İktisat Politikası Araştırmaları Dergisi
Journal of Economic Policy Researches,
JEPR 2025, 12 (1): 99–111

https://doi.org/10.26650/JEPR1503495

Submitted 22.06.2024
Accepted 04.12.2024

İktisat Politikası Araştırmaları Dergisi
Journal of Economic Policy Researches

Research Article

Open Access

The Impact of Trade Openness and Political Stability on Food Security: A Panel Data Analysis for Selected Countries

Canan Özge Eğri [1]

[1] Kırklareli University, Faculty of Economics and Administrative Sciences, Department of Economics, Kırklareli, Türkiye

Abstract Food security is a pressing global concern influenced by various factors, including commercial openness and political stability. This study employs panel data analysis to investigate the impact of commercial openness and political stability on food security in selected countries. Panel data analysis offers advantages over cross-sectional or time series methods by providing greater flexibility, enhancing estimation reliability, and addressing issues like multicollinearity. This study explores the intricate relationships between commercial openness, political stability, and food security by utilising a unified framework of econometric methods, including likelihood and two-stage least squares. The analysis also focuses on mitigating the endogeneity bias using empirical moments. In this research, the study explores the influence of trade openness and political stability on food security. While previous literature has separately examined the relationships between food security and political stability, as well as food security and globalisation, there needs to be a more comprehensive analysis integrating both aspects to understand their combined impact on food security. Therefore, the research aims to address this gap by investigating the relationship between political stability and trade openness and food security. The study uses a model tested with data from 96 countries using the Generalised Method of Moments (GMM) method. The subsequent sections of the study, specifically chapters 2 and 3, thoroughly analyse the variables under discussion. The findings of the model and the ensuing discussions are then presented. The findings from this study contribute to a deeper understanding of how commercial openness and political stability affect food security, providing valuable insights for policymakers and researchers striving to enhance global food security.

Keywords Food Security · Trade Openness · Political Stability · Panel Data Analysis

JEL Classification C33 · F14 · Q18

Citation: Eğri, C. Ö. (2025). The impact of trade openness and political stability on food security: a panel data analysis for selected countries. *İktisat Politikası Araştırmaları Dergisi–Journal of Economic Policy Researches*, *12*(1), 99-111. https://doi.org/10.26650/JEPR1503495

Corresponding author: Canan Özge Eğri cananozge.egri@klu.edu.tr

The Impact of Trade Openness and Political Stability on Food Security: A Panel Data Analysis for Selected Countries

"Please, sir, I want more."
Oliver Twist, Charles Dickens

Food security is a critical issue that affects individuals' well-being and has far-reaching implications for political stability and national security. In recent years, the intersection of food security and political stability has garnered increasing attention from policymakers, researchers, and the public. As such, exploring the complex dynamics and interdependencies between food security and political stability is imperative to understand their profound impact on societies and nations.

Food security is essential at the individual and household levels (micro levels) and the national, international, and supranational levels (macro levels). It is well known that the individual, who is the building block of society, will only have a stronger sense of security when he/she feels safe and secure from dangers for the integrity and continuity of his/her existence. In this sense, hunger and malnutrition, the leading causes of natural disasters, armed conflicts, population growth, and poverty, fundamentally threaten the state of security at the micro level (Posekov & Ivanova, 2018). At the macro level, a country's access to food and food supply is a critical issue for national and regional prosperity and stability. In political discourse, NGO reports, and the media, global attention has been drawn to food security, mainly due to the food-related disruptions of the last century. Food price volatility has put food security high on the agenda of governments, communications and broadcast media, and the citizens of countries.

On the other hand, when economic activities are considered, international trade is one of the most effective mechanisms for countries to ensure food security. International trade links food production and consumption with trade openness. Trade openness is an incentive to minimise restrictions on food imports and exports. For this reason, it mobilises food-producing countries with this feature (Khodabakhshi & Golestaninasab, 2021).

Various studies have highlighted the critical role of political risk in significantly impacting food security in countries. Factors such as government incompetence, corruption, socioeconomic conditions like unemployment and poverty, religious and ethnic tensions, internal and external conflicts, and military involvement in politics contribute to uncertainty in food security. These elements of high political risk and deteriorating political institutions lead to political instability, which in turn escalates food insecurity levels and poverty (Schnitter & Berry, 2019).

Furthermore, political environments directly impact the stability of food economies and governmental commitments to food security policies. Political crises negatively correlate with food security, emphasising the importance of stable political environments in ensuring food security. By addressing political risks and strengthening governance structures, countries can enhance their food security levels and promote economic development (Sousa et al., 2019).

This study examines the effects of trade openness and political stability on food security in selected countries. The literature has examined the relationship between food security and political stability and between food security and globalisation. However, there must be a fundamental study that looks holistically at the impact of both on food security. The model examines the impact of trade openness and political stability on food security. The model was tested using data from 96 countries, employing the Generalised

Method of Moments (GMM). The variables are first analysed sections 2 and 3 of the study. Then, the model findings and discussions are presented.

Food Security

The concept of food safety has a comprehensive meaning. To better understand the depth and comprehensiveness of the concept, the literature is still seeking answers to questions like “What does food safety mean?” and “How is food safety measured?”[1]

The answers to the questions “How can it be measured?” or “What does it mean?” for this concept, an element of security, have found different reflections in the literature. Initially, “food security” was used to describe whether a country had access to enough food to meet its nutritional needs. On the other hand, national food security has come to mean self-sufficiency. According to this perspective, food security is achieved when a country can produce the food it needs or its population demands (Pinstrup-Andersen, 2009). However, since the World Food Conference in 1974, there have been shifts in the meaning of food security. The meaning has shifted from the global and national level to the household and individual, from a food priority perspective to a livelihood perspective, from objective indicators to subjective perceptions (Maxwell, 1996). At the 1996 World Food Summit, a much broader and improved definition of food security was adopted, including other vital dimensions of food security (such as food access and utilisation) in addition to food availability by consensus. However, the narrower definition, focusing on technology, productivity, and the supply of agricultural products, still dominates the international food security discourse and practice (Burchi & De Muro, 2016). Over time, the concept has evolved and been used with different meanings in line with changes in the agenda.

