Bulgaria's agri-food trade with China

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Abstract

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The paper aims to analyze the current state and potential future opportunities for Bulgarian-Chinese trade in agri-food products. To accomplish the goal of the study various approaches are used. After presenting the dynamics of the bilateral agri-food trade over the last decade, the product structure and the top Bulgarian exported products, the comparative advantages vis-a-vis China have been identified. Then the trade complementarity of agri-food products between Bulgaria and China is analyzed. Finally, the untapped export potential of Bulgarian agricultural products on the Chinese market is explored. The paper argues that Bulgaria should better utilize the existing bilateral and multilateral mechanisms to enhance and diversify the trade cooperation on agricultural products with China which, given the complimentary export profiles of both countries, is highly mutually beneficial.

Keywords: agro-industrial sector; Bulgaria; China; comparative advantages; exports

Introduction

Throughout the last four decades China has achieved a remarkable socio-economic progress and transformed from a planned economy, relatively insular from the global economy, into the world's largest manufacturing powerhouse and merchandise trader. The economic rise of China has contributed to its positioning as the 8th (2nd non-EU) largest export partner of Bulgaria with a share of 3.2% of Bulgaria's exports in 2021. Accordingly, the foreign economic ties of Bulgaria with China have attracted significant attention from academics of both sides (Hristova-Balkanska et al., 2022; Cao et al., 2021; Tian, 2020; Kandilarov & Dimitrov, 2018; Zhelev, 2018). A largely unexplored however remains the issue of the bilateral trade cooperation in the agri-food industry.

The extraordinary social and economic advancement of China has been concomitant with a steady and significant increase in food consumption turning China into one of the world's largest agri-food markets. The booming economy in combination with enormous population (1.4 billion) that is rapidly urbanising, have brought about profound changes in demand for agricultural products as well as in the country's ability to meet this demand through domestic agricultural industries. Marked changes in the composition of diets with an overall rising food consumption in China have made the country a net food importer since 2004. Given that China is relatively land-scarce country with arable land per capita of only 0.08 hectare (OECD, 2018) it is widely expected that it will continue to turn to imports to meet its consumption needs in the future (Zhao et al., 2021). In 2021, China imported agri-food products for 209 billion USD surpassing the USA (202 billion USD)[1] as the world biggest agri-food importer. These developments offer significant opportunities for Bulgarian agri-food exporters, as well as to intensified bilateral cooperation and Chinese investments in Bulgarian food and agriculture sector.

In this context Sino-Bulgarian economic relations in the sphere of agriculture are a highly topical issue which however has not been studied carefully. Hence the objective of the present paper is by filling this gap to analyse the current state

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[1] According to International Trade Centre (ITC) data

and potential future opportunities of Bulgaria-China trade in agri-food products. To accomplish the aim of the study the following research tasks have been set:

- to present the dynamics of the bilateral Sino-Bulgarian agri-food trade in 2012–2021;
- to exhibit the product structure and identify the agri-food products with the highest comparative advantage of Bulgaria vis-à-vis China;
- to analyse the level of complementarity in agri-food trade of Bulgaria and China;
- to explore the untapped export potential of Bulgarian agri-food products on the Chinese market.

The main hypothesis is that Bulgaria has not yet fully seized the opportunities based on its naturally given comparative advantages in agri-food products on the Chinese market.

Material and Methods

The Standard International Trade Classification (SITC) is used to determine the agri-food products which cover SITC sections 0 "Food and live animals", 1 "Beverages and tobacco", 4 "Animal and vegetable oils and fats" and division 22 "Oil-seeds, oil nuts and oil kernels" (SITC 0 + 1 + 22 + 4). A more detailed description (at 3-digit SITC codes) of the 46 agri-food product groups is presented in the *Appendix 1*. International trade merchandise data are obtained from the UNCTAD statistical database.

Several methods are used to gauge the trade performance of Bulgarian agri-food products on the Chinese market. These range from simple indicators of export growth and market share to indices for calculating the comparative advantages and the correlation between them and more complex indicator of export potential.

