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EU agri-food trade with the BRICSs: The case of Brazil

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Abstract

International trade between countries can be categorised as inter-industry or intra-industry. Intra-industry trade, particularly of vertically differentiated products, has expanded significantly since the 1960s, especially in Europe. However, Fontagné *et al.* (2006) note that *inter*-industry trade has made something of a comeback since 2000, due to the increasing participation of emerging economies in world trade. Accordingly, this paper asks whether such a change is evident in the bilateral agri-food trade between the EU and Brazil which is the largest of all exporters of agri-food products to the EU. Trade types are categorised in the paper following Fontagné and Freundenberg (1997). Results suggest that whilst the majority of agri-food trade between Brazil and the EU is of an inter-industry nature, its relative importance has not increased, although there is evidence that inter-industry trade of other primary products has become more important, which accords with the observation of Fontagné *et al.* (2006). A better understanding of the changing nature and pattern of trade should inform on-going international negotiations between the EU and Brazil.

1. Introduction

The BRICSs (Brazil, Russia, India, China and South Africa)[1] account for around a fifth of the European Union (EU)'s total agri-food trade, with Brazil as the dominant partner. Indeed, Brazil is the largest of all exporters of agri-food products to the EU. In 2012, its share in the total value of EU agri-food imports was 14 per cent (EC, 2013). Brazil's rapid economic development in the new millennium, as one of the emerging economies that form the BRICSs, is well documented, whilst over the same period the number of members comprising the EU has almost doubled. These developments are likely to have had an impact on agri-food trade between the EU and Brazil. Additionally, further changes are to be expected given the most recent World Trade Organisation (WTO) agreement in Bali (December 2013) and the EU's ongoing negotiations for a free trade agreement with MERCOSUR[2], of which Brazil is a founder member. Against this background, the changing nature and pattern of agri-food trade between the EU and Brazil is the main focus of this paper.

International trade can be categorised as *inter*-industry, based on the traditional theory of comparative advantage, or *intra*-industry, based on more recent theories centred on economies of scale, imperfect competition and 'love of variety'. The empirical literature shows that intra-industry trade has expanded significantly since the 1960s, especially in Europe. However, Fontagné *et al.* (2006) note that *inter*-industry trade has made something of a comeback since 2000, due to the increasing participation of emerging economies in world trade.

Most of the agri-food trade between the EU and Brazil is inter-industry or 'one-way', *e.g*. Brazil exports soya beans to the EU, but the EU does not export soya beans to Brazil. However, some is intra-industry or 'two-way' trade, *e.g.* Brazil exports apples to the EU and the EU simultaneously exports apples to Brazil. This paper seeks to establish the extent to which the nature and pattern of these types of trade have changed since 2000 and whether the inter-industry component has become more important.

[1] The term BRICs was first introduced in the early 2000s; South Africa was added in 2010.
[2] MERCOSUR (Southern Common Market) is a customs union in Latin America.

2. Method and Data

Intra-industry trade (IIT) is usually defined as two-way trade in similar products. In empirical analysis therefore, attention needs to be paid to the meaning of 'two-way trade' and 'similar products'. Traditionally, the former is measured using the Grubel-Lloyd index or a variant, applied at a sufficiently disaggregated level of bilateral trade data such that product groups can be considered as similar. An important distinction exists in the IIT literature concerning horizontal and vertical product differentiation. Essentially, the former occurs when varieties of a product exhibit different characteristics but are of similar quality, and the latter when products are of different qualities. Since the factor content of vertically differentiated exports and imports is likely to be different, this type of IIT is closer in nature to *inter*-industry trade.

To categorise inter-industry and intra-industry trade, this paper uses the method proposed by Fontagné and Freundenberg (1997), an important feature of which is that an *entire* trade flow for a specified product is classified as either 'one-way' (inter-industry) or 'two-way' (intra-industry). This addresses a problem that arises in interpretation of the more traditional Grubel-Lloyd type measures, namely that the majority bilateral trade flow for a specified product (whichever is the larger of exports or imports) is classified as *both* inter-industry and intra-industry. The Fontagné and Freundenberg method avoids this problem; bilateral trade for a given product will be *either* inter-industry *or* intra-industry.