Food and nutrition are one of the society’s basic needs. As mentioned above, the fulfilment of this need lies in the comprehensive concept of food security. Like other forms of security, food security undeniably impacts society's physical, social, and psychological well-being. This has led the issue of food security to go beyond the concept of “food safety”. The importance of food security is so great that eradicating poverty and hunger has been recognised as one of the development goals of the third millennium. The World Bank has also identified food security as one of the essential development indicators and equated it with per capita income, fair income distribution, employment rate, environmental protection, and respect for human rights.

With all this transformation and attention, food security has yet to escape the impact of the COVID-19 pandemic, a significant global disruption. At this point, the impact of COVID-19, combined with conflicts and increasing climate disasters, has led to one of the worst humanitarian crises of the last century. Undeniably, COVID-19 has disrupted food systems globally. In response, governments have sought to stabilise food supply chains to prevent social unrest. It is important to remember that significant food supply chain disruptions have catalysed for many historical conflicts that have led to social unrest and violence, such as the French Revolution and the Arab Spring. When global food prices spiked in 2008 and again in 2011-2012, consumers took to the streets, and food riots broke out in nearly 50 countries. Some riots turned violent, such as overthrowing the Haiti and Madagascar governments (Barrett, 2020). Policymakers have had to balance the positive health impacts of solid distancing measures, such as quarantine, against their economic costs, particularly the burdens imposed on low-income and food-insecure households. In such times of crisis and instability, the low-educated workforce can be affected much more strongly than the

[1] In addition to essential reports and research on the extent to which food security can be achieved, the Global Food Security Index (GFSI) is a measurement. The Global Food Security Index (GFSI) is prepared for 113 countries, considering food supply, availability, quality, and safety, natural resources, and resilience. The index is a dynamic quantitative and qualitative benchmarking model comprising 58 indicators measuring food security drivers in developing and developed countries (Economic Impact).

middle- or highly-educated workforce. Therefore, from a public health, income distribution, or food security perspective, the extraordinarily rapid and severe shocks imposed by COVID-19 have demonstrated the value of transfer policies supporting households (Arndt et al., 2020).

Trade Openness and Political Stability

Trade openness refers to the extent to which a country actively participates in international trade through the liberalisation of trade policies and the removal of trade barriers. Trade openness also refers to the extent to which a country engages in international trade and allows the free flow of goods and services across borders (Shekhawat et al., 2021; (Arif & Rawat, 2019); Belke & Wang, 2006).

It is usually measured as the ratio of exports plus imports to the gross domestic product. In other words, this ratio provides information on the extent to which a country is engaged in international trade and integrated with the global economy. Different methods have been tried in the literature to measure trade openness.[2] It encompasses various dimensions, including the volume of trade by the size of the economy, the composition of trade, and the direct impact of trade policies on foreign trade. Trade openness is vital to a country's economic engagement with the global market. For this reason, the literature frequently examines the relationship between trade openness and economic growth.[3] A comprehensive understanding of trade openness is essential to grasp the full extent of a country's participation in international trade. Political stability is the absence of political turmoil or sudden changes in a country's governance structure. It is a crucial factor affecting a country's economic and social development. It underscores the multifaceted impact of political stability on economic development, trade dynamics, and international relations and emphasises its vital role in shaping various aspects of a country's relationship with the global economy.[4]

Interaction Between Trade Openness, Political Stability, and Food Security

The relationship between trade openness, political stability, and food security has generally been analysed and interpreted in the literature through bilateral interactions. This section analyzes the linkages between trade openness and political stability, trade openness and food security, and food security and political stability.

[2]Squalli and Wilson (2011) propose a composite measure of trade openness that takes into account both trade share and the relative importance of a country's trade level in total world trade; Liargovas and Skandalis (2011) also discuss using multiple indicators to measure trade openness; Prasetya and Purwana (2021) emphasise the impact of trade openness on trade misinvoicing, noting that trade openness can affect the propensity for capital flight through over-invoicing of imports and/or under-invoicing of exports.

[3]Dollar and Kraay "Trade, Growth, and Poverty", The Economic Journal (2004) doi:10.1111/j.0013-0133.2004.00186.x; Tahir and Khan "Trade openness and economic growth in the Asian Region", Journal of Chinese Economic and Foreign Trade Studies (2014) doi:10.1108/jcefts-05-2014-0006; Wacziarg and Welch "Trade Liberalisation and Growth: New Evidence", The World Bank Economic Review (2008) doi:10.1093/wber/lhn007; Abdallah, "An Evaluation of Simultaneous Openness Hypothesis in the Context of Stock Market Development: Evidence from a Panel of Fifty Three Countries Based a GMM Study", Modern Economy (2016) doi:10.4236/me.2016.72017; Subasat, "Do Liberal Trade Policies Promote Trade Openness?", International Review of Applied Economics (2008) doi:10.1080/02692170701745887. While some studies emphasise a positive relationship between trade openness and economic growth, others argue for a more complex and conditional relationship.

