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Chile-EU Trade Agreement: What Can We Learn from Trade Statistics?^{*}

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ABSTRACT

An Association Agreement concluded between the European Union and Chile in 2002 included a comprehensive Free Trade Agreement (FTA) that entered into force in February 2003. Our purpose is to analyse some of the economic consequences of the agricultural part of this agreement focusing in the fruit and vegetable market. Our finding is that market concentration has significantly decreased since the beginning of previous decade and has been reinforced in both markets. This has been an advantage for both Chilean producers and European consumers of fruits and vegetables.

Keywords. Markets, Fruit fresh, Trade Structure; Business Development and Benchmarking

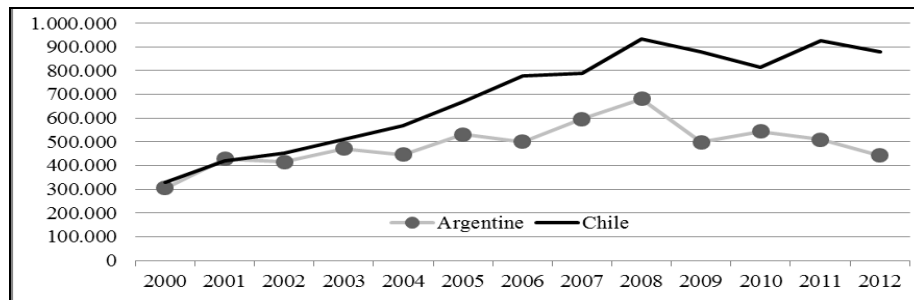
JEL: F13; Q180

^{*} The opinions expressed in this article only commit the authors and not their Institutions or companies

1 Introduction

The Association Agreement concluded between the European Union and Chile in 2002 included a comprehensive Free Trade Agreement (FTA) that entered into force in February 2003. Our purpose is to analyse some of the economic consequences of this agreement, focusing on the fruit and vegetable market. This sector has had particular relevance in Chile with many exporters and importers in the market. Furthermore, those products are closer to commodities.

Our starting point is that the Agreement has opened up new opportunities for trade. Since 2000, Europe's imports of fresh fruit and vegetables from Chile and Argentina have increased significantly. Until 2003, both countries followed a similar trend but since then Chile's exports have been growing more dynamically (figure 1).



Source: Author's calculations based on data from COMEXT (EuroStat)

Figure 1. Import of fruits and vegetables in the EU27 (1000 EUROS)

Carstensen (2000) and Domina and Taylor (2010) pointed out that market concentration is harmful to producers and consumers. This article aims to answer two questions related to the welfare both of Chilean fruit and vegetable producers and European consumers.

The first one relates to the evolution of the degree of concentration of Chilean exporters to the European Union. If their numbers have significantly increased and the level of concentration decreased, competition amongst them will have risen, and at least part of the rent created by the agreement will have been transferred to Chile's fruit and vegetable producers. The second one relates to the evolution of the degree of concentration among European's importers of Chilean goods. Here again, if competition between them has increased, this should be beneficial for suppliers, who should receive a better price and for consumers who should also see their welfare increase.

Section 2 illustrates the methodology and the database used in the analysis. Section 3 presents the results, and section 4 some conclusions.

2 Methodology

The first and most famous index used in order to assess market concentration in a particular sector is the **Gini Index** and its graphical representation (**Lorenz curve**).

Several more complex methodologies have been used in order to deepen the analysis. Miller (1967) used the **Firm's concentration ratio** in order to assess the cumulative participation of larger firms. the **Linda Index** (1976) measures inequality of market participation, but in terms of different groups; the **Entropy Index** (Theil, 1967) corresponds to the degree of uncertainty in a particular market structure, which a company faces to keep a random client; the **Comprehensive Industrial Concentration Index** (Horvath, 1970) includes relative dispersal and absolute magnitude; the **Kwoka Dominance Index** (1977) focuses on the structure of a company's market participation; the **Melnik Dominance Index** (Shy Stenbacka, 2007) is a measure to identify when a company could have a dominant position in a particular market..

In order to analyse market concentration, Hirschman (1954, 1964) developed the Herfindhal-Hirschman Index (HHI) and used it in his book: "*National Power and the Structure of Foreign Trade*." Later on, Herfindhal (1950) reformulated it in order to measure industrial concentration in a particular country.

It is calculated as

$$HHI = \sum_{i=1}^n \left(\frac{X_i}{X} 100 \right)^2$$

where: **HHI** Herfindahl-Hirschman Index;

$\frac{X_i}{X}$ participation of the i^{th} company in the market;

n number of firms in the industry or cluster.*

The main difficulty in applying this index is that it needs a powerful database with the individual data of the different companies active in the market, but luckily it could have access to the full database of exporters and importers managed by the Chilean Fruit Exporter Association (ASOEX[†]). The other data used in this analysis, customs data and information on Argentina, have been collected by the Centre for Fruit and Vegetable Information (Centro de Información Frutihortícola, CIF[‡]).

HHI is the only methodology validated by international regulation to analyse economic market concentration. It is used by the European Union, the United States and other national authorities. Under United States regulation[§], the index is interpreted as follows:

HHI < 1000 = Low concentration level.

