

Short communication

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The International Competitiveness of Azerbaijani fruit and vegetable products

Azerbaijan is a highly oil-dependent country that needs to find new avenues for increasing its international competitiveness. Therefore, this paper analyses the competitiveness of various fruit and vegetable products by calculating domestic resource cost ratios, using the data for 2015–16 as representing base years. Out of the 10 products analysed, almost all were found to have high competitive potential, especially on the Russian and European markets. In order to maintain competitiveness in the arable sector, however, Azerbaijan will need to achieve dynamic improvements in productivity and run a wise agricultural policy.

Keywords: Azerbaijan, agriculture, competitiveness, DRC, export

JEL classification: Q12

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Received: 21 September 2019, Revised: 17 October 2019, Accepted: 20 October 2019.

Introduction

The rapid decline in oil prices has been negatively affecting the Azerbaijani economy, which is highly dependent on oil exports, since the end of 2014. As a result, GDP growth has dropped to 3.1 percent in 2016 and Azerbaijani exports declined to \$13.1 billion to 2016 compared to US \$30.2 billion in 2014 (SSCRA, 2019). As a consequence, the Azerbaijani government has adopted 12 strategic roadmaps for the development of the non-oil sector to increase the share of non-oil-related goods among its exports (SRPNE, 2016; SRAAPPS, 2016). As a result, non-oil exports increased by 24 percent in 2017 compared to 2016 and amounted to \$1.5 billion (SSCRA, 2019), with the majority of this figure coming from agricultural products. In 2017, for instance, 33 percent of Azerbaijan's non-oil exports consisted of fruits and vegetables, the majority of which was tomato exports, worth \$151.6 million.

There is a high need to identify potentially competitive sectors in the economy and this article aims to fill the gap in the academic literature by analysing the competitiveness of Azerbaijani fruit and vegetable products over the course of the last 15 years by calculating Domestic Resource Cost (DRC) ratios. This article also aims to make some estimates for 2020 and 2025 under different scenarios.

Methodology

While there is a lack of consensus on how international competitiveness should be measured, in practice the DRC ratio has been widely applied (Tsakok, 1990). The DRC of a commodity compares the opportunity cost of domestic resources used in production of that commodity to the value added it generates at international prices (Masters and Winter-Nelson, 1995).

This concept builds upon the notion of effective production, but extends it through the use of opportunity costs of domestic resources rather than the domestic market price of the resources. The DRC ratio compares the opportunity costs of domestic production to the value added it generates. The criteria of the DRC thus indicates the cost of the production factors (and non-tradeable goods) necessary for the production of the equivalent of one foreign currency unit (Gorton *et al.*, 2006).

The DRC expresses the effective income (the cost) of the non-tradeable production factors (the “domestic resources” of the economy) devoted to the potential net earning of one currency unit of “tradeable resources”. The difference between tradeables and non-tradeables is also critical as the exchange rate is concerned. Both numerator and denominator of the DRC are given in the same currency by multiplying the latter by the economic opportunity cost of foreign exchange, or the shadow exchange rate, which expresses the marginally efficient rate at which non-tradable primary factors of production may be transformed into tradable value added. Multiplying the denominator of the DRC by this rate converts the shadow prices of tradable outputs and inputs, expressed in foreign currency, into their opportunity cost at the margin in terms of domestic factors of production. Once this is done, the numerator and denominator of the DRC may be compared to see whether activity j is more or less efficient than the activity that, at the margin, is just efficient. If the DRC is less than one, the domestic resource cost per unit of value added is less for activity j than for the marginally efficient activity, so the country has a comparative advantage in activity j . If the DRC is greater than one, the opposite is true and the country does not have a comparative advantage (Masters and Winter-Nelson, 1995).

In other words, DRC is an indicator of the efficiency with which a country's factors of production (land, labour and capital) are converted into useful output. More precisely,

Table 1: World Bank DRC calculations for Azerbaijani fruits and vegetables in 2000–02.

	Irrigated		Not irrigated	
	Current practice	Ideal practice	Current practice	Ideal practice
Tomato	0.431	0.230	n.a.	n.a.
Hazelnut	1.064	0.702	0.832	n.a.
Pomegranate	0.619	0.174	0.703	0.223
Potato	0.955	0.638	1.009	0.661
Cotton	1.618	1.150	n.a.	n.a.
Cabbage	0.593	0.364	n.a.	n.a.
Grape	0.825	0.475	1.180	0.534
Apple	0.813	0.514	0.854	0.549
Persimmon	n.a.	n.a.	n.a.	n.a.
Cucumber	n.a.	n.a.	n.a.	n.a.

