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## **Revealed Comparative Advantage of Turkish and Hungarian Wheat Sectors**

**Abstract.** Hungary and Turkey have a considerable share in world wheat markets. In 2018, Hungary's export value of wheat and wheat flour reached to 411 million euros and it formed 32 per cent of overall cereal & milling industry export value of the country. Export value of Turkey for the same commodities was 875 million euros in the same period and it formed 77 per cent of total cereal & milling industry export value (International Trade Centre, 2019). Considering their potential and recent upward trends in trade, this study aims to determine the competitiveness of the wheat sectors in Hungary and Turkey. The study examines the competitiveness level of both countries by using Balassa's Revealed Comparative Advantage index and Michaely index. The examination range covers the 10-year period between 2009 and 2018. Majority of data in this work was obtained and derived from International Trade Centre database. According to analysis results, Hungary has a higher degree of specialization vis-a-vis Turkey.

**Key words:** wheat sector, revealed comparative advantage, Hungary, Turkey

**JEL Classification:** F1, F14, Q17

### **Introduction**

Besides being an important part of human nutrition, wheat has been a strategic tradable commodity since ancient times. Importance of wheat sector upsurges in parallel to worldwide population growth. With the world's population estimated to reach 9.6 billion by 2050 (United Nations, 2013), wheat production is expected to keep its key role in food security and the world economy in the future. According to Food and Agriculture Organisation of United Nations (2019), world wheat production increased more than 13 percent between 2008-2017 period to meet constantly growing demand.

In this context, the wheat sector also plays a significant role in the agricultural industry in Hungary and Turkey. Hungary's wheat export volume reached 3.5 million tons in 2017, the highest level in recent five years while Turkey keeps being a leader in wheat flour export since 2013 (ITC, 2019). In light of recent trends, this study tries to investigate the competitiveness of wheat sectors in above-mentioned countries as an initial part of a more comprehensive wheat sector analysis. The paper also aims to examine Turkey's relative competitiveness in wheat and wheat flour trade vis-a-vis Hungary. The empirical analysis of the present study is based on the revealed comparative advantage. There are studies in the existing literature about the competitiveness of the agricultural sector. However, studies are limited in the literature to determine the comparative advantage of these two countries in wheat trade. Therefore, this work tries to answer how the competition trend of these

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countries has proceeded by providing an overview of the trade performance trends in the Hungarian and Turkish wheat sector over the last decade.

## **Selective Review of Literature**

This section provides a theoretical background and brief information about some of the prominent examples from studies that were conducted to measure the comparative advantage of wheat sectors in various countries.

The principles of comparative advantage were frequently examined in international trade studies. In his work “On the Principles of Political Economy and Taxation”, Ricardo (1817) emphasised the importance of free international trade and he suggested that countries should specialize in producing goods or services where they have relative cost advantages. Durand & Giorno (1987) highlighted methodological problems in constructing indicators of competitiveness with the conclusion of there is no single measure for calculating competitiveness. In the late 20th century, “Diamond” model introduced by Porter (1990), where the main determinants of competitive advantage were identified as; factor conditions, demand conditions, related and supporting industries and government. Rugman & Cruz (1993) argued that Porter’s model of international competitiveness was insufficient when applied to a small economy; therefore they developed a new model called “Double Diamond”. This approach required an analysis of both home country and its largest trading and investment partner.

Besides above-mentioned studies, various quantitative methods were used to measure competitiveness in international trade, such as the Balassa’s RCA<sup>2</sup> index, Donges and Riedel index, Bowen’s method (based on production and consumption) and Michaely index. RCA index is the widely used method in international trade studies due to its spatial (e.g. regional or country level) and sector (e.g. a specific product or product groups) flexibility. It also offers an overview of a country’s trade performance by revealing the trend of indices in a certain period. This index, however, considered only the exports and neglected the import advantage of a particular country or sector. An alternative method, called Michaely index was developed by Michaely in 1962 taking into account both export and import performance of the country.

Revealed competitive advantage method was used in several wheat sector studies. Vollrath (1987) conducted a comparative study to examine the United States’ competitive advantage in the wheat sector, focusing on wheat and wheat flour. By using the revealed comparative advantage including relative export and import share, the study proved that the U.S. wheat sub sector is not performing as well as the oilseed and coarse grain sub sectors in the period 1961-1985.

In their study on ‘Revealed Comparative Advantage of Russian Agricultural Exports’, Ishchukova and Smutka (2013) performed an analysis by using several measures of revealed comparative advantage. Using the Balassa’s index, they found out cereals (wheat, barley, etc.), cereal by-products (such as wheat bran) and processed cereal products (cereals preparations, etc.), oilseeds, vegetable oils and chocolate products had a relatively stable comparative advantage during the 1998-2010 period.

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<sup>2</sup> Revealed Competitive Advantage.

