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MIDDLE EAST: GEOGRAPHICAL ATTRACTION AND NET DEMAND FOR BRAZILIAN AGRICULTURAL EXPORTS

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ABSTRACT

This study evaluates the concentration of Brazilian agricultural exports to the Middle East. Products are defined according to the agricultural definition used by the World Trade Organization. The study uses the locational quotient (LQ), a time trend for measuring the growing Middle Eastern share on Brazilian agricultural exports, and the modified Hirschman-Herfindahl Index (mHHI) to identify the net demand from these markets for Brazilian agricultural products. The database was built specifically for this study and extends from 1989 to 2015. The results demonstrate growing Middle Eastern demand for Brazilian agricultural exports. Specific product groups dominated this process, however, namely animal or vegetable fats and oils, meat preparations thereof, dairy products, live animals, sugars and sugar confectionery, cereals, and meat and edible meat offal. Lastly, the study offers suggestions for improvements in Middle Eastern market access and further investigations, mainly of groups of products with promising potential in Middle Eastern countries.

Keywords: Agriculture; Exports; Middle East; Brazil.

RESUMO

O estudo avalia a concentração das exportações agropecuárias brasileiras com destino Oriente Médio. A definição de produto agropecuário é a da Organização Mundial do Comércio e empregaram-se o Quociente Locacional (QL), a estimativa de tendência temporal para medir o crescimento do Oriente Médio nas exportações agropecuárias brasileiras, e o índice de Hirschman-Herfindahl modificado. A base de dados foi construída especificamente com este objetivo e abrange o período 1989-2015. Os resultados mostram um aumento de atração dos produtos agropecuários brasileiros ao redor dos mercados do Médio Oriente. Todavia, neste processo determinados produtos tiveram participação dominante em termos de demanda líquida naqueles mercados, isto é, óleos animais ou vegetais, preparações de carnes, leite e laticínios, animais vivos, açúcares e confeitaria, cereais, e carnes e miudezas. Por fim, são feitas observações para melhoria de acesso àqueles países e sugeridas futuras análises, sobretudo para os produtos agropecuários com potencial promissor nos mercados do Oriente Médio.

Palavras-chave: Agricultura; Exportações; Oriente Médio; Brasil.

JEL Code: F13, Q17.

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INTRODUCTION

The Brazilian economy struggles against structural restrictions on steady growth, mainly constraints on productivity gains (BONELLI and FONTES, 2013) and institutional weaknesses. Conjectural forces and new specific limitations are further structural restrictions.

Amid this scenario, Brazilian agriculture (understood here as farm plus livestock products and processed items) has transformed the country into a global agricultural exporter. Nowadays, Brazil is the third leading agricultural exporter worldwide, responsible for 4.8% of global agricultural exports in 2016 (WTO, 2018a). Agricultural products accounted for around 30% of Brazilian export revenues between 1989 and 2015, as shown in Figure 1.

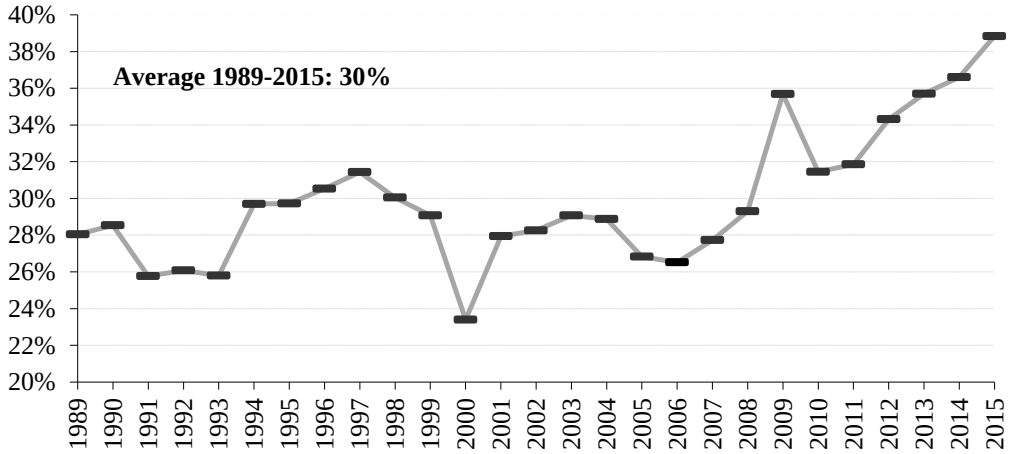

Figure 1. Share of agricultural products in Brazilian exports (US$) from 1989 to 2015

Source: The author, based on MDIC (2016).

This capacity to generate dollars through exports is as important as the capacity to save dollars by replacing imported items with domestic products (BONELLI and MALAN, 1976).

At the same time, the agricultural sector has met increasing domestic demand for food in Brazil, boosting positive sectorial trade balances throughout the entire 1989–2015 period and acting to reduce local inflation rates (BCB, 2018). Mostly in years of low domestic economic growth, these positive sectorial trade balances have been essential to Brazil's macroeconomic stability by counteracting the negative net balance from Brazil's non-agricultural trade.

Brazil is also one of the largest sources of food exports to international markets. OECD/FAO (2014) forecasted that Brazil would supply increasing shares of meat and sugar in international trade in the near future. Other analysts (CÂMARA *et al.*, 2015; FREITAS and MENDONÇA, 2016) also have shown that Brazil is one of the few countries with the capacity to expand its areas of agricultural activities.

In this context, new partners such as China, India, Russia, and the Middle East have acquired increasing volumes of Brazilian agricultural products. Several studies have explored why the Middle East has become a significant source of demand for agricultural products.