Source: ADPSA (2003)

Table 2: USAID and UNDP DRC calculations for Azerbaijani fruits and vegetables in 2009.

Product	Destination	DRC coefficient (Calculations by USAID)	DRC coefficient (Calculations by IER)
Greenhouse tomatoes	Russia	0.14	0.07
Persimmons	Russia	0.86	0.11
Fresh pomegranate	Russia	0.74	0.29
Apples	Russia	0.32	0.18
Cherries	Russia	0.16	0.63
Greenhouse cucumbers	Russia	0.36	0.06
Potatoes	Russia	0.15	0.11
Hazelnuts	Russia, Europe	0.47 0.56	–
Kiwi	Russia	0.94	–
Feijoa	Russia	0.31	–
Table grapes	Russia	–	0.46
Onions	Russia	–	0.07
Cabbages	Russia	–	0.07
Cotton	International market	–	0.30

Source: USAID (2009), IER under UNDP project, UNDP (2009)

we define the DRC for a given economic activity as the ratio of the economic opportunity cost of the domestic, non-tradeable resources used in the production of output j to the value added that is created measured in world market prices, which equal the shadow prices or economic opportunity cost of tradeable goods. An excellent review on the method with mathematical background is given in Masters and Winter-Nelson (1995) and Gorton *et al.* (2006).

Two reports have previously calculated DRC ratios for the Azerbaijani agriculture. The World Bank made DRC calculations in 2003 to reveal the products with comparative advantages (ADPSA, 2003). The calculations were made in two scenarios for current and ideal practices (Table 1).

According to World Bank results, tomato, cabbage and pomegranate had the highest DRC ratios in irrigated areas with 0.431, 0.593 and 0.619 values, respectively, with current practice. In ideal practice, DRC ratios for the same products could be 0.230, 0.364 and 0.174, respectively.

The USAID and UNDP have also made similar calculations for Azerbaijani agriculture (USAID, 2009; UNDP, 2009). Both analyses have been carried out according to the product-source-destination approach which shows whether products from a definite region have comparative advantages in a certain market. Results suggest that apples, cherries,

persimmons, fresh pomegranate, pomegranate juice, apple juice, greenhouse tomatoes and cucumbers, tomato paste, early potatoes, hazelnuts, kiwi and feijoa have quite favourable DRCs (less than one). In Table 2, the main products with comparative advantages are observable.

As evident from Table 2, the main export market for Azerbaijani fruits and vegetables products is Russia. Cherries from the Guba-Khachmaz region, greenhouse tomatoes and cucumbers from Absheron and Shamkir and early potatoes from Jalilabad show the highest comparative advantage. Apple, feijoa and kiwi stand on the second place, followed by hazelnuts from Zagatala and Gakh. However, in the case of hazelnuts, there is an additional advantage compared to other products, as along with the Russian market, hazelnuts also have a comparative advantage in the Europe market. Fresh pomegranates from Goychay are also considered to be competitive with a DRC ratio of 0.74.

Market prospects for Azerbaijani fruits and vegetables were found to be positive in both the domestic and foreign markets, yet in case of fresh produce, the sector can fully explore market opportunities if innovation in varieties and quality improvements are taken into account. Investments in storing and packaging may be an attractive strategy to sell the produce later in time or to markets at further distance to

Table 3: DRC calculations for Azerbaijani fruits and vegetables products (2015-2016).