One of the most used indicators for determining comparative advantages and measuring agri-food competitiveness by researchers from around the world (Ferto, 2008; Karlova & Serova, 2020; Jambor & Gibba, 2017) is the Balassa index, called also revealed comparative advantage (*RCA*) index. The idea behind the index rests on the trade theory implying that a higher specialization in exports is due to the existence of a comparative advantage. The *RCA* thus is a ratio comparing the share of a certain product in a selected country's exports against the global (or a reference group of countries') export share of the same product as a benchmark.

$$RCA = \frac{x_{ji}/x_{jt}}{x_{wi}/x_{wt}}, \tag{1}$$

where x_{ji} and x_{jt} represent the value of product i's exports from country j and the total value of country j's exports, and x_{wi} and x_{wt} are the world exports of product i and the world total exports, respectively. If RCA index has a value higher than 1, it means country j is more specialized in product i than the world on average and possesses a comparative advantage in trade.

A major drawback of the *RCA* is its asymmetric values – it ranges from 1 to infinity, when a country has a comparative advantage, whereas it spans between 0 and 1, when a country has a comparative disadvantage. This leads to overestimation of a sector's relative weight and causes problems, when using the index for precise comparison of the trade performance of the various products. To deal with this issue, Laursen (1998) suggested a transformation that normalizes the RCA index values distribution. The revealed symmetrical comparative advantage (RSCA) index extends from -1 to +1 and is calculated in the following way:

$$RSCA_{ji} = \frac{(RCA - 1)}{(RCA + 1)}. \tag{2}$$

When analysing *RCA* and *RSCA*, there are four distinct categories that may be formed (Mizik, 2021):

- category 1 (comparative disadvantage):
  $0 < RCA < 1$ or $-1 < RSCA < 0$;
- category 2 (low comparative advantage):
  $1 < RCA < 2$ or $0 < RSCA < 0.33$;
- category 3 (medium comparative advantage):
  $2 < RCA < 4$ or $0.33 < RSCA < 0.6$;
- category 4 (strong comparative advantage):
  $4 < RCA$ or $0.6 < RSCA$.

When different countries all have a comparative advantage in product i, it shows that these countries are competing in the international market to sell product i. If one country has an advantage over another on product i, it suggests complementarity between these countries on product i, and potential gains will be realized if they engage in trade. To measure the complementarity of trade in agri-food products between Bulgaria and China the Spearman's rank correlation coefficient is applied.

$$\rho_s = 1 - \left\{ \frac{6\sum_j^n d_j^2}{n(n^2 - 1)} \right\}, \tag{3}$$

where $j = 1 \ldots n$ is the agri-food product, d_j is the difference between the ranks of the *RCA* indices of product group j in two countries. The ρ_s value ranges from -1 to 1. A positive ρ_s signifies that the two countries have globally substitutable

export profiles due to their similarity, while a negative ρ_s shows that they are complementary. The closer the value to -1 the stronger is their complementarity (Hoang, 2018).

To analyse the untapped export opportunities for Bulgarian agri-food products on the Chinese market the Export Potential Indicator (EPI), developed for the International Trade Centre (ITC) by Decreux & Spies (2016) is used. EPI deals with the intensive product margin. It identifies goods in which the exporting country has demonstrated worldwide competitiveness, and which have strong potential for export success in a specific target market.

The EPI, inspired by gravity models, is founded on the idea that trade between two countries is positively related to the degree of product supply and demand and negatively related to trade barriers, such as customs charges or geographical distance. The basic premise is that in a frictionless economy, trade flows may be explained by a three-way matrix of exporter-product, importer-product, and exporter-importer factors or supply, demand and easiness of trade.

$$v_{ijk} = \alpha_{ik}\beta_{ij}\gamma_{ik}, \tag{4}$$

where v_{ijk} represents shipments from exporter i of product k to market j. The parameter α_{ik} denotes exporter i's performance in exporting product k, γ_{ik} market indicates j's demand for product k and β_{ij} the easiness to export any good from i to j.

Projected market share forms the supply side of the export potential indicator. Hence, the relative improvement in overall supply performance can be captured by multiplying the percentage of total exports that country i contributes for product k by the exporter's predicted GDP growth rate (compared to expected GDP growth of other exporters of the same product).

The demand component is based on projected imports, so market j's imports of product k, complemented by expected GDP per capita growth (subject to estimated revenue elasticities of import demand per capita at the sector and development levels). The indicator also takes into account the target market's future tariff advantage and the bilateral distance as compared to the average distance over which the target market generally imports the goods.

