expressed as six indicators of good governance: control of corruption, government effectiveness, regulatory quality, rule of law, political stability and absence of violence and voice and accountability. Table 1 contains detailed explanations of the variables used in the models as well as the data sources for these variables.

Table 1.
Variables' description and data sources.

Variable	Source
Control of corruption (CC): It assesses the amount of governmental authority that these groups use for their benefit if the government is taken over by powerful people and special interest groups.	Worldwide governance indicators
Government effectiveness (GE): The professionalism of the public sector and its freedom coming from influences from politics, the effectiveness of policy creation and execution, and the reliability of the government's adherence to these strategies are all used to assess perceptions.	Worldwide governance indicators
Political stability and absence of violence (PSAV): Perceptions are measured based on the possibility of the state being overthrown through destabilization, unconstitutional and politically inspired violence, and terrorism.	Worldwide governance indicators
Regularity quality (RQ): It is a perception metric based on the state's ability to create and carry out good rules and regulations that allow and encourage the growth of the private industry.	Worldwide governance indicators
Rule of law (RL): It measures how much government agents trust and follow societal rules,	Worldwide

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specifically the efficacy of legal regulation, the rights of ownership, justice and law enforcement, and the probability of violent or criminal behavior.	governance indicators
Voice and accountability (VA): It assesses citizens' perceptions of freedom of speech and connections, accessibility to information, and their ability to vote in government elections.	Worldwide governance indicators
GDP per capita (constant 2015 US$) (GDP)	Worldwide governance indicators
EPU Index (EPU)	Economic policy uncertainty index

4. Model Specification and Empirical Methodology

4.1. Model Specification

The study developed six models for assessing the effect of each institutional factor on EPU. The ingredients constituting the institutional factors were used as the independent variable in these models, and the EPU was used as the dependent variable. Simultaneously, GDP per capita was used as the control variable. The parameters utilized during the empirical evaluation and the models obtained with these variables are shown below.

$$\text{Model}_1: \text{EPU}_{it} = \alpha_0 + \alpha_1 \text{CC}_{it} + \alpha_2 \text{GDP} + \epsilon_{it}$$
$$\text{Model}_2: \text{EPU}_{it} = \alpha_0 + \alpha_1 \text{GE}_{it} + \alpha_2 \text{GDP} + \epsilon_{it}$$
$$\text{Model}_3: \text{EPU}_{it} = \alpha_0 + \alpha_1 \text{PSAV}_{it} + \alpha_2 \text{GDP} + \epsilon_{it}$$
$$\text{Model}_4: \text{EPU}_{it} = \alpha_0 + \alpha_1 \text{RQ}_{it} + \alpha_2 \text{GDP} + \epsilon_{it}$$
$$\text{Model}_5: \text{EPU}_{it} = \alpha_0 + \alpha_1 \text{RL}_{it} + \alpha_2 \text{GDP} + \epsilon_{it}$$
$$\text{Model}_6: \text{EPU}_{it} = \alpha_0 + \alpha_1 \text{VA}_{it} + \alpha_2 \text{GDP} + \epsilon_{it}$$

4.2. Empirical Methodology

The CADF (Cross-sectional augmented Dickey-Fuller) unit root test created by Westerlund [31] was utilized for stationarity analysis in that research, which examines the association between EPU and institutional factors because the variables have a cross-sectional dependence. The cointegration interaction of the factors included in the models obtained was explained using [32] analysis. The variables' coefficients were then estimated using Autoregressive Distributed Lag (ARDL) linear analysis invented by Shin, et al. [33] and ARDL nonlinear analysis put forward by Békés, et al. [34].

4.2.1. Cross-Sectional Dependency and Panel Unit Root Test

In recent years, countries have begun to act together in the international market by creating international integrations and transforming into multinational corporations [35]. Therefore, economic and financial integrations between countries and financial institutions have caused strong dependencies between cross-sectional units [36]. For this reason, examining the cross-sectional dependence of the panel data before proceeding to the stationarity and cointegration analyses will provide more accurate results.