[4]Ashraf (2022) emphasises the positive impact of political stability on economic growth, especially in the context of trade openness. Similarly, Rashid et al. (2017) emphasise the importance of political stability as an important factor considered by foreign investors, especially in competitive Asia-Pacific countries. Moreover, Asongu et al. (2021) pointed to a significant negative relationship between political stability and trade openness, especially in Sub-Saharan Africa. This is supported by Bonnal (2015), who provided new evidence on the relationship between political institutions, trade openness, and economic growth. Nzeh et al. (2023) showed the negative impact of trade openness, political stability, and FDI outflows on the Economic Community of West African States (ECOWAS) economy, highlighting the complex relationship between these factors. Ari (2021) argues that there is unidirectional causality from trade openness to government stability in the Turkish context. Abuseridze (2021) emphasises that trade growth and political stability are interconnected and underlines the importance of political stability in strengthening international trade and economic sustainability. Megasari and Saleh (2021) and Goswami (2018) also mention the significant impact of political stability on FDI inflows. Moreover, Hegre et al. (2010) underline the broader effects of political stability on international relations and trade dynamics, confirming that trade promotes peace and conflict simultaneously reduces trade.

The relationship between trade openness and political stability is the subject of extensive research in the literature. Examining the effects of periods of political stability or even instability on economies in terms of trade openness, as well as the impact of trade openness on political stability, suggests that this relationship may be bidirectional. Contrary to the arguments favouring an open economy, increased trade openness may only sometimes favour political stability. For example, Asongu et al. (2021), who found a negative relationship between political stability and trade openness in Sub-Saharan Africa, showed that political stability tends to decrease as trade openness increases. Similarly, Fredriksson and Mani (2004) tried to determine whether the effects of trade openness and political stability are mutually reinforcing or opposing. Their findings indicated a complex relationship between trade integration and political turbulence. Nevertheless, the idea that political stability is crucial for creating an environment conducive to economic activity, including trade, remains valid.[5] On the other hand, trade openness may also have implications for government policies and spending priorities. Harimaya et al. (2008) found a positive correlation between trade openness and government spending, suggesting that as countries become more open to trade, government spending in certain areas, such as agriculture, tends to increase.

The literature suggests a complex interaction between trade openness and political stability. While trade openness can positively impact economic growth, it can also be associated with reduced political stability. However, political stability is undeniably crucial for promoting economic growth and creating an environment conducive to trade and investment.

Overall, the impact of trade openness on food safety is a multifaceted issue involving trade flow, public health, and the challenges that developing countries face. Food safety standards, while potentially acting as trade barriers, also play an important role in ensuring the quality and safety of food products in domestic and international markets (Henson & Jaffee, 2004; Lam et al. 2013; Sun et. al., 2014; Wilson & Otsuki, 2004. When considered in the context of quality and safety, the interaction of food security and trade openness can have an impact at many points, from reducing child malnutrition to improving food security through factors such as access to safe water, sanitation, women's education and the availability of nutritious food (Smith & Haddad, 2015).

The role of political stability in ensuring food security is essential in the economic context. Political instability directly affects national economies and government commitments. Consequently, instability indirectly impacts the policies implemented in food security. At this point, economic growth and political stability are recognised as macrodeterminants of food security (Rezende Machado de Sousa et al., 2019). Food security is crucial for maintaining a healthy and productive life. However, it can also contribute to national and global security by playing a role in ensuring political stability and peace among people (Omotesho et al., 2014). Availability, accessibility, and stability of food are the pillars of food security, which must always be available and affordable (Susilastuti 2018). Studies have argued that food security can positively affect political stability, as higher levels of food security improve the political stability of countries. (Subramaniam et al., 2023). On the other hand, increases in food prices or decreases in food availability can lead to political instability, as they undermine the legitimacy of regimes by negatively affecting the welfare of the average citizen. However, the relationship between political instability and food security also appears to have an impact on foreign investment withdrawal decisions (Subramaniam et al., 2023)

[5] Economic growth and development is an indicator used in the literature to reflect this relationship. Younis et al. (2008) drew attention to the close relationship between political stability and economic growth and emphasised the importance of political stability in promoting economic development. In addition, Ramadhan et al. (2016) found that political stability has a positive relationship with economic growth. They emphasised the importance of political stability in driving economic outcomes.

Literature

Baldos and Hertel (2014) examined how trends in agricultural productivity and climate change affect the future of global food security. Their results show improvements in global food security for the period 2006-2050. Despite a growing population and increasing demand for biofuels, fundamental income growth, combined with projected increases in agricultural productivity, is projected to lead to a 24% increase in energy intake in the global average diet. However, it should be borne in mind that these results depend heavily on agricultural productivity growth. Without such growth, food security could suffer setbacks (Baldos & Hertel, 2014).

Dithmer and Abdulai (2017) investigated the impact of trade openness and other factors on food security. The study preferred the system GMM approach. The empirical results show that trade openness and economic growth have positive and significant effects on food security and contribute to improvements in dietary diversity (Dithmer & Abdulai, 2017).

Biniaz and Mohamadi (2018) investigated the impact of the agricultural sector's degree of trade openness on the country's food security for the period 1999-2013. According to the study, for a 1% increase in the degree of openness of agricultural trade, the food security index will increase by 0.21% eventually. Therefore, policies are recommended to increase production by using export-oriented technology to reduce production costs and increase quality and efficiency. It is also recommended that incentives for private sector investments be increased and agricultural insurance expanded to reduce risk and uncertainty and encourage farmers to produce quality products (Biniaz & Mohamadi, 2018).

Ogunlesi (2018) empirically examined the impact of agricultural productivity on food security stability using the LSDV and SYS-GMM methods for 37 selected countries in Sub-Saharan Africa (SSA) from 1990 to 2016. The study adopted per capita variability in food supply (PCFSV) to measure food security stability. At the same time, agriculture's value-added contribution to gross domestic product (AGVA) and crop production (CRPROD) were selected as agricultural productivity indicators. The study concluded that stability in food security is achieved and sustained by increasing agricultural productivity. Based on the findings, the study recommended that agricultural productivity will increase by ensuring the effective implementation of pro-agricultural growth policies in SSA, thereby improving food security stability (Ogunlesi et al., 2018).

