Journal of Business Decision and Risk Sciences (JBDRS)

https://doi.org/

Journal Homepage: *www.JBDRSJournal.com*

ORIGINAL RESEARCH PAPER

Impact of Snapback Mechanism on Business Conditions and Stock Market Performance in Iran's Agriculture, Sugar, Food and Pharmaceutical Industries

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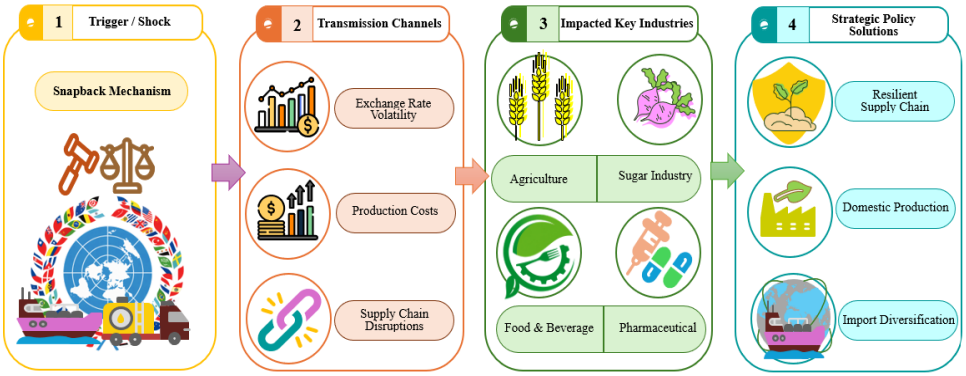
P A P E R I N F O

Paper history:
Received: 01/09/2026
Revised: 02/21/2026
Accepted in revised form: 03/01/2026
Published: 03/30/2026

***Keywords*:**
Snapback Mechanism;
International Sanctions;
Agriculture Industry Index;
ARDL Model.

A B S T R A C T

International sanctions have significantly affected Iran's economic structure by imposing financial, monetary, and trade restrictions on productive and industrial sectors. The Snapback Mechanism, as a key instrument for the reimposition and intensification of international sanctions, can further disrupt supply chains, production processes, and industrial competitiveness. This study examines the impact of the Snapback Mechanism on the agriculture, sugar, food, and pharmaceutical industry indices in Iran. Annual data for 2011–2025 were analyzed using the Autoregressive Distributed Lag (ARDL) model. The empirical findings indicate that the activation of the Snapback Mechanism has a significant negative impact on the selected industry indices through increased production costs, exchange rate volatility, higher prices of imported inputs, and restricted access to essential raw materials and advanced technologies. The results further reveal reduced production flexibility, greater dependence on domestic resources, and constraints on industrial capacity expansion in the long run. Sanctions have also weakened the competitive position of the targeted industries and undermined supply chain security and production stability. The study concludes that the effects of the Snapback Mechanism extend beyond short-term disruptions and pose significant long-term challenges to industrial development and economic resilience. To mitigate these effects, policymakers should strengthen domestic production of strategic inputs, diversify import channels, develop alternative financial and trade mechanisms, improve logistics infrastructure, and implement targeted support policies for vulnerable industries. These measures can enhance production sustainability, strengthen supply chain resilience, and improve the capacity of Iran's industrial sectors to withstand external economic shocks.



1. Introduction

Over the past decades, Iran's economy has been significantly affected by international economic sanctions and various restrictive mechanisms. Among these, the Snapback Mechanism, which provides for the automatic reimposition of United Nations sanctions against Iran, has attracted considerable attention due to its potential economic consequences [1]. The activation of this mechanism can directly and indirectly affect import-dependent industries by disrupting the supply of raw materials, restricting access to international financial resources, increasing exchange rate volatility, and raising investment risks [2].The agriculture, sugar, food, and pharmaceutical industries are among the sectors that rely heavily on imported raw materials, intermediate goods, production equipment, and advanced technologies throughout their supply chains [3]. Moreover, these industries play a critical role in ensuring food security and public health. Therefore, any disruption in their production

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ISSN:
URL: https://www.jbdrsjournal.com/article_735675.html
Please cite this article as: S. Saniei, M. Esmaeili, & M. Arabzadeh, *Journal of Business Decision and Risk Sciences (JBDRS)*, 2026, *2*(1), 1-6. https://doi.org/
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processes may have far-reaching economic and social consequences, including reduced production capacity, higher production costs, increased consumer prices, and potential shortages of essential goods.

