

A WITS-SMART Simulation of the Effects of Iran's Membership in the Shanghai Cooperation Organization on the Agricultural Sector

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ABSTRACT

Despite the use of the SMART partial equilibrium model in similar studies, none of the studies conducted inside Iran have utilized the WITS-SMART model to simulate trade relations and other trading partner countries. While this study simulates the economic effects of Iran's membership in the Shanghai Cooperation Organization (SCO) using the WITS-SMART model with data from 2023. Two scenarios with different levels of tariff reduction (a 25% and 50% reduction) were examined. The results show that reducing tariffs will increase imports of agricultural products to Iran, driven by trade creation and diversion effects. The total trade effect is estimated to be \$125.9 million and \$251.9 million in the two scenarios. India has the highest trade effect index, followed by Pakistan, China, and other member countries. The analysis by product category indicates that chapter 8 (edible fruits) have the highest potential for increased imports. The income effect is estimated to be \$32.7 million and \$75.5 million, with a projected increase in social welfare of \$16.5 million and \$28.6 million. In general, the effects of reducing import tariffs on agricultural products vary among the members of the SCO and for different products, necessitating targeted policymaking. Based on the results, it is recommended that import priorities, under conditions of tariff reduction, be in the order of India, Pakistan, China, Russia, Kyrgyzstan, Kazakhstan, Belarus, and Uzbekistan. In terms of commodity, chapters 8, 12, and 9 are prioritized, followed by chapters 17, 21, 10, and other chapters.

Keywords: Agricultural trade, Partial equilibrium, Shanghai Cooperation Organization, Simulation, Tariff reduction, WITS-SMART model.

INTRODUCTION

Membership in regional organizations and agreements reduces the economy's vulnerability to external shocks, particularly in trade exchanges. Iran, like many other nations, has engaged in economic integration agreements, including the Shanghai Cooperation Organization. The presence of member countries in the region has heightened the organization's significance. This has

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30 bolstered the organization's political influence, providing opportunities for Iran and other members
31 to enhance foreign trade (Razini et al., 2013). The Shanghai Cooperation Initiative, initially known
32 as the "Shanghai Five," was established in 1996 for security and military purposes (Iran Chamber
33 of Commerce Research Center, 2021). The organization later renamed the Shanghai Cooperation
34 Organization in 2001 to combat terrorism, separatism, and extremism (Tabatabayi, 2011;
35 Baghestani et al., 2022). The current member countries include India, Kazakhstan, China,
36 Kyrgyzstan, Pakistan, the Russian Federation, Tajikistan, Uzbekistan, and Iran (Baghestani et al.,
37 2022) with Belarus becoming a permanent member in July 2024.

38 The main goals of the Shanghai Cooperation Organization include strengthening mutual trust,
39 friendship, and good neighborliness among member countries to consolidate multilateral
40 cooperation in economic and political fields; joint cooperation to combat terrorism, separatism,
41 and extremism in all its forms; encouraging regional cooperation in various political, commercial,
42 economic, defense, environmental, cultural, scientific, technological, educational, energy,
43 transportation, and other areas; collective action and participation to create balanced and
44 comprehensive economic, social, and cultural growth in the region to increase standards and
45 improve living conditions in member countries; coordinating approaches to engage in the global
46 economy; strengthening cooperation with other countries and international organizations; and
47 cooperation in preventing international conflicts (Mohebpour et al., 2023). It is important to note
48 that trade agreements can reduce tariffs, quotas, and other barriers between trading partners and
49 reduce trade costs. Existing evidence indicates a positive relationship between trade flows and free
50 trade agreements, and based on this, trade integration can lead to better economic results (Blaghi
51 & Borges Aguiar, 2022). It is worth mentioning that one of the goals set by the Shanghai
52 Cooperation Organization in the economic field is the gradual elimination of tariff barriers and the
53 establishment of a free trade agreement (Mohebpour et al., 2023).

54 The importance of the study topic has attracted the attention of many researchers. Saqeb and
55 Sadeghiyarandi (2006) in a study aiming to examine the effects of the Iran-Pakistan preferential
56 trade agreement, using the SMART simulation model, found that Iran could benefit from tariff
57 advantages in the export of a wide range of goods. However, the effects of trade creation and
58 diversion were more in favor of Pakistan, leading to a decrease in Iran's non-oil trade surplus and
59 tariff revenues, except for rice, where the effect was reversed.

60 Mehrabi (2007) using a partial equilibrium model, examined the effects of reducing tariff barriers
61 on Iran's trade flows with Central Asian countries and concluded that this agreement led to an
62 expansion of trade volume, but the increase in imports compared to exports increased the trade
63 balance deficit.

64 Mojarrad and Homayounifar (2010), by evaluating the effects of the regional convergence
65 agreement among ECO member countries using the SMART model, stated that the implementation
66 of this agreement increased the exports of member countries to Iran more than Iran's exports to
67 these countries, and the majority of Iran's imports would be from these regions.

68 Nasrollahi et al. (2012) in a study using a partial equilibrium model examined the effects of
69 concluding a preferential trade agreement between Iran and the European Union and found that
70 this agreement led to an increase in Iran's trade volume and agricultural product exports. However,
71 due to higher tariffs on Iran's agricultural products, imports increased relative to exports, and Iran
72 would have the greatest access to the markets of Germany, Italy, Netherlands, France, United
73 Kingdom, and Ireland.

74 Jafari et al. (2017), by examining Iran's objectives and benefits in permanent membership in the
75 Shanghai Cooperation Organization (SCO), found that this membership strengthened Iran's
76 strategic ties with the organization, and Iran could utilize its capacities to achieve its national
77 interests and improve its international and regional standing.

78 Mardiha et al. (2020) using global simulation, studied the economic effects of Iran's membership
79 in the SCO under four scenarios (partial and full tariff liberalization) on 13 major export
80 commodities and concluded that Iran's accession and the implementation of liberalization would
81 lead to trade creation and increased welfare for Iran and other members; these effects are more
82 significant in the case of full liberalization.

83 Kazemnejad et al. (2021) using the SMART model, analyzed the consequences of the interim
84 agreement between Iran and the Eurasian Economic Union and found that trade between Iran and
85 this union has improved compared to the pre-agreement period. Furthermore, a reduction in import
86 tariffs for the agricultural sector from the Union led to a 4.4% increase in imports, partly due to
87 trade creation and partly due to trade diversion.