1000 < HHI < 1800 = Moderate concentration level.

HHI > 1800 = High concentration level.

European Union legislation differs only in that high economic concentration is indicated by more than 2 000 points. In order to compare results between different countries (or when there are significant changes in the number of companies participating in the market from one year to another) the “normalised” HHI is often used. This is a percentage (Baumann, 2009).

The normalised HHI formula is:

$$\frac{\sqrt{HHI} - \left(100 * \sqrt{\frac{1}{n}} \right)}{100 * \left(1 - \sqrt{\frac{1}{n}} \right)}$$

The international relevance of HHI is confirmed by the large numbers of studies and articles published that use this methodology in different areas such as mental health (Williams, Doessel, Scheurer, Whiteford, 2006;821); agribusiness exports (Sawaya Jank et al, 2001); retail sales (Hernant, Anderson, Hilmola (2007;916); banking (Al-Muharrami, 2009;447); e-commerce (Porterfield, Bailey, Evers, 2010;443); consumer demand (Stablein, Holweg, Miemczyk, 2011;355); internationalisation (Elango, 2011;452); performance after privatisation (Wu, 2007;52); logistics (Maloni, Carter, Carr, 2009;254); new product development (Veflen Olsen, Sallis, 2010;386); location decisions (Zelbs, Frazier, Sower, 2011;888) and branding (Damoiseau, Black, Raggio, 2011;273) among others.

The index is also occasionally used in an adjusted way to assess whether a country has a concentrated or unconcentrated export portfolio sector. In this case, the share of the sector exports is compared to the total national exports, using the FAO databases or Comtrade (Mikic, Gilbert, 2007; Brun, 2009; Tadeu et al, 2012; Orszaghova et al, 2013).

* Possible outcomes go from 0 to 10 000. For example, considering a monopoly that controls the whole market (100%), therefore 100 squared (100^2) is 10 000 as an index. As another example, if two companies share the market equally: 50% of the market each, 100 is (50^2) 2 500 each, which adding it calculates an index from 5000 points. If 4 companies controlled the market 30%, 30%, 20% and 20% respectively; it would be (30^2) + (30^2) + (20^2) + (20^2) = 2600 points.

Considering 10 companies with an individual 10% participation (10^2) + (10^2) + (10^2) + (10^2) + (10^2) + (10^2) + (10^2) + (10^2) + (10^2) + (10^2) = 1000 points.

[†] http://www.asoex.cl/AsoexWeb/Menu.asp?Id_Menu=70

[‡] <http://www.cif-businessintelligence.com/>

[§] <http://www.justice.gov/atr/public/testimony/hhi.htm>

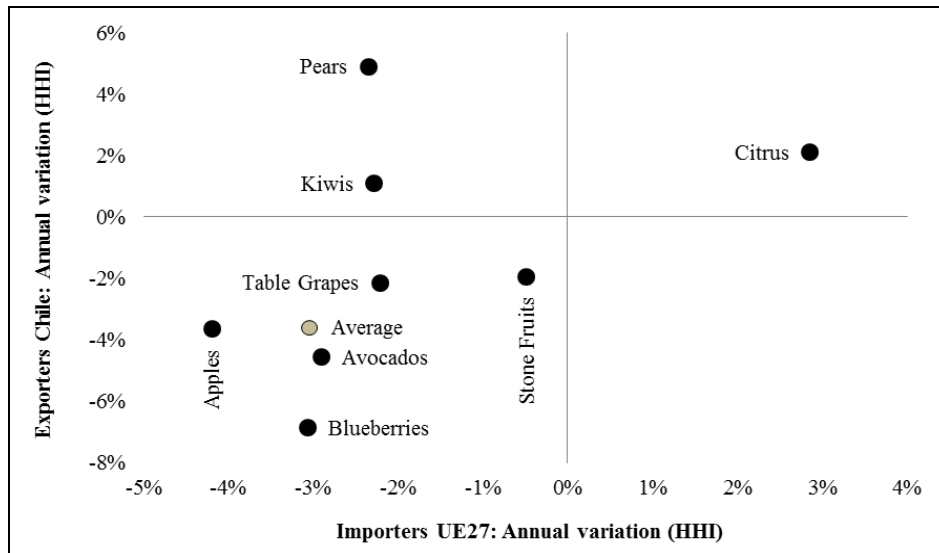
3 Results

This section discusses the results for both exporting and importing companies. Where relevant, it is focused on the 2 main products exported to the European Union by Chile and Argentina in 2012 (table grapes and apples) and their evolution since 2003 (Table 1). Detailed tables can be found in the annex.

Export structure. From 2003 to 2011, the number of companies exporting fruit and vegetable from Chile to the European Union increased by 54%, from 253 to 390 (Table 2). New actors were particularly found in grape exports (52); avocados (35); kiwis (35), blueberries (32) and apples (19) **. Our indicator of the degree of concentration for Chilean exporters decreased from moderate (1.231) to low (701) at an annual rate of 3.6% with 3 exceptions: pears, kiwis and citrus fruit (Table 3).