These disruptions may adversely affect consumer welfare and undermine the stability of essential commodity markets. Under such circumstances, examining the impact of the Snapback Mechanism on the performance indicators of these industries is essential not only from an economic perspective but also from the standpoint of public policymaking. Accordingly, the central research question of this study is: How do the key performance indices of Iran's agriculture, sugar, food, and pharmaceutical industries respond to the reimposition of sanctions through the Snapback Mechanism, and what are the implications of these changes for the country's economic policymaking? Previous studies have primarily focused on the overall effects of economic sanctions on macroeconomic variables such as economic growth, international trade, and exports [4]. However, limited attention has been paid to comparative and cross-sectoral analyses of strategic industries within the food and pharmaceutical supply chains. To address this research gap, the present study employs a panel data approach to investigate the behavior of the selected industry indices during the period following the reimposition of sanctions through the Snapback Mechanism. By providing empirical evidence on the heterogeneous responses of these strategic sectors, this study contributes to the existing literature on economic sanctions and offers policy recommendations aimed at enhancing industrial resilience and strengthening supply chain sustainability under external economic constraints [5].

Ismailzadeh et al. [6], in their study entitled "Ranking Companies in the Agriculture and Related Services Industry Listed on the Tehran Stock Exchange Using Multi-Criteria Decision-Making Methods," evaluated the performance and efficiency of firms operating in Iran's agricultural sector. The authors emphasized that exchange rate policies and international sanctions are among the primary factors contributing to declining productivity in this industry. Their findings indicate that exchange rate volatility, restrictions on preferential foreign exchange allocation, and difficulties in procuring imported production inputs have significantly increased production costs and reduced the operational scale of agricultural firms. Furthermore, intensified sanctions have disrupted technology transfer, international financial and trade relations, and access to foreign investment, thereby limiting the modernization and expansion of production processes within the sector.

Safavi Mirmohalleh et al. [7], in their study entitled "Identifying and Analyzing Supply Chain Risks in Iran's Pharmaceutical Industry Using an Integrated Meta-Synthesis and Thematic Analysis Approach," identified the major risks affecting the pharmaceutical supply chain in Iran. Their findings revealed that environmental risks, foreign exchange shortages, restrictions on international financial transactions, rising prices of pharmaceutical raw materials, and increased transportation and insurance costs were the most influential risk factors, as these dimensions exhibited the highest frequency in both the meta-synthesis and thematic analysis. The authors concluded that stakeholders in Iran's pharmaceutical supply chain should prioritize these risks and develop appropriate risk management strategies to improve supply chain performance. The study further suggests that international sanctions weaken the production structure by increasing dependence on domestic suppliers while simultaneously limiting access to foreign technologies and international markets.

Zamanian Far et al. [8], in the article "Strategies for Enhancing Resilience Against Economic Sanctions on Iran as a Foreign Policy Instrument," employed a documentary research method based on library studies and logical inference derived from comparative analyses of the existing scientific literature. The study examined the economic, social, and geopolitical consequences of economic sanctions against Iran and provided valuable insights into their effectiveness and long-term implications. Furthermore, the authors discussed various interpretations of economic resilience and sanctions neutralization within Iran's policymaking framework and analyzed the role of economic diplomacy in mitigating the adverse effects of sanctions. Their findings indicate that economic sanctions have had profound and persistent impacts on Iran's economic performance. Accordingly, the study argues that redefining Iran's position within the global economy constitutes one of the most effective long-term strategies for enhancing national economic resilience.

Rezvani et al. [9], in their study entitled "Evaluating the Effects of Economic Sanctions on Household Demand for Tea, Sugar, and Sweeteners in Urban Iran," applied a parametric approach within an extended switching regression framework to investigate changes in household consumption behavior following the imposition of sanctions. The results indicate that the price elasticity of demand for domestic and imported tea, sugar, and sweeteners increased significantly after sanctions, transforming these products from relatively price-inelastic to more price-elastic goods. The findings suggest that inflation and rising prices following sanctions increased consumers' sensitivity to price changes. Consequently, the authors recommend implementing targeted price-support policies, such as electronic food voucher programs, to protect household purchasing power and improve food security under sanction-induced inflationary conditions.

Dadres Moghaddam et al. [10], in the article "Modeling the Impact of Economic Shocks on Stock Returns in the Sugar Industry," examined the effects of major macroeconomic variables on the stock returns of sugar industry firms listed on the Tehran Stock Exchange. Using a Genetic Function Approximation algorithm to identify the most influential macroeconomic variables and a Panel Vector Autoregression (PVAR) model to estimate dynamic relationships, the study found that the official exchange rate, OPEC crude oil prices, and liquidity growth exerted positive and statistically significant effects on stock returns in the sugar industry. The findings further demonstrate that external economic shocks have persistent and long-term impacts on the financial performance of firms operating in this sector, highlighting the industry's sensitivity to macroeconomic instability and external policy shocks.