88 Farzi et al. (2021) using the dynamic GTAP model, examined the trade effects of the economic
89 agreement between Iran and Turkey on the industry and agriculture sectors, and showed that

90 despite a decrease in production in some commodity groups in the short term, the production of
91 all sectors will increase in the long term (by 2025).

92 Nejati et al. (2021) using the GTAP model, investigated the effects of reducing import tariffs for
93 the agricultural sector between Iran and the Eurasian Economic Union in three scenarios and stated
94 that trade liberalization would lead to significant welfare changes in Iran and Russia; Iran would
95 experience the greatest welfare, and Russia would also benefit from the shocks of tariff reduction,
96 although the overall effect on the trade balance and production of this sector is negative, and the
97 most negative impact is observed on the trade balance of the industrial sector.

98 Bolaghi Inanloo et al. (2022) examined the economic benefits of Iran's expanding trade relations
99 with the Eurasian Economic Union under two tariff-reduction scenarios and identified the sectors
100 of cereals and crops, processed food industries, textiles and clothing, and services as the key and
101 influential sectors.

102 Nejati and Bolaghi Inanloo (2022) using the GTAP model, analyzed the benefits of Iran's
103 membership in the Shanghai Cooperation Organization and identified the sectors of cereals and
104 crops, textiles and clothing, light industries, and heavy industries as important and influential
105 sectors.

106 Abedin Moghanki and Hosseini (2023) in evaluating bilateral trade between Iran and India showed
107 that the expansion of this trade, due to Iran's trade structure, has not led to the overall expansion
108 of Iran's trade, and benefiting from its advantages requires the improvement of Iran's economic-
109 trade structure.

110 Van Seventer and Thembi (2001) concluded in their study that the establishment of a free trade
111 area between India and South Africa would increase trade creation and trade diversion for metals
112 such as jewelry, coal, steel and iron, as well as raw chemical materials and some non-metallic
113 minerals such as cement.

114 Thangavelu et al. (2019), in examining the economic effects of the free trade agreement between
115 Cambodia and the Eurasian Economic Union, as well as ASEAN, showed that this free trade
116 agreement has a negative effect on Cambodia's electronics sector.

117 Pasara (2021), using the WITS-SMART simulation method to test Viner's theory of trade creation
118 and trade diversion effects in the Tripartite Free Trade Area (TFTA) for four product
119 classifications—raw materials, intermediate goods, consumer goods, and capital goods—across
120 agriculture, industry, and oil sectors, showed that, overall, the tripartite area would generate a net

121 gain of approximately \$1.2 trillion annually. Specifically, the industrial sector has a 34% capacity
122 and intermediate goods have a 24% capacity in net trade benefits. Meanwhile, the agricultural
123 sector is likely to contribute 18% of net trade gains. Trade in raw materials and the oil sector
124 account for the lowest shares, at 3% and 1%, respectively.

125 **Totally**, past studies have explored the effects of these agreements on trade, economic welfare,
126 production, trade balance, and trade diversion. They have utilized models like SMART, GTAP,
127 and GSIM to analyze the impacts of tariff reductions and **preferential agreements**. While previous
128 studies have employed the SMART model, this study introduces the use of the WITS-SMART
129 model to simulate trade relations with other trading partners. **One of the main strengths of this**
130 **study compared to other related studies on the same topic is the use of the WITS-SMART model.**
131 **By providing integrated and comprehensive analytical tools based on trade relationships with all**
132 **countries in the world in the relevant domain, this model enables the analysis of simulation results**
133 **of tariff reductions for all products and for all partner countries.**

134 The research aims to assess the commercial, income, and welfare impacts of Iran's membership in
135 the Shanghai Cooperation Organization. Specifically, it focuses on the effects of membership on
136 trade of agricultural products, highlighting the importance of this topic and the opportunities
137 arising from Iran's affiliation with the Shanghai Cooperation Organization. **Therefore, the main**
138 **research questions of this study are as follows:**

- 139 • **To what extent does the reduction of import tariffs on Iran's agricultural products from the**
140 **SCO member countries affect trade potentials (trade creation and trade diversion)?**
- 141 • **To what extent does the reduction of import tariffs on Iran's agricultural products from the**
142 **SCO member countries affect Iran's economic welfare?**
- 143 • **To what extent does the reduction of import tariffs on Iran's agricultural products from the**
144 **SCO member countries affect Iran's tariff revenue?**

145 The agricultural sector constitutes one of the most significant pillars of the economy of the Islamic
146 Republic of Iran, and special attention to this sector is indispensable. According to official
147 statistics, the value added of Iran's agricultural sector in 2021 amounted to approximately
148 6,582,743 billion Rials, representing 7.71% of the country's total value added (Statistical Center
149 of Iran, 2026). Furthermore, evidence indicates that over the period 2003–2022, an average of
150 approximately 663 thousand tons of various agricultural products were exported annually from
151 Iran to the member states of the Shanghai Cooperation Organization (SCO). This figure suggests

152 that nearly 16% of Iran's total agricultural exports were directed toward SCO member countries
153 during this period. In contrast, the average annual volume of agricultural imports from SCO
154 member states to Iran amounted to approximately 2,916 thousand tons, accounting for nearly 17%
155 of the total weight of Iran's agricultural imports between 2003 and 2022. These statistics
156 underscore the pivotal role of the agricultural sector in Iran's economy as well as its significance
157 in the country's international trade structure. Accordingly, the agricultural sector is selected as the
158 primary focus of the present study.

159

160 MATERIALS AND METHODS

161 This study examines the implications of Iran's membership in the Shanghai Cooperation
162 Organization on Iran's agricultural trade using the WITS-SMART model within the online WITS
163 software framework. One of the advantages of simulation using the WITS-SMART model is the
164 ability to assess the effects of tariff changes on the trade patterns of countries that are members of
165 a trade agreement. In order to clarify the study objectives, two scenarios of a 25% and 50%
166 reduction in import tariffs from member countries of the Shanghai Cooperation Organization were
167 defined. Therefore, the process of simulating smart in the framework of the mentioned scenarios
168 was carried out, and the creation of trade, trade diversion, net trade effect, net income effect, as
169 well as welfare effects for Iran were calculated and examined. It should be noted that WITS-
170 SMART model does not allow for direct scenario design based on non-tariff measures (NTMs).
171 As a partial equilibrium, static model, SMART simulates policy impacts exclusively through
172 changes in tariff rates and behavioral parameters.

