Araştırma Makalesi / Research Article

The Power That Rusts the Gears: How Corruption Affects Russia's Growth

İbrahim Halil POLAT[1] – Mahir TOSUNOĞLU[2]

Abstract

This study investigates the effect of corruption control on economic growth in Russia, emphasizing the importance of institutional quality for development. While corruption is widely viewed as a key obstacle to prosperity, some studies suggest it may have positive effects under specific circumstances. Using data from 2002 to 2023, the study applies the Johansen cointegration test, ARDL, FMOLS, DOLS, and CCR methods. Findings show that capital, population, and control of corruption contribute positively to economic growth, while labor has a negative impact. These results are consistent across all estimation methods. The research concludes that improving corruption control promotes economic growth, highlighting the need for institutional reforms, greater transparency, and accountability. Additionally, policies that encourage capital investment and align labor market skills with economic needs are recommended for sustainable growth.

Keywords: *Economic development, corruption, time series analysis.*

JEL Codes**:** *C22, D79, O10*

Çarkları Paslandıran Güç: Yolsuzluk Rusya'nın Büyümesini Nasıl Etkiliyor?

Öz

Bu çalışma, Rusya'da yolsuzluğun kontrolünün ekonomik büyüme üzerindeki etkisini incelemektedir. Kurumların kalitesiyle ekonomik kalkınma arasındaki ilişki vurgulanırken, yolsuzluğun ülkelerin zenginleşmesini engelleyebileceği belirtilmektedir. Literatürde, yolsuzluğun büyümeye genellikle olumsuz etkileri olduğu öne sürülmekle birlikte, bazı araştırmalar belirli koşullarda olumlu sonuçlar da ortaya koymuştur. Araştırmada 2002-2023 dönemi için Johansen eşbütünleşme testi, ARDL, FMOLS, DOLS ve CCR yöntemleri kullanılmıştır. Sonuçlara göre, ARDL tahminlerinde sermaye, nüfus ve yolsuzluk kontrolü büyümeyi olumlu, emek ise olumsuz yönde etkilemiştir. Diğer yöntemlerle elde edilen bulgular da bu sonuçları desteklemektedir. Yolsuzluğun kontrolündeki artış, büyümeyi desteklemekte; bu nedenle kurumsal reformlar, şeffaflık ve hesap verebilirlik ön plana çıkmaktadır.

Anahtar Sözcükler: *Ekonomik kalkınma, yolsuzluk, zaman serisi analizi.*
JEL Kodları: *C22, D79,*

[1] Corresponding Author, Dr.Öğr.Üyesi, Hakkari Üniversitesi, İİBF, İktisat Bölümü, ibrahimhalilpolat@hakkari.edu.tr, ORCID ID: 0000-0001-9785-160X

[2] Doktora Öğrencisi, Ege Üniversitesi, Sosyal Bilimler Enstitüsü, İktisat Programı, mtosunoglu00@gmail.com, ORCID ID: 0000-0002-9941-0151

https://doi.org/10.33203/mfy.1734529

Geliş Tarihi/Submitted : 2025-07-04
Kabul Tarihi/Accepted : 2025-09-26

1. Introduction

Corruption (COR) is a phenomenon as old as human history and can be observed widely across both government and private industry sectors, alongside within profit and non-profit organizations (Trabelsi, 2024). It is a structural issue that spreads rapidly when favorable conditions arise, and once entrenched, it becomes extremely difficult to eradicate. In the era of globalization, COR has transcended national boundaries, gaining an international dimension. Since the 1990s, COR refers to the inappropriate appropriation of public resources to serve private interests or the benefit of specific groups has come to be acknowledged among the key primary barriers to economic development (ECD) (Uberti, 2022). Consequently, both national governments and international organizations have increased their efforts and allocated substantial resources to combat this issue (Marquette, 2003; Polat et al.,2025).

It was only in the 1990s that international institutions began to integrate anti- COR strategies into their policy agendas. As the problem became more widespread, the scope of preventative measures expanded accordingly (İşler & Tutar, 2019). Although COR is prevalent in all societies, its intensity varies significantly across countries. An important element affecting this variation indicates the strength and efficiency of institutions (Acemoglu & Robinson, 2012). In general, developed nations possess strong institutions that prevent particular interest groups from capturing state power for their own benefit. In contrast, institutional frameworks in poorer countries tend to be weak and are often dominated by narrow interest groups. This institutional fragility imposes structural constraints that hinder the overall welfare of citizens.

Corrupt practices, therefore, function as institutional barriers that obstruct a nation's economic prosperity and deepen social inequality. Acemoglu and Robinson (2012) argue that the fundamental reason why some countries remain impoverished lies in governance systems that serve the interests of a privileged few. By contrast, advanced economies have succeeded in curbing the power of entrenched elites and building societies in which political rights are distributed more equitably, thereby enabling inclusive EG. Achieving sustainable development, therefore, requires the establishment of institutions that promote the broad and fair distribution of rights an institutional structure that inherently offers greater resistance to COR.

Murphy et al. (1991) propose two primary explanations for the observed lower levels of ECD and growth in countries where rent-seeking is prevalent. First, rent-seeking activities tend to offer increasing returns; as more individuals or groups engage in such behavior, it becomes more attractive compared to other productive endeavors. Second, rent-seeking that is facilitated or encouraged by public officials tends to adversely impact innovation-based activities, thereby significantly hindering ECD. This occurs because innovative firms, in contrast to those in traditional sectors, often require a broader range of government-provided goods and services such as licenses and import quotas. Given their inelastic and substantial demand for these services, innovative industries frequently become primary targets of corrupt practices.

Numerous other studies similarly suggest that COR undermines ECD by raising transaction costs, fostering rent-seeking behavior, creating uncertainty, misguiding investment decisions, distorting market regulations, and leading to the inefficient allocation of production factors (Rose-Ackerman, 1997; Shleifer & Vishny, 1993).

COR exerts multifaceted effects on various economic indicators, including EG, savings, investment, public expenditures, government revenues, and the informal economy (Güney, 2013; Mo, 2001). Empirical studies have consistently demonstrated that COR imposes substantial economic and social costs (Bayar, 2010). Among its many detrimental consequences on ECD are the discouragement of both domestic and foreign investment, increased income inequality and poverty, the generation of negative value added, distortions in resource and income allocation, widening fiscal deficits, and declines in the efficiency and effectiveness of public services (Beşel & Savaşan, 2014).

Large-scale COR is particularly prevalent in public investment projects and public-private partnerships. When COR is present, public investment levels often rise, yet the quality and productivity of such investments tend to deteriorate (Tanzi & Davoodi, 1997). The broader societal and institutional consequences of COR manifest not only through the inefficiency and dysfunction of public institutions but also through its deep penetration into all layers of the social hierarchy, shaping class structures and revealing itself in diverse forms (Moiseev et al., 2019). In the case of Russia, it is widely assumed that public officials at all administrative levels who control public assets such as financial resources, quotas, or property are particularly vulnerable to COR. As a result, COR is frequently associated with bureaucratic structures and political elites, where it is considered a widespread and persistent issue.

Given these circumstances, Russia emerges as a critical case for examining the relationship between EG and COR, not only because it is a developing economy but also due to the considerable variability in its political and economic dynamics. Over the past two decades, Russia has encountered alternating phases of rapid growth and economic instability, bringing institutional variables especially COR into the spotlight as key factors influencing EG (Schulze et al., 2018). From the perspective of developing economies, COR, capital accumulation, and labor market efficiency represent fundamental determinants of sustainable development (Moiseev et al., 2019). Thus, an in-depth analysis of Russia can offer valuable insights specific to its own institutional landscape, while also providing broader implications for other developing countries with similar governance structures. Moreover, according to the 2024 report released by Transparency International, Russia scored 22 out of 100 on the COR Perceptions Index, ranking 154th among 180 countries an indication of serious concerns related to transparency, rule of law, and economic stability (Transparency International, 2024).

Despite a series of reforms undertaken over the last three decades, COR has continued to undermine the functioning of public institutions in Russia, weakening public trust in government and exerting negative effects on both political and societal structures (Moiseev et al., 2019). This has significantly hindered the country's post-Soviet restructuring process (Levin & Satarov, 2013). In this context, Russia's high perceived level of COR and its centralized governance model make it a highly relevant case for studying the association between institutional robustness and EG. This study aims to examine the impact of COR control, capital accumulation, labor, and population on EG in Russia within the framework of a growth model over the period 2002–2023, utilizing detailed econometric techniques. This study thoroughly examines both the long-run and short-run dynamics using diverse econometric techniques, including the Johansen cointegration test, the ARDL bounds testing method, the Error Correction Mechanism (ECM), as well as FMOLS, DOLS, and CCR method.