Javaheri et al. [11], in their study entitled "Investigating the Impact of Oil Price Volatility and Intensified Sanctions on the Value Added of Iran's Agricultural Sector," examined the role of exogenous economic shocks in one of the most important sectors of the Iranian economy. Given the strategic importance of oil revenues in Iran's fiscal structure and the significant dependence of government budgets on oil income, the authors argued that fluctuations in oil prices, as a major external macroeconomic variable, can influence real economic sectors through various channels, including government fiscal policies, exchange rate movements, and resource allocation mechanisms. Within this context, the agricultural sector occupies a particularly important position due to its substantial contribution to gross domestic product, food security, and employment. To investigate these relationships, the authors first estimated OPEC oil price volatility using a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model and subsequently employed an Autoregressive Distributed Lag (ARDL) framework to analyze the short-run and long-run effects of oil price volatility and intensified sanctions on the value added of Iran's agricultural sector over the period 1984–2018. The combination of these econometric techniques enabled a comprehensive assessment of both the dynamics of oil price fluctuations and their transmission mechanisms to real economic variables.The empirical findings indicate that, in the long run, intensified sanctions exerted a positive effect on agricultural value added, whereas OPEC oil price volatility had a statistically significant negative impact on the sector's performance. The authors attribute this result to the structural characteristics of the agricultural sector, which relies relatively more on domestic inputs and is less dependent on direct imports compared with many other sectors of the economy. Consequently, the sector demonstrates a greater degree of resilience to external shocks and international sanctions. In contrast, uncertainty arising from oil price volatility reduces the predictability of government revenues and disrupts support policies, thereby constraining the growth of agricultural value added.

Eskanderi Pour et al. [12], in their study entitled "Investigating the Effects of Monetary Policy Shocks on the Prices of Different Agricultural Product Groups (Food and Industrial Crops)," examined the role of monetary policy in explaining price fluctuations in agricultural products. Emphasizing the strategic importance of the agricultural sector in ensuring food security, meeting the needs of a growing population, and supplying essential inputs to industrial production, the authors identified agricultural price volatility as one of the major challenges facing the sector, with significant implications for consumer welfare, producers' income, and overall economic stability.To evaluate the impact of monetary policy shocks, changes in the money supply were employed as a proxy for monetary policy. Monetary shocks were decomposed into anticipated and unanticipated components using the Hodrick–Prescott (HP) filter. Subsequently, the Generalized Method of Moments (GMM) was applied to estimate the effects of these shocks on the prices of food products and industrial agricultural products over the period 2001–2019. The use of the GMM estimator enabled the authors to address potential endogeneity and heteroskedasticity issues, thereby improving the robustness of the empirical results. The findings indicate that both anticipated and unanticipated monetary policy shocks influence agricultural product prices; however, the magnitude and direction of these effects differ across product groups. Specifically, anticipated increases in the money supply exerted a positive and statistically significant effect on the prices of both food products and industrial agricultural commodities. In contrast, unanticipated monetary shocks had no statistically significant effect on food product prices but produced a positive and significant impact on industrial agricultural products. These findings reveal heterogeneous responses among agricultural subsectors and suggest that the transmission of monetary policy shocks varies according to market characteristics and product composition. Furthermore, Eskanderi Pour et al emphasize the asymmetric nature of monetary policy shocks, demonstrating that anticipated and unanticipated monetary changes do not generate identical economic effects. The authors conclude that policymakers should account for structural differences among agricultural subsectors when designing monetary policies, as uniform policy measures may produce heterogeneous outcomes with important implications for food security and macroeconomic stability.

Mohammadvand Nahidi and Sadeghi [13], in their article entitled "Investigating the Impact of Economic Sanctions on Industrial Production in Iran," employed a Vector Autoregression (VAR) model using time-series data to examine the effects of economic sanctions on industrial production. Their empirical results indicate that economic sanctions have a statistically significant negative effect on industrial output in Iran. The impulse response analysis further demonstrates that sanction-induced shocks exert persistent adverse effects on industrial production, highlighting the vulnerability of Iran's manufacturing sector to external economic restrictions.

Azizi et al. [14], in their study "The Role of Supportive Policies in the Development of Iran's Agricultural Exports," demonstrated that government support policies can significantly enhance agricultural exports by improving access to financial resources, reducing investment risks, and facilitating access to international markets. The findings suggest that targeted support measures, including incentive packages and market guarantee programs, have encouraged producers to improve both the quality and quantity of agricultural production, thereby strengthening the country's export performance. This study provides an important foundation for understanding how economic policy instruments influence production and export indicators. Building upon this literature, the present research extends previous studies by examining the impact of the Snapback Mechanism on the performance of Iran's agriculture, sugar, food, and pharmaceutical industries. Such an analysis provides new empirical evidence on how international economic restrictions influence the performance of strategically important industries and offers policy implications for enhancing industrial resilience and strengthening national supply chain sustainability under external economic shocks.

Afesorgbor et al. [15] in their study entitled "The Impact of Economic Sanctions on Food Security and Food Prices: Evidence from Targeted Countries," employed panel data from 50 developing countries to examine the consequences of economic sanctions on food security and agricultural production. Their findings indicate that sanctions reduce productivity and disrupt food and agricultural supply chains through multiple channels, including higher import costs for production inputs, restricted access to international financial resources, and depreciation of the real exchange rate. The study further demonstrates that the adverse effects of sanctions are considerably stronger in countries with a high dependence on imported production inputs, as these constraints discourage investment in technology and domestic productive capacity.