173 The WITS-SMART model, developed by the World Bank, is widely used for analyzing the effects
174 of regional trade agreements (Makchikawa, 2012). The World Bank, in collaboration with
175 UNCTAD and consultation with organizations such as the International Trade Center, UN
176 Statistical Division, and World Trade Organization, developed the WITS software. This software
177 provides users with access to trade and tariff data (World Bank, 2024). The WITS-SMART model
178 offers integrated analytical tools for simulation analysis on tariff reduction and is compatible with
179 reputable global data sources (COMTRADE, TRAINS, and UNCTAD) (Makchikawa, 2012). The
180 practical application of the WITS-SMART model has two main dimensions. Firstly, it allows for
181 simulation scenarios on various levels of tariff reduction, complete elimination of tariffs, or
182 different levels of elasticity. Additionally, the WITS-SMART model presents results in US dollars,

183 unlike economic models that present results in technical terms of "significant" or "insignificant,"
184 which may pose challenges for policymakers (Africa Capacity Building Foundation, 2017). In
185 trade models, export and import elasticities and trade policy variables are considered key variables
186 (Kazemnejad et al., 2021). One of these elasticities is the supply elasticity, which the WITS-
187 SMART model assumes infinite supply elasticity (Mold and Mukwaya, 2015) due to the limited
188 impact of changes in domestic supply on global trade. This allows exporters to meet demand levels
189 in importing countries without affecting global prices. Armington substitution elasticity is another
190 key factor in SMART-based trade models (Pasara, 2021), with varying values based on factors
191 like production location, branding, and industry (Pasara, 2021). Various studies have used different
192 values for Armington substitution elasticity. For example, Pasara (2021) used 1.5, Francois and
193 Reinhardt (1997) used 5, and Shabanzadeh et al. (2015) calculated long-term elasticities for ten
194 agricultural products in Iran. Majdzadeh Tabatabayi et al. (2015) and Samadi et al. (2019)
195 considered a value of 2 for agriculture, forestry, and fishing. Kazemnejad et al. (2021) and Fahimi-
196 Fard (2023) used values of 1.5 and 1.4, respectively, for the agricultural sector in Iran. Estimating
197 this elasticity by commodity in developing countries is not easy, and researchers face various
198 problems, such that the sign of the calculated elasticity for some commodities is contrary to theory.
199 Also, the SMART model is grounded in the Armington assumption, which suggests that products
200 that are similar in nature but originate from different countries are imperfect substitutes. Under
201 this framework, the substitution elasticities among products are derived from the estimated export
202 and import elasticities reported in other empirical models. Consequently, previously conducted
203 empirical studies can serve as valuable sources for the estimation of these parameters within the
204 model (Kazemnejad et al., 2021). Therefore, this study uses a value of 1.5 for Armington
205 substitution elasticity in the calculations. As mentioned, the formation of a trade agreement can
206 have the following effects (Sagheb and Sadeghi Yarandi, 2006):

- 207 1. Creation of trade in the Iranian market
- 208 2. Creation of trade in the markets of member countries of the agreement
- 209 3. Trade diversion in the Iranian market and each of the member countries of the agreement

210 Trade Creation

212 An increase in imports due to lower prices of imported goods can lead to a rise in imports from
213 member countries of an agreement and a decrease in domestic production. This occurs when

214 cheaper imported goods replace more expensive domestic production. Trade creation can be
 215 calculated using the equation: (Pasara, 2021):

$$TC_{ijk} = M_{ijk} \times \eta \times \frac{\Delta_{ijk}}{(1 + t_{ijk}) \times (1 + \eta/\beta)} \quad (1)$$

216 In the above equation, TC represents trade creation, M is the volume of imports, η is the import
 217 demand elasticity, t is the import tariff, and Δ is the change in the import tariff rate.

218
 219 **Trade Diversion**

220 Trade diversion occurs when a country increases its imports from other member countries of a
 221 trade agreement because the price of imported goods from those countries is relatively lower
 222 compared to other trading partners. The impact of trade creation and diversion on a country's
 223 domestic welfare depends on the shift in imports from a more efficient producer to a less efficient
 224 one. Trade diversion results in inefficient allocation of resources, even though the total imports of
 225 the country remain the same. The Armington import substitution elasticity plays a crucial role in
 226 determining the extent of trade diversion. The equation below is used to measure trade diversion
 227 (Pasara, 2021):

$$TD_{ijk} = \frac{M_{TFTA} \times M_{ROW} \left[\left(\frac{1 + t_t}{1 + t_0} \right) - 1 \right] \times \lambda}{M_{TFTA} + M_{ROW} + M_{ROW} \left[\left(\frac{1 + t_t}{1 + t_0} \right) - 1 \right] \times \lambda} \quad (2)$$

228 In the above equation, TD represents trade diversion, M_{TFTA} is the imported goods from member
 229 countries of the agreement, M_{ROW} is the imported goods from other parts of the world, t is the tariff
 230 (where t_0 and t_t represent the tariff levels before and after the agreement), and λ is the Armington
 231 substitution elasticity.

232
 233 **Net Trade Effect (Total Trade Effect)**

234 The net trade effect (TE) is the sum of trade creation and trade diversion, which can be calculated
 235 as follows (Pasara, 2021):

$$TE = TC + TD \quad (3)$$

236
 237 **Net Income Effect**

238 The net income effect indicates the changes in income after changes in tariffs and can be calculated
 239 as follows (Pasara, 2021):

$$\Delta R_{ikj} / R_{ijk} = [\Delta t_{ijk} / (1 + t_{ijk})] \times \eta \times [(1 + \beta) / (\beta - \eta)] \quad (4)$$

240 Where ΔR_{ik} represents the income effects due to tariff changes, t_{ijk} is the tariff, η is the import
 241 demand elasticity for the importing country's economy, t is the import tariff, and β is the supply
 242 elasticity for the exporting country's economy.

