THE ROLE OF ECONOMICS AND POLITICAL FACTORS IN DETERMINING FRAGILITY IN DEVELOPING COUNTRIES: USING PANEL BMA AND WALS METHODS

Tuğba AKIN[1] Alper DEMİRKOL[2]

Abstract

This study examines the determinants of fragility in 70 developing countries from an economic and political perspective using annual data from the period 2007-2022. The research aims to identify factors that create advantages and disadvantages for fragility. The analyses were conducted using four different models employing the Ordinary Least Squares (OLS), Bayesian Model Averaging (BMA), and Weighted Average Least Squares (WALS) methods. According to the analysis results, the unemployment rate, inflation rate, official development aid, population, and rural population variables have a positive and statistically significant impact on the fragile states index. Conversely, the enrollment rate, political stability, and government effectiveness variables have a negative and statistically significant impact on the fragile states index. Examination of the posterior inclusion probability (PIP) values of the variables reveals that official development aid, population, rural population, government effectiveness, and political stability are the most effective variables in explaining changes in the fragile states index.

Keywords: Fragile States Index, Bayesian Model Averaging Method, Weighted Least Squares Method

Jel Codes: C11, C33, O33

GELİŞMEKTE OLAN ÜLKELERDE KIRILGANLIĞIN BELİRLENMESİNDE EKONOMİK VE SİYASİ FAKTÖRLERİN ROLÜ: PANEL BMA VE WALS YÖNTEMLERİNİN KULLANIMI

Özet

Bu çalışma, 2007-2022 dönemi yıllık verilerini kullanarak 70 gelişmekte olan ülkedeki kırılganlığın belirleyicilerini ekonomik ve politik bir bakış açısıyla incelemektedir. Araştırma, kırılganlık üzerinde avantaj ve dezavantaj yaratan faktörleri belirlemeyi amaçlamaktadır. Analizler, En Küçük Kareler Yöntemi (OLS), Bayesyen Ortalama Modellemesi (BMA) ve Ağırlıklı Ortalama En Küçük Kareler (WALS) yöntemleri kullanılarak dört farklı model ile gerçekleştirilmiştir. Analiz sonuçlarına göre, işsizlik oranı, enflasyon oranı, resmi kalkınma yardımı, nüfus ve kırsal nüfus değişkenleri, Kırılgan Devletler Endeksi üzerinde pozitif ve istatistiksel olarak anlamlı bir etkiye sahiptir. Buna karşılık, okullaşma oranı, siyasi istikrar ve hükümet etkinliği değişkenleri, Kırılgan Devletler Endeksi üzerinde negatif ve istatistiksel olarak anlamlı bir etki göstermektedir. Değişkenlerin ardıl dahil edilme olasılığı (PIP) değerlerinin incelenmesi, resmi kalkınma yardımı, nüfus, kırsal nüfus, hükümet etkinliği ve siyasi istikrar değişkenlerinin Kırılgan Devletler Endeksi'ndeki değişimleri açıklamada en etkili değişkenler olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Kırılgan Devletler Endeksi, Bayesyen Hareketli Ortalamalar Yöntemi, Ağırlıklı En Küçük Kareler Yöntemi

Jel Kodları: C11, C33, O33

---

[1] Doç.Dr. Aydın Adnan Menderes Üniversitesi, Siyasal Bilgiler Fakültesi Ekonometri Bölümü Merkez Kampüs, tugba.akin@adu.edu.tr, ORCID: 0000-0002-1132-388X

[2] MSc, Aydın Adnan Menderes Üniversitesi, Sosyal Bilimler Enstitüsü, Ekonometri ABD, alperdemirkol21@gmail.com, ORCID: 0009-0009-0891-5890

1. Introduction

With the increase in financial-economic globalization and advancing technology, international trade relations have intensified, thereby strengthening interactions between countries. However, this process can lead to the spread and globalization of country-specific crises (Eğilmez, 2009). The COVID-19 pandemic has deepened economic and social inequalities on a global scale, while policymakers continue to grapple with these disparities. Moreover, the direct effects of climate change worldwide, resulting in natural disasters, have triggered a series of issues such as food crises, migration movements, and social conflicts, thereby increasing the vulnerabilities of developing countries in particular (Türkeş, 2022). This situation holds a significant place among the universal challenges faced by international communities and countries. The vulnerability of developing countries in today's international relations is becoming increasingly significant. Fragile states must contend not only with internal and external challenges but also with universal problems such as global crises and climate change.

From a theoretical perspective, this study is grounded in the fragility literature that emphasizes the opportunity and grievance approaches as key explanatory frameworks (Collier and Hoeffler, 2004a; Collier et al., 2009). The opportunity approach underscores the role of limited income-generating opportunities and weak economic incentives in increasing the risk of instability, while the grievance approach highlights structural factors such as unemployment, inequality, weak institutions, and political instability that intensify social dissatisfaction and tension. Within this framework, state fragility is conceptualized as the outcome of interacting with economic and institutional mechanisms that may operate differently across countries and contexts. Accordingly, the research questions of this study are derived from these theoretical considerations and seek to empirically assess the relative importance of economic and institutional factors in shaping fragility in developing countries, in line with the empirical framework proposed by Diallo et al. (2023).

Within this broader global context, the increasing exposure of developing countries to multiple and overlapping shocks highlights the need for an empirical investigation of the country-specific factors that generate advantages (a fragility-reducing) and disadvantages (a fragility-increasing) in terms of state fragility. This study analyzes the dynamics of state fragility in 70 developing countries, considering country-specific factors that create advantages

and disadvantages concerning their vulnerabilities. To this end, five different models have been developed using Ordinary Least Squares (OLS), Bayesian Model Averaging (BMA), and Weighted Average Least Squares (WALS) methods. The study seeks to answer the following key questions: "What are the factors determining the dynamics of state fragility in developing countries?", "What are the country-specific advantageous and disadvantageous factors affecting state fragility?", and "Which of these factors are more effective?" The Fragile States Index has been used as the dependent variable, and the analyses have been conducted using annual data from the period 2007-2022. To examine the effects on state fragility, variables related to macro-economic issues (per capita GDP growth rate, unemployment rate, and inflation rate) have been considered as the primary model. Official development aid, population, rural population, primary school enrollment rate, human development index, government effectiveness, and political stability have been included as control variables. These control variables have been classified according to whether they create advantages or disadvantages, given that in some countries they support economic growth and development while in others they exacerbate vulnerability. Within this scope, the factors influencing the vulnerability of 70 developing countries have been examined.