Cross-sectional dependency analysis employs the LM (Lagrange Multiplier) designed by Pesaran [37] the CD (Cross-Sectional Dependence) created by Pesaran, et al. [38] and the LMadj (Adjusted Crosssectionally Dependence Lagrange Multiplier) invented by Pesaran and Yamagata [39].
[38] created the LM test which is an analysis technique that can be implemented during the time dimension in the series. Additionally, this test has a higher value than the cross-section dimension (T>N). The regression equation of the LM test and hypothesis tests are expressed as followed;

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$$LM = T\sum_{i=j}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2 \sim X^2_{N(N-1)/2} \quad (1)$$

H_0: *No cross-section dependency (*H_0: *Cov* $(u_{it}, u_{jt}) = 0\ for\ all\ i\ and\ t, i = j -$*)*

H_1: *There is a cross-section dependency (*H_1: *Cov* $(u_{it}, u_{jt}) \neq for\ at\ lst\ one\ couple, i \neq j -$*)*

In equation (1), ρ_{ij} demonstrates the correlation coefficients derived via the model's error terms. The asymptotic distribution of x^2 is obtained from N for all (i, j) while $T_{(i,j)} \to \infty$.

Either when the cross-section dimension is larger than the time dimension (N>T) as well as when the cross-section dimension is higher than the time dimension (T>N), the CD_{LM} (Cross Sectionally Dependency Lagrange Multiplier) test devised by Pesaran, et al. [38] may be deployed. The regression equation of the CD_{LM} method and the hypothesis tests are expressed as follows.

$$CD_{LM} = \sqrt{\frac{2T}{N(N-1)}}\left\{\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\rho_{ij}\right\} \quad (2)$$

H_0: No cross-section dependency (H_0: Cov $(u_{it}, u_{jt}) = 0\ for\ all\ i\ and\ t, i = j -$)

H_1:A cross-sectional dependency is present. (H_1: Cov $(u_{it}, u_{jt}) \neq for\ at\ least\ one\ couple, i \neq j -$)

LMadj test is a bias-adjusted version of the LM test statistic of error cross-section independence when panel models have strictly exogenous regressors and normal errors [40]. The regression equation of the LMadj test is shown in equation 3.

$$LM_{adj} = \sqrt{\frac{2}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\left(T\hat{\rho}_{ij}^2\ \frac{(T-k)\hat{\rho}_{ij}^2 - \mu_{Tij}}{\vartheta_{Tij}}\right. \quad (3)$$

k= regressors number,

μ_{Tij}=average

ϑ_{Tij}=variance.

H_0: No cross-section dependency (H_0: Cov $(u_{it}, u_{jt}) = 0\ for\ all\ i\ and\ t, i = j -$)

H_1: There is a cross-section dependency (H_1: Cov $(u_{it}, u_{jt}) \neq for\ at\ least\ one\ couple, i \neq j -$)

Following the cross-section analysis, the homogeneity test for the variables and the models was performed. The homogeneity test developed by Swamy [40] is an analysis method developed as an alternative to the Pesaran, et al. [41] test, which can also be applied to large panel data and in situations when the error term is normally distributed. With the homogeneity test, it can be determined whether the slope coefficient is heterogeneous or homogeneous. In this way, homogeneity testing can help to achieve more accurate results in the next stages of empirical application. The regression equations of the large sample and small sample belonging to the test laid out by Swamy [40] are expressed as follows:

For large sample, $\widetilde{N} = \sqrt{N}\left(\frac{N^{-1}\,\tilde{S} - k}{\sqrt{2k}}\right)$ (4)

For small sample, $\widetilde{N}_{adj} = \sqrt{N}\left(\frac{N^{-1}\,\tilde{S} - E(\tilde{Z}_{iT})}{\sqrt{Var}(\tilde{Z}_{iT})}\right)$ (5)

N: Number of horizontal sections

S: Swamy test statistic

k: Number of explanatory variables

H_0: Slope coefficients are homogenous ($\beta_i = \beta$)

H_1: Slope coefficients are heterogeneous ($\beta_i \neq \beta$)

Table 2 reflects the findings of both the cross-sectional dependence and homogeneity examinations. Based on the cross-sectional dependence analysis's findings in Table 2, which states that there is no cross-sectional dependence between the series, the H_0 hypothesis is disproved. For this reason, it was decided that there is a cross-section dependency in the models obtained and the variables used in these models. Therefore, for the stationarity analysis, implementing the second-generation unit root test that allows cross-section dependence, will enable us to obtain more accurate results from the analysis to be made.