The Organisation for Economic Co-operation and Development (OECD), in its report entitled "Sanctions and Global Supply Chains," concludes that countries heavily dependent on imported intermediate goods experience productivity losses of up to 40% in the food and pharmaceutical industries following the imposition of international sanctions. The report emphasizes that disruptions in global supply chains, higher logistics costs, and reduced access to foreign technologies substantially weaken industrial competitiveness and production efficiency [16].

The Eurasian Development Bank, in its report "Food Security and Agricultural Capacity in the Eurasian Region," examined the effects of multilateral sanctions on food markets in Central Asia. The report concludes that increasing self-sufficiency in strategic production inputs and strengthening domestic agricultural capacity play a crucial role in mitigating the adverse effects of sanction-induced shocks. According to the report, investment in domestic production capabilities and diversification of supply sources significantly enhance economic resilience under international restrictions [17].

In another study, Lukyanova and Zeynalov, in the article "The Russian Agricultural Industry During the Sanctions War," investigated the effects of Western sanctions on Russia's agricultural production structure and self-sufficiency. Their findings reveal that although sanctions initially caused a substantial decline in imports of agricultural inputs and production technologies, the implementation of import-substitution policies, government support programs, and the development of domestic technologies enabled the agricultural sector to offset a considerable portion of these negative effects over the long term. The authors conclude that endogenous productive capacities and well-designed support policies play a vital role in mitigating the economic consequences of international sanctions [18].

The United Nations Conference on Trade and Development (UNCTAD), in its report "A Review of Health and Biotechnology Policies," emphasizes that limited collaboration between research institutions and industry, together with restricted access to international markets, constitutes one of the major obstacles to innovation and technological development in biotechnology industries operating under sanctions. The report highlights that sanctions not only constrain international scientific cooperation but also reduce firms' access to advanced technologies, investment opportunities, and global innovation networks [19].

Similarly, Zartab et al [20] , in their study entitled "The Impact of Sanctions and Health System Reforms on the Performance of Iran's Healthcare System and Pharmaceutical Market," found that international sanctions adversely affected both the healthcare system and the pharmaceutical industry in Iran. The authors demonstrate that sanctions reduced domestic pharmaceutical production, limited medicine imports, disrupted collaboration with international pharmaceutical companies, and restricted access to advanced medical technologies. Their findings suggest that the pharmaceutical sector is particularly vulnerable to multilateral sanctions because such restrictions directly impair technology transfer, international research and development collaboration, and integration into global pharmaceutical supply chains.

2. Materials and Methods

This study is an applied analytical investigation employing a quantitative research approach based on time-series data. The primary objective is to examine the impact of the Snapback Mechanism on the performance of selected sectoral stock market indices listed on the Tehran Stock Exchange (TSE) over the period 2011–2025.

The study focuses on four sectoral indices, namely the Agriculture, Food Industry, Sugar, and Pharmaceutical indices, selected from the official sectoral classifications of the Tehran Stock Exchange. The required data were obtained from official domestic sources, including the Central Bank of the Islamic Republic of Iran (CBI), the Statistical Center of Iran (SCI), and the annual reports of the Tehran Stock Exchange (TSE).

The empirical analysis was conducted using EViews 13. Prior to model estimation, unit root tests were performed for all variables to determine their order of integration and to ensure the stationarity of the time-series data, thereby avoiding spurious regression results. Subsequently, the optimal lag length for each model was selected based on standard information criteria, including the Akaike Information Criterion (AIC), the Schwarz Bayesian Criterion (SBC/BIC), and the Hannan–Quinn Criterion (HQ).

To evaluate the impact of sanctions, represented by a dummy variable indicating the activation of the Snapback Mechanism, a separate Autoregressive Distributed Lag (ARDL) model was estimated for each sectoral index. The ARDL approach was selected because of its flexibility in handling variables with different orders of integration. Specifically, this methodology can be applied when the variables are integrated of order zero, I(0), or order one, I(1), provided that none of the variables is integrated of order two, I(2).

Unlike conventional cointegration techniques, such as the Johansen cointegration approach, which require all variables to be integrated of the same order, the ARDL framework accommodates a combination of I(0) and I(1) variables while allowing for reliable estimation of long-run equilibrium relationships. Furthermore, the ARDL model is particularly suitable for studies with relatively small or moderate sample sizes and generally provides more efficient and robust estimates than alternative cointegration techniques under such conditions.

An additional advantage of the ARDL methodology is its ability to estimate both short-run dynamics and long-run equilibrium relationships simultaneously within a unified modeling framework. Moreover, the model effectively addresses potential serial correlation problems, minimizes omitted-variable bias, and improves the consistency and efficiency of parameter estimates.

The general specification of the ARDL model employed in this study is presented as follows:

$$Y_t = \alpha + \sum_{i=1}^{p} \gamma_i Y_{t-i} + \sum_{j=0}^{q} \delta_j D_{t-j} + \epsilon_t \quad (1)$$

where:

- Y_t: denotes the dependent variable, representing the sectoral stock market index at time (t).
- X_j: represents the independent variable(s) included in the model.
- α: is the intercept (constant term).
- D: denotes the dummy variable representing the activation of the Snapback Mechanism (sanctions).