This methodological framework is expected to provide valuable insights not only for understanding the dynamics of EG in Russia but also for other developing countries with similar structural characteristics. As far as the authors are aware, no earlier study has employed this set of techniques to investigate the influence of COR, capital, and labor on EG specifically in the context of Russia. Therefore, this research intends to offer a unique contribution to the literature, both theoretically and empirically, while also aiming to provide concrete and actionable policy recommendations for decision-makers.

In light of the above findings, this study provides methodologically robust and reliable evidence on the COR and EG nexus by employing multiple econometric techniques. The results indicate that while population dynamics and capital accumulation support EG, labor inefficiencies in Russia exert adverse effects, and institutional quality exerts a conditional influence. Furthermore, by focusing on the relatively underexplored case of Russia, the study fills a significant gap in the literature and offers context specific implications for other emerging economies facing similar structural and governance challenges.

This study is composed of four core sections. Following the introduction, which outlines the theoretical context, the second chapter provides a detailed discussion of the conceptual framework. The third chapter presents a comprehensive explanation of the data and variables employed, along with a summary of the econometric methodology applied during the estimation process. In the fourth chapter discusses the results obtained from the empirical analysis are reported and interpreted through relevant discussions. Finally, the fifth chapter offers an overall evaluation of the findings and presents policy recommendations alongside the concluding remarks.

2. Literature Review

Over the past four decades, theoretical and empirical studies on corruption (COR) have fostered a rich and ongoing academic debate. From a theoretical standpoint, the existing literature offers no unified view on the effect of COR on economic growth (EG). Numerous studies suggest that COR can negatively affect EG (Krueger, 2002; Myrdal, 1989; Shleifer & Vishny, 1993; Tanzi, 1997; Mo, 2001; Hodge et al., 2011; Dridi, 2013; d'Agostino et al., 2016; Cieślik & Goczek, 2018; Baklouti & Boujelbene, 2019; Gründler & Potrafke, 2019; Moiseev et al., 2019; Schulze et al., 2019; Trabelsi, 2024). Hodge and colleagues (2011) argue that COR hampers EG by undermining investment, weakening human capital formation, and generating political instability. Additionally, many scholars emphasize that COR shifts public priorities, reallocates state resources toward private interests, and leads to a decline in social welfare. By linking access to public services to bribery, it raises administrative costs and fosters societal unrest and political instability, thereby deterring private investment and impeding growth (Alesina et al, 1992; Ahmad et al., 2012).

Conversely, some researchers claim that COR may, under certain circumstances, accelerate development processes. Leff (1964) suggests that COR can act as a facilitator in overcoming bureaucratic obstacles and thus promote EG. According to this view, COR may function as a corrective mechanism to bypass inefficient government procedures and enable broader participation in decision-making processes. Although COR may empower particular economic actors beyond their legal scope, whether this influences outcomes depends on whether those actors promote policies aligned with economic progress. For instance, if the business sector struggles to align with government objectives but is more committed to EG, their greater involvement in policymaking might contribute positively to development.

Some studies further argue that the relationship between COR and EG may be positive in specific national contexts (Leff, 1964; Huntington, 1968; Paul, 2010; Jiang & Nie, 2014; Nguyen & Luong, 2020). In particular, Nguyen and Luong (2020) contend that "COR does not hinder EG; rather, it can eliminate growth obstacles and accelerate the process." Similarly, Huang (2016) argues that in South Korea, COR and EG can be positively correlated. From this perspective, COR could motivate bureaucrats to deliver services more efficiently and help entrepreneurs navigate restrictive regulations. Thus, COR, under certain conditions, may act as a catalyst for economic activity and contribute to improved productivity (Mo, 2001).

On another front, Acemoglu and Verdier (1998) argue that COR can have beneficial effects on EG up to a certain threshold and introduce the notion of an "optimal level of COR." Along these lines, Dzhumashev (2014) examines how governance quality, public expenditure, and development dynamics mediate the COR -growth relationship. His findings indicate that COR may enhance economic efficiency only when the size of government activity goes beyond its economically optimal point implying that there could be a COR level that maximizes growth.

Lui (1985), using a bribery model, demonstrated that bribes might speed up bureaucratic processes and lead to more efficient outcomes. In this model, individuals or firms may choose to pay bribes to expedite licensing and approval procedures. Beck and Maher (1986) compare COR to a competitive bidding process in public procurement, suggesting that bribe rankings may resemble competitive auction results. From this angle, acquiring licenses through bribes may, in some cases, mimic the efficiency of market-based mechanisms.

As evident from the literature, the connection between COR and growth appears to shift depending on the political and institutional environment. In democratic regimes where accountability is strong, COR tends to hinder EG, while rising growth also contributes to the decline of COR. On the other hand, in authoritarian systems where accountability mechanisms are weak, COR tends to be more pervasive, and its impact on EG becomes ambiguous or negligible.

In summary, existing research shows that COR may exert both positive and negative effects on EG, indicating a complex and nonlinear relationship between the two variables. However, studies specifically addressing COR's economic implications in the context of Russia remain limited, suggesting that this research can offer a valuable contribution to the existing body of literature.

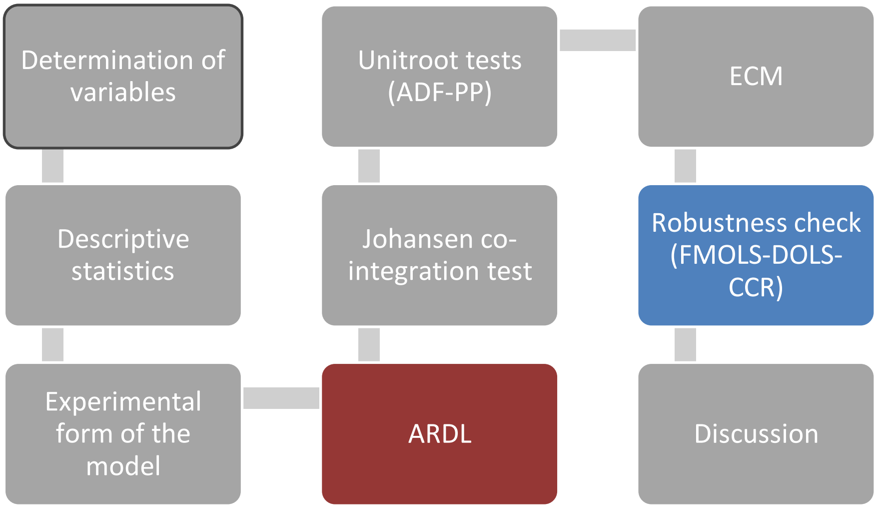
Although the literature on the COR and EG nexus is extensive, the majority of existing studies remain constrained by a one dimensional and linear perspective, framing COR either as a detrimental or a beneficial phenomenon. Such an approach fails to capture the complex, nonlinear, and institutionally contingent nature of this relationship. Moreover, single country analyses have received insufficient attention, with Russia in particular remaining underexplored despite its distinctive governance structures and institutional dynamics. In this regard, the present study seeks to address this gap by offering a contextually grounded and theoretically enriched contribution that advances the existing body of knowledge.

3. Methodology

This part details the procedure followed to analyze the influence of COR on Russia's EG, while accounting for essential control variables such as labor, capital, and population. To begin with, the time series underwent stationarity testing through the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, ensuring the variables' integration order was suitable before estimating the model. After confirming stationarity, the ARDL bounds testing method was utilized to examine both the short-term interactions and the long-run equilibrium among the variables. To reinforce the validity of the outcomes, the Johansen cointegration method was also applied as a complementary technique. Additionally, the long-run parameters were estimated by applying the FMOLS, DOLS, and CCR techniques to verify the stability and reliability of the empirical findings.

The roadmap used in this study reveals the systematic structure of the analysis process and is also expressed schematically to provide visual support for the reader to better understand the empirical approach followed. In this context, the empirical analysis method followed in the study is presented schematically below.