Assoumou-Ella and Eba-Nguema (2019) conducted a comparative analysis of the impact of trade liberalisation on food security for two different African country communities (CEMAC and WAEMU) with data covering the period 1987-2014. They found that unfavourable terms of trade erase-positive effects and lead to food insecurity. This result is valid for all country samples. The study suggests that these countries should implement trade policies that facilitate openness while supporting and diversifying domestic food production. (Assoumou-Ella & Eba-Nguema, 2019).

Abdul Manap and Ismail (2019) measured the impact of food security on economic growth directly and indirectly through variables such as poverty, life expectancy, and total employment. Their study employs the GMM method and finds that increasing food security leads to higher economic growth. Additionally, food security affects economic growth through improvements in life expectancy, total employment, and poverty reduction. In countries with better food security, economic growth positively influences life expectancy, total employment, and poverty reduction while ensuring and improving food security (Abdul Manap & Ismail, 2019).

Fusco et al.'s (2020) study aims to analyse the impact of trade openness on the level of food security in European countries by conducting a dynamic panel analysis using a GMM approach. Two different food security indicators (average protein supply and average adequacy of dietary energy supply) were selected,

which can provide information on both the quantity and nutritional quality of the food supply. The results show that, on average, trade openness has a statistically significant net positive effect on food security in European countries (Fusco et al., 2020).

Obi et al. (2020) examined the relationship between migration, remittances, and food crises. They analysed the Nigerian case using the World Bank Living Standards dataset. The results showed that remittances are valuable in meeting both short- and long-term food security and are an important tool in meeting household food security during food crises. They concluded that remittances facilitate consumption and lift households to higher levels of food security during food crises (Obi et al., 2020).

Fathelrahman et al. (2021) measured the welfare effects of food trade liberalisation in India, Egypt, Pakistan, Saudi Arabia, and the United Arab Emirates (UAE) using a partial equilibrium model. The simulation results for India, Egypt, and Pakistan show annual welfare gains (consumer surplus) of 2571, 340 and 25 million USD, respectively, while Saudi Arabia and the UAE show gains of 14 and 17 million USD. The results suggest that removing tariffs would have far-reaching welfare effects on food products in these countries. Moreover, reductions in certain goods directly related to food energy and protein availability would significantly impact people experiencing poverty. Reducing high tariffs on these commodities could increase the real incomes of more than 350 million people by 7.5% or more and lead to shifts in consumption towards more diverse and nutritionally healthy diets (Fathelrahman et al., 2021).

Sun and Zhang (2021) empirically estimated the impact of trade openness and other factors on food security using 2001-2018 panel data of Central Asian countries based on the four pillars of food security (availability, access, stability, and utilisation). Using dynamic panel data analysis with the GMM approach, the results show that (1) food security tends to improve in Central Asian countries; (2) GDP, GDP growth, and agricultural productivity contribute to improving food security. However, employment in agriculture, arable land, freshwater withdrawal in agriculture, population growth, natural disasters, and inflation rate negatively affect food security; (3) trade policy reforms can help improve food security in Central Asian countries (Sun & Zhang 2021).

Subramaniam et al. (2023) found a negative relationship between political instability and foreign divestment in the context of food security. They argue that countries with higher food security have lower levels of political instability. They also emphasised the role of economic growth, human capital, and trade openness in deterring foreign disinvestment. Subramaniam et al. (2023) also examined the relationship between food security and political stability. They concluded that higher food supply security will improve political stability in a country. This is because food security affects the welfare of the average citizen and a decrease in food security can lead to political instability due to price increases. (Subramaniam et al., 2023).

In their study, Gnedeka and Wonyra (2023) re-examined the impact of trade openness on food security for 37 Sub-Saharan African countries using the GMM method with data covering the years 2004-2018. Given that food security is a multidimensional concept, this study uses four indicators to explain this concept. To increase the robustness of the empirical results, globalisation is used as an alternative factor to trade openness. The empirical results show that trade openness significantly improves food security in Sub-Saharan Africa. However, the presence of political instability leads to deteriorating food security. The results also suggest that the quality of institutions, economic growth, remittances, human capital, and the importance of the agricultural sector also influence the level of food security in Sub-Saharan Africa. It is observed that policies targeting trade openness should also consider the quality of institutions to achieve the expected results (Gnedeka & Wonyra, 2023).

In addition to all these relationships, conflicts and crises affect food security. Nguyen et al. (2023) discussed how food security concerns during conflicts can reduce food exports, which can spike food prices and reduce the level of food security in the importing country (Nguyen et al., 2023).

In addition, recent research emphasises the importance of trade openness in improving food security and fostering economic growth. Huda (2024) and Fan (2024) showed that trade openness enhances food security, particularly in developing nations, by reducing food prices and increasing access to quality food (Huda, 2024; Fan et al., 2024). Muchtar (2024) added that trade liberalisation can boost economic growth, exemplified by a rise in halal food exports from Indonesia linked to greater trade openness (Muchtar et al., 2024). However, external factors, such as geopolitical events and climate change, can disrupt food supply chains. Krivko (2024) and Jagtap (2024) highlight how events like Russia's import ban and geopolitical conflicts can worsen food insecurity by interrupting trade flows and threatening supply routes (Krivko et al., 2024; Jagtap et al., 2024).