Easiness to trade considers actual trade between exporter i and market j for products with potential relative to their hypothetical trade if the exporter had the same share in market j as it has in world markets. If the ratio is greater than 1, exporter i finds it easier to trade with market j than with the rest of the world on average. This could be because the two countries are closely located, speak the same language or have the same culture, or have done business together in the past. This will make it easier for exporter i to sell any kind of goods to market j. Conversely, if Easiness is lower than 1, then the potential of the exporter to supply on the market decrease regardless of the product being considered (Decreux & Spies, 2016).

The value of real exports is determined by calculating the arithmetic mean of direct and indirect data from reputable reporters during the preceding five years. Realized potential reflects the extent to which this product, market, or supplier has already utilized its export potential. At the most disaggregated level, per country, product, and market, the realized potential corresponds to the gap between potential and actual exports (in percentage terms), when potential exceeds actual exports and to 100 percent when potential falls short (Kašťáková et al., 2022).

Results and Discussion

The economic relations of Bulgaria have been primarily focused on the EU and require some diversification to third countries. One such promising alternative market and investment partner is China. While there has been a very positive dynamics, yet the Sino-Bulgarian trade relations are largely unbalanced – in 2021, the negative trade balance of Bulgaria amounted to 1.2 billion USD or almost 22% of the overall Bulgarian Merchandise Trade Deficit[2]. At the same time by the end of 2021, overall Chinese investment in Bulgaria amounted to the lacklustre 131.6 million EUR or just 0.26% of the total inward FDI stock[3].

The food and agricultural sector plays a special role in the bilateral Sino-Bulgarian economic relations. In 2015, in the framework of the cooperation between China and the countries of Central and Eastern Europe (CEE) known as the "16+1" initiative, an Association for the Promotion of Agricultural Cooperation between China and the Central and Eastern European countries (APACCCEEC) was established as a legal entity under the Bulgarian Ministry of Agriculture. It operates as a collaboration platform and a coordinator in the "16+1" initiative in the field of agriculture, building a network of corporate contacts and exchanging relevant information in its centralized database.

The first "16+1 e-Commerce Logistics Hub and Pavilion for Agricultural and Other Products opened in November 2017, in Trakia Economic Zone – Plovdiv. It was later complemented by a digital online platform for the consolidation

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[2] According to International Trade Centre (ITC) data, available at: https://intracen.org/resources/trade-statistics#export-of-goods

[3] According to Bulgarian National Bank data, available at: https://www.bnb.bg/Statistics/StExternalSector/StDirectInvestments/StDIBulgaria/index.htm

of Chinese and CEE products – the "16Plus1Cloud". Finally, in 2019, 16+1 Demonstration Centre for e-Commerce with Agricultural and other Products was officially opened at the premises of the Agricultural University in Plovdiv.[4] Furthermore, several Bulgarian agricultural research institutions have developed partnerships with Chinese counterparts such as the Institute of Rose and Essential Oil Cultures – Kazanlak, the Institute of Agriculture – Kyustendil, the Institute of Mountain Animal Husbandry and Agriculture – Troyan and the Institute of Viticulture and Enology -Pleven (Shopov, 2022).

While so far Bulgaria has attracted just a negligible amount of Chinese FDI, a large part of it has been directed to the agricultural sector. According to data from the Chinese embassy in Bulgaria and the Bulgarian Academy of Sciences, presented by Hristova-Balkanska et al. (2022), the Chinese investments in the Bulgarian agriculture amount to 105.6 million BGN or over 1/3 of all Chinese FDI in Bulgaria. To have the result for the whole agri-food sector we should also add the investment of the Bulgarian Tianshinong Feed Company, which specializes in the manufacturing of animal feed and the cultivation of maize. The company initiated its initial investment activities in Dobrich in 2012, which have grown to 15 million EUR. The biggest investment in the sector of 35 million EUR has been realized since 2013, by Hera Agro in Parvomai in the cultivation of maize, wheat, and other crops. Since 2015, TerraLand is reported to have invested roughly €8 million in vineyards near the town of Lom on the Danube (Shopov, 2022). The Chinese FDI had a very positive impact on the Bulgarian exports of agri-food products which have started growing noticeably after 2012.