This study contributes to literature in several important respects. First, in contrast to studies that rely on single-equation panel estimators, it employs Bayesian Model Averaging (BMA) and Weighted-Average Least Squares (WALS) to examine state fragility in a framework that explicitly accounts for model uncertainty. Second, it jointly considers economic, political-institutional, demographic, and social determinants within an integrated empirical setting, allowing for context-dependent effects across countries. Third, by emphasizing posterior inclusion probabilities rather than point estimates, the analysis highlights determinants that consistently emerge as influential across alternative model specifications. Finally, by covering a broad sample of developing countries over a period marked by major global shocks, the study provides additional empirical insights into fragility dynamics under heightened uncertainty.

In the first section of the study, the conceptual framework is explained; in the second section, empirical literature studies related to the vulnerability of countries are discussed. The third and fourth sections report the methodology and the obtained estimation results. The study concludes with a final section summarizing the findings.

2. Conceptual Framework

In the literature, the term "fragility" is generally associated with governance, capacity challenges, and weak state legitimacy, while some studies explain it through negative economic, financial, and social indicators. There is no consensus on the state of fragility and its causes among countries (Diallo et al., 2023). Essentially, fragility encompasses the inability to fulfill basic rights and services, difficulties in ensuring border security, the transformation of violent and conflict environments into civil wars, ethnically, religiously, politically fragmented identities, and issues of state legitimacy (Bertocchi and Guerzoni, 2010; Besley and Collier, 2018; Diallo et al., 2023). These challenges, combined with ethnic, religious, or political differences and income distribution problems, lead to social unrest and societal conflicts. External intervention and dependency reduce the self-sustainability of these countries, while internal and external violence, along with natural disasters, increase economic and social fragility (Besley and Collier, 2018). Legitimate states effectively provide personal and property security, the rule of law, healthcare, education, and infrastructure services (Rotberg, 2003). States that fail to provide these elements are characterized as "fragile" or "failed" states. With globalization, the more integrated trade relations between countries have made the presence and impact of developing countries and fragile states increasingly noticeable. Developing countries and fragile states share many common characteristics such as weak infrastructure, high inflation, current account deficits, economic contraction, political instability, and inadequate governance.

The inability to deliver basic services in fragile states due to internal and external conflicts causes the unstable functioning of social, political, economic, and demographic mechanisms (François and Sud, 2006). This situation leads to regional and global security threats, civil wars, and the weakening of state structures (Arıöz and Topdağ, 2023). Therefore, efforts to ensure political stability and improve living conditions in post-conflict environments are seen as crucial steps in preventing fragility (World Bank, 2011). In the absence of preventive policy frameworks that strengthen institutions, reduce socio-economic vulnerabilities, and enhance political stability, the likelihood of violence, conflict settings, and recurring crises emerging or persisting in these fragile countries increases significantly (Gisselquist, 2017). In this scenario, fragile developing countries may be driven into a "Fragility Syndrome", distancing themselves from long-term strategic planning and stability goals in economic,

security, and political areas. Countries facing fragility syndrome may be exposed to the risk of international intervention (Hoeffler, 2019: 1069). Such international interventions can be perceived as interference in the internal affairs of countries and can lead to tensions in international relations. Developed countries take measures such as humanitarian aid, development projects, and diplomatic solutions against the economic instability and internal-external security issues of fragile developing countries. However, more comprehensive approaches are extremely important for permanent solutions to improve the current situation (Patrick, 2006). In this context, a systematic framework capable of capturing the social, economic, political, and cohesion-related dimensions of fragility becomes essential. The Fragile States Index is calculated by The Fund For Peace based on the Conflict Assessment Software Tool (CAST), using quantitative and qualitative data through four categories and twelve sub-indicators for 179 countries worldwide, covering social, economic, political, and cohesion indicators (Arıöz and Topdağ, 2023; Demirkol and Akın, 2023). This index is recognized as a tool to determine the stability levels and identify the fragility of countries (Fragile States Index, 2015). Additionally, the index provides a profile by comparing the risk of severe internal conflict, crisis environments, or weaknesses of countries globally. The four categories and twelve indicators in the Fragile States Index are presented in Table 1.

Table 1. Examination of the fragile states index and related indicators

ECONOMIC INDICATORS	Economic Decline Economic Inequality and Income Inequity Emigration of Skilled Labor
POLITICAL INDICATORS	State Structure and Order Public Services Human Rights and Rule of Law
SOCIAL INDICATORS	Demographic Pressures Migration Events and Internal Migration Status International Intervention and External Involvement
COHESION INDICATORS	Safety and Security Systems Regional and Political Elites Social Divisions and Intergroup Conflicts

Source: The Fragile State, 2023

The Fragile States Index, calculated by the CAST analysis platform, evaluates the social, economic, political, and cohesion indicators of countries using a scoring system ranging from 1 to 10. A score close to 1 for the indicators of a country signifies a low level of fragility,

indicating that the country has potential for stability and development. On the other hand, scores close to 10 denote a high level of fragility, suggesting an increased potential for vulnerability in the respective country.

In selecting the determinants of the Fragile States Index for the countries under study, this paper follows both the conceptual structure of the Index and the empirical framework proposed by Diallo et al. (2023). Accordingly, the explanatory variables are grouped into macroeconomic, political-institutional, demographic, and social dimensions. Monetary policy outcome variables, including per capita GDP growth, unemployment, and inflation, are incorporated to capture macroeconomic conditions. Political and social factors comprise official development assistance, total population, rural population share, primary school enrollment, government effectiveness, and political stability, reflecting institutional capacity, governance quality, and social structure. The cohesion dimension is represented by the Human Development Index, which summarizes broader development outcomes related to health, education, and living standards. Importantly, the classification of variables into 'advantage (a fragility-reducing)' and 'disadvantage (a fragility-reducing)' groups does not rely on rigid theoretical sign restrictions; rather, it reflects the context-dependent and potentially non-monotonic effects emphasized in the fragility literature, whereby the same variable may function as either a stabilizing or destabilizing factor depending on country-specific institutional and structural conditions.

3. Empirical Literature

When reviewing the empirical literature on the subject, it has been observed that the Fragile States Index, the indexing methods used for evaluating fragile states, and the factors used to assess these indexes are limited. Summaries of the literature on empirical studies analyzing factors affecting state fragility, both directly and indirectly, are presented below.

In their study, Bertocchi and Guerzoni (2010) examined the determinants of the Country Policy and Institutional Assessment (CPIA) index, representing state fragility in Sub-Saharan African countries from 1992 to 2007, using macroeconomic indicators with probit and instrumental variable probit regression methods. The analysis results showed that economic growth was the most significant factor in reducing fragility. However, when using the instrumental variables method, it was concluded that growth had no effect on fragility. The study also found that an increase in investments positively impacted fragility.

Sezgin and Budak (2022) analyzed the impact of the human development level on economic growth using a panel regression model for the period 2010-2020. They selected 13 countries, six developed and seven developing, and analyzed them separately. The findings showed that the Human Development Index increased economic growth in both country groups, with a more pronounced effect in developed countries.