Additionally, Sandström (2024) highlights the vulnerabilities of food supply chains, noting that the dependency on imported agricultural inputs makes the system fragile. Li (2024) further stresses that disruptions in global trade networks can have far-reaching effects on food security (Sandström et al., 2024; Li et al., 2024). To counter these challenges, Oriekhoe (2024) and Jia (2024) advocated for sustainable practices within food systems (Oriekhoe et al., 2024; Jia et al., 2024). They argue that a diversified supply chain, supported by international trade, can enhance resilience against shocks like climate change and ensure more stable food security. In summary, while trade openness promotes food security and economic growth, the text underscores the need for resilience through sustainable practices to mitigate the impact of external disruptions.

In the literature, the relationship between trade openness, political stability, and food security has generally been analysed and interpreted through bilateral interactions. However, this study takes a different approach by adopting a holistic perspective on these interactions and identifies the connections between these elements. Besides that, the literature suggests a positive link between political stability and food security; geopolitical conflicts and civil unrest can disrupt food access and distribution, regardless of a country's direct involvement. Additionally, regime responses to food insecurity and price crises vary, influencing political stability (Nguyen et al., 2023; Djeufack Dongmo, 2024). However, this study contributes to the literature by offering a different perspective, focusing on the impact of political stability on food security, which means the relationship is analysed in the opposite direction. Furthermore,, found that political stability has no effect on food security.

Data and Methods

Panel data analysis, also referred to as longitudinal or cross-sectional time series analysis, combines the strengths of both time series and cross-sectional data. This analytical approach enables researchers to effectively investigate the dynamics and interrelationships among variables over time while accommodating individual disparities or heterogeneity across the observed units. Moreover, it offers a higher degree of freedom compared to the cross-sectional or time series methods, thereby enhancing the reliability of the estimations. Additionally, it aids in alleviating the issue of multicollinearity commonly encountered in cross-sectional or time series analyses by incorporating observations from multiple time periods for each individual unit (Allison, 1994; Andreß et al., 2013; Frees, 2004; Vaisey & Miles, 2017).

In dynamic panel data analyses, the estimation technique that is most favoured is the "Generalised Method of Moments" (GMM), which was introduced by Arellano and Bond (1991). The GMM serves as an econometric estimation method that, instead of depending on assumptions about the underlying probabil-

ity distribution, does not necessitate explicit distributional assumptions; it solely requires the computation of statistical moments from the model and data. This unified framework, which encompasses various econometric methods (such as likelihood, ordinary least squares, two-stage least squares), allows for flexibility in model specification and estimation procedures. Furthermore, it has the advantage of addressing endogeneity bias in explanatory variables by using empirical moments rather than theoretical population moments (Hansen, 2010; Hansen & West, 2002).

The global food security index was chosen as the dependent variable because the study examines the impact of trade openness and political stability on food security. The literature examined the relationships between food security and political stability and between food security and globalisation. However, a fundamental study that holistically examines the impact of both on food security is required. Thus, in line with the question sought to be answered, the independent variables are the political stability index of the PRS Group, the Trade Globalisation Index from the KOF Globalisation Index, and the logarithm of per capita income for the four selected models. Data from 96 countries for the years 2012-2020 were used.

Table 1

Indicators in the Model

Abbreviations	Variables
gfi	Global Food Security Index
pol	PRS Group's Political Stability Index
koftrgidf	KOF Globalisation Index in Trade Globalisation Index
lncap	National income per capita

Model and Findings

The fundamental dynamic model used in the analysis can be elucidated as follows: Within model (1), the variable y denotes the dependent variable, while x represents the independent variables. Additionally, the lagged value of the dependent variable was incorporated as an explanatory variable within the model. The term v_i signifies unit effects. At this juncture, two assumptions are posited: 1.) e_{it} exhibits no serial correlation, and 2.) All explanatory variables within the model are considered exogenous, with the error term possessing a mean of zero and a constant variance.

$$y_{it} = \alpha y_{i,t-1} + \beta x_{it} + v_i + e_{it} \quad (1)$$

The adapted version of the general model discussed above for the analysis is as shown in Equation 2

$$gfsi_{it} = \beta_0 + \alpha gfsi_{i,t-1} + \beta_1 lnpcapi_{it} + \beta_2 lnkoftrgidf_i + \beta_3 lnpol_{it} + v_i + e_{it} \quad (2)$$

The outcomes derived from the model of the study, as estimated through the Generalised Method of Moments (GMM) techniques, are presented in Table 2. The primary objective was to assess the model's validity by comparing the outcomes obtained from two distinct estimators. Towards the conclusion of the table, diagnostic tests such as the Sargan and Hansen statistics were employed to ascertain the validity of the instrumental variables, while the AB1 and AB2 autocorrelation tests, as suggested by Arellano and Bond (1991), were conducted to further evaluate the model's robustness. The statistical significance of the AB_1 test statistic at the 5% level, coupled with the statistical insignificance of the AB_2 test result, indicates the absence of autocorrelation issues within the model (Arellano, 2003:121).

Table 2

GMM Estimation Results for Food Security

gfi	1	2	3	4
L1.	0.335* (.145)	0.335* (0.131)	0.35* (0.133)	0.466* (0.085)

koftrgidf	0.033 (.047)	0.033 (.044)	.021 (.045)	.009 (.029)
L1	-.104* (.036)	−0.103* (.034)	-.095* (.035)	-.067** (.026)
pol	64.23 (40.31)	64.23** (35.37)	55.24 (36.35)	0.927 (3.300)
lncap	16.29* (4.51)	16.29* (4.15)	15.55* (4.277)	11.58* (3.33)
Sargan	0.753	0.753	0.753	0.361
Hansen	0.607	0.607	0.607	
AB1	0.000	0.000	0.000	0.000
Ab2	0.422	0.423	0.388	0.161
Obs	672	672	672	672
Group	96	96	96	96
Number of instruments	9	9	9	10

Note: All tests were performed using the xtabond2 command. Two-stage robust and no robust and one-stage robust and no robust methods were preferred, respectively.