"Trade in an item is considered to be 'two-way' when the value of the minority flow (for example imports) represents at least 10 per cent of the majority flow (exports)" (Fontagné and Freundenberg, 1997, p.30). Thus, two-way trade in product j requires that the following condition be satisfied, where *X* and *M* describe the value of exports and imports:

$$\frac{Min(X_j, M_j)}{Max(X_j, M_j)} \geq 0.1 \qquad (1)$$

When the minority flow is below this level it is not considered a structural feature of trade, and the gross trade flow is defined as *inter*-industry or one-way.

The Fontagné and Freundenberg measure identifies, on the basis of the 10 per cent minimum trade overlap, the combined bilateral trade flows (X_j+M_j) as either inter-industry or IIT, with total trade types (FF^i) defined as:

$$FF^i = \frac{\sum_j (X^i_j + M^i_j)}{\sum_j (X_j + M_j)} \qquad (2)$$

where *i* represents inter-industry trade or IIT.

Generally, the FF measure will yield values for two-way trade which are higher than shown by Grubel-Lloyd type measures, because once the overlap threshold is met the entire trade flow is treated as two-way.[3]

Intra-industry trade can then be further categorised into horizontally differentiated and vertically differentiated products in the conventional way based on unit values. Typically, unit value, as an indicator of the average price of a good, is used as a proxy for product quality in trade data. The underlying assumption is that relative prices are likely to reflect relative qualities. Despite some shortcomings, the use of unit values has become common in the separation of horizontal and vertical IIT. Trade flows are typically defined as horizontally differentiated where the spread in the unit value of exports, relative to the unit value of imports, is less than 15 per cent. Where relative unit values are greater than this, products are considered as vertically differentiated.

Thus, intra-industry trade of a horizontally differentiated product, *j*, occurs where the unit values of exports (UV_j^X) and imports (UV_j^M) satisfies the following condition (Fontagné and Freundenberg, 1997):

$$1/1.15 \leq \frac{UV_j^X}{UV_j^M} \leq 1.15 \qquad (3)$$

[3] Fontagné and Freundenberg (1997) point out that their approach and the more traditional measures of IIT are complementary rather than substitutes.

Intra-industry trade of a vertically differentiated product is defined as being where the relative unit values of exports and imports are outside this range. Thus, trade is classified as two-way horizontal (HIIT), two-way vertical (VIIT), or one-way (inter-industry).

To examine the changing nature and pattern of agri-food trade between the EU and Brazil, the paper applies this method to a data set of approximately 800 agri-food products traded between the EU and Brazil. The annual data are taken from Eurostat, at the HS6[4] level, for the period 2000 to 2012.

3. Findings

Before focusing on results based on the agri-food trade flows, it is insightful to briefly examine results for total trade between the EU and Brazil. In 2000, 26 per cent of the total trade of these partners was IIT or two-way trade, according to the Fontagné and Freundenberg method of calculation; by 2012 this share had fallen to 19 per cent (Table 1)[5]. This accords with the observation of Fontagné *et al.* (2006) relating to the apparent reversal of the global trends of inter- and intra- industry trade since the start of the new millennium. In the case of the EU and Brazil, the increasing share of inter-industry trade reflects an increase in the importance of non-agri-food primary products, whose share has more than doubled (Table 1). However, the same is not true with respect to agri-food trade, which as a share of total trade actually declined slightly between 2000 and 2012, by 1.7 percentage points, from 21.5 to 19.8 per cent (Table 1).

[4] Harmonised System at the six-digit level.
[5] At the global level, around 40 per cent of total trade is IIT, although for trade in primary products it is much less at around 15 per cent (Fontagné *et al.*, 2006).

Table 1 EU-Brazil Trade, 2000 and 2012

Year	**2000**	**2012**
Total trade (€ bn nominal)	35.5	76.9
IIT (% of total trade)	25.7	19.2
Inter-industry trade (% of total trade)	74.3	80.8
of which:		
- agri-food products*	21.5	19.8
- non-agri-food primary products**	6.6	15.0

Source: Eurostat Database last accessed February 2014;
*HS6 1-24 ** HS6 25-27

Looking more closely at agri-food trade between the two partners, its nominal value has doubled over the period, in line with total trade. However, intra-industry trade accounts for only 2-3 per cent in value terms and approximately 100 products. In contrast, inter-industry trade accounts for 97-98 per cent and 700 to 800 products (Table 2). These shares are fairly stable over the period, and although inter-industry trade clearly dominates, the share of intra-industry trade shows no sign of having become smaller.