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At the same time, as a result of the homogeneity analysis, the H_0 hypothesis, which states that the slope coefficient is homogeneous, is rejected. Therefore, it was decided that the slope coefficient was heterogeneous in all models.

Table 2.
Cross-sectional dependency test.

Variables	LM	CD_{LM}	LMadj	$\tilde{N}$	$\tilde{N}_{adj}$
$Model_1$	127.0(0.0000)	10.56(0.0000)	27.13(0.0000)	5.940(0.000)	6.641(0.000)
$Model_2$	121.6(0.0000)	10.51(0.0000)	25.79(0.0000)	6.325(0.000)	7.072(0.000)
$Model_3$	115.5(0.0000)	10.01(0.0000)	24.07(0.0000)	6.708(0.000)	7.500(0.000)
$Model_4$	91.8(0.0000)	8.749(0.0000)	17.19(0.0000)	7.224(0.000)	8.077(0.000)
$Model_5$	80.16(0.0000)	7.906 (0.0000)	13.86(0.0000)	7.224(0.000)	8.077(0.000)
$Model_6$	77.22(0.0000)	7.507(0.0000)	13.02(0.0000)	6.502(0.000)	7.262(0.000)
EPU	181.6(0.0000)	13 (0.0000)	48.32(0.0000)		
CC	103(0.0000)	-0.1809 (0.8565)	23.07(0.0000)		
GE	62.94(0.0000)	-1.461(0.1440)	10.22(0.0000)		
PSAV	69.05(0.0000)	5.403(0.0000)	12.18(0.0000)		
RQ	68.28(0.000)	20.6(0.0093)	11.93(0.0000)		
RL	61.59(0.0003)	9.783(0.0000)	2.059(0.0395)		
VA	65.27(0.0000)	1.361(0.1735)	10.97(0.0000)		
GDP	192.3(0.0000)	12.02(0.0000)	51.75(0.0000)		

Source: (P-value appears in the brackets).

Based on what came out of the cross-sectional dependency evaluation, that is a cross-sectional dependency in the models found and the variables employed. It was chosen to do the CADF unit-root examination for the stability investigation because of this.

The CADF unit root test, invented by Westerlund [31] is a second-generation unit root test created as a result of adding the cross-sectional averages of the lagged levels and the first differences of the individual series to the ADF test. The regression equation of the CADF and the hypothesis tests are expressed as follows.

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + \sum_{j=0}^{p} d_{ij} + \Delta \bar{y}_{t-j} + \sum_{j=1}^{p} \delta_{ij} \Delta y_{i,t-j} + e_{it} \quad (6)$$

H_0: There is a unit root ($H_0: b_i = 1$)
H_1: There is no unit root ($H_1: b_i \neq 1$)
The stationarity levels of the components in the CADF are determined in line with the statistical values of the CIPS (Cross-Sectionally Augmented Panel Unit Root) method. CIPS statistics values are predicated on the mean of individual CADF statistics. The regression equation of the CIPS statistical analysis and the hypothesis tests are expressed as follows.

$$CIPS(N,T) = N^{-1} \sum_{i=1}^{N} t_i(N,T) \quad (7)$$

H_0: There is a unit root ($H_0: b_i = 1$)
H_1: There is no unit root ($H_1: b_i \neq 1$)

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Table 3.
CADF test results.

CIPS statistics					
	Level		**1. Difference**		
Variables	**Test statistics**	**P-value**	**Test statistics**	**P-value**	**Result**
EPU	-2.137	0.132	-3.427	0.000*	I(1)
CC	-1.924	0.297	-2.954	0.000*	I(1)
GE	-1.690	0.544	-3.024	0.000*	I(1)
PSAV	-1.475	0.758	-3.303	0.000*	I(1)
RQ	-1.913	0.308	-3.207	0.000*	I(1)
RL	-1.801	0.423	-2.457	0.023*	I(1)
VA	-2.508	0.262	-2.706	0.004*	I(1)
GDP	-1.806	0.908	-2.641	0.006*	I(1)

Note: * denotes statistical significance at the 5% level.