Following the estimation of the ARDL model, an Error Correction Model (ECM) was employed to examine the speed at which short-run disequilibria adjust toward the long-run equilibrium. The Error Correction Term (ECT) provides information on the rate of adjustment following a short-term shock. A negative and statistically significant coefficient indicates that deviations from the long-run equilibrium are gradually corrected over time, implying convergence toward the equilibrium path. More specifically, the magnitude of the ECT coefficient reflects the proportion of short-run disequilibrium that is eliminated in each period.

Subsequently, the long-run relationships between the selected sectoral indices and the sanctions dummy variable were estimated, and the cumulative long-term effects of the Snapback Mechanism on the performance of the sectoral indices were analyzed. The variables included in the empirical model are defined as follows:

2.1. Independent Variable Sanctions (Proxy for the Activation of the Snapback Mechanism)

The independent variable in this study is a dummy variable representing the activation of the Snapback Mechanism and the associated sanctions regime. The variable is coded as follows:

- Variable Type: Dummy (Binary) Variable.

- Value = 0: Period prior to the imposition (or reimposition) of sanctions.
- Value = 1: Period following the imposition (or reimposition) of sanctions.

This dummy variable is incorporated into the ARDL model to estimate the short-run and long-run effects of the Snapback Mechanism on the selected sectoral stock market indices.

2.2. Dependent Variables

The dependent variables in this study are the sectoral stock market price indices representing the performance of four strategic industries listed on the Tehran Stock Exchange (TSE). Specifically, the following sectoral indices are examined:

- Agriculture Sector Price Index
- Food Industry Price Index
- Sugar Industry Price Index
- Pharmaceutical Industry Price Index

These sectoral stock indices are employed as proxies for the performance of their respective industries and serve as the dependent variables in the ARDL models. Separate models are estimated for each sectoral index to evaluate the short-run and long-run effects of the Snapback Mechanism on the performance of these strategic industries.

3. Results and Discussion

3.1.Trend Analysis of Sectoral Indices

To examine the performance of the selected sectoral indices and assess their response to the activation of the Snapback Mechanism, Figure 1 presents the annual trends of the Agriculture, Food Industry, Sugar, and Pharmaceutical stock market indices over the period 2011–2025.

The figure provides an overall view of the price movements and performance of these strategic industries and facilitates a comparison of their behavior before and after the reimposition of sanctions through the Snapback Mechanism. Visual inspection of the data indicates that the sectoral indices followed relatively stable trends prior to 2018. However, beginning in 2019, coinciding with the intensification of international sanctions and the implementation of the Snapback Mechanism, the indices exhibited substantially greater volatility and more pronounced upward movements, particularly in the pharmaceutical and sugar industries.

This increase is largely attributable to exchange rate depreciation, tighter import restrictions, higher production costs, and disruptions in the supply of imported raw materials and intermediate goods. In contrast, the agriculture sector displayed comparatively lower volatility, reflecting its greater reliance on domestic production inputs and its relatively higher resilience to sanction-induced external shocks. Overall, the graphical evidence suggests that the economic effects of the Snapback Mechanism have been heterogeneous across industries. The magnitude of each sector's response appears to depend primarily on its dependence on imported inputs, access to foreign technologies, exposure to international markets, and the effectiveness of domestic support policies. These preliminary observations provide descriptive evidence that complements the subsequent econometric analysis of the short-run and long-run effects of sanctions on sectoral performance.

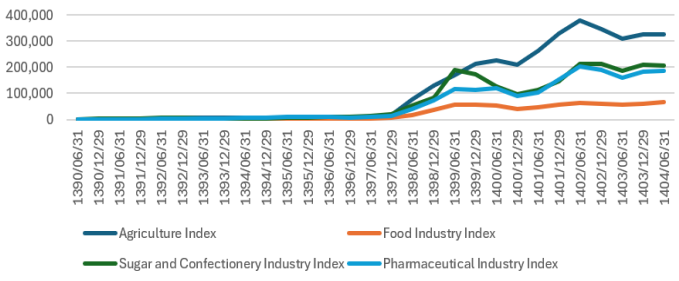


Figure1. Trend of Agricultural, Food Industries, Sugar and Sweetener, and Pharmaceutical Indices in Iran (2010–2024)

Source: Research Findings

3.2. Descriptive Statistics of the Variables

To provide a preliminary understanding of the behavior and distribution of the study variables, descriptive statistics were calculated for the four sectoral stock market indices, namely the Agriculture, Food Industry, Sugar, and Pharmaceutical indices. These descriptive measures offer an overview of the central tendency and dispersion of the data prior to the econometric analysis.