Middle East mainly comprises agricultural importing countries, even though some countries have agricultural areas and suitable technology. Today Middle East share in Brazilian agricultural exports is around 10%. The Middle East is also a region that concentrates famine populations (FAO, 2010), suggesting high potential in terms of food demand and imports. This region is growing in the world dairy market (SANTO, 2010), and more imports from Brazilian agricultural cooperatives are heading to countries such as the United Arab Emirates, especially from 2008 onward (SIMÃO and CAMPOS, 2011).

In terms of both present and prospective explanations, Santo, Lima, and Souza (2012) feature Iran, United Arab Emirates and Saudi Arabia among Brazil's main partners for agricultural exports. United Arab Emirates is strongly dependent on food imports (MAPA, 2018a) as are several other Middle Eastern countries, and it works as a regional trade hub for receiving Middle East agricultural imports. Iran and Yemen are also highlighted as markets for Brazilian agricultural exports, both at present and at regarding potential for the future (MAPA, 2018b, 2018c).

Against this backdrop, the goal of this article is to measure the share of Brazilian agricultural exports to Middle Eastern countries, and the net demand associated with these trading partners. A secondary objective is to evaluate which agricultural products these partners demand most, based on Brazil's profile as an agricultural exporter.

This effort can provide information about strategies to enhance and deepen access to Middle Eastern food markets, to achieve a better and more diversified profile of Brazil's global agricultural exports. Since traditional markets as United States and European Union are reducing their share in Brazilian agricultural exports, it is crucial a better understanding about potential exports to complementary partners, and Middle East countries can qualify.

METHODOLOGY AND DATABASE

This study employed Brazilian export data from MDIC (2016) spanning 1989 to 2015. This time interval was evaluated because it comprises all years of stable and publicly available data on Brazilian trade. The agricultural product definitions are taken from the Agricultural Agreement, which is the GATT result of the Uruguay Round and provides rules on market access, special safeguard provisions, domestic support commitments, subsidy commitments, and sanitary and phytosanitary measures (WTO, 2011).

The respective Harmonized System codes are presented in Table 1 and the corresponding Harmonized System (HS) tariff lines are taken in six- or eight-digit level.

Table 1. Harmonized System (HS) codes from the Agricultural Agreement

HS Chapter	Item
1 and 2	All
4 to 24	All (except fish and their preparations)
29	2905.43 and 2905.44
33	33.01
35	35.01 to 35.05
38	3809.10 and 3823.60
41	41.01 to 41.03
43	43.01
50	50.01 to 50.03
51	51.01 to 51.03
52	52.01 to 52.03
53	53.01 and 53.02

Source: The author, based on WTO (2011).

Methodological harmonization was performed as established in MDIC (2012) to use the codes from the Brazilian Product Classification (1989-1996) and the Mercosur Common Nomenclature (1996-2015). The Brazilian Product Classification complies with the Agricultural Agreement at six or eight digit levels. At the same time, the Mercosur Common Nomenclature harmonized according to MDIC (2012) is equivalent to the Brazilian Product Classification, so it also complies with the Agricultural Agreement.

In this study Middle East region comprises Saudi Arabia, Bahrain, Qatar, Kuwait, Dubai, the United Arab Emirates, Yemen, Democratic Yemen, Iraq, Iran, Israel, Jordan, Lebanon, Oman, Palestine and Syria. This group of countries comprises nations labeled as Middle East by the Brazilian Ministry of Development, Industry and Commerce. This is assumed to be a representative set of Middle Eastern countries since it includes traditional Brazilian partners like Saudi Arabia and the United Arab Emirates, as well their main neighbors.

The methodology utilized three different tools: locational quotient (LQ), analysis of variance (ANOVA) and LQ time trend, and the modified Hirschman-Herfindahl Index (mHHI), as detailed in the following subsections 2.1, 2.2, and 2.3.

Locational Quotient (LQ)

The first stage of the methodological approach utilized LQ. Freitas (2016a) applied this method to analyze Brazilian agricultural exports to American markets. This tool has also been used in studies extending beyond agricultural analyses, for example in investigations of regional specialization in China (LU, FLEGGB and DENGE, 2011), industrial reallocations (RUAN and ZHANG, 2014), and high-tech concentrations (DEVEREUX, GRIFFITH and SIMPSON, 2004).

LQ is useful for assessing whether a group of products mainly goes to certain regions; in other words, if one specific partner is relatively more important for agricultural exports than for all exports. According to Haddad (1989), LQ is defined by the following equation, for each group *i* of Brazilian agricultural exports:

$$LQ_{ij} = \left(X_{ij} / X_{i*}\right) / \left(X_{*j} / X_{**}\right) \quad (1)$$

where:

X_{ij} = HS_i Brazilian agricultural exports to *j*; *j*: Middle Eastern countries;

X_{i*} = HS_i Brazilian agricultural exports worldwide;

X_{*j} = Brazilian exports to *j*; *j*: Middle Eastern countries;

X_{**} = Brazilian exports worldwide.

- $\left(X_{ij} / X_{i*}\right)$ = $country_j$ relative importance in HS_i Brazilian agricultural exports;

- $\left(X_{*j} / X_{**}\right)$ = $country_j$ relative importance in Brazilian exports.

HS_i comprises the groups of agricultural products identified in the Agricultural Agreement (WTO, 2011), such as live animals (HS01); meat and edible meat offal (HS02); dairy products (HS04); other animal originated products (HS05); trees and other plants, live; bulbs, roots (HS06); edible vegetables and roots and tubers (HS07); fruits (HS08); coffee, tea, mate and spices (HS09); cereals (HS10); and so on.