Figure 1
Analysis Flowchart



3.1. Evaluation of Stationarity through ADF and PP Unit Root Tests

Time series models typically consider the inclusion of non-stationary variables may lead to misleading outcomes, often resulting in spurious regression problems that obscure the true relationships among variables. Consequently, determining the stationarity of each variable is a crucial preliminary step in econometric modeling (Gujarati, 2004). So as to evaluate the stationarity characteristics of the data series, this study utilized unit root tests (non-stationarity). Specifically, the study utilized the Augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1981) alongside the Phillips-Perron (PP) test introduced by Phillips and Perron (1988).

The ADF method addresses potential autocorrelation in the error term by incorporating lagged differences of the dependent variable. It is typically estimated under three alternative model specifications. The optimal lag length used in the ADF regression is determined through information criteria. While the ADF test relies on a parametric approach to correct for autocorrelation (Dickey & Fuller, 1981), the PP test uses non-parametric adjustments, making it more robust to heteroskedasticity and serial correlation in the error term. As a result, the PP test is often considered more flexible and less sensitive to the limiting distribution of the test statistic as the sample size approaches infinity (Phillips & Perron, 1988).

Both the ADF and PP tests follow similar hypotheses. The H0 in each test asserts the presence of the presence of a unit root, meaning the series is non-stationary while the alternative hypothesis (HA)suggests stationarity. If the H0 is rejected, the series is deemed stationary; elsewise, it is considered to possess a unit root.

Despite their shared objective, the two tests differ methodologically Conducting the ADF test entails deciding on the optimal number of lags and is implemented through a parametric framework, whereas the PP test adopts a non-parametric approach and demonstrates greater resilience to heteroskedastic errors. These features render the PP test particularly advantageous in studies with smaller sample sizes, where it is often found to outperform the ADF test in terms of reliability (Phillips & Perron, 1988).

3.2. Johansen Cointegration Test

This research applies the Johansen co-integration test (1988) to determine both the presence and the number of long-run equilibrium connections among the variables. Unlike the Engle-Granger method, the Johansen approach enables the simultaneous identification of multiple cointegrating vectors within integrated time series. A key strength of this technique lies in its capacity to uncover several cointegration relationships at once, thereby reducing potential errors associated with residual-based estimations. A widely recognized assumption for the application of the Johansen test is that all variables included in the model ought to be integrated of order one, I(1). But, Johansen (1995) argues that strict pre-testing for integration levels (i.e., I(0) or I(1)) is not necessarily essential for the validity of the test (Johansen, 1988; Johansen & Juselius, 1990). This is because cointegrating vectors are determined by the stationary linear combinations of the variables, and the presence of stationarity in the cointegration space will emerge from the test results themselves (Tosunoğlu & Uçal, 2025a).

After conducting the Johansen cointegration analysis, the ARDL bounds testing method was additionally applied to examine both short-run fluctuations and long-run associations among the variables. The trace and maximum eigenvalue statistics within the framework of the test are engaged to evaluate the number of cointegrating link. Johansen framework were calculated using conventional test formulations, as described by Chontanawat (2020) and Hjalmarsson & Österholm (2010).

$$\lambda_{trace} = -\mathrm{T} \sum_{i=r+1}^{n} \ln(\lambda_i) \tag{1}$$

$$\lambda_{max} = -\mathrm{T} \ln(\lambda_{r+1}) \tag{2}$$

The symbol λ_i represents the ranked eigenvalues extracted from the calculated matrix, while T denotes the sample size adjusted for the appropriate lag length. The H_0 that there are at most r cointegrating vectors is tested using the trace statistic. Conversely, the maximum eigenvalue statistic is employed to evaluate the H_A that there are r + 1 cointegrating relationships, against the null that the number is exactly r.

3.3. FMOLS, DOLS, and CCR Estimation Methods

This research FMOLS, Dynamic OLS and CCR techniques were employed to assess the long-run Associations between the variables. These cointegration-based estimators, like conventional methods, require the variables are required to be I(1), indicating stationarity is achieved at the first difference (Erdoğan et al., 2018).

It is well-known that models estimated using the conventional OLS approach may produce biased standard errors for the coefficient estimates, especially in the existence of endogeneity and serial correlation. The FMOLS method, originally introduced by Phillips and Perron (1988), is planned to provide consistent and efficient parameter estimates in cointegrated systems by addressing these issues through non-parametric corrections.

The FMOLS, DOLS, and CCR tests all share the suppose that the time series involved are I(1) and cointegrated (Erdoğan et al., 2018). However, they offer methodological improvements over traditional OLS by correcting for common econometric problems. Specifically, FMOLS, developed by Hansen and Phillips (1990), effectively corrects for serial correlation and endogeneity between the regressors and the error term, offering robust estimations in cointegrated regressions.

Similarly, the DOLS estimator proposed by Stock and Watson (1993) addresses the endogeneity problem by augmenting the cointegrating regression with leads and lags of the differenced independent variables. This dynamic specification helps to eliminate simultaneity bias and improves estimation efficiency (Tosunoğlu & Uçal, 2025a).

On the other hand, the CCR approach, introduced by Park (1992), aims to eliminate the biases associated with conventional OLS by transforming the data constructed using the long-term covariance matrix. This transformation asymptotically removes endogeneity by accounting for long-run correlation between the regressors and the error term, thereby enhancing the reliability of coefficient estimates (Mehmood et al., 2014).

3.4. Cointegration Analysis Using The ARDL Bounds Testing Method

Economic time series are often characterized by non-stationarity, meaning they typically follow processes that contain unit roots (Johansen & Juselius, 1990). Analyzing such non-stationary series without appropriate transformation may result in spurious regressions and misleading inferences (Granger & Newbold, 1974). A common approach to mitigate this problem involves differencing the series to achieve stationarity. However, this transformation may weaken the time-dependent structure of the data and obscure the long-term relationships among variables (Tarı & Yıldırım, 2009). For this reason, cointegration techniques are preferred to examine whether a set of non-stationary variables move together in the long run, even if they are individually unitroot (non-stationary). Such analyses can be conducted using various techniques developed by researchers like Eriçok and Yılancı (2013).

Among the commonly employed cointegration techniques, the ARDL bounds testing method stands out due to its flexibility. One of its major advantages is that it can be applied regardless of whether the underlying variables are integrated of order zero, I(0), or order one, I(1), as long as none is integrated of order two, I(2) (Pesaran et al., 2001). Unlike traditional cointegration tests, the ARDL method eliminates the need for pre-testing the integration level of each variable (Narayan & Narayan, 2005).

Compared to the Engle-Granger cointegration method, the ARDL bounds testing procedure offers more robust statistical properties. This superiority stems from the ARDL model's incorporation of an Unrestricted Error Correction Model (UECM), which enables the simultaneous estimation of both long-run and short-run dynamics (Narayan & Narayan, 2005). This feature enhances the model's reliability relative to other cointegration tests.

Another key strength of the ARDL method lies in its suitability for small sample sizes. Monte Carlo simulation studies have shown that, under limited sample conditions, the ARDL bounds test provides more reliable and powerful results than both the Engle-Granger and Johansen cointegration approaches. As such, it presents a practical advantage for researchers working with restricted datasets (Narayan & Smyth, 2005a).

Although ARDL models are structured around autoregressive distributed lag formulations, they do not intrinsically address potential endogeneity among variables. The bounds testing methodology within the ARDL framework generally comprises three main steps. Initially, it examines whether a long-run cointegrating relationship exists among the variables. Upon establishing cointegration, the next phase involves estimating the ARDL model over the long term and calculating the corresponding coefficients. Finally, in the third stage, short-run dynamics are captured using an ECM (Narayan & Smyth, 2006). In this study, the unrestricted ECM equations derived within the ARDL framework are presented below:

$$\Delta lgdp_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i}\Delta lgdp_{t-i} + \sum_{i=1}^{p} \beta_{2i}\Delta lcaf_{t-i} + \sum_{i=1}^{p} \beta_{3i}\Delta llab_{t-i} + \sum_{i=1}^{p} \beta_{4i}\Delta \text{lpop}_{t-i} + \sum_{i=1}^{p} \beta_{5i}\Delta \text{coc}_{t-i} + \beta_6 lgdp_{t-1} + \beta_7 lcaf_{\,t-1} + \beta_8 llab_{t-1} + \beta_9 \text{lpop}_{t-1} + \beta_{10}\text{coc}_{t-1} + \varepsilon_t \qquad (3)$$

In the ARDL model equations, Δ refers to the first-order differencing operator, β_0 represents the constant term, β_{1i} to β_{5i} indicate the short-run dynamic coefficients, while β_6 to β_{10} capture the long-run relationships among the variables. The error term is denoted by ε_t, and p refers to the lag length of both the dependent and independent variables. The F-statistic, a key element in the bounds testing methodology, is recognized for its sensitivity to the choice of lag length (Bahmani-Oskooee & Goswami, 2003).