In 2021, exports of agri-food products from Bulgaria to China reached a record high of $189.5 million, up by more than 37 times from 2012 (Figure 1). This remarkable growth was achieved only in the last 3 years of the 2012–2021 peri-
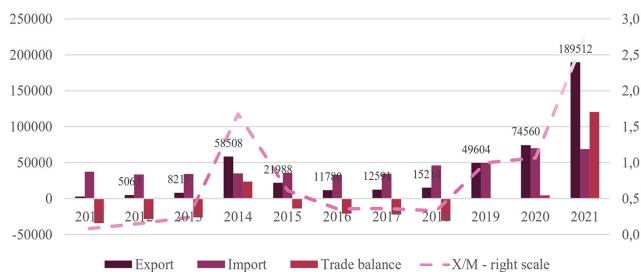
od, which was characterized by a high volatility in the export performance. The peak for the first half of the analysed period was recorded in 2014, when Bulgaria exported agri-food products for $58.5 million, but next year they dropped to less than $22 million and the positive trade balance turned again negative for the following five years.

After a steady growth of the exports after 2018, in 2020 Bulgaria has registered a positive trade balance in agri-food trade with China for the first time after 2014. The predominance of exports over imports reached a ratio of 2.8 in 2021 – a historical high. Unlike manufacturing goods where Bulgaria has been having a constant trade deficit, the positive agri-food trade balance reflects the higher competitiveness of Bulgaria over China in this sector.

As the trade surplus is observed just in two consecutive years and thus cannot be taken as a solid trend, we can have a look at additional indicators to see whether Bulgaria is utilizing its alleged competitive advantages in the agri-food sector in the Chinese market. Figure 2 shows that this might not be the case. The Chinese market has been less represented in Bulgaria's exports of agri-food products than in the overall export list of the country. While in 2012 China accounted for 2.9% of Bulgaria's merchandise exports, Bulgaria relied on China just for the exports of 0.1% of its agri-food products. At the end of the period a larger share of the country's agri-food exports was directed to China but still not at par with some other products.

Similar conclusions can be made when observing the data from Figure 3. The agri-food products are less represented in Bulgaria's export list to China than on average to the world. That means that Bulgaria is less specialized therefore less competitive on the Chinese market with agri-food products than with other merchandise. However, in dynamic perspective one should acknowledge that there is a visible positive trend of improving the relative export performance of the
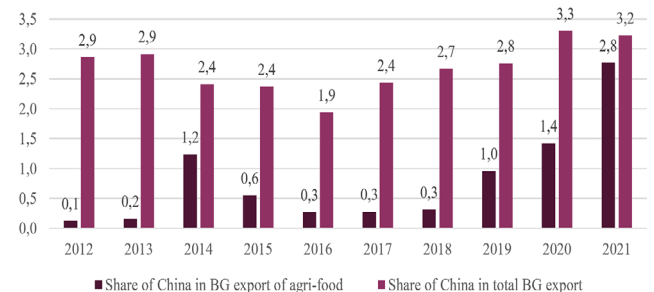

Fig. 1. Dynamics of Bulgarian trade in agri-food products with China (2011–2021, thousand USD)
Source: own calculations based on UNCTAD (2022)

Fig. 2. Comparison of China's share in Bulgarian total merchandise exports and agri-food exports (2012-2021, %)
Source: own calculations based on UNCTAD (2022)

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[4] https://china2ceec.org/apaccceec/?lang=en

Bulgarian agri-food sector. Its share in the national exports to China has increased dramatically – from 0.7% in 2012, to 14.3% in 2021. This shows that over time the agri-food sector of Bulgaria is gaining competitive positions on the Chinese market though not yet as much as on other countries.
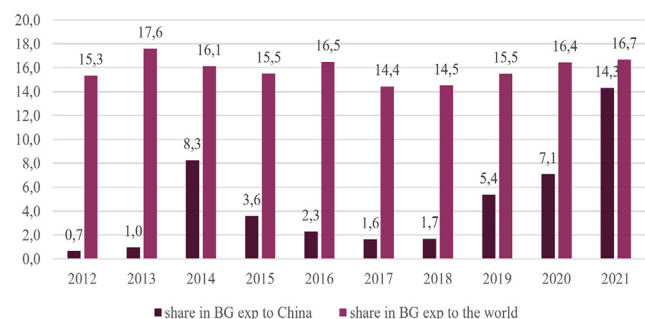

Fig. 3. Comparison of the share of agri-food products in Bulgarian export to the world and to China (2012–2021, %)
Source: own calculations based on UNCTAD (2022)

It should be noted that in contrast to the free movement of goods on the Single European market, besides the higher transportation costs due to distance and the high tariffs, China applies various non-tariff measures for safety reasons such as certifications, permits, and registration processes. Thus, Bulgarian food and agricultural products are less represented on the Chinese market than other products that do not undergo similar requirements.