LQ can assume zero or any positive value. In dealing with major commercial partners, the next step is to organize them by decreasing LQ for a chosen variable (HS_i share in Brazilian agricultural exports, for example). This will allow the product groups to be ranked in terms of importance in the included import markets.

Therefore, LQ will indicate whether the relative importance of Middle East is bigger for a HS_i group than for all Brazilian exports. It permits selecting groups of products for which the Middle East is relatively more important than for the entire set of items exported by Brazil.

ANOVA

A second approach is to evaluate the LQ time trend. Here, the ANOVA table allows the F-test to be used (SARTORIS, 2003; BARRETO and HOWLAND, 2006; FÁVERO *et al*., 2009). In this case, the F-test evaluates the hypothesis according to which there is no time trend for the LQ series. This stage allows measuring whether the concentration (or deconcentration) of Brazilian agricultural exports to Middle Eastern countries is time-consistent, if it exists.

Simple linear regression is used as an initial approach, in which time (T) is the explanatory variable of the LQ series, in line with Equation 2. In

Equation 2, the u_t term is defined based on classic assumptions about the residuals in simple linear regression models.

$$LQ_t = \beta_0 + \beta_1.T + u_t \quad (2)$$

The approach using a simple linear form allows new questions to be asked for better understanding of Middle East's share in Brazilian agricultural exports. An extension of the single linear model is the multiple regression model as described in Greene (2000), which can be applied for further analysis of Brazilian agricultural exports to specific partners.

From Equation 2, according to Sartoris (2003) and Barreto and Howland (2006), it is possible to split the total sum of squares (TSS) into the explained sum of squares (ESS) and the residual sum of squares (RSS), which are expressed in terms of each point series by Equation 3. In that equation, lq_m is the sample mean of the LQ series and lq_{est} is the estimated LQ for every point of the series according to single linear regression:

$$\text{TSS} = \text{ESS} + \text{RSS} = \sum_{t=1}^{T}(lq_t - lq_m)^2 = \sum_{t=1}^{T}(lq_{est} - lq_m)^2 + \sum_{t=1}^{T}(e_{est})^2 \quad (3)$$

This allows investigating the sources of variation and the degrees of freedom contained in each term of Equation 3, and permits calculation of the ANOVA (Table 2), from which the F-test is used to evaluate the statistical significance of the coefficients described in Equation 2.

Table 2. Analysis of variance (ANOVA)

Source (A)	Degrees of freedom (B)	Mean square = (A)/(B)	F-test (F_t)
ESS	1	ESS/1 = MSE	F_t = MSE/MSR
RSS	(n-2)	RSS/(n-2) = MSR	
TSS	(n-1)	TSS/(n-1)	

Source: The author, based on Sartoris (2003) and Barreto and Howland (2006).

Modified Hirschman-Herfindahl Index

The third methodological approach is to apply the modified Hirschman-Herfindahl Index (mHHI) based on Crocco *et al.* (2006). Here this index states the net effect specifically resulting from the agricultural products in the context of total Brazilian exports to Middle Eastern countries. Equation 4 calculates the mHHI.

$$mHHI_{ij} = (X_{ij}/X_{i*}) - (X_{*j}/X_{**}) \quad (4)$$

The relative importance of a country *j* for HS_i group of Brazilian agricultural exports is discounted by the relative importance of the same country *j* for all Brazilian (agricultural and non-agricultural) products exported.

This approach partially overcomes a limitation of the LQ, namely that it does not specify the level of economic diversity of Brazilian agricultural products exported to each partner. Therefore, the mHHI summarizes the net effects (associated with a surplus resulting from agricultural products) of the trade in question. It offers new information about how much a

specific partner demands (in net terms) for a HS_i group of Brazilian agricultural exports.

Moreover, all the results are evaluated with regard to tariffs imposed by Middle Eastern countries on Brazilian agricultural exports. According to the World Bank (2018), Saudi Arabia, United Arab Emirates and Israel accounted for 54% of the 2016 GDP (constant 2010 US$) of all Middle Eastern partners in the study.

So, since the Middle East countries (except for Israel) do not participate in bilateral trade arrangements with Brazil, it was analyzed the MFN tariff data from Saudi Arabia and United Arab Emirates, available from WTO (2016a, 2016b), while the Israeli data (WTO, 2012) encompass a Preferential Agreement between Mercosur and Israel. The study employs the MFN concept because Brazil only has effective bilateral agreements with Israel, and lacks similar protocols with all the other Middle Eastern countries evaluated here (MDIC, 2018).

RESULTS AND DISCUSSION

It is important to note that the calculation of LQ was based on the Brazilian profile of US$ agricultural exports in terms of HS_i share in mean values from 1989 to 2015, as described in Table 3. Consequently, the results are associated with this profile.

Table 3. Group share in Brazilian agricultural export profile, mean values, 1989–2015

Product group (HS_i)	% share
Oil seeds and oleaginous fruits (12)	16.09%
Meat and edible meat offal (02)	14.01%
Food industries, residues and wastes thereof (23)	12.97%
Sugars and sugar confectionery (17)	11.96%
Coffee, tea, mate and spices (09)	11.04%
Preparations of vegetables, fruit or nuts (20)	6.93%
Tobacco and manufactured (24)	6.39%
Animal or vegetable fats and oils (15)	4.58%
Meat preparations thereof (16)	2.40%
Cereals (10)	2.32%
Miscellaneous edible preparations (21)	2.25%
Fruits (08)	1.93%
Beverages, spirits and vinegar (22)	1.73%
Cocoa and cocoa preparations (18)	1.50%
Other agricultural products (several HS_i groups)*	3,89%

Note: *Other agricultural products: products with less than 1% share individually.
Source: The author, based on MDIC (2016).