To ensure robust estimation, the optimal lag length is established using information criteria (Narayan & Narayan, 2005). Once the appropriate lag length has been established, the F-statistic serves to evaluate the joint statistical significance of the level and lagged values of the dependent and explanatory variables.

At this stage, the H_0 tests whether the lagged levels of the variables are jointly insignificant in the model. If rejected, it implies the presence of a long-run cointegration relationship among the variables (Tosunoğlu & Uçal, 2025b). Therefore, the bounds test functions as a formal hypothesis test for cointegration and is expressed through the following null hypothesis:

$$H_0: \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0 \quad (4)$$

The evaluation of the F-test involves comparing the obtained statistic to predefined critical values provided by Pesaran et al. (2001) at various significance levels. However, since these critical values were derived under the assumption of large sample sizes, Narayan (2005) later developed an alternative set of critical values more suitable for studies with small sample sizes. Within this framework, when the calculated F-statistic exceeds the upper bound of the critical values, the H_0 indicating no cointegration is rejected, implying that a long-run equilibrium relationship exists among the variables. On the other hand, when the F-statistic lies below the lower bound, the null cannot be rejected, indicating the absence of cointegration (Narayan, 2005). When the computed F-statistic is located between the lower and upper bounds, the test results become inconclusive, and no definitive con a conclusion may be inferred about the presence of cointegration (Narayan & Narayan, 2005).

Once cointegration is confirmed, the next step involves estimating the long-run ARDL model. At this stage, the primary goal is to obtain reliable estimates of the long-run coefficients of the explanatory variables. During the model specification process, information criteria are utilized to define the suitable lag length for the variables. The ARDL model in the long run formulations used in this study are presented as follows:

$$lgdp_t = \beta_0 +. \sum_{i=.1}^{p} \beta_{1i} lgdp_{t-i} +. \sum_{i=.1}^{p} \beta_{2i} lcaf_{t-.i} +. \sum_{i=1}^{p} \beta_{3i} llab_{t-.i} +. \sum_{i=1}^{p} \beta_{4i} \mathrm{lpop}_{t-.i} +. \sum_{i=1}^{p} \beta_{5i} \mathrm{coc}_{t-.i} + \varepsilon_t \quad (5)$$

In the model equations, β_0 denotes the long-run intercept term, β_{1i} to β_{5i} represent the long-run slope coefficients, p indicates the selected lag length, and ε_t represents the long-run error term.

3.5. Error Correction Mechanism (ECM)

ECM is a valuable tool for addressing cointegration within a single-equation framework, particularly in cases where the estimated parameters exhibit weak exogeneity. The ECM is typically derived from an extended ARDL model and is relying on the parameter estimate of the lagged dependent variable estimated using the OLS method

(Banerjee et al., 1998).

Once the long-run parameters are derived using the ARDL bounds framework testing approach, the next step involves the formulation of the error correction model. In this stage, short-run dynamics are captured while simultaneously estimating the parameter associated with the error correction component, indicating the rate at which the system returns to its long-run equilibrium (Narayan & Narayan, 2005).

$$\Delta lgdp_t = \beta_0 + \sum_{i=1}^{p} \beta_{1i} \Delta lgdp_{t-i} + \sum_{i=1}^{p} \beta_{2i} \Delta lcaf_{t-i} + \sum_{i=1}^{p} \beta_{3i} \Delta llab_{t-i} + \sum_{i=1}^{p} \beta_{4i} \Delta \mathrm{lpop}_{t-i} + \sum_{i=1}^{p} \beta_{5i} \Delta \mathrm{coc}_{t-i} + \beta_1 ECT_{t-1} + \varepsilon_t \quad (6)$$

In the equation above, β_{1i} to β_{5i} represent the short-run dynamic coefficients, p denotes the relevant lag length, β_0 denotes the short-run intercept term, and ε_t is the short-run error term. The coefficient β_1, on the other hand, indicates the adjustment speed parameter, which shows the proportion of a short-run deviation from equilibrium that is adjusted in the following time period.

If the estimated coefficient of the error correction term (ECT_{t-1}) falls within the range of 0 to –1, it implies that the system gradually converges toward its long-run equilibrium. When the coefficient lies between –1 and –2, it suggests that the system approaches equilibrium through dampened oscillations around the long-run path. However, if the coefficient is less than –2 or greater than 0, it indicates instability in the adjustment process and that the system diverges from its equilibrium path (Alam & Quazi, 2003).

3.6. Data Set and Model Specification

To examine the influence of COR control on EG in Russia, the study applies the following variables: real GDP (= 2015, US$, per capita), control of COR (measured by the availability of resources), gross fixed capital formation (= 2015 US$), total labor force, and total population. These variables were derived from the World Bank's (WDIs) database.

In this context, EG is proxied by per capita GDP, COR control is represented by the resource-based COR control indicator, capital is measured by gross fixed capital formation, labor input is captured by the total labor force, and population is reflected by the total population figures.

All variables are transformed into their natural logarithmic forms. The log-log functional form was chosen as it allows the estimated coefficients to be interpreted as elasticities, thereby enabling a direct comparison of variables expressed in different units. A summary table of the variables used in the analysis is presented below.

Table 1
Overview of Variables

Abbreviation	Variable	Measurement	Role	Source
lgdp	Economic Growth (EG)	Real GDP (= 2015, US$, per capita), in logarithmic form	Dependent	WDIs
lcaf	Capital	Gross fixed capital formation (= 2015, US$, per capita), in log form	Independent	WDIs
llab	Labor	Total labor force per capita, in logarithmic form	Independent	WDIs
lpop	Population	Total population, in logarithmic form	Independent	WDIs
coc	Control of Corruption	Control of corruption: resource-based index	Independent	WDIs

In this research, economic growth (EG), the explained variable, is represented by real GDP per capita. This indicator is obtained by dividing the gross domestic product by the mid-year population. GDP reflects the overall gross value added produced by domestic economic agents, incorporating product-related taxes while excluding any subsidies not accounted for in product valuations. It is important to highlight that this measure does not account considering capital consumption and the diminishing availability of natural resources. To eliminate the effects of inflation, the data are reported in constant 2015 US dollars.

The main explanatory variable, control of corruption (COR), is evaluated using the indicator titled "control of COR: number of sources." This indicator refer to perceptions regarding the degree to which public authority is misused for private benefit, covering both minor and major forms of corruption, including elite-driven state capture. The "number of sources" component refers to the quantity of data inputs used to derive the estimate. The dataset originates from the WDIs, a composite measure based on assessments from citizens, experts, and business professionals concerning governance quality. These evaluations come from diverse origins, including research institutions, NGOs, international bodies, think tanks, and the private sector. It is worth noting that official government assessments are not included in the WGI database.

Capital, another independent indicator is measured through gross fixed capital formation per capita. This includes enhancements to land, acquisition of physical assets including plants, machinery, and equipment, as well as investments in infrastructure projects such as transportation networks, educational institutions, and healthcare facilities. The net acquisition of valuable assets is also included. Data are recorded in constant 2015 US dollars and adjusted per capita to ensure consistency with the dependent variable.

Labor is proxied by total labor force per capita, capturing individuals aged 15 and older who are economically active either employed or actively seeking employment. This includes both first-time job seekers and the unemployed, but typically excludes unpaid family workers, volunteers, and students. Some national accounts also exclude armed forces. Since labor market participation can fluctuate due to seasonal employment, the labor force is scaled by total population to represent labor participation dynamics relative to the country's demographic structure.

Each of these variables has been transformed into natural logarithmic form, enabling elasticity-based interpretation and facilitating comparability across variables measured in different units. Descriptive statistics are used to obtain a priori information about variables (Tosunoğlu, 2024). Descriptive statistics for the variables used in the analysis are presented in the table below.