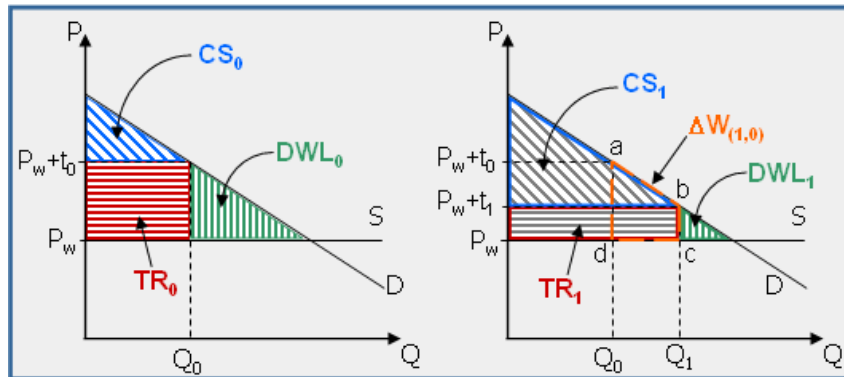
243
 244 **Welfare Effects**

245 Equation (5) provides an estimate of welfare effects, which essentially represent the sum of
 246 producer and consumer surplus (Pasara, 2021):

$$W_{ijk} = 0.5(\Delta t_{ijk} \times \Delta M_{ijk}) \quad (5)$$

247 In the above equation, W_{ijk} represents the welfare effects resulting from changes in import tariffs,
 248 Δt_{ijk} is the change in tariffs, and ΔM_{ijk} is the change in import volume.

249 The WITS-SMART model analyzes trade policy impacts on customs revenue, consumer surplus,
 250 and welfare. The Figure 1 depicts the relationship between these factors using demand and supply
 251 curves for an imported good (World Bank, 2025).



252
 253 **Figure 1.** The impact of tariff reduction on customs revenue, consumer surplus, and welfare.
 254
 255 The figure illustrates the impact of reducing tariffs on a good. On the left side, the current situation
 256 with a tariff (t_0) is shown, where the domestic price is $P_w + t_0$ (P_w is the world price) and import
 257 quantity is Q_0 . The variables defined on the left side include initial tariff revenue (TR_0), initial
 258 consumer surplus (CS_0), and initial deadweight loss (DWL_0). On the right side, the effects of
 259 reducing the tariff t_0 t_1 are depicted. The lower domestic price ($P_w + t_1$) leads to an increase in import
 260 demand to Q_1 . The impact on final tariff revenue (TR_1), final consumer surplus (CS_1), and final
 261 deadweight loss (DWL_1) is shown. The welfare change (DW) resulting from the tariff reduction is
 262 also illustrated, indicating the benefits gained from reducing the tariff. It is important to consider

263 the opposing effects on tariff revenue, including the loss of revenue from the fixed import value
264 and the increase in revenue from increased imports (World Bank, 2025).

265
266 **Data and Information**

267 To simulate the SMART partial equilibrium model, the latest available trade data (year 2023) were
268 used. The required data and information included the quantity and value of imports, as well as
269 import tariffs on agricultural products from trading partner countries in 2023 (97 countries),
270 disaggregated by agricultural product types. These data were extracted from the website of the
271 Islamic Republic of Iran Customs Administration, based on the Harmonized System (HS-8)
272 classification. In other words, among the 99 chapters of the Harmonized System, the first 24
273 chapters (covering agricultural and basic food industries) were selected for this study. The linkage
274 between these 24 chapters and the overall 99 chapter HS structure allows for a more precise
275 comparison of the agricultural sector's position within the broader economy. After data collection,
276 the dataset was formatted according to the standard structure required by the WITS online
277 software. The data were manually entered by the researcher through the software's data entry
278 module. The preparation process for these data (covering Iran's total agricultural imports from all
279 countries, disaggregated by product) was highly complex and faced several challenges, which were
280 eventually resolved through email correspondence and guidance obtained from World Bank
281 experts.

282
283 **RESULTS AND DISCUSSION**

284 **The commercial effects of Iran's membership in the Shanghai Cooperation Organization on**
285 **agricultural imports by country**

286 Table 1 displays the outcomes of simulating the economic impacts of scenarios involving a 25%
287 decrease in tariffs (Scenario 1) and a 50% decrease in import tariffs (Scenario 2) from member
288 nations of the Shanghai Cooperation Organization. The data is categorized by trade creation, trade
289 diversion, and overall trade impact using the findings of the partial equilibrium model. It is evident
290 that trade creation with member countries of the Shanghai Cooperation Organization totals around
291 \$116 million and \$233 million, respectively, in these scenarios. These results indicate that tariff
292 reductions can substantially enhance Iran's import flows from SCO member states by lowering
293 import prices and improving consumer access to competitively priced goods. The growth in trade
294 creation—roughly doubling as tariff reductions deepen—reflects increased efficiency and welfare

gains within the importing country, as resources reallocate toward more efficient producers among trading partners. However, the potential presence of trade diversion suggests that part of the increase in imports may come at the expense of non-member trading partners. Other studies have also proven the results of trade creation under tariff reductions. For example, the results of Pasara's (2021) study on testing Weiner's theory of trade creation and trade diversion effects in the Trilateral Free Trade Area (TFTA) indicate that in total, the trilateral area will earn a net profit of approximately \$2.1 trillion per year. Also, the results of Kazemnejad et al. (2021) study showed that the amount of trade creation and trade diversion of Iran's agricultural imports from the Eurasian Economic Union due to tariff reductions was about \$17.7 and \$11.4 million, respectively.

Table 1. Commercial Effects of Reducing Tariffs on Agricultural Imports of Iran from SCO Member Countries (Thousand US Dollars).

country	Trade Creation		Trade Diversion		Total Trade Impact		The average import tariff in Iran (2023)
	Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2	
Uzbekistan	45	91	20	40	65	131	3
Pakistan	32092	64184	114	232	32206	64416	9.5
China	15595	31189	1200	2405	16794	33594	6.6
Russian Federation	9144	18287	1226	2462	10370	20749	6.5
Kyrgyzstan	1029	2057	83	166	1112	2223	3.7
Kazakhstan	423	846	40	80	463	926	2.6
India	58059	116119	6774	13599	64833	129718	6.7
Belarus	51	102	22	45	73	147	6.5
SCO countries	116437	232875	9478	19029	125916	251904	6.5
Other countries	0	0	-9478	-19029	-9478	-19029	6.8

Source: Research Findings.