Brazilian agricultural exports to the Middle East

Figure 2 highlights the relevance of the Middle East for Brazilian exports, and identifies different paths for agricultural and non-agricultural exports. Both product baskets had almost the same share in Brazilian exports during the late 1980s, approximately 4–5%. From that time onward, the Middle East's share of Brazilian agricultural exports grew significantly, and that region now accounts for 10% of Brazilian agricultural exports, twice the original level.

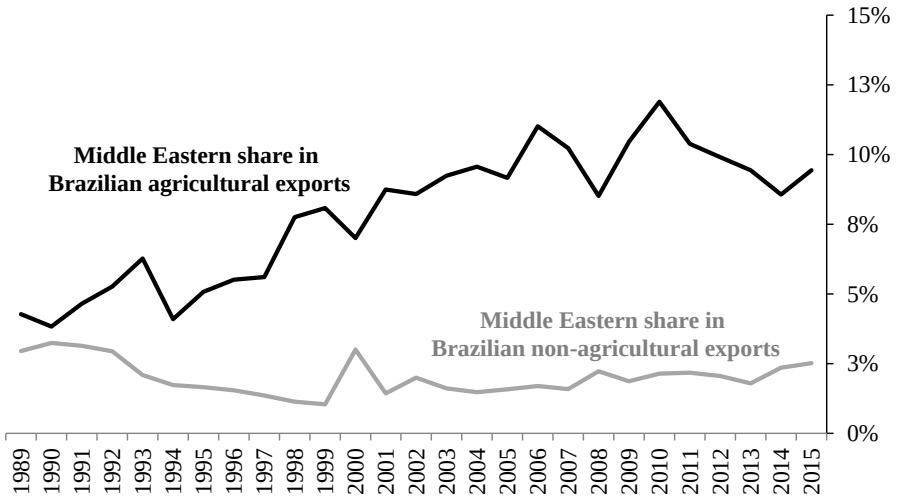

Figure 2. Relevance of Middle East for Brazilian exports, 1989–2015

Source: The author, based on MDIC (2016).

Meanwhile, the Middle Eastern share in Brazilian non-agricultural exports dropped to 3%, probably related to Middle East demand profile focused on food products and to the presence of tough competition and logistic advantage of the European Union in non-agricultural items (WTO; 2018a, 2018b).

This performance of the Middle East in Brazilian agricultural exports has a positive time trend, as shown in Figure 3. Even so, the time trend must be tested in statistical terms, which is done using the F-test. The ANOVA procedure resulted in an F-test score of 76.86, which indicates a meaningful time trend at 1% significance level.

In general, this trend can be associated with water shortage in that region (IGLESIAS, QUIROGA and DIZ, 2011) and with a strong agricultural demand by Saudi Arabia (FAVRO *et al*., 2015; MAPA, 2018d) and United Arab Emirates (MAPA, 2018a). Limitations in agricultural area have also made the Middle Eastern countries food importers.

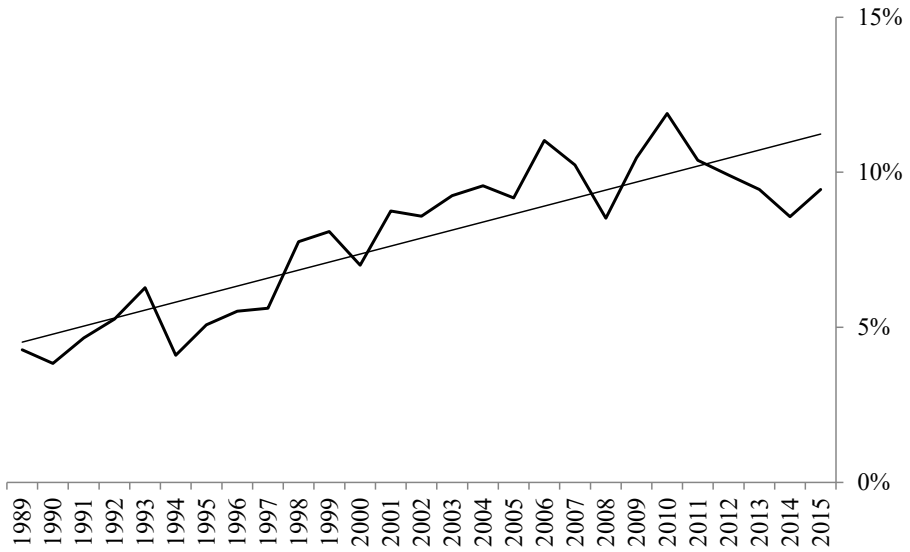

Figure 3. Middle Eastern time trend in Brazilian agricultural exports, 1989–2015

Source: The author, based on MDIC (2016).

LQ for product HS_i groups in Middle East

As established in the methodology section, LQ detects the agricultural product groups for which the Middle East represents intense demand. Table 4 illustrates average LQ levels for selected time periods, namely 1989–2015 (long term), 1989–1994 (before the establishment of Brazil's present currency, the Real - R$), 1994–2008 (from the introduction of the Real to the global crisis spreading from the United States), and 2008–2015 (from the global crisis onward). Since 2008–2015 is most recent, the results are ranked conforming to this period.

Table 4 breaks down three basic arguments for further discussion. Initially, the LQ for four product groups exceeded unity for all selected time periods: meat and edible meat offal, sugars and sugar confectionery, meat preparations thereof, and animal or vegetable fats and oils. Cereals, live animals, and dairy products also comprise the leading LQ group, even though they had poor results during 1989–1994. For such seven groups of products, the Middle East region is relatively more important for agricultural exports than for all Brazilian exports.