Table 3 illustrates the CADF results. According to the table, when the first difference is taken, all of the variables used in the models created become stationary. For this reason, Pesaran and Smith [32] analysis that utilizes the error correction model, which can be adopted whenever each of the parameters is stationary at I (1) or I (0) level and allows for cross-sectional dependence, was applied to investigate the parameters' long-term cointegration connection.

4.2.2. Westerlund Panel Cointegration Analysis

Westerlund cointegration analysis, developed by Pesaran and Smith [32] is an analysis method that includes cross-sectional dependence. Since Westerlund cointegration analysis is based on structural dynamics instead of dynamics, it includes four-panel tests that do not contain common factor constraints and are based on the null hypothesis that cointegration does not exist [32]. The regression equation of the Westerlund analysis and the null and alternative hypotheses are shown as follows.

$$\Delta Y_{it}=\delta'_{dt}+\mu'_i\Delta X_{it}\gamma_i Y_{it-1}\varphi_i X_{it-1}+\varepsilon_{it} \quad (8)$$

H_0: Pi=0 (for all i), There is no cointegration
H_1: Pi<0 (for all i), There is cointegration,
Pi= Error correction term
d_t =vector showing constant and trend
μ'_i, lond run γ_i and φ_i short-run parameters.

The equations for Pa and Pt, which are used to gather information about error correction in the cross-section dimension of the panel in cointegration analysis are shown in equations 9 and 10.

$$Pa=(\sum_{i=1}^{N} L_{i11})^{-1}\sum_{i=1}^{N} L_{i12} \quad (9)$$

$$Pt=\tilde{\sigma}^{-1}(\sum_{i=1}^{N} L_{i11})^{-1/2}\sum_{i=1}^{N} L_{i12} \quad (10)$$

H_0: There is no cointegration
H_1: There is cointegration,

The equations for Ga and Gt tests used in the calculation of group mean statistics in the Westerlund analysis are shown as follows.

$$Ga=\sum_{i=1}^{N} L_{i11}^{2} L_{i12} \quad (11)$$

$$Gt=\sum_{i=1}^{N} \bar{\sigma} L_{i11}^{-1/2} L_{i12} \quad (12)$$

H_0: There is no cointegration for all units
H_1: There is cointegration for some units

Westerlund analysis results are shown in Table 4. Since the slope coefficient is heterogeneous in the models obtained and the time dimension of the data of the variables used is larger than the cross-section dimension, The cointegration connection between each factor is looked into using the Ga

estimation method. The H_0 hypothesis, which is represented as no cointegration among the variables, was ruled out in light of the estimated results, and it was determined to have a cointegration link between institutional components and EPU. After determining the long-term cointegration relationship, to control the magnitude of the long-term relationship dependent and independent parameters, ARDL linear and ARDL nonlinear estimation methods were used.

Table 4.
Westerlund analysis results.

Models	Statistics	Value	Z-value	P-value	Robust P-value
$Model_1$	Gt	-3.546	-4.191	0.000	0.000*
	Ga	-20.258	-3.555	0.000	0.000*
$Model_2$	Gt	-3.774	-4.993	0.000	0.130
	Ga	-22.034	-4.310	0.000	0.045*
$Model_3$	Gt	-4.072	-6.044	0.000	0.000*
	Ga	-22.977	-4.711	0.000	0.000*
$Model_4$	Gt	-4.346	-7.009	0.000	0.020*
	Ga	-23.630	-4.988	0.000	0.010*
$Model_5$	Gt	-3.489	-3.989	0.000	0.350
	Ga	-19.734	-3.332	0.000	0.000*
$Model_6$	Gt	-3.454	-3.866	0.000	0.225
	Ga	-22.787	-4.630	0.000	0.047*

Note: * denotes statistical significance at the 5% level.

4.2.3. ARDL Linear and Nonliear Analysis

ARDL linear cointegration analysis is an analysis method that allows coefficient estimation in the long and short term while the parameters utilized in the model are stationary at I (0) or I (1) level. The panel ARDL model makes full use of the lag length to assess the long- and short-term regression linkage among parameters without limiting the sample size [31, 42]. ARDL linear cointegration analysis includes PMG (Pooled Mean Group) and MG (Mean Group) techniques for estimating. The ARDL model is shown as follows.

$$y_{it}=\sum_{j=1}^{\rho}\lambda_{ij}y_{i,i-j}+\sum_{j=0}^{q}\delta_{ij}x_{i,t-j}+\mu_t+\varepsilon_{it} \quad (13)$$

i=1,2,….N, t=1,2.3….T x_{it} is a vector of K*1 regressors, λ_{ij} is a scalar, μ_t is a group-specific effect.