Source: Global Food Security Index

The results in Table 2 indicate that the first lag of the food security index, the dependent variable in the model, is significant. In this case, it can be interpreted that the food security of the previous year affects the food security of the following year; in other words, when the food security of the previous year is positive, the following year is also positive, while food insecurity affects the following year negatively. It can also be interpreted that the food supply is subject to continuity over time. Decoupling production structures from climatic conditions will ensure continuity in production. The first lag of the trade globalisation index, which is the first of the independent variables, is significant but at a low level.

On the other hand, the political stability index is found to be insignificant due to the analysis. In the analysis, the independent variable that is valid in all models and has a high degree of significance is the national income per capita. There is a positive relationship with the global food security index. A 1% change in national income per capita increases food security nearly sixteen percent. Because of the tests for the validity of the estimation results for the dynamic models, all the models are valid.

Conclusion

Trade openness and political stability are crucial factors that significantly impact food security. Research by Marson et al., (2022) highlights that trade openness plays a vital role in reducing undernourishment in developing countries, mainly through its direct effects on various dimensions of food security, with the cereals sector being particularly influential (Marson et al., 2022). This emphasises the importance of trade policies in enhancing food security. Moreover, the study by Sartori and Schiavo (2015) emphasises the role of international trade in mitigating climate-induced changes in productivity and how liberalising trade can contribute positively to food security. This underscores the interconnectedness of trade policies and global food security outcomes (Sartori & Schiavo, 2015) . Additionally, Erokhin (2017) discusses how food security is increasingly influenced by trade systems and foreign trade policies, indicating that trade openness can significantly impact a country's ability to ensure food security. This suggests that political decisions regarding trade can have far-reaching implications for a nation's food security status (Erokhin, 2017).

Furthermore, Subramaniam et al. (2023) highlighted the positive relationship between food security and political stability, indicating that enhancing food security can lead to improved political stability within a country (Subramaniam et al., 2023). While the literature emphasises a positive relationship between political stability and food security, regional conflicts and civil unrest arising from the geopolitical location of countries, even if they are not parties, can directly affect food access, distribution, and stability (Nguyen et al., 2023). Moreover, different regimes may respond differently to food insecurity and food price crises. This impacts political stability (Djeufack Dongmo, 2024). Consequently, these situations may lead to a negative relationship between political stability and food security. As frequently highlighted in the literature, food insecurity negatively affects political stability as it may lead to a social uprising. In contrast, in the model considered in this study, the relationship is analysed in the opposite direction. Accordingly, political stability has no effect on food security.

In conclusion, the relationship between trade openness, political stability, and food security is complex and requires thorough analysis. Trade policies and political decisions significantly impact a country's food security status, with trade openness often playing a crucial role in improving food security outcomes. Longitudinal data analysis and advanced econometric methods are necessary to understand the intricate interactions between these factors and their influence on food security outcomes (Jones et al., 2013). Researchers can offer valuable insights by exploring these relationships, which can inform policy decisions aimed at enhancing global food security. Furthermore, there is a positive correlation between food security and political stability, highlighting the importance of ensuring food security to foster stability within a nation. Improving food security can lead to enhanced political stability, underscoring the critical role of food security in broader socio-political contexts. Future research should continue to employ robust methodologies to develop effective strategies for ensuring food security for all populations. Utilising longitudinal data analysis, advanced econometric methods, and a comprehensive understanding of the interplay between trade openness, political stability, and food security will be crucial in guiding policy interventions to enhance food security outcomes globally.

Peer Review Externally peer-reviewed.
Conflict of Interest The author has no conflict of interest to declare.
Grant Support The author declared that this study has received no financial support.

Author Details Canan Özge Eğri (Assist. Prof.)
[1] Kırklareli University, Faculty of Economics and Administrative Sciences, Department of Economics, Kırklareli, Türkiye
0000-0002-7850-8627 cananozge.egri@klu.edu.tr

References

Abdul Manap, Nur, and Normaz Ismail. (2019). "Food Security and Economic Growth." *International Journal of Modern Trends in Social Sciences* 108-18. doi: 10.35631/IJMTSS.280011.

Allison, Paul D. (1994). "Using Panel Data to Estimate the Effects of Events." *Sociological Methods & Research* 23(2):174-99. doi: 10.1177/0049124194023002002.

Andreß, Hans-Jürgen, Katrin Golsch, and Alexander W. Schmidt. 2013. "How to Do Your Own Panel Analysis." Pp. 287-92 in *Applied Panel Data Analysis for Economic and Social Surveys*, edited by H.-J. Andreß, K. Golsch, and A. W. Schmidt. Heidelberg: Springer.

Economist Impact "Global Food Security Index (GFSI)." Retrieved February 20, 2022 (http://foodsecurityindex.eiu.com/).

Arndt, Channing, Rob Davies, Sherwin Gabriel, Laurence Harris, Konstantin Makrelov, Sherman Robinson, Stephanie Levy, Witness Simbanegavi, Dirk van Seventer, and Lillian Anderson. (2020). "Covid-19 Lockdowns, Income Distribution, and Food Security: An Analysis for South Africa." *Global Food Security* 26:100410. doi: 10.1016/j.gfs.2020.100410.

Assoumou-Ella, Giscard, and Ismaelline Eba-Nguema. (2019). "Trade Openness and Food Security in Africa: A Comparative Study of CEMAC and WAEMU Countries." Pp. 119-35 in *The External Sector of Africa's Economy*, *Advances in African Economic, Social and Political Development*, edited by D. Seck. Cham: Springer International Publishing.