These product groups are concentrated in protein items. Future sales growth depends on the competitive strength of other competing suppliers and potential bilateral agreements between Brazil-Mercosur and Middle Eastern economies. Guimarães and Zeidan (2010) described beneficial aspects of a bilateral agreement between Mercosur and Middle Eastern countries in the context of meat products and fruits, especially better access to those internal markets through preferential tariff lines that can be established by a bilateral agreement.

Table 4. Average LQ for groups of products during selected time periods, 1989–2015

Product group (HS)	1989-2015	1989-1994	1994-2008	2008-2015
Meat and edible meat offal (02)	6.90	9.51	6.90	5.21
Cereals (10)	3.23	0.60	3.59	4.03
Sugars and sugar confectionery (17)	4.65	3.91	5.19	3.98
Live animals (01)	2.94	0.00	3.88	3.19
Dairy products (04)	1.42	0.56	1.01	2.85
Meat preparations thereof (16)	1.28	1.11	1.41	1.17
Animal or vegetable fats and oils (15)	4.88	4.89	6.60	1.02
Food industries, residues and wastes (23)	0.74	0.24	0.87	0.84
Albuminoidal substances (35)	0.50	0.09	0.53	0.75
Miscellaneous edible preparations (21)	0.35	0.32	0.17	0.67
Coffee, tea, mate and spices (09)	0.79	0.72	0.96	0.58
Lac; gums, and plant resins (13)	0.29	0.02	0.28	0.51
Fruits (08)	0.49	0.54	0.49	0.46
Tobacco and manufactured (24)	0.27	0.21	0.21	0.43
Preparations of cereals, flour, or milk (19)	0.34	0.15	0.40	0.35
Oil seeds and oleaginous fruits (12)	0.38	0.00	0.56	0.26
Raw hides, skins and leather (41)	0.14	0.00	0.15	0.25
Essential oils and resinoids (33)	0.23	0.17	0.25	0.24
Other animal originated products (05)	0.10	0.06	0.07	0.24
Preparations of vegetables, fruit, nuts (20)	0.17	0.14	0.16	0.22
Vegetable plaiting materials (14)	0.43	0.00	0.75	0.19
Beverages, spirits and vinegar (22)	0.07	0.01	0.03	0.17
Cocoa and cocoa preparations (18)	0.14	0.05	0.18	0.13
Edible vegetables and roots and tubers (07)	0.05	0.00	0.04	0.10
Cotton (52)	0.04	0.01	0.06	0.06
Products of the milling industry (11)	0.04	0.00	0.06	0.04
Other vegetable textile fibers (53)	0.00	0.00	0.00	0.00
Trees and other plants, live; roots (06)	0.01	0.00	0.02	0.00
Wool, fine or coarse animal hair (51)	0.00	0.00	0.00	0.00
Silk (50)	0.00	0.00	0.00	0.00
Organic chemical products (29)	0.02	0.06	0.01	0.00
Diverse chemical products (38)	0.00	0.00	0.00	0.00
Fur skins, artificial fur (43)	NA	NA	NA	0.00
Pharmaceutical products (30)	NA	NA	NA	NA

NA: not available.
Source: The author, based on MDIC (2016).

Product groups with LQ ranging from 0.50 to 1.00 have the potential for improved sales in Middle Eastern markets. This product basket comprises food industries, residues and wastes thereof; albuminoidal substances; miscellaneous edible preparations; coffee, tea, mate and spices; lac, gums, and plant resins; and fruits. Aguiar and Matsuoka (2016) pointed out strong Middle Eastern demand for soybeans products, and coffee is a product

highlighted as a potential item for some major Middle Eastern markets, like United Arab Emirates (MAPA, 2018a).

Figure 4 presents another perspective, measuring the Middle Eastern LQ for the main product groups among Brazilian agricultural exports.

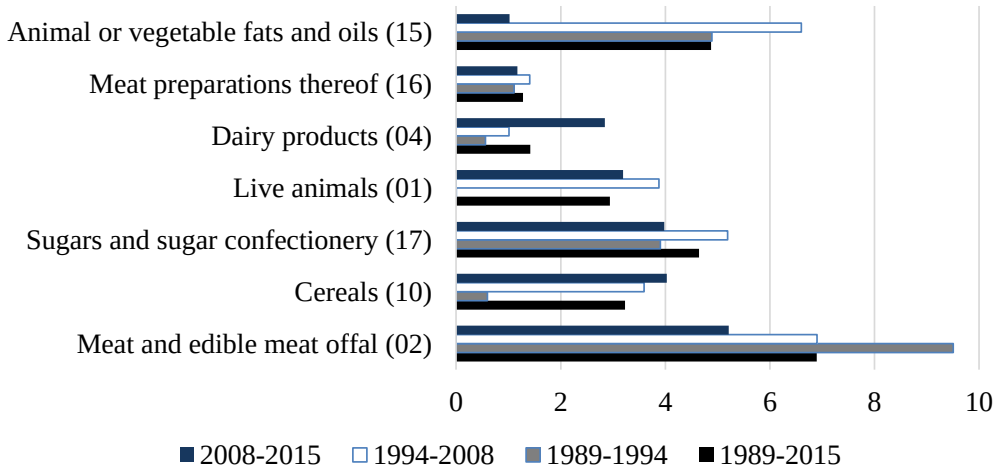

Figure 4. Middle Eastern LQs, main groups of Brazilian agricultural exports, 1989–2015

Source: The author, based on MDIC (2016).

Meat and edible meat offal had impressive performance in 1989–1994, while animal or vegetable fats and oils, live animals, and sugars and sugar confectionery had higher LQs during 1994–2008. For cereals and dairy products, more intense relative demand came from the Middle East during 2008–2015, which combines with increasing corn acquisition by Iran (MAPA, 2018b), Saudi Arabia (FAVRO *et al*., 2015) and Yemen (MAPA, 2018c) in recent years.