The descriptive statistics indicate that the Sugar Industry Index exhibits the highest mean value as well as the largest standard deviation among the selected sectoral indices, suggesting both a higher average price level and greater volatility relative to the other industries. This pattern reflects the sector's greater sensitivity to macroeconomic fluctuations, exchange rate movements, and changes in production costs during the study period. Examining descriptive statistics before estimating the econometric models is essential because it enables researchers to identify the statistical characteristics of the variables, detect potential outliers, assess the variability of the data, and evaluate the normality of their distributions. These preliminary analyses provide valuable insights into the underlying properties of the dataset and contribute to the reliability and validity of the subsequent empirical estimations.

Table 1. Descriptive Statistics of Agricultural, Food Industry, Sugar, and Pharmaceutical Indices in Iran (2011–2025)

Statistical Index	Pharmaceutical Industries	Food	Agriculture	Sugar
Mean	72968.45	117452.8	24636.79	63109.14
Median	13360.00	9376.000	4923.000	11196.00
Maximum	213605.0	379578.0	68252.00	202247.0
Minimum	1553.00	788.0000	784.0000	1355.00
Std. Dev	83142.02	139278.9	26325.65	72338.00
Skewness	0.646248	0.655278	0.452718	0.717644
Kurtosis	1.722603	1.751248	1.371528	1.917774
Jarque-Bera	3.990264	3.959636	4.195015	3.904444

Source: Research Findings

3.3. Unit Root Test

Before estimating the time-series models, the stationarity properties of all variables were examined to avoid the problem of spurious regression, which may arise when non-stationary variables are used in econometric estimations. Establishing the order of integration of the variables is a prerequisite for selecting an appropriate estimation technique and ensuring the validity and reliability of the empirical results. To assess the stationarity of the variables, the Augmented Dickey–Fuller (ADF) unit root test was employed. This test determines whether each variable is stationary at level, I(0), or becomes stationary after first differencing, I(1). Since the Autoregressive Distributed Lag (ARDL) approach requires that none of the variables be integrated of order two, I(2), the ADF test also serves to verify the suitability of the ARDL methodology for the present study.

The results of the ADF unit root tests are presented in the following tables.

Table 2. Results of the Augmented Dickey–Fuller Unit Root Test at Level $I(0)$

Variable	Probability Value (p-value)	Augmented Dickey-Fuller Test Statistic
Sugar and Confectionery Industry	0.89	-0.38
Agriculture Industry	0.87	-0.51
Food Industry	0.94	-0.4
Pharmaceutical Industry	0.96	0.137

Source: Research Findings

Table 3. Results of the Unit Root Test at First Difference $I(1)$

Variable	Probability Value (p-value)	Augmented Dickey-Fuller Test Statistic
Sugar and Confectionery Industry	0.0049	-4
Agriculture Industry	0.0081	-2.73
Food Industry	0.005	-4
Pharmaceutical Industry	0.0021	-4.36

Source: Research Findings

3.4. Short-Run Estimation of the Autoregressive Distributed Lag (ARDL) Model

To estimate the Autoregressive Distributed Lag (ARDL) model, the optimal lag length was selected using the Schwarz Bayesian Criterion (SBC/BIC). This criterion was preferred because it generally selects more parsimonious model specifications by penalizing excessive lag lengths, thereby reducing the risk of overparameterization and improving the efficiency of the estimated model, particularly in studies with relatively small sample sizes.

The short-run dynamics of the ARDL model were then estimated to evaluate the immediate effects of the explanatory variables, including the sanctions dummy variable representing the Snapback Mechanism, on the selected sectoral stock market indices. The estimated short-run coefficients provide evidence on the direction, magnitude, and statistical significance of these effects during the adjustment process.

The results of the short-run ARDL estimation are presented in the following table.

Table 4. Results of the Short-Run Model for the Agricultural Index

Variable	Probability Value (p-value)	Statistic	Coefficient
First Lag of the Dependent Variable	0.0000	17.05472	0.861534
Sanctions Dummy Variable	0.0009	3.776610	50916.72
Intercept	0.8210	0.228702	1353.134
Error Correction Coefficient	0.0000	-4.881121	-0.138466

Source: Research Findings

This table indicates that the sanctions dummy variable is statistically significant. Following September 2018, this variable increased the Agriculture Index by an average of 50,916.72 points in the short run. The first lag of the Agriculture Index is also statistically significant, with a coefficient of 0.861534, indicating that approximately 86% of the value of the index in the previous period is transmitted to the current period. This coefficient represents the one-period lagged dependent variable and captures the primary short-run dynamic behavior of the model.

The results also reveal the existence of a long-run cointegrating relationship among the variables, which has been significantly influenced by a major structural break occurring in September 2018. Furthermore, the impact of sanctions on the Agriculture Index is positive and statistically significant, implying that an increase in the sanctions variable is associated with an increase in the Agriculture Index. These findings also confirm the existence of a long-run cointegrating relationship between the sanctions variable and the Agriculture Index.