Table 2
Summary Statistics of the Variables

Variable	Mean	Standard Deviation	Minimum	Maksimum
lgdp	9.077892	0.154433	8.684430	9.251537
lcaf	26.29878	0.262592	25.62118	26.59803
llab	18.12960	0.015262	18.10459	18.14891
lpop	18.78596	0.006723	18.77655	18.79537
coc	11.36364	1.989148	8.000000	14.00000
Number of observations: 22				

Upon examining the an examination of the summary statistics for the variables reveals that the data do not contain any significant outliers. This provides a reliable foundation for the subsequent empirical analysis. The impact of COR control on EG in Russia will be investigated using time series econometric techniques, including the Johansen cointegration test, the ARDL bounds testing approach, and FMOLS, DOLS, CCR, and the ECM frameworks.

$$lgdp = f(lcaf, llab, lpop, coc) \quad (7)$$

In the model specified above, lgdp serves as the dependent variable, while lcaf, llab, lpop, and coc are included as explanatory (independent) variables.

4. Findings and Discussion

A key strength of the ARDL bounds testing method lies in its flexibility, as it remains applicable regardless of whether the variables are level stationary [I(0)] or attain stationarity after first differencing [I(1)] (Pesaran et al., 2001). However, to ensure the validity of the method, the possibility that any of the variables might be integrated of order two I(2) has been carefully assessed. In pursuit of this aim unitroot tests were conducted, and the findings are presented below.

Table 3

Unit Root Test Results (ADF and PP)

	ADF		PP	
Variable	**C**	**C/T**	**C**	**C/T**
lgdp	-3.64**	-2.81	-5.42**	-3.64*
lcaf	-3.30**	-2.65	-4.14***	-2.66
llab	-1.99	-1.08	-1.23	-1.03
lpop	-3.69**	-3.89**	-1.77	-2.25
coc	-1.19	-1.59	-1.49	-1.70
Δlgdp	-3.56**	-3.98**	-3.57**	-3.98**
Δlcaf	-3.07**	-3.14*	-3.02**	-3.09*
Δllab	-2.79*	-5.04***	-2.79*	-5.01***
Δlpop	-2.83*	-2.97***	-1.55*	-2.94***
Δcoc	-3.38**	-4.08**	-3.35**	-5.49***

Notes: The appropriate lag lengths in the ADF test were determined using the Akaike Information Criterion (AIC), with a maximum lag set to 3. For the PP test, the bandwidth selection was based on the Newey-West method, and the Bartlett Kernel function was employed for estimation. Statistical significance is indicated by (*), (**), and (***), corresponding to the (10%), (5%), and (1%) significance levels, respectively.Δ denotes the first difference of the variable.

Rely on the findings of the ADF and PP tests, it is evident that the variables in their logarithmic form are non-stationary in their level form, yet become stationary once first differences are applied. Accordingly, it can be concluded that the series follow an integration process of order one, i.e., I(1).

Table 4

Johansen Cointegration Test Results

H_0	Trace stat.	p-value	Max-Eigen stat.	p-value
R = 0	136.78***	0.0000	60.77***	0.0000
R ≤ 1	76.01***	0.0000	37.22***	0.0021
R ≤ 2	38.79***	0.0035	22.29**	0.0342
R ≤ 3	16.49**	0.0352	16.49**	0.0219
R ≤ 4	0.01	0.9371	0.01	0.9371

The findings from the Johansen cointegration test are summarized in the preceding table. As reported by the trace statistic, four cointegrating link are identified at the 5% significance level. Similarly, the maximum eigenvalue test also indicates the presence of four cointegrating vectors at the same significance level. These findings confirm a cointegrating relationship among the variables over the long run.

So as to further validate the cointegration relationship, the ARDL bounds testing approach is also employed. As the unit root test results verify that none of the series are integrated of order two [I(2)], the ARDL methodology is considered appropriate for conducting the analysis (Akpınar & Çelik, 2025). The results of the ARDL bounds test are shown in the following table.

Table 5

ARDL Bounds Test Results

Model	Optimal Lag Length	F-statistic	Critical Value (Bound Test)		Cointegration
			***I*(0)**	***I*(1)**	
lgdp=f(lcaf, llab, lpop, coc)	(1, 2, 3, 1, 0)	26.34	3.07	4.44	√

Evidence gathered from the ARDL bounds testing procedure are presented in the table above. Critical limits of the F-statistic range from 3.07 (lower bound) to 4.44 (upper bound). Since the calculated F-statistic (26.34) exceeds the upper bound value (26.34 > 4.44), the null hypothesis of no long-run relationship is rejected. Therefore, a statistically significant cointegration relationship is confirmed among the variables at the 1% significance level.

Following the confirmation of a long-run cointegration link among the variables through the ARDL bounds F-test, long-run ARDL estimations were conducted. However, the reliability of the F-test results depends on whether the model satisfies certain statistical assumptions. To assess the validity of these assumptions, a series of diagnostic tests were performed. Table below provides the outcomes of the applied diagnostic tests.

Table 6

Diagnostic Test Results for the ARDL Model

Test	Hypothesis	t-stat lgdp
Ramsey Reset	No functional form misspecification	0.037 (0.8528)
Breusch-Godfrey LM	No autocorrelation.	0.712 (0.6980)
Breusch- Pagan LM	No heteroskedasticity	12.896 (0.2113)

Notes: The values in parentheses represent the p-values based on the corresponding F-statistics.

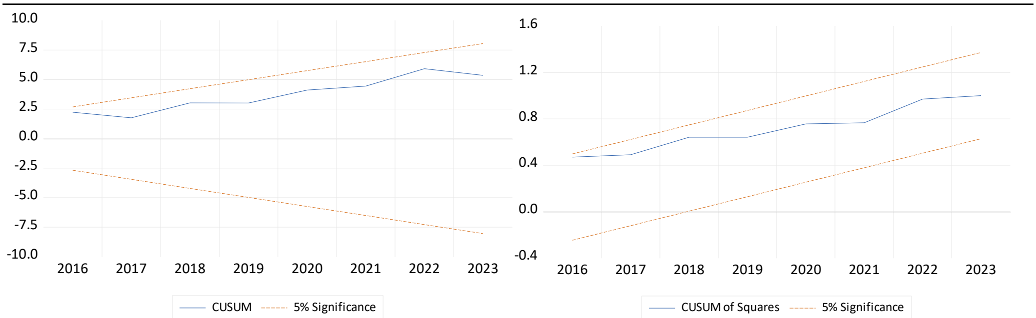
Rely on the findings of the diagnostic tests, the H0 could not be rejected. This indicates that the model does not suffer from autocorrelation, heteroskedasticity, or functional form misspecification. Therefore, it can be concluded that the model is statistically reliable and that the estimation results rest on a sound empirical foundation.

In the final stage, the stability of the parameter estimates was investigated. For this purpose, the stability tests known as CUSUM and CUSUMSQ, formulated by Brown et al. (1975), are applied to detect structural changes, were employed to assess the stability of the estimated ARDL model and to detect any potential structural breaks. The aforementioned tests are widely used to evaluate whether model coefficients remain stable over time.

According to the graphical outputs, none of the coefficients exhibit structural instability with statistical significance established at the 5% level. The outcomes imply that there is no significant variation in the model parameters throughout the sample period. The CUSUM and CUSUMSQ test results are presented below.

Figure 2

CUSUM and CUSUMSQ-Based Analysis of Model Stability



According to the results of the ARDL bounds testing procedure, a long-run cointegration relationship has been identified among the variables included in the model. In line with this finding, the long-run ARDL coefficient estimates were obtained as a next step in the analysis. The estimated long-run coefficients along with their corresponding statistical values are presented in the table below.

Table 7

Long-Run Estimation Results (ARDL, FMOLS, DOLS, and CCR)

Method	Variable	Coeff.	Std. err	t-stat	p-value
ARDL	lcaf	0.59***	0.01	46.04	0.0000
	llab	-2.04***	0.23	-9.05	0.0000
	lpop	1.62***	0.21	7.84	0.0001
	coc	0.01***	0.01	5.92	0.0004
FMOLS	lcaf	0.61***	0.01	44.06	0.0000
	llab	-1.24**	0.45	-2.77	0.0136
	lpop	2.28***	0.47	4.85	0.0002
	coc	0.01*	0.01	1.75	0.0989
	c	-27.32*	13.87	-1.97	0.0664
DOLS	lcaf	0.57***	0.04	14.22	0.0008
	llab	-4.61**	0.96	-4.83	0.0170
	lpop	4.12**	0.91	4.51	0.0203
	coc	0.03**	0.01	3.37	0.0436
	c	-607.52**	136.52	-4.45	0.0470
CCR	lcaf	0.60***	0.01	43.75	0.0000
	llab	-1.15**	0.54	-2.12	0.0499
	lpop	2.44***	0.54	4.49	0.0004
	coc	0.01	0.00	1.71	0.1068
	c	-31.83*	17.50	-1.82	0.0876

Note: Statistical significance is indicated by (*), (**), and (***), corresponding to the (10%), (5%), and (1%) significance levels, respectively.