In their study, Diallo, Gui-Diby, and Imam (2023) conducted a comprehensive analysis of the effects of monetary policy tools on violence incidents and country fragility in 110 developing countries from 1980 to 2018. Using fixed effects and fixed effect instrumental variables methods, the study considered two models: a basic model with the Fragile States Index (SFI) as the dependent variable and an extended model with the Magnitude of Violence Events (MEV) as the dependent variable. The extended model was analyzed using three approaches: the "advantage" model, the "disadvantage" model, and a "combined" model including advantage and disadvantage factors. The analysis results showed that monetary policy outcomes such as the inflation rate, exchange rate volatility, and unemployment rate had a positive and statistically significant effect on fragile states. Additionally, in the advantage model, increases in natural resource rents, population, and rural population had a positive effect on the MEV index, while the per capita GDP growth rate, average years of schooling, and school enrollment rate had a negative effect. In the disadvantage model, population, ethnic division, and rural population positively affected the MEV index, while official development assistance had a negative and statistically significant effect. Finally, in the combined model, the inflation rate, rural population, and population had a positive effect on the MEV index, while the school enrollment rate and average years of schooling had negative and statistically significant effects. The study highlighted the complex nature of country fragility and the critical role of monetary policy, alongside fiscal policy, in influencing and mitigating country fragility. Similarly, in their study, Demirkol and Akın (2023) analyzed the impact of the unemployment rate, inflation rate, and exchange rate volatility on the Fragile States Index in developing countries for the period 2007-2021 using Panel OLS, fixed effects, random effects, instrumental variables, and IFE methods. The findings emphasized the complex relationship between fragility and macroeconomic variables and highlighted the importance of a comprehensive study evaluating the Fragile States Index and its sub-indicators.

Arıöz and Topdağ (2023) examined the factors determining fragility in 39 Sub-Saharan African countries from 2007 to 2019 using panel data analysis methods. The analysis results showed that increases in per capita GDP, political stability, and government expenditures reduced fragility in Sub-Saharan African countries, while official development assistance and IMF loans increased fragility. GDP growth had no effect on fragility. The analysis was repeated considering the 2010-2019 crisis periods, and similar results were observed.

Studies examining the determinants of fragility in developing countries have shown that economic, social, and demographic factors are mostly considered in researching countries' fragility, and the results vary across studies. In this study, variables were determined following the works of Diallo et al., (2023), Boonman (2023), and Magnus et al., (2010), and empirical methods were decided upon accordingly. The use of multiple models and methods allowed for a more detailed comparison of the results, and the validity of the findings was tested.

4. Methodology

4.1. Data

In this study, the determinants of fragility in 70 developing countries[3] for the period 2007-2022 are examined using economic and political factors through the methods of Ordinary Least Squares (OLS), Bayesian Model Averaging (BMA), and Weighted Average Least Squares (WALS). The determinants of fragility in developing countries are analyzed within the framework of four different models. The sample consists of 70 developing countries, selected based on data availability and consistency across the Fragile States Index and World Bank databases. The list of countries included in the analysis is provided in a footnote. The sample period covers 2007–2022, reflecting a methodological rather than a purely theoretical choice. The Fragile States Index has been published in a methodologically consistent and uninterrupted manner since 2007; therefore, the analysis period is restricted to 2007–2022,

---

[3] Albania, Algeria, Armenia, Azerbaijan, Belarus, Belize, Bosnia and Herzegovina, Cambodia, Cameroon, Chad, China, Colombia, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, The Gambia, Georgia, Ghana, Guatemala, Guinea, Guyana, Honduras, India, Indonesia, Iran, Kazakhstan, Kyrgyzstan, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Pakistan, Panama, Paraguay, Peru, Rwanda, Samoa, Senegal, Serbia, South Africa, Sri Lanka, Suriname, Tanzania, Thailand, Togo, Tunisia, Türkiye, Ukraine, Vietnam, Zambia.

and all other variables are selected accordingly to ensure data compatibility and comparability. In the analysis, the inflation rate, unemployment rate, and per capita GDP growth rate are considered as main variables, while the enrollment rate, official development aid, population, rural population, government effectiveness, political stability, and Human Development Index variables are included as auxiliary variables. The logarithms of the Fragile States Index (LNFSI), population (LNPOP), primary school enrollment rate (LNSHENROLL), and Human Development Index (LNHDI) variables are taken to achieve a more suitable normal distribution and to allow for easier and more comprehensible interpretations of the analyses. The analyses are tested using the E-Views12 and Stata15 software packages. Detailed information on the variables included in the study is presented in Table 2.

Tablo 2. Definitions of the Variables Used

VARIABLES	VARIABLE DEFINITIONS	SOURCE
LNFSI	Fragile States Index: 0 (Low) - 120 (High)	www.theglobaleconomy.com
GROWTH	GDP Growth per Capita (% Annual)	https://data.worldbank.org
UNEMP	Unemployment (% of Total Labor Force)	https://data.worldbank.org
INF	Inflation, Consumer Prices (% Annual)	https://data.worldbank.org
ODA	Official Development Assistance (Net ODA, % of GNI)	https://data.worldbank.org
LNPOP	Population (Total)	
RURPOP	Rural Population (% of Total Population)	https://data.worldbank.org https://data.worldbank.org
LNHDI	Human Development Index	
GOV	Government Effectiveness (Index between -2.5 and 2.5)	https://hdr.undp.org
POLITY	Political Stability (Index between -2.5 and 2.5)	https://data.worldbank.org https://data.worldbank.org
LNSHENROLL	School Enrollment, Primary (% Gross)	https://data.worldbank.org

4.2. Estimating Models

In this study, four different models are specified: a baseline model, a fragility-reducing (stabilizing) model, a fragility-increasing (destabilizing) model, and a combined model that includes all variables.