Baldos, Uris Lantz C., and Thomas W. Hertel. (2014). "Global Food Security in 2050: The Role of Agricultural Productivity and Climate Change." *Australian Journal of Agricultural and Resource Economics* 58(4):554-70. doi: 10.1111/1467-8489.12048.

Barrett, Christopher B. 2020. "Actions Now Can Curb Food Systems Fallout from COVID-19." *Nature Food* 1(6):319-20. doi: 10.1038/s43016-020-0085-y.

Biniaz, A., and H. Mohamadi. (2018). "The Effect of Agriculture Trade Openness on Food Security in Iran (ARDL Approach)." *Agricultural Economics Research* 10(38):81-104.

Dithmer, Jan, and Awudu Abdulai. (2017). "Does Trade Openness Contribute to Food Security? A Dynamic Panel Analysis." *Food Policy* 69:218-30. doi: 10.1016/j.foodpol.2017.04.008.

Djeufack Dongmo, A. and Avom, D. (2024). "Urbanization, civil conflict, and the severity of food insecurity in africa." Politics & Policy, 52(1), 140-168. https://doi.org/10.1111/polp.12572

Erokhin, Vasilii. (2017). "Self-Sufficiency Versus Security: How Trade Protectionism Challenges the Sustainability of the Food Supply in Russia." *Sustainability* 9(11):1939. doi: 10.3390/su9111939.

Fan Lihong, Nazhat Nury Aspy, Dilruba Yesmin Smrity, Md. Faris Dewan, Md. Golam Kibria, Mohammad Haseeb, Mustafa Kamal and Md Saidur Rahman. (2024). "Moving towards food security in South Asian region: Assessing the role of agricultural trade openness, production, and employment." *Heliyon, 10*(13), e33522, https://doi.org/10.1016/j.heliyon.2024.e33522.

Fathelrahman, Eihab, Stephen Davies, and Safdar Muhammad. (2021). "Food Trade Openness and Enhancement of Food Security-Partial Equilibrium Model Simulations for Selected Countries." *Sustainability* 13(8):4107. doi: 10.3390/su13084107.

Frees, Edward W. (2004). *Longitudinal and Panel Data: Analysis and Applications in the Social Sciences*. Cambridge: Cambridge University Press.

Fusco, Giulio, Benedetta Coluccia, and Federica De Leo. (2020). "Effect of Trade Openness on Food Security in the EU: A Dynamic Panel Analysis." *International Journal of Environmental Research and Public Health* 17(12):4311. doi: 10.3390/ijerph17124311.

Gnedeka, Kodjo Théodore, and Kwami Ossadzifo Wonyra. (2023). "New Evidence in the Relationship between Trade Openness and Food Security in Sub-Saharan Africa." Retrieved April 29, 2023 (https://www.researchsquare.com/article/rs-2429858/v1).

Hansen, Bruce E., and Kenneth D. West. (2002). "Generalized Method of Moments and Macroeconomics." *Journal of Business & Economic Statistics* 20(4):460-69. doi: 10.1198/073500102288618603.

Hansen, Lars Peter. (2010). "Generalized Method of Moments Estimation." Pp. 105-18 in *Macroeconometrics and Time Series Analysis*, edited by S. N. Durlauf and L. E. Blume. Palgrave Macmillan UK.

Henson, Spencer, and Steven Jaffee. 2004. *Standards and Agro-Food Exports from Developing Countries: Rebalancing the Debate*. The World Bank.

Huda, Fahmi Alamil. (2024). "The impact of trade openness, tariff, and globalization on food security in the ASEAN region." *KnE Social Sciences*. https://doi.org/10.18502/kss.v9i14.16107.

Jagtap Sandeep, Hana Trollman, Frank Trollman, Guillermo Garcia-Garcia, Wayne Martindale. (2024). "Surviving the storm: Navigating the quadruple whammy impact on Europe's food supply chain." *International Journal of Food Science & Technology, 59*(6), 3652-3666. https://doi.org/10.1111/ijfs.17106;.

Jia, Junwen, Weiqiang Yang, Fang Wu· Xuefeng Cui. (2024). "Elevated diversity of the supply chain boosts global food system resilience." *Environmental Research Letters, 19*(2), 024049. https://doi.org/10.1088/1748-9326/ad2434.

Jones, Andrew D., Francis Ngure, Gretel H. Pelto, and Sera L. Young. (2013). "What Are We Assessing When We Measure Food Security? A Compendium and Review of Current Metrics." *Advances in Nutrition* 4(5):481-505. doi: 10.3945/an.113.004119.

Khodabakhshi, Akbar, and Reza Golestaninasab. (2021). "Impact of the Trade Openness on Food Security in Oil-Based Economies (OPEC Countries)." *Iranian Journal of Agricultural Economics and Development Research* 52(3):541-52. doi: 10.22059/ijaedr.2021.291891.668842.

Krivko, Mikhail, Katarzyna Czech, Michał Wielechowski, Pavel Kotyza, Luboš Smutka. (2024). "Rebalancing agri-food trade flows due to Russian import ban: The case of direct neighbors." *Frontiers in Sustainable Food Systems, 8.* https://doi.org/10.3389/fsufs.2024.1420945

Lam, Hon-Ming, Justin Remais, Ming-Chiu Fung, Liqing Xu, and Samuel Sai-Ming Sun. (2013). "Food Supply and Food Safety Issues in China." *The Lancet* 381(9882):2044-53. doi: 10.1016/S0140-6736(13)60776-X.