Iran's agricultural trade potential with India is valued at \$58 million and \$116 million. Other countries with trade potential include Pakistan, China, Russia, Kyrgyzstan, Kazakhstan, Belarus, and Uzbekistan within the Shanghai Cooperation Organization. Uzbekistan has the least trade deviation among these countries. The net trade effect of Iran's agriculture with these nations is estimated at around \$125.9 million to \$251.9 million in different scenarios. India has the highest total trade effect index, followed by Pakistan, China, Russia, Kyrgyzstan, Kazakhstan, Belarus, and Uzbekistan. Import tariff variations play a significant role in these differences, with India showing strong potential for agricultural imports to Iran. Pakistan's role is significant but hindered by relatively high tariff rates. Reducing import tariffs on agricultural products from organization-

318 affiliated countries is expected to boost imports. India is projected to increase agricultural imports
319 to Iran by 51.5%, followed by Pakistan at 25.6% and China at 13.3%. These three countries
320 represent 90% of the total trade effect index, making them key trade partners for Iran. The
321 remaining 10% is shared among Russia, Kyrgyzstan, Kazakhstan, Uzbekistan, and Belarus, with
322 Russia having a slightly higher share. Kazakhstan, Kyrgyzstan, Belarus, and Uzbekistan have
323 minimal impact compared to the top three countries.

324 These findings indicate that Iran's agricultural trade opportunities are heavily concentrated among
325 a few key partners, particularly India, Pakistan, and China. Lowering tariff barriers could unlock
326 substantial unrealized trade potential and improve Iran's access to competitively priced
327 agricultural products. Strengthening logistics, transportation corridors, and trade facilitation
328 mechanisms within the SCO framework would further enhance bilateral exchange. Overall,
329 strategic tariff reforms and targeted regional cooperation could significantly expand Iran's
330 agricultural trade. Agricultural trade potential is shaped by comparative advantages, existing trade
331 patterns, and geographic proximity to key SCO members. Shorter transport routes through Central
332 Asia provide cost efficiency, yet policy and tariff barriers remain restrictive. Targeted tariff
333 reforms, improved logistics, and regional trade agreements would significantly enhance Iran's
334 agricultural competitiveness and integration within the SCO market. In general, the findings
335 underscore that greater integration with SCO member economies could strengthen trade ties and
336 improve market efficiency, provided that the welfare gains from increased competition outweigh
337 the potential costs of diversion (Figure 2).

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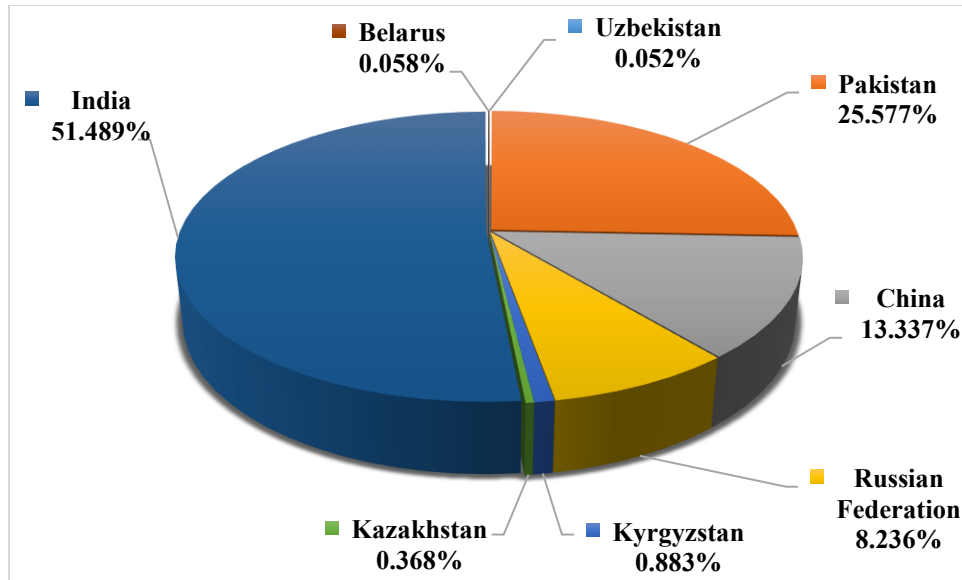


Figure 2. Share of SCO Member Countries in Total Trade Impact (%).

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In 2023, the average import tariffs on agricultural products in Iran from member countries of the organization were compared, revealing that the highest tariff rates were imposed on products imported from Pakistan (9.5%), while the lowest rates were applied to products from Kazakhstan (2.6%). The average import tariff on agricultural products from all member countries of the Shanghai Cooperation Organization in Iran was around 6.5%.

The commercial effects of Iran's membership in the Shanghai Cooperation Organization on the import of agricultural products by chapter

Table 2 presents the outcomes of modeling the economic impacts of decreasing import tariffs by 25% and 50% on agricultural goods in Iran from member nations of the Shanghai Cooperation Organization. The analysis includes trade creation, trade diversion, and overall net trade effects across the first 24 chapters (covering agricultural and basic food industries).

361 **Table 2.** Commercial Effects of Reducing Import Tariffs on Agricultural Products of Iran from
362 SCO Member Countries by Chapter (thousand US dollars).