The import in China of some of the food categories can only take place after the exporting country has been approved by the Chinese competent authority and the issuance of bilateral protocols. Bulgaria has started 28 procedures, of which till now only 10 have already been finalized. These cover the sanitary and phytosanitary requirements for the export of:

– sunflower seeds;
– alfalfa – for feed;
– maize – for feed;
– tobacco;
– plant-based compound feed and feed additives;
– sunflower meal and dry stills;
– milk and dairy products;
– fish and fish products;
– frozen fruits and vegetables;
– honey.[5]

The product structure of Bulgarian agricultural and food products on the Chinese market has shown great oscillation

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[5] Bulgarian Food Safety Agency website, https://bfsa.egov.bg/wps/portal/bfsa-web/home/bfsa.for.business/certificates.and.export.information.for.non-EU.countries, Accessed on 21 Nov. 2022

during the last decade. For example, in 2017 over half of the exports consisted of "Beverages and Tobacco" (Figure 4). In three years, their share collapsed to less than 1%. The drop of the share of beverages is a result of the inability of Bulgarian wine producers to maintain their market share due to problems with uneven quality, insufficient quantities and lack of reliable partners (Shopov, 2022).
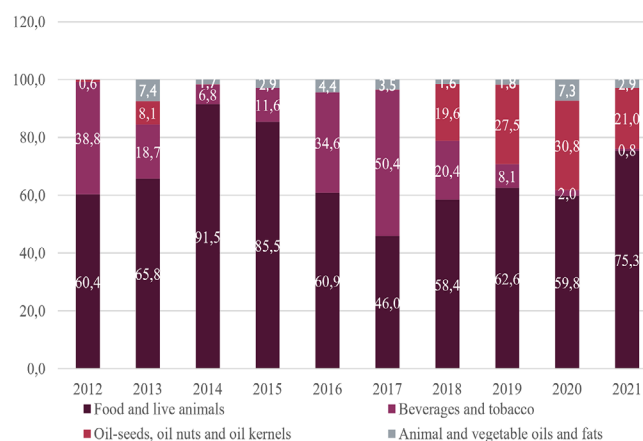

Fig. 4. Product structure of Bulgarian agri-food export to China (2012–2021, %)
Source: own calculations based on UNCTAD (2022)

In 2021, the leading Bulgarian agri-food product on the Chinese market with a value of almost $92 million was feeding stuff for animals (Figure 5). On the second position with $45.4 million was maize. These are also the products that have registered the largest increase of their exports during the last five years. Both products are also the ones in which some of the most successful Chinese FDI was realized, signifying the positive impact of the latter on the export performance of the sector. Together with the export of oil seeds and oleaginous fruits ($39.7 million), the top three products account for 93.4% of all the Bulgarian agri-food export to China.

Table 1 shows the agri-food products exported by Bulgaria, which have the highest competitiveness in comparison with China on the world market. These are products that potentially can be realized on the Chinese market as well. In the ten years period the list did not change much as the most competitive products continued to be barley, wheat, cheese, maize, meat, fixed vegetable fats and oils, oil seeds and oleaginous fruits. Tobacco and milk and milk products dropped out of the 10 most competitive goods and were substituted by cocoa and food preparations with cocoa. Interestingly, for the products with the highest RCA (barley and wheat) Bulgaria does not have a signed protocol for the sanitary and phytosanitary requirements and cannot export to China.
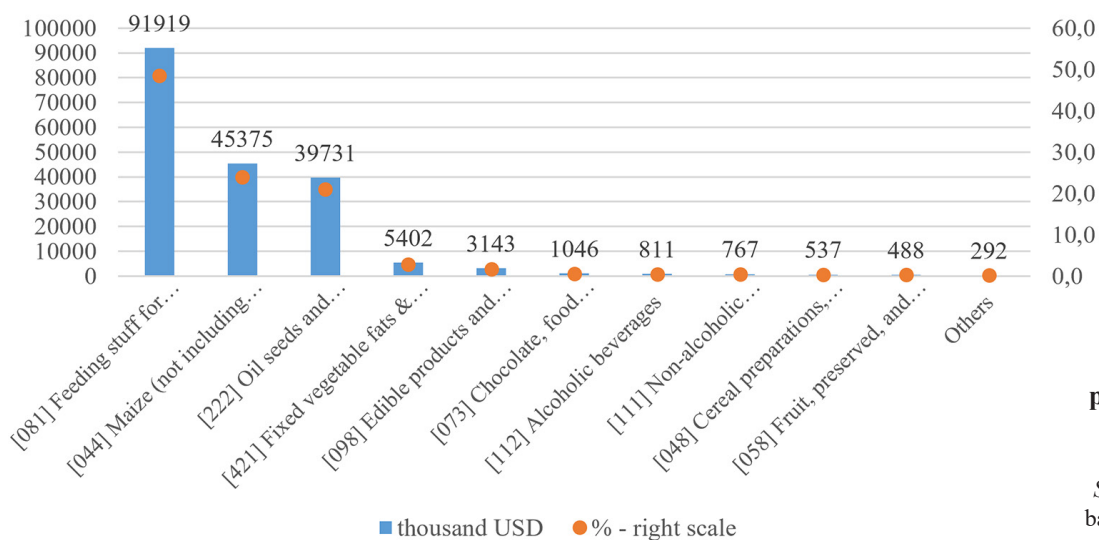
Figure 5. Leading products in Bulgarian agri-food exports to China, 2021
Source: own calculations based on UNCTAD (2022)