The table above presents the estimated long-run coefficients obtained through ARDL, FMOLS, DOLS, and CCR methods. The results indicate that control of COR, capital, and labor are statistically significant at the 10% significance level. Across all estimators, capital, population, and control of COR have a positive impact on EG, while labor exerts a negative influence. The findings reveal that capital accumulation and population growth exert a positive influence on EG, consistent with the results of Solow (1956), Barro (1991), Levine & Renelt (1992), Bloom & Williamson (1998), and Head & Mayer (2014). Another key result indicates that labor constrains EG, a conclusion that aligns with the works of Lewis (1954), Krugman (1994), and Islam (1995). COR, while affecting growth in the expected direction, appears to have only a limited and conditional impact, in line with the findings of Leff (1964), Dzhumashev (2014), and Djouadi et al. (2024). Overall, the evidence suggests that investment and demographic dynamics constitute the primary drivers of potential growth, whereas improvements in labor quality and institutional structures are essential. In particular, the adverse effect of labor may be explained by insufficient education, low productivity, informal employment, and technological mismatches, which hinder labor's contribution to EG and instead impose an economic burden.

The ARDL bounds testing approach is particularly effective for studies with small sample sizes. According to Monte Carlo simulations, the ARDL method provides more robust results compared to the Engle-Granger and Johansen cointegration techniques in cases with a limited number of observations (Narayan & Smyth, 2005b). This makes the ARDL bounds approach a reliable econometric tool even in small-sample applications.

When comparing the coefficient estimates across methods, the ARDL results appear to be more reliable and statistically robust. Nonetheless, the findings from FMOLS, DOLS, and CCR also support the ARDL estimates, reinforcing the robustness of the results. Importantly, the ARDL coefficients are found to be statistically significant at the 1% level, indicating strong empirical support for the long-run relationships identified. The results of the ARDL ECM are presented in the table below.

Table 8

ARDL Error Correction Model (ECM) Results

Variable	Coeff.	Std err.	t-stat	p-value
ECT_{t-1}	-1.27***	0.09	-14.06	0.0000
Note: Statistical significance is indicated by (*), (**), and (***), corresponding to the (10%), (5%), and (1%) significance levels, respectively.				

The results of the ECM are presented above. The parameter associated with ECT_{t-1} measures how quickly discrepancies from the long-run equilibrium are corrected. The estimated coefficient falls within the interval between –1 and –2, specifically at –1.27, which implies that the system returns to equilibrium with diminishing oscillations around the long-run path, as suggested by Alam and Quazi (2003).

The error correction coefficient in the model has been found to be statistically significant. However, relying solely on the p-value is not sufficient to assess the statistical significance of the error correction coefficient. Therefore, a critical value bounds test for the t-statistic of the error correction term must also be conducted. The results of this bounds test for the t-statistic of the ECTt-1 are shown in the following table.

Table 9

t -Bounds Test for the Error Correction Term.

t-Statistic	Critical Value (Bound Test)	
	I **(0)**	***I*** **(1)**
-14.05	-2.58	-4.23

The t-bounds test findings pertaining to the error correction term are summarized in the above table. The computed t-statistic value is –14.05, which lies beyond the critical threshold of –4.23 at the 1% significance level. Given that the absolute magnitude of the t-statistic surpasses the upper critical bound, the coefficient of the lagged error correction term (ECT_{t-1}) is deemed statistically significant at the 1% level. This finding substantiates the presence of a valid error correction mechanism within the model.

Furthermore, the extent of the error correction coefficient (–1.27) suggests that any short-run disequilibrium is corrected within approximately 0.79 years (1/1.27), indicating a relatively fast adjustment toward the long-run equilibrium. This finding implies that variations from the long-run path in the environmental quality model are eliminated within less than a year, reinforcing the presence of a strong and stable correction mechanism.

5. Conclusion

COR is a phenomenon that not only has economic implications but also leads to various social and political challenges. This study focuses on the effects of COR control on EG in Russia using several advanced econometric methods. Focusing on the period from 2002 to 2023, the analysis explores the growth dynamics of the Russian economy by incorporating key variables such as COR control, capital accumulation, labor force, and population. Both short-run and long-run relationships among these variables are analyzed within a comprehensive econometric framework.

To assess long-term relationships, the empirical analysis applies Johansen cointegration, ARDL bounds testing, and estimators like FMOLS, DOLS, and CCR. The findings confirm that the relationships among the variables are robust and consistent across different methodological approaches. This multi-method strategy enhances the credibility of the results and strengthens their relevance for policy formulation. Ultimately, the study provides reliable empirical evidence on the role of institutional quality specifically, COR control in shaping EG in Russia, delivering relevant perspectives for researchers as well as decision-makers.

The long-run estimation results reveal that control of COR, capital accumulation, and population have a positive and statistically significant impact on EG, whereas labor exerts a negative influence. Notably, the fact that variables such as capital and COR control are significant at the 1% level highlights the crucial role of structural and institutional factors in shaping economic performance. These findings indicate that promoting EG requires not only macroeconomic stability but also improvements in institutional quality.

The negative coefficient associated with labor may point to structural inefficiencies in Russia's labor market, such as low productivity or mismatches between worker skills and labor demand. This outcome underlines the necessity of reforms targeting the labor market, including measures aimed at enhancing workforce productivity, addressing skills gaps, and increasing the adaptability of labor to evolving economic needs.

The error correction coefficient obtained from the short-run analysis indicates a relatively high speed of adjustment, suggesting that the system gradually converges back to its long-run equilibrium following a short-term deviation within approximately 0.79 years following a short-run shock. This implies that the EG process in Russia is responsive and resilient in the face of temporary disturbances. However, the sustainability of this adjustment capacity appears to be closely linked to improvements in institutional factors. In this context, enhancing the quality of governance and strengthening institutional frameworks are essential for maintaining long-term growth stability and resilience.

These findings are not aligned with the strand of literature that argues a negative impact of increased COR (i.e., a decline in COR control) on EG (Cieślik & Goczek, 2018; Baklouti & Boujelbene, 2019; Gründler & Potrafke, 2019; Trabelsi, 2024). However, they are consistent with studies suggesting that a reduction in COR control or a rise in COR may have a positive effect on EG (Paul, 2010; Jiang & Nie, 2014; Huang, 2016; Nguyen & Luong, 2020).

From this perspective, COR may act as an incentive mechanism for bureaucrats, potentially improving the efficiency of public service delivery. It may also help entrepreneurs bypass inefficient regulations and administrative bottlenecks. Some studies even suggest that, under certain conditions and within limited thresholds, COR can facilitate economic activity and accelerate growth processes (Mo, 2001).

Nevertheless, in the long run, COR distorts the investment climate, increases transaction costs, and leads to inefficiencies in resource allocation. Therefore, strengthening institutional quality and enhancing governance mechanisms remain essential for sustaining long-term economic performance.

This study faced several limitations, the most notable being the restriction of the data period to 2002-2023. The primary reason for this constraint is that the COR control variable, which is derived from governance indicators, has been continuously available only since 2002. As a result, the time span was limited to 22 years, which is relatively short for conventional time series analysis.

To resolve the problem associated with a small sample size, the ARDL approach was employed, as it is well-suited for limited observations and takes into account the specific structure of the Russian data set. This methodological choice helps mitigate potential biases and improves the robustness of the estimations despite the restricted time horizon.

The findings of this paper suggest that institutional improvement particularly the control of COR displays a critical role in the long-term growth process of the Russian economy, while capital accumulation emerges as a key driver sustaining economic expansion. The findings provide critical implications for developing countries, emphasizing that growth strategies should not be limited to maintaining macroeconomic stability but should also prioritize institutional reforms.