Model I

$$LnFsi_{it} = \beta_0 + \beta_1 Inf_{it} + \beta_2 Unemp_{it} + \beta_3 Growth_{it} + \varepsilon_{it} \qquad (1)$$

Model II

$$LnFsi_{it} = \theta_0 + \theta_1 Inf_{it} + \theta_2 Unemp_{it} + \beta_3 Growth_{it} + \theta_{it} E_{it} + u_{it} \qquad (2)$$

Model III

$$LnFsi_{it} = \vartheta_0 + \vartheta_1 Inf_{it} + \vartheta_2 Unemp_{it} + \beta_3 Growth_{it} + \vartheta_{it} P_{it} + \varepsilon_{it} \qquad (3)$$

Model IV

$$LnFsi_{it} = \vartheta_0 + \vartheta_1 Inf_{it} + \vartheta_2 Unemp_{it} + \beta_3 Growth_{it} + \sigma_{it} A_{it} + \varepsilon_{it} \qquad (4)$$

The empirical framework of this study is structured around four alternative model specifications that are conceptually grounded in the opportunity–grievance framework widely employed in the fragility literature (Collier and Hoeffler, 2004a; Collier, Hoeffler and Rohner, 2009; Diallo et al., 2023). Model I serves as the baseline model and examines the relationship between the Fragile States Index and core macroeconomic indicators, namely real GDP per capita growth (GROWTH), the unemployment rate (UNEMP), and the inflation rate (INF). These variables capture fundamental macroeconomic conditions that are central to both opportunity- and grievance-based explanations of state fragility. Model II extends the baseline specification by incorporating a set of auxiliary variables, denoted as E_{it}, which are considered relatively advantageous within the opportunity channel. These include official development assistance (ODA), population size (LNPOP), rural population share (RURPOP), and the school enrollment rate (LNSHENROLL). From an opportunity perspective, these variables are expected to enhance income-generating prospects, human capital accumulation, and access to basic services, thereby increasing the opportunity cost of engaging in destabilizing activities.

Model III augments the baseline model with auxiliary variables deemed relatively disadvantageous for countries, denoted as P_{it}, and associated primarily with the grievance channel. In addition to ODA, population, and rural population—which are retained due to their context-dependent and potentially bidirectional effects—this model includes the Human Development Index (LNHDI), government effectiveness (GOV), and political stability (POLITY). These variables capture institutional quality, governance capacity, and socio-political

inclusion, which may alleviate fragility through improved state capacity but may also exacerbate grievances when characterized by inequality, exclusion, or governance failures.

Model IV provides a comprehensive specification in which macroeconomic variables remain the primary regressors, while all variables classified as relatively advantageous and disadvantageous are jointly included as auxiliary variables, denoted as A_{it}. This specification is designed to capture the multidimensional and overlapping channels through which economic, demographic, and institutional factors influence fragility.

Importantly, the classification of variables in this study does not rely on the presumed direction of their empirical effects on fragility, but rather on the underlying economic and institutional mechanisms emphasized by the opportunity–grievance framework. Within this context, real GDP per capita growth is treated as an opportunity-related variable, as it expands productive economic opportunities and raises the cost of fragile behavior. In contrast, unemployment is evaluated under the grievance channel due to its association with income loss, social exclusion, and dissatisfaction (Collier and Hoeffler, 1998, 2004a). Variables such as ODA, population, rural population, human development, school enrollment, government effectiveness, and political stability are deliberately positioned under both approaches, reflecting their capacity to exert dual and context-specific effects on fragility (Baten and Mumme, 2013; Diallo et al., 2023). Overall, this modeling strategy aligns with the opportunity–grievance literature and allows for a nuanced assessment of the complex and nonlinear determinants of state fragility.

The variables in each model aim to provide a comprehensive analysis of the determinants of state fragility in developing countries, using Ordinary Least Squares (OLS), Bayesian Model Averaging (BMA), and Weighted Average Least Squares (WALS) methods.

4.3. Econometric Methodology

The empirical research in this study consists of three stages. First, cross-sectional dependence was tested using Breusch and Pagan (1980) LM test, Pesaran (2004) CD test, and the Bias-Corrected LM test by Pesaran et al. (2008). Second, due to the unbalanced structure of the panel dataset and data availability constraints, the Fisher ADF unit root test was employed, while acknowledging its limitations under cross-sectional dependence. This test, developed

by Maddala and Wu (1999) and Choi (2001), is a widely used method in time series and panel data analysis. It includes the "dfuller" and "pperron" options and allows model expansion with trend and demean options (Tatoğlu, 2018). The trend option increases the estimation power by considering linear or nonlinear trends over time (Baltagi, 2005), while the demean option controls for trends within the dataset, leading to more accurate results. The Fisher ADF unit root test enhances test power through probability values obtained from Monte Carlo simulations. Third, the determinants of state fragility in developing countries were analyzed using OLS, Bayesian Model Averaging (BMA), and Weighted Average Least Squares (WALS) methods. By employing multiple analysis methods, the study comprehensively examined the dynamics of state fragility in developing countries and validated the robustness of the results.

The Bayesian Model Averaging (BMA) method adopts an approach that constructs a set of models using multiple independent variables to measure their impact on the dependent variable. In Bayesian models, special attention is given to minimizing deviations from the true values of the estimates. This approach aims to provide more reliable and robust prediction results (Raftery and Zheng, 2003). The BMA method uses the Markov Chain Monte Carlo (MCMC) sampling technique to estimate posterior probability distributions. By using the Posterior Inclusion Probability (PIP), the strength of the variables' impact on the dependent variable is determined, and the priority for inclusion in the regression model is calculated (Zellner, 1986). According to specified criteria, variables with PIP values between 0.75 and 0.99 are considered highly likely to be included in the model, while those with values below 0.50 are deemed unlikely to be included. Additionally, variables with PIP values approaching 0 tend to have negative coefficients, whereas those approaching 1 are associated with positive coefficients (Magnus et al., 2010; Yardımcı, 2019; Boonman, 2023).

The large number of variables used in regression analyses can create uncertainty in model selection. Moral-Benito (2015) argues that the BMA and WALS methods can minimize this uncertainty. The WALS method uses orthogonal transformation for the inclusion of auxiliary variables in the model. This means that the auxiliary variables are mathematically independent, minimizing their mutual influence. This can prevent the multicollinearity problem for highly correlated variables in regression analyses (Berger et al., 2023). The WALS method combines Bayesian statistical methods and frequentist statistics of parameters, thus merging

the advantages of both the BMA method and frequentist statistics (De Luca et al., 2018). WALS examines model selections as core and auxiliary variables. The inclusion of auxiliary variables in a model where core variables are fixed can vary based on the significance of the model (Danilov and Magnus, 2004). Magnus et al. (2010) highlight the disadvantages of the BMA method, such as the difficulties in using normal distributions and the arbitrary selection of variance, which necessitates alternative methods like WALS. The WALS method seeks to minimize uncertainties in estimating model parameters and requires less computational effort. By using priors from the "Laplace" distribution instead of normal priors, WALS provides more reliable estimates. The BMA method faces computational challenges and issues with prior-based selection, leading to uncertainty and reduced reliability of results. Due to these reasons, the WALS method is considered more advantageous and is preferred over BMA (Magnus et al., 2010; Seya et al., 2014).

5. Empirical Results

5.1. Preliminary Tests

The descriptive statistics of the data are presented in Table 3, and the correlation matrix is shown in Table 3.