MG is more advantageous than PMG analysis because it gives cointegration analysis, separate regression analysis for each country and coefficients in the long and short term [31]. The estimation equation of the MG analysis is expressed as follows.

$$\theta=\left(\frac{1}{N}\right)\sum_{i=j}^{N}\theta i\,\hat{\alpha}=\frac{1}{N}\sum_{i=j}^{N}\alpha_i \quad (14)$$

t=1,2…T, i=1,….N

The PMG estimation method is an ARDL cointegration analysis technique that forbids the production of short-term coefficients and error variances that diverge between groups while paving the way for the long-range coefficients to be hindered to remain the same [42]. The estimation equation of the PMG analysis is expressed as follows.

$$\Delta Y_{it}=\emptyset_{it}(Y_{i,t-1}-\beta_i X_{i,t-1})+\sum_{j=1}^{p-1}\gamma_{\gamma}^{i}\,\Delta Y_{i,i-j}+\sum_{j=0}^{q-1}\delta_{y}^{i}\,\Delta X_{i,t-j}+\mu_i+\varepsilon_{it} \quad (15)$$

β_i= Long-run slope parameter,

$\emptyset_{it}$= Error correction run

$X_{i,t-1}$= Vector of explanatory variables

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μ_i fixed effects, p, and q are the appropriate lag lengths of the variables designated to comply with formation criteria.

Findings of the ARDL Linear analysis appear in Table 5. To be able to establish the direction in which all the components interact, MG and PMG estimation methods were used under ARDL Linear analysis. According to the results obtained from the table, the Hausman test shows that the PMG estimation method gives more accurate results in all models.

According to the PMG estimation results in Table 5, CC, PSAV, and VA variables are observed to have a long-term, relevant adverse effect on EPU. In the short run, the effect of RQ variable on EPU is negative, while the CC variable is positive.

Table 5.
ARDL linear analysis.

Dependent variable: epu			**MG**	**PMG**	**Hausman tests results (MG vs PMG)**
$Model_1$	Long-run	CC	0.090(0.981)	-2.146(0.021)*	
		GDP	3.104 (0.108)	2.044(0.000)	X^2=0.78
	Short-run	CC	2.833(0.497)	2.142(0.021)*	(0.6767)
		GDP	-1.483(0.000)	2.044(0.000)	
		ect	-0.446(0.000)	-0.331(0.000)	
$Model_2$	Long-run	GE	0.268(0.954)	-1.034(0.401)	
		GDP	4.157(0.026)	2.250(0.000)	X^2=0.99
	Short-run	GE	-0.143(0.905)	-0.686(0.477)	(0.6096)
		GDP	-1.909(0.000)	-1.548(0.000)	
		ect	-0.451(0.000)	-0.303(0.000)	
$Model_3$	Long-run	PSAV	-0.426(0.466)	-1.296(0.000)*	
		GDP	3.453(0.039)	1.429(0.000)	X^2=2.32
	Short-run	PSAV	0.185(0.352)	0.240(0.111)	(0.3142)
		GDP	-1.949(0.000)	-1.615(0.002)	
		ect	-0.484(0.000)	-0.340(0.000)	
$Model_4$	Long-run	RQ	1.615(0.204)	2.873(0.035)*	
		GDP	3.143(0.083)	1.813(0.000)	X^2=0.75
	Short-run	RQ	-3.153(0.069)	-2.469(0.029)*	(0.6863)
		GDP	-1.396(0.002)	-1.327(0.006)	
		ect	-0.452(0.000)	-0.305(0.000)	
$Model_5$	Long-run	RL	5.179(0.241)	0.017(0.993)	
		GDP	4.551(0.047)	2.785(0.000)	X^2=1.15
	Short-run	RL	-2.315(0.198)	-1.439(0.453)	(0.5615)
		GDP	-1.871(0.000)	-1.564(0.002)	
		ect	-0.428(0.000)	-0.281(0.000)	
$Model_6$	Long-run	VA	-4.348(0.039)	-3.452(0.002)*	
		GDP	3.375(0.008)	2.187(0.000)	X^2=0.92
	Short-run	VA	-1.369(0.220)	-1.350(0.164)	(0.6314)
		GDP	-1.182(0.001)	-1.235(0.036)	
		ect	-0.474(0.000)	-0.302(0.000)	

Note: * points to statistical significance at the 5% level.