Product	Sowing type	All	Absheron	Ganja-Gazakh	Duzen Shirvan	Daglig Shirvan	Mil-Karabakh	Mugan-Salyan	Quba-Khachmaz	Shaki-Zaqatala	Lankaran-Astara
Potato, fresh	Not irrigated	0.249	n.a.	0.254	n.a.	n.a.	n.a.	n.a.	0.218	0.262	0.192
	Irrigated	0.121	n.a.	0.113	0.115	n.a.	0.105	0.154	0.500	0.194	0.126
Tomato	Irrigated	0.059	0.067	0.116	0.070	n.a.	0.058	0.051	0.033	0.092	0.054
	Greenhouse	0.077	0.076	0.078	0.179	n.a.	0.127	n.a.	n.a.	n.a.	n.a.
Cucumber	Irrigated	0.042	0.031	0.071	0.079	n.a.	0.125	0.055	0.022	n.a.	0.060
	Greenhouse	0.043	n.a.	0.043	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Grape	Irrigated	0.058	n.a.	0.058	n.a.	n.a.	n.a.	n.a.	0.040	n.a.	n.a.
	Not irrigated	0.128	n.a.	n.a.	n.a.	0.118	n.a.	n.a.	n.a.	0.117	0.174
Apple	Irrigated	0.251	n.a.	0.212	n.a.	n.a.	n.a.	n.a.	0.252	n.a.	n.a.
	Not irrigated	0.318	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.314	n.a.	0.377
Hazelnut	Irrigated	0.028	n.a.	0.028	n.a.	n.a.	n.a.	n.a.	0.036	0.016	n.a.
	Not irrigated	0.037	n.a.	n.a.	n.a.	0.035	n.a.	n.a.	n.a.	0.071	n.a.
Cabbage	Irrigated	0.180	0.077	0.094	n.a.	n.a.	0.109	0.427	0.096	n.a.	0.122
	Not irrigated	0.106	n.a.	0.177	n.a.	n.a.	n.a.	n.a.	n.a.	0.203	n.a.
Pomegranate	Irrigated	0.078	n.a.	0.195	0.063	0.130	n.a.	n.a.	n.a.	n.a.	0.151
Persimmon	Irrigated	0.021	n.a.	0.012	0.099	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Cotton	Irrigated	0.370	n.a.	0.851	0.420	n.a.	0.271	0.405	n.a.	n.a.	n.a.

Source: own calculations based on FDMS data

the producer's production region (USAID, 2009). Moreover, high fragmentation and small scale of the producers, limited access to knowledge and technologies, lack of finance and relatively high rates of interests are among the main problems negatively affecting the competitiveness of local fruit production.

Results and Discussion

Ten agricultural products (tomato, hazelnut, persimmon, apple, pomegranate, grape, potatoes, cotton, cucumber and cabbage) with the highest share in agricultural export of Azerbaijan are chosen for the analysis. In estimating DRC ratios for each commodity, a number of assumptions were made related to the social prices for outputs and tradable inputs, the social costs of non-tradable domestic resources and the choice of production structures.

Social prices for outputs and tradable inputs are measured as border prices (export/import parity prices) and are adjusted to the farm level. Products for which Azerbaijan was a net exporter an average free on board (FOB) export parity price was taken as the unadjusted reference price. The social prices for tradable inputs are based on border prices and data for Azerbaijan were taken from National Statistical Office and State Office of Customs. The adjustment of prices from border to farm were made, where appropriate, of handling charges, transport, storage and maintenance costs. Private input prices and quantities, together with information on yields, were taken from Azerbaijan Farm Data and Monitoring System, providing information on over 4000 agricultural enterprises.

The prices of non-tradable resources were measured in terms of the opportunity costs of land, labour and capital employed in the production. In the case of land, the opportunity costs can be indicated by the social rental value in the second best alternative. But even in this case, there is often a problem in identifying a single second best alternative according to the level of risk, income, demand, price stability over time and other factors. For example, vegetable crops usually are more profitable compared to staple food crops, but still many producers continue to grow food crops because of their higher price and demand stability over time. In this situation, land of identical quality produces a variety of crops. In order to handle this situation, an average of suitable commodity alternatives for deriving shadow land prices was taken. In case of capital, the economic cost of fixed asset has been indicated by the interest rate that could be earned if the amount invested in the asset were invested into the financial market as the second best alternative.

As far as labour is concerned, the wage rate in the second best alternative, mainly in non-agricultural labour opportunities, is taken. As agricultural producers are not professional specialists, alternative occupations are generally unskilled in nature. Therefore, the social value of labour was calculated by weighting to the average wage rates of unskilled workers in non-agricultural occupations in the country excluding the capital of Baku. Table 3 summarises the results of our calculations.

Results suggest that on the country level, potato production is competitive in both irrigated and non-irrigated areas with DRC ratios of 0.121 and 0.249, respectively. In some regions specialised in potato production, DRC ratios were

Table 4: Expected DRC ratios for Azerbaijani fruits and vegetables products for 2020 and 2025 .

Product	2020		2025	
	Effects of price change	Effects of yield change	Effects of price change	Effects of yield change
Tomato	0.166	0.211	0.247	0.276
Hazelnut	0.133	0.246	0.223	0.239
Persimmon	0.124	0.268	0.367	0.406
Potato, fresh	0.142	0.206	0.278	0.295
Grape	0.289	0.355	0.365	0.378
Apple	0.284	0.389	0.427	0.489
Pomegranate	0.257	0.341	0.342	0.407
Cotton	0.371	0.405	0.458	0.473
Cucumber	0.147	0.204	0.242	0.344
Cabbage	0.200	0.217	0.260	0.310

Source: own calculations

even better (Ganja-Gazakh: 0.113, Duzen Shirvan: 0.115), compared to country average.