Table 1. Bulgarian agri-food products with the highest competitiveness vis-à-vis China (RSCA index, 2012 & 2021)

	2012		2021
[041] Wheat (including spelt) and meslin, unmilled	1.000	[043] Barley, unmilled	1.000
[043] Barley, unmilled	0.997	[041] Wheat (including spelt) and meslin, unmilled	1.000
[024] Cheese and curd	0.996	[024] Cheese and curd	0.998
[044] Maize (not including sweet corn), unmilled	0.935	[044] Maize (not including sweet corn), unmilled	0.997
[016] Meat, edible meat offal, salted, dried; flours, meals	0.867	[011] Meat of bovine animals, fresh, chilled or frozen	0.997
[421] Fixed vegetable fats & oils, crude, refined, fractio.	0.863	[421] Fixed vegetable fats & oils, crude, refined	0.960
[222] Oil seeds and oleaginous fruits (excluding flour)	0.816	[072] Cocoa	0.895
[122] Tobacco, manufactured	0.727	[222] Oil seeds and oleaginous fruits (excluding flour)	0.829
[022] Milk, cream and milk products (excluding butter, cheese)	0.654	[047] Other cereal meals and flour	0.797
[023] Butter and other fats and oils derived from milk	0.650	[073] Chocolate, food preparations with cocoa, n.e.s.	0.741

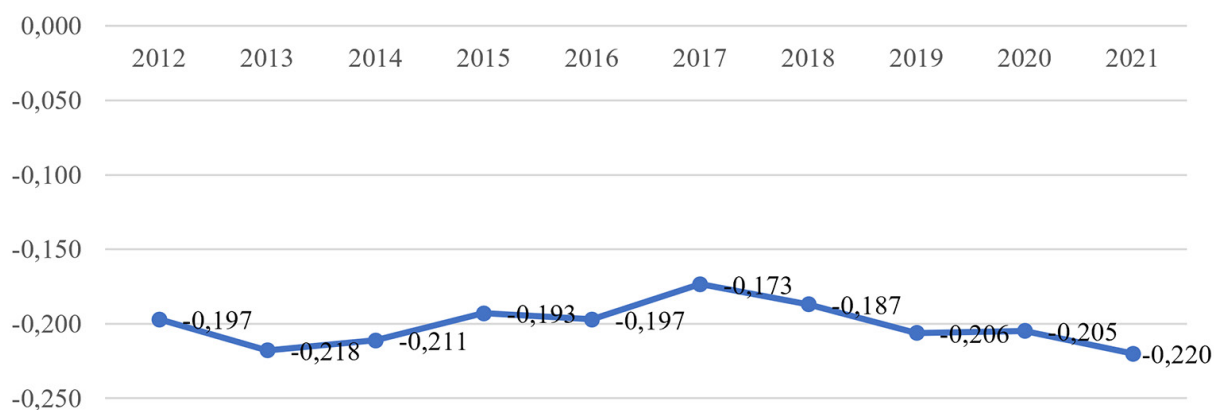*Source:* own calculations based on UNCTAD (2022)

Fig. 6. Spearman rank correlation coefficient of the RCA indicators of Bulgarian and Chinese agri-food products (2012-2021)
Source: own calculations based on UNCTAD (2022)