The next step analyzes net demand from the Middle East for Brazilian agricultural products using the modified Hirschman-Herfindahl Index, which allows comparing the different product group results for distinct periods of time within 1989–2015.

Modified Hirschman-Herfindahl Index

Table 5 shows the mean mHHI for the Middle East, measured between 1989 and 2015. The results yield a number of notable numbers and discussion points.

Table 5. Average mHHi for groups of products during selected periods, 1989–2015

Product group (HS)	1989-2015	1989-1994	1994-2008	2008-2015
Meat and edible meat offal (02)	0.207	0.273	0.183	0.201
Cereals (10)	0.094	-0.012	0.099	0.146
Sugars and sugar confectionery (17)	0.132	0.095	0.138	0.141
Live animals (01)	0.084	-0.032	0.117	0.103
Dairy products (04)	0.023	-0.014	0.004	0.088
Meat preparations thereof (16)	0.010	0.003	0.014	0.008
Animal or vegetable fats and oils (15)	0.129	0.128	0.185	0.000
Food industries, residues and wastes (23)	-0.008	-0.024	-0.002	-0.008
Albuminoidal substances (35)	-0.017	-0.030	-0.015	-0.012
Miscellaneous edible preparations (21)	-0.023	-0.022	-0.027	-0.016
Coffee, tea, mate and spices (09)	-0.010	-0.010	-0.003	-0.020
Lac; gums, and plant resins (13)	-0.025	-0.032	-0.023	-0.024
Fruits (08)	-0.020	-0.015	-0.018	-0.026
Tobacco and manufactured (24)	-0.027	-0.026	-0.026	-0.027
Preparations of cereals, flour, or milk (19)	-0.024	-0.027	-0.019	-0.031
Oil seeds and oleaginous fruits (12)	-0.023	-0.032	-0.013	-0.035
Essential oils and resinoids (33)	-0.029	-0.027	-0.025	-0.036
Raw hides, skins and leather (41)	-0.032	-0.032	-0.029	-0.036
Other animal originated products (05)	-0.033	-0.030	-0.031	-0.037
Preparations of vegetables, fruit, nuts (20)	-0.031	-0.028	-0.027	-0.037
Vegetable plaiting materials (14)	-0.022	-0.032	-0.007	-0.040
Beverages, spirits and vinegar (22)	-0.035	-0.032	-0.032	-0.040
Cocoa and cocoa preparations (18)	-0.032	-0.031	-0.028	-0.041
Edible vegetables, roots and tubers (07)	-0.035	-0.032	-0.032	-0.043
Cotton (52)	-0.036	-0.032	-0.031	-0.045
Products of the milling industry (11)	-0.036	-0.032	-0.031	-0.046
Other vegetable textile fibers (53)	-0.037	-0.032	-0.033	-0.048
Trees and other plants, live; roots (06)	-0.037	-0.032	-0.033	-0.048
Wool, fine or coarse animal hair (51)	-0.037	-0.032	-0.033	-0.048
Silk (50)	-0.037	-0.032	-0.033	-0.048
Diverse chemical products (38)	-0.037	-0.032	-0.033	-0.048
Fur skins, artificial fur; (43)	-0.039	-0.035	-0.035	-0.048
Organic chemical products (29)	-0.037	-0.030	-0.033	-0.049
Pharmaceutical products (30)	-0.034	-0.034	NA	NA

NA: not available.
Source: The author, based on MDIC (2016).

Initially according to Table 5, only four product groups yielded a positive mHHI for any verified time interval (meat and edible meat offal, sugars and sugar confectionery, meat preparations thereof, and animal or vegetable fats and oils). This shows very specific kind of agricultural exports to the Middle East, since it is remarkable that meat-based products (poultry and bovine mainly) and sugars (MAPA; 2018a, 2018b; 2018d) represent a fundamental core of Middle Eastern demand for Brazilian agricultural exports.

In meat markets, partial or total non-tariff barriers still exist on bovine meat exported to Saudi Arabia, Kuwait, Lebanon, Oman, Qatar, and Bahrain, which indicates the existence of some space for the respective trade negotiations (FLORINDO, DE MEDEIROS and MAUAD, 2015). At the same time, according to Freitas (2016b) meat-based products and sugars are among the most competitive Brazilian agricultural exports.

A second notable point is that mHHI values for cereals, live animals, and dairy products were negative for the 1989–1994 period. In this respect, the Middle East region´s economic growth rates are candidates to explain seasonal agricultural demands by the evaluated countries in future studies as well further investigations concerning the possible impacts of exchange rates against former Brazilian currencies (prior to the Real) on some groups of Brazilian agricultural exports.

Complementarily, it is important to measure the level of positive mHHI occurrence among the product groups. This information highlights how persistent the positive mHHI was for any product group, and is presented in Figure 5.