Sarker (2014) analyzed and compared competitiveness of the Canadian and Australian wheat sectors. The results of his study demonstrated that during the period 1961-2012, both countries have shown to have a comparative advantage in wheat sector. The study also revealed that the wheat sector competitiveness of these countries showed a declining trend in the related period.

Kleynhans et al. (2016) identified the competitiveness of South African wheat industry vis-a-vis its major trade partners using the trade data from 1992 to 2012. It has been found that Africa's unprocessed wheat industry was not competitive against Argentina, Australia, Brazil, Canada, Germany and the USA. However, the study also emphasized that South Africa had a competitive advantage in wheat flour due to favourable institutional environment.

Granabetter (2016) investigated export trade development of the Austrian district Burgenland in relation to the foreign trade of Austria by using the revealed comparative advantage index. The findings proved that Burgenland had important exports of agricultural products (including cereals) and the trade relations with neighbouring countries improved in the period of 2010-2014.

## Materials and Methods

The objective of this study is to find out and compare the competitive performance of the Hungarian and Turkish wheat sectors and to determine if the patterns of comparative advantage for above-mentioned countries' wheat trade showed a significant shift over the last decade. Accordingly, Balassa's Revealed Comparative Advantages (RCA) index and Michaely index (MI) were used to measure the competitiveness of wheat sectors.

Balassa (1965) suggested the following of index of revealed comparative advantage ( $RCA_i$ ) in order to quantify the level of trade specialization of a country. For  $RCA > 1$ , it is said that there is a comparative advantage in the relevant sector. In other words, the share of that industry in the country's total exports is greater than its share in world trade. For  $RCA < 1$ , there is a comparative disadvantage in the relevant sector (Jain and Singh, 2009).

$$RCA_i = \left[ \left( \frac{X_{i,j}}{\sum X_j} \right) / \left( \frac{X_{i,w}}{\sum X_w} \right) \right],$$

$X_{i,j}$  = exports of good  $i$  by country  $j$ ,

$\sum X_j$  = total exports by country  $j$ ,

$X_{i,w}$  = world exports of good  $i$ ,

$\sum X_w$  = total world exports.

Another index used to determine the competitiveness of the wheat sectors is the Michaely index (Michaely, 1962). This index takes into account both export and import to identify sectors where a country has a comparative advantage. The Michaely index is formulated as follows:

$$MI_i = \left[ \left( \frac{E_i}{E} \right) - \left( \frac{I_i}{I} \right) \right],$$

$E_i$  = exports of commodity  $i$  of a country,

$I_i$  = imports of commodity  $i$  of a country,

$E$  = total exports by country,

$I$  = total imports by country.

The Michaely index takes a value between -1 and +1 and it shows the degree of specialization of exports or the lack of specialization in specific commodity groups. Positive MI index indicates a certain degree of specialization in a given commodity, if the index is negative, it indicates an insufficient pro-export specialization in a given commodity (Burianova, 2014).

The classification of agricultural commodities used in the study is the Harmonized Commodity Description and Coding System (HS). The HS codes for wheat and wheat flour are 1001 and 1101 respectively. The data used in this research is based on the euro and compiled from the trade database of the International Trade Centre. These data belong to the wheat sector of Hungary and Turkey and cover the ten-year period of 2009-2018.

## Findings

Implementing the methods developed by Balassa and Michaely, the present empirical analysis is based on the measurement of revealed comparative advantages. The two indices defined above are computed for comparison of Hungary's trade in wheat and wheat flour over the period 2009-2018 vis-a-vis Turkey.

Table 1. Wheat trade balance of Hungary by years (Euro thousand)

Years	Export	Import	Balance
2009	270.815	12.843	257.972
2010	354.701	21.288	333.413
2011	316.357	41.566	274.791
2012	348.172	42.099	306.073
2013	550.773	33.321	517.452
2014	481.284	33.754	447.530
2015	386.801	44.622	342.179
2016	445.288	42.230	403.058
2017	575.523	33.987	541.536
2018	411.490	38.506	372.984

Source: Author's own calculations, based on Intracen data.

Table 1 presents Hungary's wheat sector trade balance the last ten years for the commodities that are classified as HS 1001 (wheat) and HS 1101 (wheat flour). As seen from the table, there is an upward trend in Hungarian wheat exports in the monitored period. Despite occasional decreases in some years, wheat export volume increased 13 per cent compared with 2009, as well as total wheat export value went up 52 per cent, ensuring a positive trade balance. Majority of Hungary's wheat trade partners are other European Union countries such as Italy, Romania and Austria. Geographic proximity and constant demand from neighbouring countries play a significant role in the country's export route (ITC, 2019).