Table 3. Descriptive statistics[4]

	Obs.	Mean	Max.	Min.	St. Dev.
LNFSI	1120	77.59	113.30	37.20	12.94
GROWTH	1120	2.44	56.98	-34.77	4.88
UNEMP	1120	7.54	35.23	0.14	5.91
INF	1118	6.41	72.30	-8.97	7.27
ODA	1117	3.24	19.87	-0.63	3.90
LNPOP	1120	68.5 mil.	1.4 billion	190.5 K	224 mil.
RURPOP	1120	49.89	84.76	16.15	17.93
LNHDI	1120	0.65	0.84	0.31	0.12
GOV	1120	-3.37	1.22	-1.61	0.50
POLITY	1120	-0.42	1.20	-2.81	0.72
LNSHENROLL	1104	102.88	150.35	50.22	14.43

---

[4] Data for the school enrollment rate (primary school) (Lnshenroll) variable is unavailable for the years 2013 and 2014 in Montenegro; 2017 and 2018 in Paraguay; and 2021 and 2022 in El Salvador, Guyana, Iran, Maldives, Mauritania, and Zambia. Additionally, inflation rate (Inf) data for the years 2018 and 2019 is missing for Suriname, and Official Development Assistance (ODA) data for the year 2022 is unavailable for Belarus, China, and Thailand.

Examining the descriptive statistics of the variables within the study, it is observed that the GDP growth rate per capita, inflation rate, official development aid, population, political stability, and unemployment rate variables exhibit high standard deviations and a wide distribution. Conversely, the government effectiveness, human development index, rural population, and primary school enrollment rate variables have lower standard deviations and show a narrow distribution. This analysis provides general information about the distribution and measures of central tendency of the variables.

Table 4. Correlation test results

	GROWTH	GOV	HDI	INF	ODA	POLITY	POP	RURPOP	SHENROLL	UNEMP
GROWTH	1.00									
GOV	0.083	1.00								
HDI	0.025	0.585	1.00							
INF	0.003	-0.162	-0.020	1.00						
ODA	-0.049	-0.266	-0.619	0.026	1.00					
POLITY	0.031	0.433	0.320	-0.147	0.071	1.00				
POP	0.142	0.181	0.006	-0.001	-0.184	-0.177	1.00			
RURPOP	0.064	-0.285	-0.627	0.024	0.573	-0.124	0.061	1.00		
SHENROLL	0.040	0.116	0.101	0.041	0.084	0.259	-0.035	0.039	1.00	
UNEMP	-0.070	0.268	0.315	-0.061	-0.164	0.168	-0.104	-0.305	-0.050	1.00

The correlation analysis results reveal that there is no multicollinearity problem among the independent variables (Table 4).

5.2. Cross-Sectional Dependence Test

Before conducting unit root analyses for the variables considered in the study, it is necessary to test for cross-sectional dependence among the units. The null hypothesis of the cross-sectional dependence tests used in the study is "There is no cross-sectional dependence." According to the results shown in Table 5, the null hypothesis was rejected at the 1% significance level based on the Breusch and Pagan (1980) LM test, Pesaran CD test (2004), and the adjusted LM test by Pesaran et al. (2008). This indicates that there is cross-sectional dependence among the variables included in the model.

Table 5. Cross-Sectional Dependence test result

	LM	LM_{adj}	CD
LNFSI	5804.04***	48.76***	59.90***
	(0.0000)	(0.0000)	(0.0000)
GROWTH	9265.61***	98.57***	75.44***
	(0.0000)	(0.0000)	(0.0000)
UNEMP	5322.04***	41.82***	37.40***
	(0.0000)	(0.0000)	(0.0000)
INF	9040.48***	95.33***	77.65***
	(0.0000)	(0.0000)	(0.0000)
ODA	4088.66***	24.08***	24.91***
	(0.0000)	(0.0000)	(0.0000)
LNPOP	13071.92***	153.34***	47.84***
	(0.0000)	(0.0000)	(0.0000)
RURPOP	23836.23***	308.22***	2.51***
	(0.0000)	(0.0000)	(0.0120)
LNHDI	11019.11***	123.80***	94.06***
	(0.0000)	(0.0000)	(0.0000)
GOV	2978.18***	8.10***	1.09
	(0.0000)	(0.0000)	(0.2725)
POLITY	3278.26***	12.42***	1.58
	(0.0000)	(0.0000)	(0.1126)
LNSHENROLL	2597.40***	2.62***	-0.046
	(0.0051)	(0.0087)	(0.9627)

Note: The values in parentheses indicate the probability values of the coefficients, while ***, **, and * represent the significance levels of the test statistics at 1%, 5%, and 10%, respectively.

According to the results presented in Table 5, the null hypothesis was rejected at the 1% significance level based on the analyses from the Breusch and Pagan (1980) LM test, Pesaran CD test (2004), and the adjusted LM test by Pesaran et al. (2008). This indicates the presence of cross-sectional dependence among the variables included in the model.

5.3. Fisher Augmented Dickey-Fuller (Fisher ADF) Unit Root Test

The unit root tests in the study were conducted using intercept and intercept-trend models, considering the optimal lag values. The results of the Fisher Augmented Dickey-Fuller (Fisher ADF) unit root tests for the variables considered in the study are presented in Table 6.

Table 6. Results of the Fisher Expanded Dickey-Fuller (Fisher ADF) unit root test

	Intercept				Intercept and Trend			
	$\chi^{2\text{-}1}$	ρ	$\chi^{2\text{-}1}_{adj}$	ρ	$\chi^{2\text{-}1}$	ρ	$\chi^{2\text{-}1}_{adj}$	ρ
LNFSI (1)	172.9**	0.03	1.96	0.02**	236.60***	0.00	5.77***	0.00
GROWTH (1)	495.9***	0.00	21.27***	0.00	473.54***	0.00	19.93***	0.00
UNEMP (0)	165.06*	0.07	1.49*	0.06	223.9***	0.00	5.01***	0.00
INF (1)	526.5***	0.00	23.10***	0.00	446.43***	0.00	18.31***	0.00
ODA (1)	169.9**	0.04	1.78**	0.03	171.18**	0.03	1.86**	0.03
LNPOP (0)	443.21***	0.00	18.12***	0.00	221.2***	0.00	4.85***	0.00
RURPOP (1)	428.7***	0.00	17.25***	0.00	338.58***	0.00	11.86***	0.00
LNHDI (0)	205.59***	0.00	3.92***	0.00	174.8**	0.02	2.08**	0.01
GOV (0)	173.86**	0.02	2.02**	0.02	191.0***	0.00	3.05***	0.00
POLITY (1)	192.9***	0.00	3.16***	0.00	230.03***	0.00	5.38***	0.00
LNSHENROLL (1)	236.2***	0.00	5.75***	0.00	244.40***	0.00	6.23***	0.00

Note: The values in parentheses indicate the probability values of the coefficients, while ***, **, and * represent the significance levels of the test statistics at 1%, 5%, and 10%, respectively.