Table 2. Bulgarian agri-food export potential to China, top 10 products, million USD

HS code and product	Export Potential	Actual Export	Untapped Potential
151211 Crude sunflower-seed or safflower oil	39	3.4	35
1003 Barley	16	0	16
230630 Oilcake of sunflower seeds	49	35	14
1001Xb Wheat & meslin	13	0	13
120510 Low erucic acid rape or colza seeds	11	0	11
100590 Maize (excl. seed for sowing)	34	29	4.9
190532 Waffles & wafers	3.9	0.113	3.8
210690 Food preparations	6.7	3	3.6
230990 Preparations used in animal feeding	4.6	1.2	3.5
020714 Fowls, cuts & offal, frozen	2	0	2

Source: International Trade Centre (2022)

The negative ρ_s values of the RCA indicators in Figure 6 exhibit that Bulgaria and China are not competing on the world market, and they have complementarity in agricultural competitiveness structures with the mean ρ_s value of – 0.20. The trade complementarity has been increasing over time indicating better opportunities for Bulgaria to match the agricultural import demand of China.

Finally, Table 2 shows Bulgarian goods with the highest absolute difference between export potential and actual export. These are the products which posses the greatest untapped potential. The top 5 include crude sunflower-seed or safflower oil, barley, oilcake of sunflower seeds, wheat, low erucic acid rape or colza seeds, and maize. To be able to tap on the potential Bulgaria has first to conclude protocols with China for the sanitary and phytosanitary requirements of three out of the five products where the actual current export is non-existent.

Conclusion

Bulgarian trade ties with China are getting closer. There has been an intensification of Sino-Bulgarian trade with agri-food products in the last few years turning the trade balance positive for Bulgaria. This is mainly due to the positive effect of Chinese FDI in the Bulgarian agri-food sector. Despite the positive developments however the exports of Bulgarian agri-food products on the Chinese market are highly concentrated in three product groups – animal feed, maize, and oil seeds (>93%). There is a need for diversification of Bulgarian exports and perspective products in this regard are those with a strong comparative advantage vis-à-vis China such as cereals, dairy products, oil seeds, and cocoa products. Some of the products with untapped potential on the Chinese market such as barley and wheat require further administrative efforts from the state to conclude the necessary bilateral protocols. The trade complementarity of Bulgarian competitive agricultural products to Chinese ones denotes that further strengthening of the agri-food cooperation will be mutually beneficial. The existence of institutional cooperation mechanisms and e-commerce platforms indicates a promising future for the Sino-Bulgarian trade in agricultural products.

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Appendix 1
Agri-food products according to the SITC 3-digit codes

SITC code	products	SITC code	products
001	Live animals	057	Fruit, nuts excl. oil nuts
011	Bovine meat	058	Fruit, preserved, prepared
012	Other meat, other offal	059	Fruit, vegetable juices
016	Meat, ed. offl., dry. slt, smk	061	Sugars, molasses, honey
017	Meat, offl. Prdd. nes	062	Sugar, confectionery
022	Milk and cream	071	Coffee. coffee substitutes
023	Butter, other fat of milk	072	Cocoa
024	Cheese and curd	073	Chocolate, oth. cocoa prep.
025	Eggs, birds, yolks, albumin	074	Tea and mate
034	Fish, fresh., chilled, frozn	075	Spices
035	Fish, dried. salted, smoked	081	Animal feed stuff
036	Crustaceans, molluscs	091	Margarine and shorten
037	Fish etc. prepd. prsvd. nes	098	Edible prod. prepetns, nes
041	Wheat, meslin, unmilled	111	Non-alcohol beverage
042	Rice	112	Alcoholic beverages
043	Barley, unmilled	121	Tobacco unmanufactured
044	Maize, unmilled	122	Tobacco, manufactured
045	Other cereals, unmilled	222	Oil seeds and oleaginous fruits (excl. flour)
046	Meal, flour of wheat, msln	223	Oil seeds, oleaginous fruits (incl. flour, n.e.s.)
047	Other cereal meal, flours	411	Animal oils and fats
048	Cereal preparations	421	Fixed veg. fat, oils, soft
054	Vegetables	422	Fixed veg. fat, oils, other
056	Vegetables, prpd, prsvd. nes	431	Animal, veg. fats, oils, nes.

Source: SITC, available online:
https://unstats.un.org/unsd/publication/SeriesM/SeriesM_34rev4E.pdf