Table 2 EU-Brazil agri-food trade types, 2000-2012

Year	Agri-food trade (exports+imports) (€billion nominal)	Trade type (%)		Products traded (number)	
		Inter-industry	Intra-industry	Inter-industry	Intra-industry
2000	7.8	97.2	2.8	715	104
2001	9.4	98.0	2.0	737	110
2002	8.7	97.3	2.7	744	114
2003	9.0	97.9	2.1	730	119
2004	9.7	97.8	2.2	773	100
2005	9.9	97.7	2.3	773	121
2006	10.3	97.9	2.1	779	100
2007	13.0	98.0	2.0	767	98
2008	14.4	98.0	2.0	769	117
2009	12.6	97.9	2.1	725	106
2010	12.9	97.2	2.8	732	101
2011	15.1	97.2	2.8	729	105
2012	15.6	97.3	2.7	846	108

Source: Eurostat Database last accessed February 2014

Of the intra-industry trade in agri-food products, the majority is classified as 'vertical', reflecting differences in product quality, which in turn likely reflects differences in factor inputs, more akin to inter-industry trade (Table 3). This is in line with many empirical studies which find that vertical intra-industry trade (VIIT) typically dominates horizontal intra-industry trade (HIIT). The year-to-year fluctuations in the split between HIIT and VIIT in Table 3 may reflect reporting deficiencies in the data and the arbitrary choice of the HIIT/VIIT threshold, as well as any real differences.

Table 3 EU-Brazil IIT trade in agri-food products, 2000-2012

Year	Agri-food IIT (exports+imports) (€m nominal)	Trade type (%)		Products traded (number)	
		HIIT	VIIT	HIIT	VIIT
2000	216	19	79	8	92
2001	189	24	76	14	94
2002	233	17	82	11	95
2003	191	4	93	12	98
2004	213	13	87	10	80
2005	229	2	98	9	99
2006	213	15	85	13	82
2007	255	12	88	12	84
2008	295	4	95	13	99
2009	260	6	93	10	89
2010	358	36	63	16	80
2011	420	17	83	12	89
2012	418	2	98	7	96

Source: Eurostat Database last accessed February 2014

Table 4 details the five most important agri-food products, by value, in each year over the period, for both intra-industry trade and inter-industry trade. In terms of inter-industry trade, 'Coffee (HS6 code 090111)', 'Oilcake (230400)', 'Soya beans (120100)', 'Orange juice (200919)' and 'Tobacco (240120)' are the most important products, featuring in the top five in most years. Maize (100590), Meat (020130 and 020714) and Sugar (170111) earn a top-5 billing in occasional years. The most important products of intra-industry trade are not as concentrated as for the inter-industry trade, but include 'Guts, bladders and stomachs of animals (050400)', 'Vegetable saps and extracts (130219)', 'Food preparations (210690)', 'Bulbs, tubers and tuberous roots (060110)' and 'Tobacco (240110)'. Trade in (different) tobacco products is both inter- and intra-industry. As noted previously, most of the intra-industry trade is classed as 'vertical' (varieties of different quality).

Table 4 Five most important inter- and intra-industry trade agri-food products by year, EU-Brazil, 2000-2012