Table 2 demonstrates Turkey's wheat sector trade balance for the same products (HS 1001 and HS 1101). It can be seen from the table that the growth dynamics import value exceeded exports in some years and it resulted in a negative balance of the wheat trade. The growth dynamics of the value of exports seems to have a steady increase although the unstable balance in the relevant period. The table also proves the sector's import dependency. Therefore,

it can be said that besides internal factors, external factors such as fluctuation in world supplies and prices have a significant impact on Turkish wheat sector. The main export product of Turkish wheat sector is wheat flour (HS 1101) as it has a considerable share in the country's trade. The wheat flour sector has a considerable demand for imported raw material (mainly from Russia). Major destinations of export are the Middle Eastern countries such as Iraq and Syria (ITC, 2019). Same reasons like for Hungary, demand and geographic proximity of Middle Eastern countries are the basic determinants of export destinations.

Table 2. Wheat trade balance of Turkey by years (Euro thousand)

<b>Years</b>	<b>Export</b>	<b>Import</b>	<b>Balance</b>
2009	460.144	647.656	-187.512
2010	600.300	493.357	106.943
2011	642.089	1.165.342	-523.253
2012	680.411	875.583	-195.172
2013	772.383	970.733	-198.350
2014	727.170	1.164.154	-436.984
2015	910.816	995.352	-84.536
2016	984.454	825.538	158.916
2017	944.862	952.948	-8.086
2018	874.839	1.095.654	-220.815

Source: Author's own calculations, based on Intracen data.

The RCA values during the years from 2009 to 2018 have been determined for the sum of 2 groups of commodities: wheat and wheat flour, using data supplied by the International Trade Centre. The results are summarized in Table 3 and Table 4 for Hungary and Turkey respectively. Annual RCA indices were calculated and presented at the two-digit level (HS 1001 and HS 1101).

Table 3. RCA and Michaely indexes for Hungary

<b>Years</b>	<b>RCA Index</b>	<b>Michaely Index</b>
2009	1,57	0,0043
2010	2,04	0,0046
2011	1,35	0,0034
2012	1,48	0,0038
2013	2,34	0,0063
2014	2,08	0,0054
2015	1,65	0,0038
2016	1,88	0,0043
2017	2,32	0,0054
2018	1,63	0,0035

Source: Author's own calculations, based on Intracen data.

Table 3 presents compiled calculation results for Hungary by using Balassa index and Michaely index. It can be seen from the table that the RCA index of Hungary varied between 1.35 and 2.34 during this period. According to calculation results, it can be said that Hungary has revealed comparative advantage in wheat export according to Balassa's index (RCA>1). In regard to Michaely index, the country also considered as competitive (MI>0).

Table 4 shows the same calculations for Turkey. According to the RCA index, Turkish wheat sector has a competitive advantage in world markets. However, when import values were taken into account, the MI index was negative (which indicates a lower degree of specialization) for the years of 2009, 2011 and 2014.

Table 4. RCA and Michaely indexes for Turkey

Years	RCA Index	Michaely Index
2009	2,16	-0,0001
2010	2,87	0,0035
2011	2,26	-0,0001
2012	1,95	0,0010
2013	2,34	0,0016
2014	2,20	-0,0003
2015	2,67	0,0017
2016	2,97	0,0030
2017	2,76	0,0022
2018	2,60	0,0003

Source: Author's own calculations, based on Intracen data.

As an indicator of competitiveness, the higher the RCA index is, the higher the competitive advantage of the country. Therefore, as a result of index calculations for the wheat sector, both countries enjoy comparative advantages in the world market, however, in cross-comparison between two countries showed that Turkey seemed to have a higher comparative advantage than Hungary considering RCA index. For example in 2018 the relevant index was 2.60 for Turkey while it was 1.63 for Hungary. However, Michaely index comparison drew a totally different picture by highlighting Turkey's import based market structure. In regard to MI indices, Hungary has a higher degree of specialization vis-a-vis Turkey. Nonetheless, the results also suggest that it is important to take into account import values to see the competitiveness of import-dependent countries.

## Conclusion and Future Research

The analyses of specialization and comparative advantage of Hungarian and Turkish wheat and wheat flour export are presented in this article. These analyses used two different indices of revealed comparative advantage, which were calculated for the period from 2009 to 2018. According to the comparative advantages described in the Balassa index the quad classification level (HS 1001 and HS 1101), both countries in this sector have a

comparative advantage and competitiveness in world markets. However, cross-comparison between these two countries using Michaely index showed that Hungary is more competitive than Turkey.

The methods used in this study investigated whether a country has a comparative advantage in the export of a particular commodity or not. However, these methods do not explain which factors affect the competitiveness of a country. Natural resources, the productivity of the agricultural product, the structure of the sector and finally state policies, supports and interventions have an impact on the comparative advantage of a country in the trade of a particular commodity. Therefore, the results of this study formed the basis of further research on the determination of the main factors affecting the competitiveness of wheat markets in Hungary and Turkey.

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