In Table 6, the null hypothesis stating that "all units contain a unit root" was rejected, indicating that all variables are stationary at level values (I(0)).

5.4. Results of OLS, BMA, and WALS Methods

The level values of the variables were estimated using OLS, BMA, and WALS testing methods. The results obtained for Models I, II, III, and IV are presented in Table 7.

Table 7. Results of OLS, BMA, and WALS estimates

	OLS		BMA		WALS	
	β	*SE*	*β*	*SE*	*β*	*SE*
MODEL – I						
Constant	4.382***	(.00095)	4.3803***	(.0098)	4.38***	(.0099)
Growth	-.0008	(.00178)	-.00003	(.0003)	-.0002	(.00102)
Unemp	-.0081***	(.00049)	-.00802	(.0009)	-.0072***	(.0009)
Inf	.0027***	(.00073)	.0027***	(.0008)	-.0025***	(.0007)
MODEL – II						
Constant	4.3271***	(.08179)	4.3272***	(.1436)	4.326***	(.14374)
Growth	-.0013	(.00159)	-.0013	(.0009)	-.00125	(.00093)
Unemp	-.0008*	(.00039)	-.0008	(.0008)	-.0011	(.00076)
Inf	.0014***	(.00058)	.0014***	(.0006)	.00149***	(.00058)
Auxiliary Variables						
Oda	.00973***	(.00145)	.0097***	(.00133)	.0086***	(.00118)
Lnpop	.04099***	(.00281)	.0409***	(.00258)	.0389***	(.00254)
Rurpop	.00317***	(.00012)	.00317***	(.00029)	.0031***	(.00026)
Lnshenroll	-.18420***	(.02020)	-.1840***	(.02892)	-.1748***	(.02893)
MODEL – III						
Constant	3.81165***	(.03697)	3.8024***	(.03808)	3.8034***	(0.03761)
Growth	.00102	(.00077)	.00100	(.00059)	.00095	(0.00058)
Unemp	.00128***	(.00031)	.00127***	(.00054)	.00117***	(0.00054)
Inf	-.00039	(.00049)	-.00049	(.00041)	-0.00027	(0.00040)
Auxiliary Variables						
Oda	.00642***	(.00098)	.00725***	(.00123)	.00604***	(.00109)
Lnpop	.01717***	(.00174)	.01802***	(.00229)	.01783***	(.00221)
Rurpop	.00198***	(.00009)	.00209***	(.00022)	.00188***	(.00021)
Lnhdi	-.06212***	(.02716)	-.0264***	(.03458)	-.0819***	(.02452)
Gov	-.11843***	(.00678)	-.1236***	(.00854)	-.11229***	(.00774)
Polity	-.09621***	(.00678)	-.0969***	(.00544)	-.0906***	(.00540)
MODEL – IV						
Constant	3.62261***	(.07514)	3.7906***	(.07472)	3.6914***	(.10323)
Growth	.00144	(.00096)	0.0014***	(.00065)	0.0014***	(.00065)
Unemp	.00139***	(.00033)	0.0013***	(.00054)	0.0012***	(.00054)
Inf	-.00044	(.00046)	-0.0005	(.00042)	-0.00028	(.00041)
Auxiliary Variables						
Oda	.00601***	(.00096)	.00718***	(.00123)	.00557***	(.00111)
Lnpop	.01575***	(.00178)	.01744***	(.00234)	.01528***	(.00228)
Rurpop	.00196***	(.00008)	.00211***	(.00023)	.00182***	(.00021)
Lnhdi	-.07274***	(.02752)	-.02421	(.03413)	-.0939***	(.02533)
Gov	-.11689***	(.00712)	-.1235***	(.00852)	-.1108***	(.00781)
Polity	-.10001***	(.00728)	-.0982***	(.00554)	-.0947***	(.00563)
Lnshenroll	.04483***	(.01385)	.00465	(.01493)	.03265	(.02194)

Note: The symbols *, **, and *** in the table indicate the significance levels of 1%, 5%, and 10%, respectively. In the context of the EKK analysis, issues related to heteroscedasticity and autocorrelation were addressed using the "Cross-section Sur (PCSE)" method. The critical values for the T-table are 1.645, 1.96, and 2.576 for significance levels of 10%, 5%, and 1%, respectively.

When examining the analysis results provided in Table 7, it is observed that, in general, positive changes in the variables ODA, LNPOP, and RURPOP significantly increase the fragility of developing countries by adversely affecting the fragile states index at a 1% significance level across all considered models. Conversely, positive changes in the LNHDI variable negatively influence the fragile states index at a 1% significance level, thereby reducing fragility in developing countries. Similarly, a 1% increase in the LNSHENROLL variable reduces the fragility of countries by approximately 0.18%. Consistent with expectations, increase in the GOV and POLITY variables positively impact the fragile states index at a 1% significance level, reducing fragility in developing countries. While the GROWTH variable is generally not statistically significant in the models, the UNEMP variable in Models III and IV significantly increases fragility in developing countries at a 1% significance level. No consistent and statistically significant results were found regarding the impact of the INF variable. Beyond statistical significance, the magnitude of the estimated coefficients provides important economic insights. The relatively larger coefficients associated with official development assistance, population, and rural population suggest that demographic pressures and aid dependency exert economically meaningful effects on fragility outcomes. In contrast, the coefficients of political stability and government effectiveness, while negative, are substantial in size, indicating that improvements in institutional quality and governance can generate sizable reductions in fragility. Compared to these factors, the coefficients of core macroeconomic variables such as inflation, unemployment, and per capita GDP growth are relatively small and less stable across models, implying that macroeconomic conditions alone have a limited economic impact on fragility in the absence of strong institutional frameworks.

The findings of this study are consistent with those of Diallo et al. (2023) and Arıöz and Topdağ (2023).

In this study, the posterior inclusion probability (PIP) values for all variables presumed to affect the Fragile States Index were estimated using Bayesian Model Averaging (BMA) and Weighted Average Least Squares (WALS) methods. The estimated PIP values indicate the likelihood of a variable being included in the model, making them important for identifying influential variables. The posterior probability distributions for the variables are presented in Table 8.

Table.8 Posterior Inclusion Probability (PIP) results

	BMA		WALS
	PIP	t-stat	t-stat
CONSTANT	1.00	51.99***	36.80***
GROWTH	0.22	0.47	2.49***
UNEMP	0.33	0.62	1.84
INF	0.06	-0.19	-1.07
ODA	1.00	5.40***	5.04***
LNPOP	1.00	6.82***	6.96***
RURPOP	1.00	8.76***	8.42***
LNHDI	0.47	-0.83	-3.68***
GOV	1.00	-13.71***	-14.18***
POLITY	1.00	-17.64***	-16.63***
LNSHENROLL	0.11	-6.32***	2.20**

Note: The terminal probability (PIP) values presented in the table indicate a high likelihood of inclusion in the model when between 0.75 and 0.99, while values of 0.50 and below suggest a weak likelihood of inclusion. The "t-stat" values in the table represent the t statistics corresponding to the PIP values.