Chapter	Scenario 1			Scenario 2			Average Iranian Import Tariff (2023)	
	Total Trade Effect	Trade Diversion	Trade Creation	Total Trade Effect	Trade Diversion	Trade Creation		
Chapter 1	Live Animals	52	4	47	103	9	95	2
Chapter 2	Meat and Edible Offal	163	48	115	327	97	230	2.2
Chapter 3	Fish and Crustaceans, Shellfish and Other Aquatic Invertebrates	233	35	198	468	71	396	16.7
Chapter 4	Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included	40	0	40	80	0	80	3
Chapter 5	Other Animal Products, Not Specified Elsewhere	3	0	3	6	0	6	3
Chapter 6	Live Plants and Floriculture Products	695	3	692	1390	7	1384	3.5
Chapter 7	Edible Vegetables and Certain Roots and Tubers	5202	238	4964	10405	478	9928	4.8
Chapter 8	Edible Fruit and Nuts; Peel of Citrus Fruit or Melons	35545	1176	34369	71113	2374	68739	21.5
Chapter 9	Coffee, Tea, Mate and Spices	14953	500	14453	29913	1007	28905	5.6
Chapter 10	Cereals	10198	1916	8281	20411	3848	16562	4.4
Chapter 11	Products of the Milling Industry; Malt; Starches; Inulin; Wheat Gluten	150	11	139	300	22	279	6.5
Chapter 12	Oil Seeds and Oleaginous Fruits; Miscellaneous Grains, Seeds and Fruit; Industrial or Medicinal Plants; Straw and Fodder	24421	3265	21157	48854	6540	42314	10
Chapter 13	Lac; Gums, Resins and Other Vegetable Saps and Extracts	756	210	546	1514	423	1091	3.1
Chapter 14	Vegetable Plaiting Materials; Vegetable Products Not Elsewhere Specified or Included	113	27	86	226	54	172	3.5
Chapter 15	Animal or Vegetable Fats and Oils and Their Cleavage Products; Prepared Edible Fats; Animal or Vegetable Waxes	6190	138	6053	12381	275	12105	3.4
Chapter 17	Sugars and Sugar Confectionery	13019	314	12705	26038	628	25410	6.2
Chapter 18	Cocoa and Cocoa Preparations	354	107	247	709	215	493	4
Chapter 19	Preparations of Cereals, Flour, Starch or Milk; Pastrycooks' Products	1988	3	1986	3977	5	3971	29.5
Chapter 20	Preparations of Vegetables, Fruit, Nuts or Other Parts of Plants	216	66	150	436	135	301	17.5
Chapter 21	Miscellaneous Edible Preparations	11305	1369	9937	22616	2744	19873	4.1
Chapter 22	Beverages, Spirits and Vinegar	15	5	10	30	10	20	5
Chapter 23	Residues and Waste from the Food Industries; Prepared Animal Fodder	191	29	162	383	58	324	2.6
Chapter 24	Tobacco and Manufactured Tobacco Substitutes	114	16	98	228	32	196	6.7

363 Source: Research Findings.

364 Simulation results suggest that reducing import tariffs by 25% and 50% on agricultural products
365 from Shanghai Cooperation Organization (SCO) member countries could lead to trade creation
366 and diversion in most chapters, except the fourth and fifth. The highest trade creation values of
367 \$34.4 million and \$68.7 million are observed in scenarios one and two, respectively, in the eighth
368 chapter. Subsequent chapters with significant trade creation potential include the twelfth, ninth,
369 seventeenth, twenty-first, tenth, fifteenth, seventh, and nineteenth. Chapters with trade creation
370 potential below \$1 million are ranked lower. The trade diversion potential is highest in the twelfth,
371 tenth, twenty-first, eighth, ninth, seventeenth, seventh, thirteenth, fifteenth, and eighteenth
372 chapters. Other chapters with lower trade diversion potential are ranked accordingly.

373 Simulation results suggest that reducing import tariffs on Iranian agricultural products from SCO
374 member countries in the eighth chapter could generate a total trade effect potential of \$35.5 million
375 and \$71.1 million in scenarios one and two, respectively, surpassing other chapters. The high
376 import tariff rates in this chapter contribute to its effectiveness in boosting imports from SCO
377 countries. The twelfth, ninth, seventeenth, twenty-first, tenth, fifteenth, seventh, and nineteenth
378 chapters exhibit the highest net trade effects, with total trade effects ranging from \$1.9 million to
379 \$48.8 million in scenarios one and two. Subsequent chapters are ranked based on their total trade
380 effect index, highlighting the importance of chapters with higher trade effects in importing
381 agricultural products from SCO member countries.

382 Reducing import tariffs on agricultural goods from SCO member nations, particularly in chapters
383 like the eighth and twelfth, presents a significant policy opportunity. These reductions are
384 projected to stimulate substantial trade creation and positive net trade effects, with the eighth
385 chapter showing the highest potential. This suggests a strategic focus on these specific agricultural
386 product categories could enhance trade relations within the SCO framework and boost Iran's
387 agricultural imports.

388
389 **The welfare and income effects of reducing import tariffs on the agricultural sector of Iran
390 from SCO member countries by chapters**

391 Table 3 shows the income effects of a 25% and 50% reduction in import tariffs on agricultural
392 products from SCO member countries by chapters, along with the share of each chapter's total
393 income effect.

394

395 **Table 3.** Revenue Effects of Reducing Tariffs on Agricultural Products Imported from SCO
396 Member Countries to Iran by Chapter (US dollars - percentage).

Chapter	Scenario 1		Scenario 2	
	amount	share	amount	share
Chapter 1	-15750	0.048	-32245	0.04
Chapter 2	-37354	0.114	-80558	0.11
Chapter 3	-65272	0.199	-135885	0.18
Chapter 4	-13294	0.041	-27188	0.04
Chapter 5	-1025	0.003	-2095	0.003
Chapter 6	-225691	0.690	-466303	0.62
Chapter 7	-1622825	4.959	-3363921	4.48
Chapter 8	-6138094	18.755	-19559864	26.04
Chapter 9	-4688838	14.327	-9764842	13
Chapter 10	-2789032	8.522	-5707476	7.6
Chapter 11	-45596	0.139	-94958	0.13
Chapter 12	-6910399	21.115	-14417806	19.19
Chapter 13	-183041	0.559	-377589	0.5
Chapter 14	-28781	0.088	-59263	0.08
Chapter 15	-1997682	6.104	-4109662	5.47
Chapter 17	-4226196	12.913	-8653475	11.52
Chapter 18	-82134	0.251	-171367	0.23
Chapter 19	-244879	0.748	-1032632	1.37
Chapter 20	-38156	0.117	-110655	0.15
Chapter 21	-3301428	10.035	-6802485	9.01
Chapter 22	-3341	0.010	-7061	0.01
Chapter 23	-54197	0.166	-111237	0.15
Chapter 24	-32058	0.098	-66977	0.09

397 Source: Research Findings.

398 Reducing import tariffs on agricultural products from member countries would lead to a decrease
399 in revenue, known as the income effect. A 25% reduction in tariffs is estimated to result in a total
400 income effect of around \$32.7 million. The twelfth chapter would be most affected, with an
401 estimated income effect of approximately \$-6.9 million, representing 21% of the total. The
402 reduction in tariff rates would significantly impact specific chapters, such as the seventh, fifteenth,
403 tenth, twenty-first, seventeenth, ninth, eighth, and twelfth, which collectively contribute to over
404 97% of the calculated income effect. In a second scenario, the total income effect is projected to
405 exceed \$75 million, with significant impacts on the twelfth and eighth chapters, accounting for
406 over 45% of the total. The lowest income effect in this scenario is \$-2,000, associated with the
407 fifth chapter. The estimated income effects for various chapters show significant variations
408 compared to others.