In this context, policymakers are advised to accelerate labor market reforms, strengthen the investment climate to promote capital formation, and enhance institutional capacity in the fight against COR.

However, the focus of this study on a single country Russia may limit the generalizability of the findings. Future research should consider comparative analyses across multiple developing economies, which could yield more comprehensive insights into the relationship between institutions and growth. Moreover, future studies could disaggregate institutional indicators such as COR control to identify which specific dimensions of institutional quality have the most significant impact on EG.

Furthermore, the observed negative effect of labor on growth calls for more micro-level and sector-specific investigations, which could provide targeted policy recommendations to improve labor market performance. Finally, incorporating emerging themes such as artificial intelligence, digitalization, and climate policies into the institutional quality-growth nexus would offer valuable contributions to the literature and address a notable research gap.

Authorship: All authors contributed to the study's conception, data collection, analysis, and manuscript preparation. All authors reviewed and approved the final version for submission.

Conflict of Interest: The authors declare that there is no conflict of interests in the research, authorship, and publication processes.

Funding: The authors declare that no financial support or funding was received for this study.

Ethicalal Statement: The authors declare that scientific and ethical principles have been adhered to in this study, and all sources used have been properly cited.

References

Acemoglu, D., & Robinson, J. A. (2013). *Why nations fail: The origins of power, prosperity, and poverty*. Crown Currency. https://doi.org/10.1111/dpr.12048.

Acemoglu, D., & Verdier, T. (1998). Property rights, corruption and the allocation of talent: A general equilibrium approach. *The Economic Journal, 108*(450), 1381-1403. https://doi.org/10.1111/1468-0297.00347.

Adaman, F., Çarkoğlu, A., & Şenatalar, B. (2001). *Hane halkı gözünden Türkiye'de yolsuzluğun nedenleri ve önlenmesine ilişkin öneriler*. TESEV Yayınları.

Ahmad, E., Ullah, M. A., & Arfeen, M. I. (2012). Does corruption affect economic growth? *Latin American Journal of Economics, 49*(2), 277-305. https://doi.org/10.7764/LAJE.49.2.277.

Akıllı, H. (2013). Kamu hizmeti imtiyazından yap-işlet-devret yöntemine: Yasal serüven. *Sayıştay Dergisi, (89)*, 91–114. https://dergipark.org.tr/tr/pub/sayistay/issue/61544/919105

Akpınar, A., & Çelik, N. (2025). OECD ülkelerinde cari açık sorunu ve çözüm önerileri: DFE-ARDL panel model bulguları. *Dokuz Eylül Üniversitesi İşletme Fakültesi Dergisi, 26*(1), 46–66.

Alam, I., & Quazi, R. (2003). Determinants of capital flight: An econometric case study of Bangladesh. *International Review of Applied Economics, 17*(1), 85–103. https://doi.org/10.1080/713673164.

Alesina, A., Özler, S., Roubini, N., & Swagel, P. (1992). *Political Instability and Economic Growth* (NBER Working Paper No. 4173). National Bureau of Economic Research. https://doi.org/10.3386/w4173.

Baklouti, N., & Boujelbene, Y. (2020). Shadow economy, corruption, and economic growth: An empirical analysis. *The Review of Black Political Economy, 47*(3), 276-294. https://doi.org/10.1177/0034644619885349.

Banerjee, A., Dolado, J., & Mestre, R. (1998). Error-correction mechanism tests for cointegration in a single-equation framework. *Journal of Time Series Analysis, 19*(3), 267-283. https://doi.org/10.1111/1467-9892.00091.

Barro, R. J. (1991). Economic growth in a cross section of countries. *The Quarterly Journal of Economics, 106*(2), 407–443. https://doi.org/10.2307/2937943.

Bayar, G. (2010). Türkiye'de yolsuzluk-ekonometrik bir inceleme. *Erciyes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 1*(28), 105–131. https://dergipark.org.tr/tr/pub/erusosbilder/issue/23762/253267.

Beck, P. J., & Maher, M. W. (1986). A comparison of bribery and bidding in thin markets. *Economics Letters, 20*(1), 1–5. https://doi.org/10.1016/0165-1765(86)90068-6.

Beşel, F., & Savaşan, F. (2014). Türkiye'de yapısal kırılmalar altında yolsuzluk-ekonomik büyüme ilişkisi. *Kocaeli Üniversitesi Sosyal Bilimler Dergisi, (27)*, 73–86. https://dergipark.org.tr/tr/pub/kosbed/issue/25692/271139.

Bloom, D. E., & Williamson, J. G. (1998). Demographic transitions and economic miracles in emerging Asia. *The World Bank Economic Review, 12*(3), 419–455. https://doi.org/10.1093/wber/12.3.419.

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society: Series B (Methodological), 37*(2), 149-163. https://doi.org/10.1111/j.2517-6161.1975.tb01532.

Chontanawat, J. (2020). Relationship between energy consumption, CO_2 emission and economic growth in ASEAN: Cointegration and causality model. *Energy Reports, 6*, 660-665. https://doi.org/10.1016/j.egyr.2019.09.046.

Cieślik, A., & Goczek, Ł. (2018). Control of corruption, international investment, and economic growth – Evidence from panel data. *World Development, 103*, 323–335. https://doi.org/10.1016/j.worlddev.2017.10.028.

Demez, S., & Polat, İ. H. (2021). The relationship between inflation, unemployment and growth: The case of EAGLEs countries. *Uluslararası Afro-Avrasya Araştırmaları Dergisi, 6*(12), 71-90

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica, 49*(4), 1057–1072. https://doi.org/10.2307/1912517.

Djouadi, I., Zakane, A., & Abdellaoui, O. (2024). Corruption and economic growth nexus: empirical evidence from dynamic threshold panel data. *Business Ethics & Leadership, 8*(2), 49–62. https://doi.org/10.61093/bel.8(2).49-62.2024.

Dridi, M. (2013). Corruption and economic growth: The transmission channels. *MPRA Paper No. 47873*. University Library of Munich. https://mpra.ub.uni-muenchen.de/47873.

Dzhumashev, R. (2014). Corruption and growth: The role of governance, public spending, and economic development. *Economic Modelling, 37*, 202–215. https://doi.org/10.1016/j.econmod.2013.11.032.

d'Agostino, G., Dunne, J. P., & Pieroni, L. (2016). Government spending, corruption and economic growth. *World Development, 84*, 190–205. https://doi.org/10.1016/j.worlddev.2016.01.012.

Erdoğan, L., Tiryaki, A., & Ceylan, R. (2018). Türkiye'de uzun dönem ekonomik büyümenin belirleyicilerinin ARDL, FMOLS, DOLS ve CCR yöntemleriyle tahmini. *Hacettepe Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 36*(4), 39-57. https://doi.org/10.17065/huniibf.336371.

Eriçok, R. E., & Yılancı, V. (2013). Eğitim harcamaları ve ekonomik büyüme ilişkisi: Sınır testi yaklaşımı. *Bilgi Ekonomisi ve Yönetimi Dergisi, 8*(1), 87-101. https://dergipark.org.tr/tr/pub/beyder/issue/3472/47233.

Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics, 2*(2), 111–120. https://doi.org/10.1016/0304-4076(74)90034-7.

Gründler, K., & Potrafke, N. (2019). Corruption and economic growth: New empirical evidence. *European Journal of Political Economy, 60*, Article ID 101810. https://doi.org/10.1016/j.ejpoleco.2019.08.001.

Gujarati, D. N. (2004). *Basic econometrics* (4th ed.). New York, NY: McGraw-Hill.

Güney, T. (2013). *Yolsuzluk ve refah* (Yayınlanmamış doktora tezi). Dumlupınar Üniversitesi, Sosyal Bilimler Enstitüsü, Kütahya.

Hansen, B. E., & Phillips, P. C. B. (1990). Estimation and inference in models of cointegration: A simulation study. *Advances in Econometrics, 8*, 225–248.

Head, K., & Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. In G. Gopinath, E. Helpman, & K. Rogoff (Eds.), *Handbook of international economics* (Vol. 4, pp. 131–195). Elsevier. https://doi.org/10.1016/B978-0-444-54314-1.00003-3.

Huntington, S. P. (1968). *Political order in changing societies*. New Haven, CT: Yale University Press.

Hjalmarsson, E., & Österholm, P. (2010). Testing for cointegration using the Johansen methodology when variables are near-integrated: Size distortions and partial remedies. *Empirical Economics, 39*, 51-76. https://doi.org/10.1007/s00181-009-0294-6.