Table 5. Results of the Autoregressive Distributed Lag Model for the Food Industry Index

Variable	Probability Value (p-value)	Statistic	Coefficient
First Lag of the Dependent Variable	0.0000	9.663496	0.784754
Sanctions Dummy Variable	0.0033	3.24653	13141.97
Intercept	0.6227	0.498226	803.6263
Error Correction Coefficient	0.0004	-4.030046	-0.215246

Source: Research Findings

The sanctions dummy variable is statistically significant, indicating that following September 2018, sanctions increased the Food Industry Index by an average of 13,141.97 points in the short run. The first lag of the Food Industry Index is also statistically significant, with a coefficient of 0.784754, indicating that approximately 78% of the index value from the previous period is carried over to the current period. This coefficient represents the one-period lagged dependent variable and captures the main short-run dynamics of the model.

The results further indicate the existence of a long-run cointegrating relationship among the variables, which has been significantly affected by a major structural break occurring around September 2018. Moreover, the impact of sanctions on the Food Industry Index is positive and statistically significant, implying that an increase in the sanctions variable is associated with an increase in the Food Industry Index. These findings also confirm the existence of a long-run cointegrating relationship between the sanctions variable and the Food Industry Index.

Table 6. Results of the Autoregressive Distributed Lag Model for the Sugar Industry Index

Variable	Probability Value (p-value)	Statistic	Coefficient
First Lag of the Dependent Variable	0.0000	7.270634	0.748077
Sanctions Dummy Variable	0.0111	2.744371	44713.55
Intercept	0.7648	0.302455	2100.884
Error Correction Coefficient	0.0029	-3.271589	-251923

Source: Research Findings

The sanctions dummy variable is statistically significant, indicating that following September 2018, sanctions increased the Sugar and Confectionery Industry Index by an average of 44,713.55 points in the short run. The first lag of the Sugar and Confectionery Industry Index is also statistically significant, with a coefficient of 0.748077, indicating that approximately 74% of the index value from the previous period is carried over to the current period. This coefficient represents the one-period lagged dependent variable and captures the main short-run dynamics of the model.

The results further indicate the existence of a long-run cointegrating relationship among the variables, which has been significantly influenced by a major structural break occurring in September 2018. Moreover, the impact of sanctions on the Sugar and Confectionery Industry Index is positive and statistically significant, implying that an increase in the sanctions variable is associated with an increase in the Sugar and Confectionery Industry Index. These findings also confirm the existence of a long-run cointegrating relationship between the sanctions variable and the Sugar and Confectionery Industry Index.

Table 7. Results of the Autoregressive Distributed Lag Model for the Pharmaceutical Industry Index

Variable	Probability Value (p-value)	Statistic	Coefficient
First Lag of the Dependent Variable	0.0000	10.69443	0.842715
Sanctions Dummy Variable	0.0132	2.667830	28712.58
Intercept	0.0000	0.316971	1503.678
Error Correction Coefficient	0.0018	-3.458755	-0.157285

Source: Research Findings

The sanctions dummy variable is statistically significant, indicating that following September 2018, sanctions increased the Pharmaceutical Industry Index by an average of 28,712.58 points in the short run. The first lag of the Pharmaceutical Industry Index is also statistically significant, with a coefficient of 0.842715, indicating that approximately 84% of the index value from the previous period is carried over to the current period. This coefficient represents the one-period lagged dependent variable and captures the main short-run dynamics of the model.

The results further indicate the existence of a long-run cointegrating relationship among the variables, which has been significantly influenced by a major structural break occurring in September 2018. Moreover, the impact of sanctions on the Pharmaceutical Industry Index is positive and statistically significant, implying that an increase in the sanctions variable is associated with an increase in the Pharmaceutical Industry Index. These findings also confirm the existence of a long-run cointegrating relationship between the sanctions variable and the Pharmaceutical Industry Index.

3.5. Bounds Test

The Bounds Test was employed to examine the existence of a long-run relationship among the variables included in the model. Accordingly, the test was conducted, and the results are presented in the corresponding table. According to the bounds testing approach, if the calculated F-statistic exceeds the upper critical bound, the null hypothesis of no long-run relationship can be rejected regardless of the order of integration of the variables. Conversely, if the calculated F-statistic falls below the lower critical bound, the null hypothesis cannot be rejected.

Based on the estimated results, the calculated F-statistic is greater than the upper critical bound at the 1% significance level. Therefore, the null hypothesis of no long-run relationship is rejected, confirming the existence of a long-run cointegrating relationship among the variables in the model.