409 Tariff income growth rates vary across chapters, ranging from -0.1% to -23.4%. A 25% decrease
410 in import tariffs on agricultural products from member countries of the organization will lead to
411 the largest decline in tariff income for the fourth and fifth chapters. These chapters, which solely
412 import from member countries of the Shanghai Cooperation Organization, will experience a 47.9%
413 reduction in the second scenario. Notably, chapters like the nineteenth, seventh, first, sixth,

414 seventeenth, fifth, and fourth will see a more significant and rapid decrease in tariff income
415 compared to others.

416 Table 4 presents the impact on welfare of reducing import tariffs by 25% and 50% on agricultural
417 products from member countries of the Shanghai Cooperation Organization. The table breaks
418 down the welfare effects by tariff chapters and shows the share of each chapter in the total welfare
419 effect.

420
421 **Table 4.** Welfare Effects of Reducing Tariffs on Agricultural Imports from SCO Member
422 Countries to Iran by Chapter (US dollars - percentage).

Chapter	Scenario 1		Scenario 2	
	amount	share	amount	share
Chapter 1	1265	0.008	2200	0.008
Chapter 2	7769	0.047	15483	0.054
Chapter 3	8090	0.049	14840	0.052
Chapter 4	1049	0.006	1798	0.006
Chapter 5	81	0.0005	139	0.0005
Chapter 6	18188	0.110	31236	0.11
Chapter 7	200231	1.215	348943	1.22
Chapter 8	12554465	76.166	21633105	75.73
Chapter 9	659294	4.000	1145712	4.01
Chapter 10	189471	1.149	357562	1.25
Chapter 11	6028	0.037	10858	0.04
Chapter 12	949873	5.763	1708694	5.98
Chapter 13	16119	0.098	31335	0.11
Chapter 14	2469	0.015	4699	0.02
Chapter 15	196965	1.195	340410	1.19
Chapter 17	344200	2.088	596774	2.09
Chapter 18	9735	0.059	19187	0.07
Chapter 19	949964	5.763	1628567	5.7
Chapter 20	45540	0.276	88492	0.31
Chapter 21	314370	1.898	570995	1.99
Chapter 22	505	0.003	1010	0.004
Chapter 23	4446	0.027	8115	0.028
Chapter 24	4502	0.027	8153	0.029

423 Source: Research Findings.

424 The simulation results show that reducing tariffs on agricultural imports from Shanghai
425 Cooperation Organization (SCO) countries by 25% leads to increased imports and a \$16.5 million
426 rise in social welfare. Overall, the welfare benefits from increased agricultural imports total
427 approximately \$28.6 million. The distribution of welfare benefits varies by product, with the
428 largest gains seen in the eighth chapter. In both scenarios, the welfare impact of this chapter is
429 significant, accounting for \$12.5 million in the first scenario and \$21.6 million in the second
430 scenario, representing about 76% of the total welfare impact. In scenario one, the nineteenth and
431 twelfth chapters each contribute around \$949,900 in welfare benefits, ranking second and third,
432 respectively, with a 5.8% impact. In scenario two, the twelfth chapter generates \$1.7 million in

433 benefits, ranking second with a 5.9% impact. The nineteenth, ninth, and seventeenth chapters also
434 contribute significant benefits in scenario two. The ranking of welfare benefits across all chapters
435 shows a consistent pattern. Notably, the fifth and twenty-second chapters have the lowest
436 commercial benefits in both scenarios. The eighth chapter stands out with a unique welfare impact
437 compared to other chapters.

438 Reducing Iran's agricultural import tariffs from SCO member countries will lead to a significant
439 decrease in government customs revenue. However, this policy will also result in a substantial
440 increase in social welfare and boost imports, with the most significant benefits concentrated in
441 chapter 8. Therefore, policymakers must actively manage the budget deficit arising from tariff
442 reductions (through alternative revenue sources) and provide targeted support for competitive
443 domestic production to leverage the economic advantages of engaging with the SCO. Adopting
444 this balanced approach will ensure Iran's effective integration into regional trade while ensuring
445 food security.

446 CONCLUSIONS

448 The main goal of the study was to examine the impact of reducing import tariffs on Iranian
449 agricultural products from SCO countries on both commercial and welfare aspects. Using the
450 WITS-SMART model, the simulation results indicated that lowering tariffs would lead to an
451 increase in imports of agricultural products to Iran through trade creation and diversion. India
452 showed the highest total trade effect index, followed by Pakistan, China, Russian Federation,
453 Kyrgyzstan, Kazakhstan, Belarus, and Uzbekistan. Therefore, the potential for increased imports
454 from India, Pakistan, China, and Russian Federation is higher compared to other countries. The
455 study predicts that in the event of tariff reduction, imports of agricultural products to Iran will
456 primarily come from these countries. The analysis also revealed that the potential for total trade
457 effects in reducing import tariffs on agricultural products from SCO countries to Iran is higher in
458 the eighth chapter compared to other chapters. The twelfth, ninth, seventeenth, twenty-first, tenth,
459 fifteenth, seventh, and nineteenth chapters showed the highest net trade effects, while the
460 thirteenth, sixth, eighteenth, third, twentieth, twenty-third, second, eleventh, twenty-fourth,
461 fourteenth, first, fourth, twenty-second, and fifth chapters followed in subsequent ranks based on
462 the total trade effect index.

463 Based on the trade diversion index for agricultural products, India ranks highest, followed by the
464 Russian Federation, China, Pakistan, Kyrgyzstan, Kazakhstan, Belarus, and Uzbekistan. If import
465 tariffs are reduced, it is expected that there will be a rise in imports of agricultural products from
466 SCO countries instead of other countries. This is because the prices of imported products from
467 SCO countries are lower compared to those from other countries globally. Overall, a decrease in
468 import tariffs will result in increased imports of agricultural products from SCO countries through
469 a combination of trade creation and trade diversion, with trade creation being the primary driver
470 of increased imports.