Code	Product name (abbreviated)	Year													Total
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	
	INTER-INDUSTRY TRADE														
090111	Coffee (excl. Roasted and decaffeinated)	X	X	X	X	X	X	X	X	X	X	X	X	X	13
230400	Oilcake and other solid residues	X	X	X	X	X	X	X	X	X	X	X	X	X	13
120100	Soya beans, whether or not broken	X	X	X	X	X	X	X	X	X	X	X	X		12
200919	Orange juice, unfermented			X	X	X	X	X	X	X	X	X		X	10
240120	Tobacco, partly or wholly stemmed or stripped	X	X	X	X	X					X	X	X	X	9
100590	Maize (excl. Seed)								X	X					2
200911	Frozen orange juice, unfermented	X	X												2
020130	Fresh or chilled bovine meat, boneless							X							1
020714	Frozen cuts and edible offal of fowls						X								1
120190	Soya beans, whether or not broken													X	1
170111	Raw cane sugar												X		1
	INTRA-INDUSTRY TRADE														
050400	Guts, bladders and stomachs of animals	V	V	V	V	V	V	V	V	V	V	V	V	V	13
130219	Vegetable saps and extracts	V	V	V	V	V	V	V	V	V	V				10
210690	Food preparations, n.e.s.		H	H		H	V	H	H	V	V	H			9
060110	Bulbs, tubers, tuberous roots				V		V	V	V	V	V		V	V	8
240110	Tobacco, unstemmed or unstripped	H				V	V		V	V					5
151620	Vegetable fats and oils	V	V		V										3
210610	Protein concentrates			V	V	V									3
230990	Preparations of animal feeding											H	V	V	3
220290	Non-alcoholic beverages	V		V											2
060210	Unrooted cuttings and slips		V					V							2
080510	Fresh or dried oranges										V	V			2
180500	Cocoa powder											H		V	2
080810	Fresh apples												H	V	2
220710	Undenatured ethyl alcohol												V		1

Source: Eurostat Database last accessed February 2014, H is horizontal IIT; V is vertical IIT.

4. Summary and concluding comments

The total value of trade between the EU and Brazil has more than doubled (in nominal terms) from €36 billion in 2000 to €77 billion in 2012. However, application of the FF method of calculation shows that there has been a decline in the share of total intra-industry trade and an increase in inter-industry trade. This supports the observation of Fontagne *et al.* (2006) that inter-industry trade at the global level has made something of a comeback since 2000. In the case of the EU and Brazil, the increasing share of inter-industry trade reflects an increase in the importance of non-agri-food primary products, whose share has more than doubled. However, within the BRICSs, Brazil remains the largest of all exporters of agri-food products to the EU, accounting for 14 per cent of the total value of EU agri-food imports in 2012.

The majority of agri-food trade between Brazil and the EU is of an inter-industry nature, accounting for 97-98 per cent of around 800 products. The EU's imports from Brazil are dominated by primary agricultural products, *e.g.* 44 per cent in 2012 (European Commission, 2013). Coffee, soya beans, orange juice, oilcake and tobacco are the most traded commodities with maize, meat and raw cane sugar also important in some years. In general, inter-industry trade is more prevalent in the case of primary products; indeed, for the EU and Brazil, intra-industry trade in agri-food products remains constant at around only 2-3 percent and approximately 100 products. However, most of the intra-industry trade is vertically differentiated, reflecting differences in product quality, and therefore closer to inter-industry trade.

International trade between the EU and Brazil has a typical North-South composition. Brazil is an exporter of primary agricultural products, while most of the EU countries export mainly manufactured products with higher value added. Jank (2000) points out that the increase in Brazilian exports of soya beans, tobacco, orange juice and meat is mainly related to concentration in the agro-food industry which was stimulated by the injection of Foreign Direct Investment during the 1990s. The Brazilian agro-food sector is characterized by low costs at the farm level, high soil productivity, and an export strategy focused on primary commodities, but protectionism and the trade barriers that exist between the EU and Brazil are also of importance. While the Brazilian economy is subject to relatively high protection, with

an average applied tariff of 12 per cent[6], the protection afforded to the agricultural sector is considerably lower, especially in relation to that of the EU. The Producer Support Estimate in 2008-2010 averaged 5 per cent for Brazil compared to 26 per cent for the EU (Brooks and Cervantes-Godoy, 2013). Moreover, the low value-added agricultural commodities exported from Brazil to the EU are subject to lower barriers than those applied to many higher value-added products.

Finally, the current negotiations between Brazil and the EU demonstrate that both regions are willing to facilitate the liberalisation of each other's markets. Moreover, the potential for a win-win outcome from greater trade flows is a real possibility, given the complementarities that exist between the production activities of both partners. Thus, a better understanding of the changing nature and pattern of agri-food trade between these two key players in the global arena should inform the on-going trade negotiations involving the EU and Brazil and, as noted by Fontagné *et al.* (2006), may point to implications for internal economic adjustments induced by greater trade openness.

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