Our calculations have also revealed that tomato was one of the most competitive products. For irrigated areas, the country’s average DRC ratio was 0.059 and for greenhouses, it was 0.077. However, it should be noted that greenhouses have the advantage that tomato production can be run during the whole year. In the case of Guba-Khachmaz region, the DRC for irrigated lands was the lowest, indicating the highest comparative advantage in tomato production.

The same situation can be observed for cucumbers. The country’s average DRC ratios for cucumbers were almost equal for both irrigated lands and greenhouses with values of 0.042 and 0.043, respectively. For the Guba-Khachmaz region, DRC in irrigated lands was even less, 0.022. For cotton, which is one of the most important export products of Azerbaijan, the country’s average DRC ratio equalled to 0.370. However, in the Mil-Karabakh region (the main area for cotton production), the DRC ratio was even less, 0.271.

As for perennial crops, grapes were also found to be competitive with a DRC ratio of 0.058 for irrigated areas and 0.129 for non-irrigated areas, meaning that non-irrigated grape production was more competitive. In the case of apples, production was again competitive for both irrigated and non-irrigated lands with respective DRC values of 0.251 and 0.318. Hazelnut production was extremely competitive with DRC ratios of 0.028 for irrigated and 0.037 for non-irrigated lands, suggesting it has great export potential. Pomegranate is also very competitive on export markets, although this product needs irrigation at all times. As for persimmon, high competitive potential was also found here with a DRC value of 0.021 – again, irrigation is highly needed here.

As a next step, we have also made some projections based on the same methodology, taking into account possible changes in prices and yields of products. Average prices for 2020 and 2025 were taken from OECD-FAO Agricultural Outlooks (OECD, 2019) and local price collection system

for agricultural products (PI, 2019)¹. Possible changes in yields were calculated according to average yield change in the country based on State Statistical Committee data (SSCRA, 2019). Table 4 summarises the results of the foresight exercise.

As evident from Table 4, all products analysed will remain competitive in 2020 and 2025. The best indicators for 2020 are observed in the case of persimmons, hazelnuts, fresh potato, cucumber and tomato with DRC ratios of 0.124, 0.133, 0.142, 0.147 and 0.166, respectively, taking into account price effects. As to yield changes, these products are still competitive but to a lesser extent. By 2025, hazelnuts, cucumber, tomato, cabbage and fresh potato demonstrate the highest DRC ratios with 0.223, 0.242, 0.247, 0.260 and 0.278, respectively. Taking into account the effects of yield change, these products are less competitive. The rest of the products also show competitive DRC ratios, suggesting that local agricultural production has a future in global markets.

As to the policy side, the Azerbaijani government aims to support agriculture in a number of ways. First of all, farmers get subsidies (200 manats ~ \$118) per hectare. However, this rate changes according to species and cultivation techniques and is about to increase. Moreover, the government provides input support (irrigation water, elite seeds, fuel and fertilizers and machinery) to farmers through the state-owned company Agroleasing, which is due to be privatised, and the newly established Agro Insurance Fund will start its activities and support 50% of state insurance payments this year. Agricultural policy also grants tax exemptions for local farmers. Moreover, the Azerbaijani government also aims to encourage agro-processing investments as well as to create agro-based clusters (Agroparks), playing the role of a hub for production, logistics and sales of agricultural products. On the whole, governmental support is expected to increase the competitiveness of Azerbaijan’s agricultural products, including fruits and vegetables (Berkum, 2017; Ruijs, 2017).

Conclusions

The article analysed the competitiveness of Azerbaijan’s fresh fruits and vegetables products by calculating their DRC indices. Russia and Europe were found to be the main markets and out of the 10 products analysed, almost all of them held important market potential. There is a high need for Azerbaijan to find sectors and products with competitive potential to at least partially offset oil-dependence in exports. Governmental policies aim to increase the competitiveness of local agricultural and food production, including fruits and vegetables. Future research might want to evaluate other sectors and products also with other methods to get a more diversified picture of the competitiveness of Azerbaijan’s agriculture.

¹ A price collection system for agricultural products (www.aqrabazar.az) has been created between January 2014 and April 2015. The database includes daily updated wholesale and retail prices of 46 kinds of fruits and vegetables and their 400 varieties based on a simple product classification system (small, medium and large). The database started working from 1st August 2015, the primary version covered 19 retail and 5 wholesale markets in Baku and in other regions. Organisations under control of the Ministry of Agriculture were responsible for collecting price information.

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