Table 8. Results of the Bounds Test for Examining Long-Run Relationships

F-Statistic Decision	Upper Bound	Lower Bound	Significance Level
F>I(1)	3.797	3.303	10%
F>I(1)	4.663	4.090	5%
F>I(1)	6.760	6.027	1%

Source: Research Findings

3.6. Long-Run Estimation of the Model Using the Autoregressive Distributed Lag (ARDL) Approach

Table 9. Results of the Long-Run Relationship Estimation for the Food Industry Index

Variable	Probability Value (p-value)	Statistic	Coefficient
Sanctions Dummy Variable	0.0001	4.742494	61055.62
Intercept	0.6208	0.500686	3733.527

Source: Research Findings

Table 10. Results of the Long-Run Relationship Estimation for the Pharmaceutical Industry Index

Variable	Probability Value (p-value)	Statistic	Coefficient
Sanctions Dummy Variable	0.0035	3.208589	182551.7
Intercept	0.7536	0.317286	9560.233

source: Research Findings

Table 11. Results of the Long-Run Relationship Estimation for the Sugar Industry Index

Variable	Probability Value (p-value)	Statistic	Coefficient
Sanctions Dummy Variable	0.0004	4.024166	177489.1
Intercept	0.7644	0.302911	8339.394

Source: Research Findings

Table 12. Results of the Long-Run Relationship Estimation for the Agricultural Index

Variable	Probability Value (p-value)	Statistic	Coefficient
Sanctions Dummy Variable	0.0002	4.101440	367719.9
Intercept	0.8208	0.228777	9772.316

Source: Research Findings

To examine the existence of a long-run relationship among the variables, a cointegration test was conducted. The estimated results indicate that the probability value associated with the sanctions variable is statistically significant across all sectoral indices. Therefore, the null hypothesis of no long-run relationship is rejected, confirming the existence of a long-run cointegrating relationship between sanctions and all four sectoral indices. These findings suggest that changes in the sanctions variable have a persistent long-term association with the Agriculture, Food Industry, Sugar and Confectionery Industry, and Pharmaceutical Industry indices.

4. Conclusions

This study examined the Snapback Mechanism as a form of international sanctions and analyzed its effects on four sectoral stock market indices: Agriculture, Sugar and Confectionery, Food Industry, and Pharmaceutical Industry. The estimated short-run and long-run models indicate that sanctions exert a positive and statistically significant effect on the nominal indices of these sectors. In other words, the activation of the Snapback Mechanism has led to an increase in the nominal values of these sectoral indices.

However, this apparent increase should not be interpreted as evidence of an improvement in the real performance of these industries. Rather, it primarily reflects the depreciation of the domestic currency, rising import costs, structural inflation, and price fluctuations induced by sanctions.

Consequently, the observed growth in sectoral indices largely represents increases in prices and production costs rather than improvements in productivity or real output.

The findings further suggest that sanctions have made the importation of food products, agricultural inputs, and intermediate goods more difficult and costly. As a result, domestic producers have experienced increased demand, higher sales revenues, improved corporate earnings, and consequently higher stock prices.

The positive and statistically significant coefficient of the sanctions variable across the Agriculture, Food Industry, Sugar and Confectionery, and Pharmaceutical Industry indices also indicates that these sectors exhibited a relatively high degree of resilience under sanction conditions. Import restrictions, exchange rate depreciation, stronger domestic demand, government support measures, and the reallocation of capital from more vulnerable sectors toward relatively defensive industries contributed to higher corporate profitability and rising stock market valuations in these sectors.

From an analytical perspective, the effects of sanctions—particularly the Snapback Mechanism—can be explained through four principal transmission channels. First, the exchange rate and financial channel, whereby restricted access to foreign exchange and international financial resources increased the cost of imported production inputs. Second, the trade channel, through which disruptions in supply chains and import restrictions imposed greater pressure on industries such as pharmaceuticals and sugar. Third, the price channel, in which exchange rate depreciation generated substantial nominal increases in sectoral indices that may appear as positive growth despite the absence of real economic improvement. Fourth, the domestic resilience channel, whereby the Agriculture and Food Industry sectors, owing to their greater reliance on domestic inputs, were better able to mitigate part of the adverse effects of sanctions.

Overall, the empirical findings demonstrate that although sanctions have had a positive and statistically significant effect on nominal sectoral indices, they have simultaneously reduced production efficiency, increased production costs, and weakened the long-term competitiveness of these industries in real terms. These results reflect the transmission of sanction-related pressures through sector-specific inflation and higher production costs rather than genuine improvements in industrial performance.

From a policy perspective, the findings emphasize that reducing economic vulnerability and strengthening industrial resilience require three strategic priorities: (1) reinforcing domestic supply chains and achieving greater self-sufficiency in critical production inputs; (2) diversifying import sources and developing alternative financial and payment channels; and (3) promoting targeted investment in technology, innovation, and productivity-enhancing measures to improve industrial resilience.

In conclusion, this study demonstrates that although the activation of the Snapback Mechanism increased the nominal stock market indices of the selected industries, it simultaneously intensified cost pressures and reduced productive efficiency in the real economy. Therefore, implementing resilient industrial policies and strengthening domestic productive capacities are essential prerequisites for mitigating the long-term economic consequences of international sanctions.

Author Contributions

All authors contributed equally to the conception, preparation, and writing of this manuscript.

Conflict of Interest

The authors, while observing publication ethics in the referencing, declare the absence of interest of conflict.

Acknowledgement

The authors would like to express their gratitude to the BMI Economic and Banking Research Center.

AI Used Statment

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