When analyzing the terminal probability values presented in Table 8, it is evident that the most significant determinants of the fragile states index in developing countries are, in order, Official Development Assistance (ODA), natural logarithm of population (LNPOP), rural population (RURPOP), government effectiveness (GOV), and polity index (POLITY). Therefore, it is assessed that these factors play a critical role in determining state fragility in developing countries and should be taken into account in policymaking and decision-making processes.

6. Conclusion

In this study, the determinants of fragility in 70 developing countries were examined using panel data analysis methods, including Ordinary Least Squares (OLS), Bayesian Model Averaging (BMA), and Weighted-Average Least Squares (WALS), based on annual data covering the 2007–2022 period. The main objective of the analysis is to identify economic and political factors that may generate relative advantages or disadvantages in terms of state fragility.

The empirical findings can be summarized as follows. Results from the baseline model indicate that per capita GDP growth does not exert a statistically significant effect on the

Fragile States Index. While unemployment and inflation are included as key macroeconomic indicators, their estimated effects vary across alternative model specifications and estimation methods. This limited and inconsistent influence of macroeconomic outcome variables suggests that, in fragile developing countries, macroeconomic conditions alone are insufficient to mitigate fragility. Instead, the persistence of fragility appears to be closely associated with structural weaknesses, including limited institutional capacity, weak government effectiveness, and low levels of political stability. The empirical results indicate that core macroeconomic indicators, namely per capita GDP growth, inflation, and unemployment, are not consistently effective in explaining variations in fragility across the countries analyzed. In contrast, the impacts of Official Development Assistance (ODA), population size, and rural population are found to be positive across all model specifications, suggesting that these factors tend to exacerbate fragility in developing countries. Prolonged reliance on external development assistance to finance population growth and rural development may increase dependency and weaken domestic institutional capacity. Such aid often fails to translate into sustainable improvements in social welfare and economic development due to political and institutional weaknesses, including corruption, weak governance, and limited accountability. Similarly, the use of development assistance to address short-term needs may delay long-term structural reforms, thereby reinforcing fragility.

By contrast, the Human Development Index and primary school enrollment rates are found to contribute to reducing fragility. Higher enrollment rates are associated with a more educated and skilled labor force, which supports productivity gains and long-term economic development. Improvements in human development outcomes, including reductions in poverty and inequality and better health conditions, enhance economic resilience and help mitigate fragility. Finally, increases in political stability and government effectiveness are consistently associated with lower levels of fragility, underscoring the stabilizing role of effective public service provision, accountability, rule of law, and strong institutional frameworks. An evaluation based on the posterior inclusion probability (PIP) values indicates that official development assistance, population size, rural population, political stability, and government effectiveness consistently emerge as the most influential determinants of fragility across all model specifications. The robustness of these findings across alternative estimation methods suggests that political and institutional factors play a central role in shaping fragility

outcomes in developing countries. Accordingly, reducing fragility requires prioritizing improvements in political stability, governance quality, and broader social indicators, rather than relying solely on macroeconomic conditions.

The policy implications of this study are directly derived from the empirical findings. First, the consistently positive and significant effects of official development assistance, population size, and rural population on fragility indicate that reliance on external aid and unmanaged demographic pressures may exacerbate fragility in developing countries. Accordingly, development assistance should be reoriented toward strengthening institutional capacity, governance quality, and accountability mechanisms rather than financing short-term consumption or population-driven expenditures. Second, the robust negative effects of political stability and government effectiveness on fragility highlight the central role of institutional quality. Policies aimed at improving the rule of law, reducing corruption, enhancing public service delivery, and ensuring political stability are likely to yield substantial reductions in fragility. Third, the stabilizing effects of human development and school enrollment rates suggest that investments in education, health, and human capital formation are essential for reducing long-term fragility. Such policies not only improve social welfare but also enhance economic resilience and institutional effectiveness. Finally, the limited and inconsistent impact of core macroeconomic variables implies that macroeconomic stabilization policies alone are insufficient to address fragility in the absence of strong institutions. Therefore, macroeconomic policies should be implemented in conjunction with institutional and social reforms to achieve durable reductions in state fragility.

References

ARIÖZ, Z., and Topdağ, D. (2023) "Fragile States and Aid Allocation for Sub-Saharan African Countries: An Empirical Research." Uluslararası İlişkiler Dergisi, 1-15.

BALTAGI, B. H. (2005). "Econometric Analysis of Panel Data" New York: Wiley.

BATEN, J., AND C. MUMME. (2013). "Does Inequality Lead to Civil Wars? A Global Long-Term Study Using Anthropometric Indicators (1816–1999)." *European Journal of Political Economy* 32: 56–79. doi:10.1016/j. ejpoleco.2013.06.007.

BERGER, M., Pock, M., Reiss, M., Röhrling, G., and Czypionka, T. (2023). "Exploring the effectiveness of demand-side retail pharmaceutical expenditure reforms: Cross-country evidence from weighted-average least squares estimation." International Journal of Health Economics and Management, 23(1), 149-172. https://doi.org/ 10.1007/s10754-022-09337-6

BERTOCCHI, Graziella; Guerzoni, Andrea (2010) "Growth, history, or institutions? What explains state fragility in sub-Saharan Africa," IZA Discussion Papers, No. 4817, Institute for the Study of Labor (IZA), Bonn.

BESLEY, T., and P. Collier 2018. "Escaping the Fragility Trap." Accessed November 3, 2021. https://www.theigc.org/wpcontent/uploads/2018/04/Escaping-the-fragility-trap.pdf

BOONMAN, Tjeerd M., 2023. "Portfolio capital flows before and after the Global Financial Crisis," Economic Modelling, Elsevier, vol. 127(C).

BREUSCH, T.S. and Pagan, A. R. (1980). "The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics." The Review of Economic Studies, 47(1), 239-253.

CHOI, I. (2001). "Unit root tests for panel data." Journal of international money and Finance, 20(2), 249-272. https://doi.org/10.1016/S0261-5606(00)00048-6

COLLIER, P., AND A. HOEFFLER. (1998). "On Economic Causes of Civil War." Oxford economic papers 50 (4): 563–573. doi:10. 1093/oep/50.4.563.

COLLIER, P., AND A. HOEFFLER. (2004A.) "Aid, Policy and Growth in Post-Conflict Societies." *European economic review* 48: 1125–1145. doi:10.1016/j.euroeco-rev.2003.11.005.