Hodge, A., Shankar, S., Rao, D. P., & Duhs, A. (2011). Exploring the links between corruption and growth. *Review of Development Economics, 15*(3), 474–490. https://doi.org/10.1111/j.1467-9361.2011.00621.x.

Huang, C. J. (2016). Is corruption bad for economic growth? Evidence from Asia-Pacific countries. *The North American Journal of Economics and Finance, 35*, 247-256. https://doi.org/10.1016/j.najef.2016.03.006.

Islam, N. (1995). Growth empirics: A panel data approach. *The Quarterly Journal of Economics, 110*(4), 1127–1170. https://doi.org/10.2307/2946651.

İşler, K., & Tutar, F. K. (2019). Yolsuzluk ve ekonomik etkileri: Türkiye örneği. *Atlas Journal, 5*(17), 32–59. https://doi.org/10.31568/atlas.267.

Jiang, T., & Nie, H. (2014). The stained China miracle: Corruption, regulation, and firm performance. *Economics Letters, 123*(3), 366-369. https://doi.org/10.1016/j.econlet.2014.02.007

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control, 12*(2–3), 231–254. https://doi.org/10.1016/0165-1889(88)90041-3.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration — with applications to the demand for money. *Oxford Bulletin of Economics and Statistics, 52*(2), 169–210. https://doi.org/10.1111/j.1468-0084.1990.mp52002003.x.

Krueger, A. O. (2002). *Political economy of policy reform in developing countries* (Vol. 4). MIT press.

Krugman, P. (1994). The myth of Asia's miracle. *Foreign Affairs, 73*(6), 62–78. https://doi.org/10.2307/20046929.

Leff, N. H. (1964). Economic development through bureaucratic corruption. *American Behavioral Scientist, 8*(3), 8–14. https://doi.org/10.1177/000276426400800303.

Levine, R., & Renelt, D. (1992). A sensitivity analysis of cross-country growth regressions. *The American Economic Review, 82*(4), 942–963.

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School, 22*(2), 139–191. https://doi.org/10.1111/j.1467-9957.1954.tb00021.x.

Lui, F. T. (1985). An equilibrium queuing model of bribery. *Journal of Political Economy, 93*(4), 760–781. https://doi.org/10.1086/261329.

Marquette, H. (2003). *Corruption, politics and development: The role of the World Bank*. Basingstoke: Palgrave Macmillan.

Mehmood, B., Feliceo, A., & Shahid, A. (2014). What causes what? Aviation demand and economic growth in Romania: Cointegration estimation and causality analysis. *Romanian Economic and Business Review, 9*(1), 21-34.

Mo, P. H. (2001). Corruption and economic growth. *Journal of Comparative Economics, 29*(1), 66–79. https://doi.org/10.1006/jcec.2000.1703.

Moiseev, V. V., Goncharova, I. V., & Chuvardin, G. S. (2019, August). Corruption in Russia: Reasons for the growth. In *2019 5th International Conference on Social Science and Higher Education (ICSSHE 2019)* (pp. 25–28). Atlantis Press. https://doi.org/10.2991/icsshe-19.2019.6.

Murphy, K. M., Shleifer, A., & Vishny, R. W. (1991). The allocation of talent: Implications for growth. *The Quarterly Journal of Economics, 106*(2), 503–530. https://doi.org/10.2307/2937945.

Myrdal, G. (1989). Corruption: Its causes and effects. In A. Heidenheimer, M. Johnston, & V. T. LeVine (Eds.), *Political corruption: A handbook* (pp. 963–971). New Brunswick, NJ: Transaction Publishers.

Narayan, P. K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics, 37*(17), 1979–1990. https://doi.org/10.1080/00036840500278103.

Narayan, P. K., & Narayan, S. (2005). Estimating income and price elasticities of imports for Fiji in a cointegration framework. *Economic Modelling, 22*(3), 423–438. https://doi.org/10.1016/j.econmod.2004.06.004.

Narayan, P. K., & Smyth, R. (2005a). Electricity consumption, employment and real income in Australia: Evidence from multivariate Granger causality tests. *Energy Policy, 33*(9), 1109–1116. https://doi.org/10.1016/j.enpol.2003.11.010.

Narayan, P. K., & Smyth, R. (2005b). Trade liberalization and economic growth in Fiji: An empirical assessment using the ARDL approach. *Journal of the Asia Pacific Economy, 10*(1), 96–115. https://doi.org/10.1080/1354786042000309099.

Narayan, P. K., & Smyth, R. (2006). What determines migration flows from low-income to high-income countries? An empirical investigation of Fiji–U.S. migration 1972–2001. *Contemporary Economic Policy, 24*(2), 332–342. https://doi.org/10.1093/cep/byj017.

Nguyen, T. A. N., & Luong, T. T. H. (2020). Corruption, shadow economy and economic growth: Evidence from emerging and developing Asian economies. *Montenegrin Journal of Economics, 16*(4), 85–94. https://doi.org/10.14254/1800-5845/2020.16-4.7.

Paksha Paul, B. (2010). Does corruption foster growth in Bangladesh? *International Journal of Development Issues, 9*(3), 246–262. https://doi.org/10.1108/14468951011073308.

Park, J. Y. (1992). Canonical cointegrating regressions. *Econometrica, 60*(1), 119–143. https://doi.org/10.2307/2951679.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289–326. https://doi.org/10.1002/jae.616.

Phillips, P. C. B. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(2), 335–346. https://doi.org/10.1093/biomet/75.2.335.

Polat, İ. H., Tosunoğlu, M., & Gümüş, M. (2025). The balancing act: Can corruption control and accountability save public efficiency in India? *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi, 26*(2), 464–490. https://doi.org/10.31796/ogusbd.1445932.

Rose-Ackerman, S. (1997). The role of the World Bank in controlling corruption. *Law & Policy in International Business, 29*(1), 93–114.

Schulze, G. G., & Zakharov, N. (2018). Corruption in Russia. In M. Kochanowicz, & J. Kubik (Eds.), *Handbook on the geographies of corruption* (pp. 195–212). Cheltenham: Edward Elgar. https://doi.org/10.4337/9781786430520.00024.

Shleifer, A., & Vishny, R. W. (1993**).** Corruption. *The Quarterly Journal of Economics, 108*(3), 599–617. https://doi.org/10.2307/2118402.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics, 70*(1), 65–94. https://doi.org/10.2307/1884513.

Stock, J. H., & Watson, M. W. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica, 61*(4), 783–820. https://doi.org/10.2307/2951763.

Tanzi, V., & Davoodi, H. (1997). Corruption, public investment, and growth (IMF Working Paper No. 97/139). International Monetary Fund. https://doi.org/10.5089/9781451929515.001.

Tarı, R., & Yıldırım, D. Ç. (2009). Döviz kuru belirsizliğinin ihracata etkisi: Türkiye için bir uygulama. *Yönetim ve Ekonomi Dergisi, 16*(2), 95–105. https://doi.org/10.29131/uiibd.30688.

Tosunoğlu, M. (2024). The relationship between technological innovation and economic growth in EU countries: A system GMM approach. *Verimlilik Dergisi, 58*(4), 651–662. https://doi.org/10.51551/verimlilik.1402628.

Tosunoğlu, M., & Uçal, H. (2025a). The relationship of energy consumption and economic growth under structural break: An application on Türkiye. *Pamukkale Üniversitesi İşletme Araştırmaları Dergisi, 12*(1), 171–189. https://doi.org/10.47107/pausbed.1396965.

Tosunoğlu, M., & Uçal, H. (2025b). The relationship between energy consumption and economic growth: Cointegration and causality approaches. *Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, (67)*, 177–193. https://doi.org/10.30794/pausbed.1444843.

Trabelsi, M. A. (2024). The impact of corruption on economic growth: A nonlinear evidence. *Journal of Social and Economic Development, 26*(3), 953–962. https://doi.org/10.1007/s40847-023-00280-6.

Transparency International. (2025). Transparency International: The global coalition against corruption. https://www.transparency.org. Accessed: 29 May 2025.

Uberti, L. J. (2022). Corruption and growth: Historical evidence, 1790–2010. *Journal of Comparative Economics, 50*(2), 321–349. https://doi.org/10.1016/j.jce.2021.11.001.