Li Junjie, Qin Xiao, Haixia Wu, Jianping Li. (2024). " Unpacking the global rice trade network: Centrality, structural holes, and the nexus of food insecurity. *Foods, 13*(4), 604. https://doi.org/10.3390/foods13040604.

Marson, Marta, Donatella Saccone, and Elena Vallino. (2022). "Total Trade, Cereals Trade and Undernourishment: New Empirical Evidence for Developing Countries." *Review of World Economics* 159(2):299-332. doi: 10.1007/s10290-022-00468-z.

Muchtar, Masruri, Hafid Asy'ari, Ahmad Rodoni, Euis Amalia, Muhamad Nadratuzzaman Hosen. (2024). "Does a free trade agreement's impact on the export of halal food to OIC countries matter? Evidence from Indonesia." *Etikonomi, 23*(1), 147-166. https://doi.org/10.15408/etk.v23i1.32951.

Nguyen, T. T., Timilsina, R. R., Sonobe, T., & Rahut, D. B. (2023). Interstate war and food security: implications from Russia's invasion of Ukraine. Frontiers in Sustainable Food Systems, 7. https://doi.org/10.3389/fsufs.2023.1080696.

Nguyen, Trung T., Raja R. Timilsina, Tetsushi Sonobe, and Dil B. Rahut. (2023). "Interstate War and Food Security: Implications from Russia's Invasion of Ukraine." *Frontiers in Sustainable Food Systems* 7.

Obi, Chinedu, Fabio Bartolini, and Marijke D'Haese. (2020). "International Migration, Remittance and Food Security during Food Crises: The Case Study of Nigeria." *Food Security* 12(1):207-20. doi: 10.1007/s12571-019-00990-3.

Ogunlesi, Ayodeji, Koye Bokana, Chidozie Okoye, and Jens-Peter Loy. (2018). "Agricultural Productivity and Food Supply Stability in Sub-Saharan Africa: LSDV and SYS-GMM Approach." Retrieved April 26, 2022 (https://mpra.ub.uni-muenchen.de/90204/).

Omotesho, Kemi F., Azeez Muhammad-Lawal, and Damilare E. Ismaila. (2014). "Assessment of Hired Labor Use and Food Security among Rural Farming Households in Kwara State, Nigeria." *Journal of Agricultural Sciences, Belgrade* 59(3):353-61.

Oriekhoe, Osato Itohan, Olawale Adisa, Bamidele Segun Ilugbusi. (2024). "Climate change and food supply chain economics: A comprehensive analysis of impacts, adaptations, and sustainability." *International Journal of Applied Research in Social Sciences, 6*(3), 267-278. https://doi.org/10.51594/ijarss.v6i3.885.

Rezende Machado de Sousa, Luna, Arlette Saint-Ville, Luisa Samayoa-Figueroa, and Hugo Melgar-Quiñonez. (2019). "Changes in Food Security in Latin America from 2014 to 2017." *Food Security* 11(3):503-13. doi: 10.1007/s12571-019-00931-0.

Sandström, Vilma, Ellen Huan-Niemi, Jyrki Niemi, Matti Kummu. (2024). "Dependency on imported agricultural inputs—Global trade patterns and recent trends." *Environmental Research: Food Systems, 1*(1), 015002. https://doi.org/10.1088/2976-601x/ad325e.

Sartori, Martina, and Stefano Schiavo. (2015). "Connected We Stand: A Network Perspective on Trade and Global Food Security." *Food Policy* 57:114-27. doi: 10.1016/j.foodpol.2015.10.004.

Schnitter, Rebekka, and Peter Berry. (2019). "The Climate Change, Food Security and Human Health Nexus in Canada: A Framework to Protect Population Health." *International Journal of Environmental Research and Public Health* 16(14):2531. doi: 10.3390/ijerph16142531.

Smith, Lisa C., and Lawrence Haddad. (2015). "Reducing Child Undernutrition: Past Drivers and Priorities for the Post-MDG Era." *World Development* 68:180-204. doi: 10.1016/j.worlddev.2014.11.014.

Sousa, Luna Rezende Machado de, Ana Maria Segall-Corrêa, Arlette Saint Ville, and Hugo Melgar-Quiñonez. (2019). "Food Security Status in Times of Financial and Political Crisis in Brazil." *Cadernos de Saúde Pública* 35:e00084118. doi: 10.1590/0102-311X00084118.

Subramaniam, Yogeeswari, Nanthakumar Loganathan, and Tajul A. Masron. (2023). "Food Security and Political Instability-Foreign Divestment Analysis." *Journal of Chinese Economic and Foreign Trade Studies* 16(1):55-63. doi: 10.1108/jcefts-04-2022-0025.

Sun, Dingqiang, Jikun Huang, and Jun Yang. (2014). "Do China's Food Safety Standards Affect Agricultural Trade? The Case of Dairy Products." *China Agricultural Economic Review* 6(1):21-37. doi: 10.1108/CAER-06-2012-0062.

Sun, Zhilu, and Defeng Zhang. (2021). "Impact of Trade Openness on Food Security: Evidence from Panel Data for Central Asian Countries." *Foods* 10(12):3012. doi: 10.3390/foods10123012.

Susilastuti, Darwati. (2018). "Poverty Reduction Models: Indonesian Agricultural Economic Approach." *European Research Studies* XX(3A):164-76.

Vaisey, Stephen, and Andrew Miles. (2017). "What You Can-and Can't-Do with Three-Wave Panel Data." *Sociological Methods & Research* 46(1):44-67. doi: 10.1177/0049124114547769.

Wilson, John S., and Tsunehiro Otsuki. (2004). "To Spray or Not to Spray: Pesticides, Banana Exports, and Food Safety." *Food Policy* 29(2):131-46. doi: 10.1016/j.foodpol.2004.02.003.