By increasing the institutional quality and creating strong institutional factors, the activities to be realized in the economy can be carried out within the framework of the principles of transparency, accountability and auditability. For this reason, placing economic activities in a certain order and performing them following the law can reduce the uncertainties that will occur in the economy by making the future clearer and more understandable.

ARDL non-linear cointegration analysis is an asymmetric model that uses positive and negative partial sum decompositions while variables are stationary at I (0) and I (1) levels. The non-linear ARDL

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model is a method constructed by the flexible and dynamic analysis method of the classical ARDL model, which reveals the combined long-run and short-run asymmetrical association [34]. The equation model of ARDL non-linear analysis is shown as follows;

$y_t=\sum_{j=i}^{p} \emptyset_j\, y_{t-j}+\sum_{j=0}^{q} \emptyset_{-}^{+\prime}\, x_{t-j}^{+}+\emptyset_{t-j}^{-\prime})+\varepsilon_t$ (16)

x_t , $x_t=x_0+x_t^{+}+x_t^{-}$, The k×1 multiple regressor vector known as

$\emptyset_j$ autoregressive parameter,

$\emptyset_j^{+}$ and $\emptyset_j^{+}$ asymmetrically distributed delay parameters,

ε_t stands for the error term.

The equation of the error correction model is expressed as follows;

$\Delta y_t=\rho y_{t-1}+\theta^{+\prime}x_{t-1}^{+}+\theta^{-\prime}x_{t-1}^{-}+\sum_{j=1}^{p-1} y_j \Delta_{t-j}+\sum_{j=0}^{q-1}(\varphi_j^{+\prime}\Delta x_{t-j}^{+}+\varphi_j^{-\prime}\Delta x_{t-j}^{-})+\varepsilon_t=\rho\xi_{t-1}+$

$\sum_{j=1}^{p-1} y_j \Delta_{t-j}+\sum_{j=0}^{q-1}(\varphi_j^{+\prime}\,\Delta x_{t-j}^{+}+\varphi_j^{-\prime}\Delta x_{t-j}^{-})+\varepsilon_t$ (17)

$\rho=\sum_{j=1}^{\rho} \Phi_j\text{-}1$,

$y_j=-\sum_{i=j+1}^{\rho} \Phi_I$ for j=1,….. $\rho-1$,

$\theta^{+}=\sum_{j=0}^{q} \varphi_j^{+\prime}$, $\theta^{-}=\sum_{j=0}^{q} \varphi_j^{-\prime}$, $\theta_0^{+}=\varphi_0^{+}$

$\varphi_0^{+}=\text{-}\sum_{i=j+1}^{q} \theta_j^{+}$ for j=1…..q-1, $\varphi_0^{-}=\theta_0^{+}$, $\varphi_j^{-}=\sum_{i=j+1}^{q} \theta_j^{-}$ for j=1…..q-1, $\xi_t=y_t\text{-}\beta^{+\prime}t-\beta^{-\prime}x_t^{-}$

$\beta^{+}=-\theta^{+}/\rho$ ve $\beta^{-}=-\theta^{-}/\rho$ asimetrik uzun dönem parametreleridir.

H_0: $\beta^{+}=\beta^{-}$; In both the long and short runs, there has a symmetrical cointegration relation among the parameters.

H_1: $\beta^{+}\neq\beta^{-}$; In both the long and short runs, there is an asymmetrical cointegration relation among the parameters.