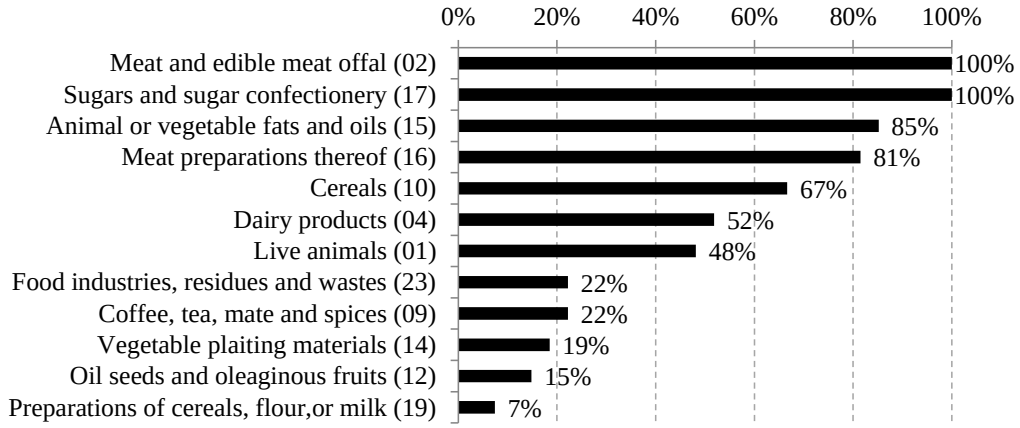

Figure 5. Positive mHHI occurrence from the Middle East, main product groups, Brazilian agricultural exports, 1989–2015

Source: The author, based on MDIC (2016).

Three sets of product groups deserve attention in terms of positive mHHI. The first set is composed of meat and edible meat offal, sugars and sugar confectionery, animal or vegetable fats and oils, and meat preparations thereof. In these product groups, mHHI was positive for at least 81% of the 1989–2015 period.

Cereals, dairy products, and live animals form a second product set with positive mHHI for at least 48% of the 1989–2015 period, although these positive results were not as intense in comparison with the first set of products. These products are probably subject to seasonal factors affecting Brazilian agricultural exports to Middle Eastern countries, which could be the subject of further analysis, in terms of improving Brazilian agricultural access in those markets.

Finally, the third set of product groups includes food industries, residues and wastes thereof; coffee, tea, mate and spices; vegetable plaiting materials; oil seeds and oleaginous fruits; and preparations of cereals, flour, or milk. This set of product groups includes basic items and processed goods, and includes products which require greater Brazilian access to Middle East markets in order to assure higher buying potential from these partners in the near future.

It is important to include alongside these results information about the Most Favored Nation (MFN) tariffs imposed by Middle Eastern countries on Brazilian agricultural exports. The corresponding tariff set can help to understand the pattern of product groups demanded by Middle East countries according to the results presented.

Table 6 illustrates the MFN tariffs imposed by the three major Middle Eastern commercial partners on Brazilian agricultural exports (Saudi Arabia in 2015, United Arab Emirates in 2015, and Israel in 2012). These tariff lines correspond to the latest available information for each country (WTO, 2018b) until the last version of this study.

Table 6. Average MFN tariffs imposed by Saudi Arabia, United Arab Emirates, and Israel on Brazilian agricultural exports

Product group	Saudi Arabia	United Arab Emirates	Israel
WTO agriculture	5.8%	5.5%	24.5%
Animals and products thereof	3.5%	2.7%	42.3%
Dairy products	5.0%	5.0%	109.9%
Fruit, vegetables and plants	4.0%	3.7%	35.2%
Coffee and tea	5.3%	3.6%	1.4%
Cereals and preparations	3.9%	3.5%	13.5%
Oil seeds, fats, oils and their products	4.8%	4.8%	6.6%
Sugars and confectionery	3.9%	3.3%	3.8%
Beverages, spirits and tobacco	32.9%	32.9%	15.3%
Cotton	5.0%	5.0%	0.0%
Other agricultural products	4.2%	4.2%	4.8%

Source: The author, based on WTO (2012, 2016a, 2016b).

The average MFN tariffs imposed by Israel on agricultural imports are higher than those imposed by Saudi Arabia and United Arab Emirates. This is the case for the WTO set of agricultural products as well as for specific product groups like animals and products thereof, fruit, vegetables and plants, cereals and preparations, and especially dairy products. For food security reasons, the Israeli government has a strong regulatory role, particularly in the dairy and egg sectors (WTO, 2012). Specifically, dairy products, animals, and products thereof are protected in the Israeli market.

At the same time, Saudi Arabia and United Arab Emirates have similar agricultural tariff schedules, but clearly focus on protecting the markets for beverages, spirits, and tobacco, which include imports which are prohibited

or restricted due to religious concerns. Therefore, these groups of products deserve particular attention in further bilateral agreements between Brazil/Mercosur and Middle Eastern countries, also because United Arab Emirates functions as a trade hub in the region. According to MAPA (2018a, 2018b), there are no specific bilateral trade agreements comprising Mercosur and set of Middle Eastern nations.

Also important is the duty-free percentage of tariff lines in United Arab Emirates and Israel, and Israel´s share of *non-ad valorer* tariffs, which are shown in Table 7.

Table 7. Percentage of Duty-Free Tariff Lines (DFTL) in United Arab Emirates (UAE) and Israel and Israel´s share of non-ad valorem tariffs

Product group	UAE (DFTL %)	Israel (DFTL %)	Israel (Share of *non-ad valorem* tariffs)
WTO agriculture	22.3%	32.3%	24.2%
Animals and products thereof	40.1%	28.0%	36.3%
Dairy products	0.0%	6.8%	15.9%
Fruit, vegetables and plants	25.3%	16.3%	35.7%
Coffee and tea	26.3%	81.1%	5.4%
Cereals and preparations	29.9%	33.6%	23.2%
Oil seeds, fats, oils	4.0%	39.9%	11.5%
Sugars and confectionery	32.5%	60.7%	32.1%
Beverages, spirits and tobacco	1.2%	23.9%	23.1%
Cotton	0.0%	100.0%	0.0%
Other agricultural products	15.5%	60.0%	5.5%

Source: The author, based on WTO (2012, 2016a).

According to WTO (2012), many Israeli agricultural tariffs are fairly complex and non-transparent since they are compound or mixed duties and there are bans on imports of non-kosher meat and meat products (Kosher Meat Import Law of 1994), which were extended to tobacco and manufactured tobacco substitutes.