COLLIER, P., A. HOEFFLER, AND D. ROHNER. (2009). "Beyond Greed and Grievance: Feasibility and Civil War." *Oxford economic papers* 61 (1): 1–27. doi:10.1093 /oep/gpn 029.

DANILOV, D., Magnus, J.R. (2004) "On the harm that ignoring pretesting can cause." Journal of Econometrics 122, 27–46. https://doi.org/10.1016/j.jeconom.2003.10.018

DE LUCA, G., Magnus, J. R., and Peracchi, F. (2018). "Weighted-average least squares estimation of generalized linear models." Journal of econometrics, 204(1), 1–17. https://doi.org/10.1016/j.jeconom.2017.12.007

DEMIRKOL, A., and Akın, T. (2023). "Gelişmekte Olan Ülke Gruplarında Makroekonomik Göstergelerin Kırılgan Devletler Endeksi Üzerindeki Etkisinin Panel Veri Yöntemler ile Karşılaştırılması." 7. Uluslararası İzmir İktisat Kongresi 17-18.05.2023, İzmir Türkiye. Sözlü Sunum-Tam Metin.

DIALLO, O., Gui-Diby, S. L., and Imam, P. A. (2023). "Do monetary policy outcomes promote stability in fragile settings?". Applied Economics, 1-17. https://doi.org/ 10.1080/ 00036846.2023.2168612

EĞİLMEZ, M. (2009). "Küresel Finans Krizi." Ankara: Remzi Yayıncılık.

FRAGILE STATE INDEX (2015). "Fragile States Index Annual Report 2015", The Fund for The Peace, https://fragilestatesindex.org/wp-content/uploads/2017/05/Fragile-States-Index-Annual-Report-2015- ver-9.pdf, Erişim Tarihi: 03.03.2024.

FRAGILE STATE INDEX (2023). "Fragile States Index Annual Report 2023", The Fund for The Peace,https://fragilestatesindex.org/wp-content/uploads/2023/06/FSI-2023-Report_final.pdf, Erişim Tarihi: 03.03.2024.

FRANÇOIS, M., and Sud, I. (2006). "Promoting stability and development in fragile and failed states." Development policy review, 24(2), 141-160. https://doi.org/10.1111/ j.1467-7679.2006.00317.x

GISSELQUIST, R. M. (2017). "Varieties of fragility: implications for aid." In Fragility, Aid, and State-building (pp. 1-12). Routledge.

GÜLCEMAL, Tuba (2020). "Effect of human development index on GDP for developing countries: a panel data anaysis." Journal of Economics, Finance and Accounting (JEFA), V.7(4), p.338-345.

HOEFFLER, A. (2019). "Fragility and development in Africa: An introduction." Review of Development Economics, 23(3), 1067-1072. https://doi.org/10.1111/rode.12616

IMF (2018). World Economic Outlook, October 2018. "International Monetary Fund." https://www.imf.org/en/Publications/WEO/Issues/2018/09/24/world-economic-outlook-october-2018. Erişim Tarihi: 08.03.2024

MADDALA, G. S. ve Wu, Shaowen (1999). "A Comparative Study of Unit Root Tests With Panel Data and A New Simple Test". Oxford Bulletin Economics and Statistics, Special Issue, 632-652.

MAGNUS JR, Powell O, Prüfer P. (2010). "A comparison of two model averaging techniques with an application to growth empirics." Journal of Econometrics 154(2): 139–153. https://doi.org/10.1016/j.jeconom.2009.07.004

MORAL-BENITO, E., (2015). "Model averaging in economics: An overview". J. Econ. Surv. 29(1), 46–75. https://doi.org/10.1111/joes.12044

PATRICK, S. (2006), "Weak State and Glabal Threats: Fact or Fiction?", The Center for Strategic and International Studies and Massachusetts Institute of Technology, ss.27-53. https://doi.org/10.1162/016366006776026248

PESARAN, H. M. (2004). "General Diagnostic Tests for Cross Section Dependence in Panels." University of Cambridge Working Paper, 435, 1-41.

PESARAN, H. M., Ullah, A. and Yamagata, R. T. (2008). "A Bias Adjusted LM Test of Error Cross Section Independence." The Econometrics Journal, 105-127.

RAFTERY, A.E., Zheng, Y., (2003). "Discussion: Performance of Bayesian Model Averaging".J. Amer. Statist. Assoc. 98 (464), 931–938. https://doi.org/10.1198/ 016214503000 000891

ROTBERG, R. I. (2003). "Failed states, collapsed states, weak states: Causes and indicators." State failure and state weakness in a time of terror, 1, 25.

SEYA, H., Tsutsumi, M., and Yamagata, Y. (2014). "Weighted-Average Least Squares Applied to Spatial Econometric Models: Monte Carlo Investigation." Geographical Analysis, 46(2), 126-147. https://doi.org/10.1111/gean.12032

SEZGIN, F.H., and Budak, Y. (2022). "İnsani gelişmişliğin büyüme etkisi: Gelişmiş ve ge-lişmekte olan ülkeler karşılaştırması." İstanbul İktisat Dergisi - Istanbul Journal of Economics, 72(1), 81-104.

TATOĞLU, Y.F. (2018), "Panel Zaman Serileri Analizi: Stata Uygulamalı", Beta Yayınları 2.Baskı, İstanbul

TÜRKEŞ, M. (2022). "İklim diplomasisi ve iklim değişikliğinin ekonomi politiği." Bilim ve Ütopya, 332, 31-45.

YARDIMCI, A. (2019). "Bayesci model ortalaması yöntemi: İstihdam oranı üzerine bir uygulama". İstatistikçiler Dergisi: İstatistik ve Aktüerya, 12(1), 15-31.

WEHNCKE, Francois Cornelius, Godfrey Marozva, and Patricia Lindelwa Makoni. (2023). "Economic Growth, Foreign Direct Investments and Official Development Assistance Nexus: Panel ARDL Approach." Economies 11: 4. https://doi.org/10.3390/econo-mies11010004

WORLD BANK (2011) "World Development Report: Conflict, Security and Development." Washington DC: World Bank Erişim Tarihi: 12.04.2024

WORLD BANK (2021) "Europe and Central Asia Economic Update, Fall 2021: "Competition and Firm Recovery Post-COVID-19." © Washington, DC: World Bank. http://hdl.handle.net/10986/36296 License: CC BY 3.0 IGO. Erişim Tarihi: 08.03.2024.

ZELLNER, A. (1986) "On assessing prior distributions and Bayesian regression analysis with g-prior distributions. In: Goel, P.K., Zellner, A. (Eds.), Bayesian Inference and Decision Techniques: Essays in Honor of Bruno de Finetti (Studies in Bayesian Econometrics Statistics)", Vol. 6. Elsevier Science Ltd, North Holland, pp. 233–243.