ARDL Non-Linear estimation results are given in Table 6. According to the table, the Hausman test results show that the PMG estimation method gives more accurate results. According to the results obtained:

- Negative shocks to the CC variable affect the EPU positively, while positive shocks to the CC variable affect the EPU negatively. According to these results, we can say that there is an asymmetric association between the CC variable and EPU in the long run.
- Negative and positive shocks to the RQ variable affect the EPU positively. The effect of negative shocks on the RQ variable is greater than the effect of positive shocks. Therefore, we can say that the RQ variable affects the EPU negatively.
- The positive and negative shocks to the VA variable affect the EPU negatively. However, the impact of positive shocks is greater. Therefore, we can say that the positive shocks to the VA variable affect the EPU negatively and significantly.
- Positive and negative shocks to the PSAV variable affect the EPU negatively. However, the effect of positive shocks on the PSAV variable is greater on EPU. Therefore, we can say that positive shocks to the PSAV variable reduce the uncertainty of economic policy.
- The ARDL linear and ARDL nonlinear estimation results were as expected in line with the theoretical explanations. Increasing the effectiveness of institutional factors has a decreasing effect on the uncertainty of economic policy. Therefore, the setting up of a solid institutional structure in societies and the implementation of appropriate policy regimes in this way can ensure that predictable policy preferences are determined even in the face of negative shocks to the economy and thus, uncertainties can be reduced.

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Table 6.
ARDL non-linear analysis.

Dependent variable: EPU			MG	PMG	Hausman Test Results (MG vs PMG)
$Model_1$	Long-run	CC-	4.487(0.313)	2.003(0.037)*	
		CC^+	4.552 (0.308)	-2.029(0.035)*	
		GDP	2.509 (0.183)	2.132(0.000)	X^2=1.81 (0.6118)
	Short-run	CC-	0.104(0.986)	2.739(0.568)	
		CC^+	0.109(0.986)	2.747(0.566)	
		GDP	-1.484(0.013)	-1.220(0.043)	
		ect	-0.501(0.000)	-0.324(0.000)	
$Model_2$	Long-run	GE-	-2.020(0.533)	-1.342(0.180)	
		GE^+	-1.959(0.547)	-1.301(0.193)	
		GDP	4.849(0.010)	2.029(0.000)	X^2=2.90 (0.4080)
	Short-run	GE-	-1.190(0.544)	-2.040(0.221)	
		GE^+	-1.198(0.541)	-2.040(0.220)	
		GDP	-2.163(0.000)	-1.551(0.000)	
		ect	-0.483(0.000)	-0.344(0.000)	
$Model_3$	Long-run	$PSAV^-$	0.684(0.571)	-1.375(0.000)*	
		$PSAV^+$	0.749(0.540)	-1.383(0.000)*	
		GDP	3.396(0.300)	1.541(0.000)*	X^2=2.91 (0.4064)
	Short-run	PSAV-	-1.132(0.727)	-0.109(0.682)	
		$PSAV^+$	-1.121(0.743)	-0.102(0.692)	
		GDP	-1.528(0.000)	-1.425(0.008)	
		ect	-0.442(0.000)	-0.312(0.000)	
$Model_4$	Long-run	RQ^-	1.883(0.255)	3.976(0.002)*	
		RQ^+	1.806(0.254)	3.943(0.002)*	
		GDP	3.470(0.102)	1.704(0.000)	X^2=1.18 (0.7586)
	Short-run	RQ^-	-1.946(0.199)	-1.166(0.141)	
		RQ^+	-1.946(0.200)	-1.167(0.142)	
		GDP	-1.429(0.004)	-1.448(0.002)	
		ect	-0.432(0.000)	-0.283(0.002)	
$Model_5$	Long-run	RL^-	-5.312(0.706)	-0.697(0.711)	
		RL^+	-5.031(0.715)	-0.695(0.711)	
		GDP	1.572(0.000)	2.719(0.000)	X^2=3.19 (0.3628)
	Short-run	RL^-	-5.046(0.056)	-2.118(0.272)	
		RL^+	-5.547(0.056)	-2.117(0.272)	
		GDP	-1.427(0.003)	-1.641(0.002)	
		ect	-0.437(0.000)	-0.285(0.000)	
$Model_6$	Long-run	VA^-	-4.401(0.091)	-3.787(0.000)*	
		VA^+	-4.420(0.088)	-3.861(0.000)*	
		GDP	3.107(0.089)	2.452(0.000)	X^2=0.75 (0.8617)
	Short-run	VA^-	-2.150(0.195)	-1.322(0.356)	
		VA^+	-2.133(0.198)	-1.298(0.362)	
		GDP	-2.186(0.034)	-1.216(0.072)	
		ect	-0.530(0.000)	-0.351(0.000)	

Note: * implies statistical significance at the 5% level.