The duty-free percentage of agriculture lines is more notable in the Israeli tariff schedules, for the WTO agricultural set of products as well as for several product groups. Exceptions exist in the context of meat and edible meat offal, and meat preparations thereof (WTO, 2012). In these product groups, Kosher requirements apply, which means that several types of import prohibitions or restrictions apply, based on religious aspects. Moreover, Israel signed a bilateral agreement with Mercosur containing 103 agricultural concessions (MDIC, 2018). The agreement was signed in April 2010 and was internalized by Decree 7,159 of 2010.

These 103 concessions represent 18% of Israel´s tariff concessions and are concentrated in dairy products (26 items), preparations of cereals, flour, starch or milk (17 items), animal or vegetable fats and oils (10 items), meat and edible meat offal (9 items), preparations of vegetables, fruit or nuts (9

items), and fruits (8 items). Some of these products (animals and products thereof and fruit, vegetables and plants) match the product groups highly affected by *non-ad valorem* tariffs, which represents some relief in terms of Israeli market access.

Meanwhile, in United Arab Emirates the duty-free percentage of agricultural lines is notably low for dairy products, oil seeds, fats and oils and their products, beverages, spirits and tobacco, and cotton. Future negotiations should include specific proposals for these products in terms of access to the UAE market.

Even so, specific characteristics of any import schedule must be observed. According to WTO (2012, 2016a, 2016b), there are singularities and complexities involved in United Arab Emirates, Kingdom of Saudi Arabia, and in Israel`s access structure.

In Saudi Arabia (WTO, 2016b), alcoholic beverages, pork, and pork-related products are banned on religious grounds; an import-licensing regime applies to dates and date palm seedlings, preparations for animal forage, live animals and birds, and plants for planting. Saudi Arabia also has strict marketing and labeling requirements for meat and poultry products, including that the animal was slaughtered in accordance with Islamic Halal procedures. The country has bilateral arrangements on sanitary and phytosanitary matters with Brazil and all imports of food and animal products for human consumption require permits.

For United Arab Emirates (WTO, 2016a), peak tariffs concentrate on beverages, spirits, and tobacco, and specific tariffs apply to tobacco products. Import restrictions also include several agricultural tariff lines, specifically pork and poultry meat and preparations, beverages and spirits, and tobacco products. Most of the sanitary and phytosanitary requirements in United Arab Emirates are related to poultry products or live sheep and goats and their products, and all live animals and animal products and fodder require import permits prior to importation.

Israel, in turn, has a free trade agreement with Mercosur. The relative importance of commerce via free trade agreements, however, has steadily declined because of the growing importance of trade with Asian countries. Moreover, Israel made considerable progress in terms of aligning its technical regulations and food standards with mandatory standards for international, regional or foreign origin (WTO, 2012), and the SPS notifications[1] are related to aligning Israel's phytosanitary import requirements with international standards.

[1] SPS notifications refer to transparency obligations requiring member governments to report trade measures dealing with food safety and animal and plant health to the relevant WTO body if the measures might have an effect on other members (WTO, 2018c). These notifications inform the standards of safety a country consider appropriated for its consumers and its trade partners must accomplish them. For avoiding their use as an excuse for protecting domestic producers, it is required having them based on international standards as the WTO ones.

FINAL REMARKS

This study investigated the role played by Middle East countries in attracting Brazilian agricultural exports. It also detailed the groups of products demanded the most by this region. The data spanned the period from 1989 to 2015, and they must be taken accordingly, that is, subordinated by the corresponding macroeconomic events.

The Middle East's share in Brazilian agricultural exports increased significantly, and reached 10% of Brazilian agricultural exports, doubling its share in three decades.

The study highlights product groups exported to Middle Eastern markets. The first set of products had higher LQ than unity for all selected time periods, and primarily are protein items. These sales can be improved, depending on bilateral agreements between Brazil-Mercosur and Middle Eastern economies. A second list features goods with potential for increased exports to Middle Eastern markets.

The mHHI results and the LQ findings identified the main groups of products in terms of net demand from the Middle East for Brazilian agricultural products. The highest net demand is for Brazilian meat and edible meat offal, cereals, sugars and sugar confectionery, live animals, dairy products, meat preparations thereof, and animal or vegetable fats and oils.

In terms of local access for agricultural products, trade policies in the Middle East cannot be neglected. The largest regional economies feature several restrictions related to meat (mostly poultry and pork) and preparations, dairy products, beverages and spirits, tobacco products, and even sugar, based on religious grounds or established by sanitary regulations.

There is a bilateral agreement between Mercosur and Israel, which eased tariff restrictions on agricultural products in the Israeli market. The deepening of such instrument could boost Brazilian agricultural access to this country; at the same time, similar agreements could be beneficial for easier access to all Middle Eastern countries.

If new arrangements of this type are possible, products like protein items, food industries, residues and wastes thereof; albuminoidal substances; miscellaneous edible preparations; coffee, tea, mate and spices; lac gums, plant resins; and fruits are natural candidates for future preferential access to Middle Eastern markets. Those new arrangements certainly will require adjustments from Brazil's public and private sectors.

Finally, the study´s limitations and desirable further investigations must be cited. The study did not explore other variables that can affect Brazilian agricultural exports to the Middle East, namely exchange rate, distance, and non-tariff barriers. Still, Brazil´s competitors for agricultural exports to the Middle East were not evaluated.

Consequently, a future extension would include such variables in multiple regression approaches to gain new insights about the most demanded

agricultural products by those countries. Moreover, another useful deepening would be to compare Brazil´s access to the Middle East *vis-à-vis* other agricultural powers like United States, European Union, and Russia.

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