471 The findings of this study indicate that reducing import tariffs on agricultural products from the
472 Shanghai Cooperation Organization countries to Iran will have significant impacts on both
473 commercial and welfare aspects. Important findings of the studies include:

- 474 • Given the organization's broad objectives—especially encouraging regional cooperation
475 in various political, commercial, and economic fields—its member countries may, under
476 specific and critical circumstances, have effective cooperation with one another,
477 particularly in the trade of agricultural products and agricultural inputs.
- 478 • Import management opportunity :Tariff reductions, especially with countries like India,
479 Pakistan, China, and Russia can lead to increased access and potentially greater diversity
480 of agricultural products in the Iranian market.
- 481 • Balanced Impact: Tariff reduction works through both increased imports from new sources
482 (trade creation) and shifting imports from more expensive to cheaper sources (trade
483 diversion), with trade creation playing a more dominant role.
- 484 • Welfare Implications: Increased trade (both creation and diversion) can benefit consumers
485 through lower prices and wider product availability, assuming these benefits are partially
486 passed on.
- 487 • Trade Partner Prioritization: Policymakers can focus on strengthening trade relations with
488 leading partners such as India, Pakistan, and China.
- 489 • Chapter-Specific Focus: Attention to Chapter 8 (and other mentioned chapters) in tariff
490 classifications can help prioritize policy interventions.

491 Based on the research findings, the following suggestions are presented:

- 492 • The results shows that reducing import tariffs on agricultural products from member
493 countries of the Shanghai Cooperation Organization could significantly increase trade

494 volume and social welfare. However, at the same time, it would lead to a decrease in the
495 government's tariff revenues. In addition, the impact of this policy on different products
496 and countries varies, so commercial and tariff policy-making should be carried out
497 considering these differences and priorities.

498 • According to the results, the proposed priority order of countries for importing agricultural
499 products to Iran from the member states of the Shanghai Cooperation Organization, under
500 conditions of reduced import tariffs, is as follows: India, Pakistan, China, the Russian
501 Federation, Kyrgyzstan, Kazakhstan, Belarus, and Uzbekistan.

502 • According to the results, the proposed priority order for importing agricultural products by
503 chapter, under conditions of reduced import tariffs from the members of the Shanghai
504 Cooperation Organization, is as follows: 1) Chapter 8, 2) Chapter 12, 3) Chapter 9, 4)
505 Chapter 17, 5) Chapter 21, 6) Chapter 10, 7) Chapter 15, 8) Chapter 7, 9) Chapter 19, 10)
506 Chapter 13, 11) Chapter 6, 12) Chapter 18, 13) Chapter 3, 14) Chapter 20, 15) Chapter 23,
507 16) Chapter 2, 17) Chapter 11, 18) Chapter 24, 19) Chapter 14, 20) Chapter 1, 21) Chapter
508 4, 22) Chapter 22, and 23) Chapter 5.

509
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597 شبیه‌سازی آثار عضویت ایران در سازمان همکاری‌های شانگهای: کاربرد مدل WITS-SMART

598 ابوالفضل محمودی، و یداله آذرین‌فر

600 چکیده

601 علیرغم استفاده از مدل تعادل جزئی اسمارت در برخی مطالعات، هیچ کدام از پژوهش‌های انجام شده در داخل ایران از مدل
602 WITS-SMART به منظور شبیه‌سازی روابط تجاری و سایر کشورهای طرف تجاری بهره نبرده‌اند. این در حالی است که
603 این مطالعه به شبیه‌سازی آثار اقتصادی عضویت ایران در سازمان همکاری‌های شانگهای با استفاده از مدل WITS-SMART
604 و داده‌های سال 1402 شمسی (معادل با 2023 میلادی) در قالب دو سناریوی کاهش 25 و 50 درصدی تعرفه‌های واردات از
605 کشورهای عضو سازمان همکاری‌های شانگهای می‌پردازد. نتایج نشان داد که با کاهش تعرفه، واردات محصولات کشاورزی به
606 ایران از طریق ایجاد تجارت و انحراف تجارت افزایش خواهد یافت که در این بین سهم ایجاد تجارت در افزایش واردات
607 بیشتر از انحراف تجارت خواهد بود. کل اثر تجارت در سناریوهای 1 و 2 به ترتیب حدود 125/9 و 251/9 میلیون دلار
608 محاسبه شد. کشور هند بالاترین شاخص کل اثر تجارت را در هر دو سناریو دارد. پس از هند، کشورهای پاکستان، چین،
609 فدراسیون روسیه، قرقیزستان، قزاقستان، بلاروس و ازبکستان در رتبه‌های بعد بر اساس این شاخص قرار دارند. نتایج تحقیق
610 بر اساس تقسیم‌بندی محصولات در 24 فصل مطابق سیستم کدگذاری هماهنگ (HS) نشان داد که فصل هشتم (میوه‌های
611 خوراکی؛ پوست مرکبات یا پوست خربزه و مشابه آن) از بیشترین پتانسیل برای افزایش واردات از کشورهای عضو این
612 سازمان برخوردار است و فصل‌های دوازدهم، نهم، هفدهم، بیست و یکم، دهم، پانزدهم، هفتم و نوزدهم به ترتیب بیشترین
613 خالص اثر تجارت را دارند. نتایج تحقیق نشان داد که کل اثر درآمدی در سناریوهای 1 و 2 به ترتیب حدود 32/7 - و 75 -
614 میلیون دلار خواهد بود. افزایش رفاه اجتماعی حاصل از شبیه‌سازی سناریوهای 1 و 2 نیز به ترتیب حدود 16/5 و 28/6
615 میلیون دلار تخمین زده شد. بیشترین منافع رفاهی در نتیجه کاهش تعرفه واردات در هر دو سناریو مربوط به فصل هشتم
616 خواهد بود. به طور کلی، آثار کاهش تعرفه واردات محصولات کشاورزی در میان کشورهای عضو سازمان همکاری
617 شانگهای و محصولات مختلف متفاوت است و نیازمند سیاست‌گذاری هدفمند است. بر اساس نتایج، اولویت واردات در شرایط
618 کاهش تعرفه‌ها به ترتیب از کشورهای هند، پاکستان، چین، روسیه، قرقیزستان، قزاقستان، بلاروس و ازبکستان پیشنهاد می
619 شود. از نظر فصول کالایی نیز فصول 8، 12 و 9 در اولویت بالاتری قرار دارند و پس از آن‌ها فصول 17، 21، 10 و
620 سایر فصول در مراتب بعدی پیشنهاد می‌شوند.

621