5. Conclusion and Discussion

Regulatory measures taken in the face of unexpected events such as economic crises, wars and government changes in today's world can have negative consequences on the economy by creating uncertainties in monetary and fiscal policies. These uncertainties in economic policy can affect society at macro and micro levels and cause changes in producer and consumer decisions. In the event of the

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uncertainty of economic policy, the decisions of individuals and companies about the future may change in a biased, unrealistic and pessimistic way. In the next period, consumers can reduce their consumption and increase their savings. Moreover, companies can postpone their investment decisions. At the same time, the uncertainty experienced in economic policy increases the risk environment in the markets. Since this situation increases borrowing costs, firms and banks may choose to increase their savings rates as they feel the need to hold more cash for precautionary purposes. Therefore, the measures taken in an environment of uncertainty pave the way for disruption of investment, employment and production activities. Negative market expectations may cause economic activity to stagnate and economic performance to slow.

Institutions that shape economic, social and political relations between individuals and economic actors can directly or indirectly impact the economy by influencing decisions such as production, consumption, investment and employment. Indicators such as control of corruption, government effectiveness, regulatory quality, rule of law, political stability and absence of violence and voice and accountability, which are also expressed as good governance indicators within the scope of the World Bank governance indicators project, are the factors that enable us to obtain information about the political and institutional structure of the country and also increase the institutional quality. The presence of strong institutional factors prevents market failures and activities that raise transaction costs, which lead to negative situations such as rent-seeking, moral hazard, and mismanagement, and provides legitimacy to the measures implemented. By placing economic activities in a specific order in societies, increasing the functions of institutional factors can make economic policy clearer and more understandable. Simultaneously, the uncertain environment in the economy can be reduced by controlling the illegal actions that may occur because of the existence of institutional factors which are based on the transparency, accountability, and auditability of the economy's activities. The negative effects of EPU can be mitigated by improving the quality of institutional factors, which protects investor rights, eliminates information asymmetry and ensures political stability.

In this study, which examines the effect of institutional factors on EPU, Pesaran and Smith [32] analysis method, which allows cross-sectional dependence in panel data, was applied because of examining the cointegration relationship among parameters. once it has been determined that the parameters have a cointegration relationship, ARDL linear and ARDL nonlinear analyses were used to estimate the coefficients. According to ARDL linear analysis results, control of corruption, political stability and absence of violence and voice and accountability negatively affect EPU in the long run. As a result of ARDL Non-linear estimation, while negative shocks on control of corruption positively affect EPU; Positive shocks on control of corruption negatively affect EPU. Therefore, it may be asserted that the interaction between EPU and corruption control is asymmetrical. Negative shocks on regularity quality positively affect EPU. Positive shocks on voice and accountability positively affect EPU. Likewise, EPU benefits from positive shocks to political stability and the absence of violence. These results obtained from empirical analysis; show parallelism with the studies obtained by Baker, et al. [1]; Saleem, et al. [8]; Pesaran [30]; Farooq, et al. [3]; North [15]; Amal and Seabra [20]; Rodrik [19]; Peng, et al. [16] and Moura, et al. [17]. Therefore, increasing the effectiveness of institutional factors has a decreasing effect on EPU. In short, institutions that determine how the game will be played can minimize the risk and uncertainty by providing improvements in the economic structure within the rules and structural order they create.

To sum up, the studies, carried out to increase the institutional quality at the country level and hereby, improve the institutional factors, can be effective in making strong decisions for the future by reducing the policy uncertainties that will arise in the economy. Increasing the functionality of institutional factors can reduce illegal acts such as bribery, tax evasion and corruption. In this way, increasing the confidence of individuals and companies in the economic system can provide a revival of economic activities. Therefore, a strong economic structure can be created. In the developing world

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order, with the effect of globalization, the economies of all countries in the world are becoming interconnected. For this reason, in the event of a crisis that may occur in the foreign market, since countries with weak economic power are most affected by this situation, uncertainties may arise in the economic policy of these countries. A strong economic structure, which can be created through the development of institutional factors, can mitigate the negative effects of a potential crisis and recession.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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