Import structure. Over the same period, the number of European companies importing Chilean fruit and vegetables also increased, by more than 28%, from 458 to 587 (Table 4). By product, the newcomers are mainly active in grapes (47), apples (48), kiwis (23), avocados (31) and stone fruits (26). In this case, the low level of concentration is maintained but with a decrease in the index from 788 to 617 (Table 5) with one exception - citrus - which is a minor component of Chile's exports.

Trend in market concentration. Figure 2 summarises the conclusions. Market concentration, both for Chilean exporting and European importing companies, is generally decreasing. The exceptions are pears, kiwis and citrus on the export side and citrus on the import side. At this stage, it is not able to explain these divergences, which merit further research.



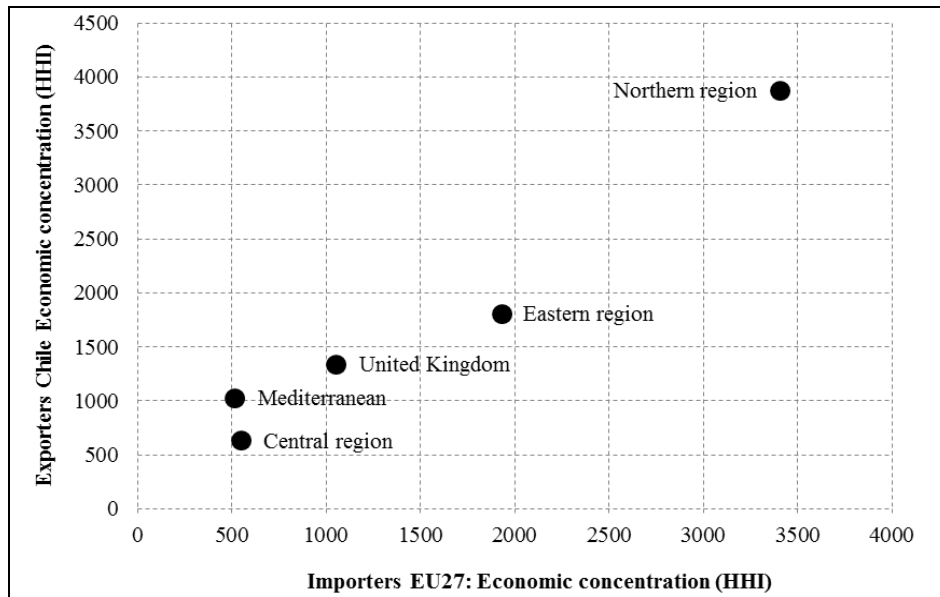
Source: Authors' calculations based on data from the Chilean Exporters Association

Figure 2. Trend of trading structure of the main fruits.

Major differences between regions or countries can be summarized as follows (figure 3):

- In the north of Europe (Denmark, Finland, Norway, Iceland and Sweden), the structure of the retail sector results in their markets being among the most concentrated (HHI: Above 2 000 points is a high concentration).
- Market concentration is also fairly high in Eastern European countries such as Poland, Romania, Hungary, Bulgaria and Croatia. Only a few companies import directly from Chile, most trade being re-exports from the Netherlands or Germany. Trade in the United Kingdom is also moderately concentrated (HHI: between 1 000 and 2 000 points is a moderate concentration).
- The “central” region (Belgium, Netherlands, Austria and Switzerland), and the “Mediterranean” Member States (Italy, Portugal, Spain, Greece and France), represent the lowest degree of concentration, both for exporters and importers (HHI: less than 1 000 points is a low concentration).

** Some new companies are active in several products and are counted once in each of them.

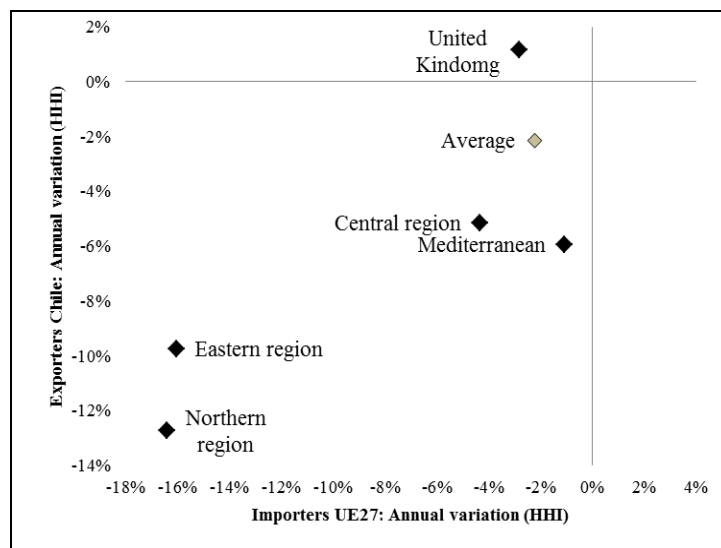


Source: Author's calculations based on data from the Chilean Exporters Association

Figure 3. Chilean fruit: economic concentration index in 2012

Full details are provided in the statistical annex. The results for table grapes and apples, the two most important products regarding their economic impact are discussed in the following in more detail.

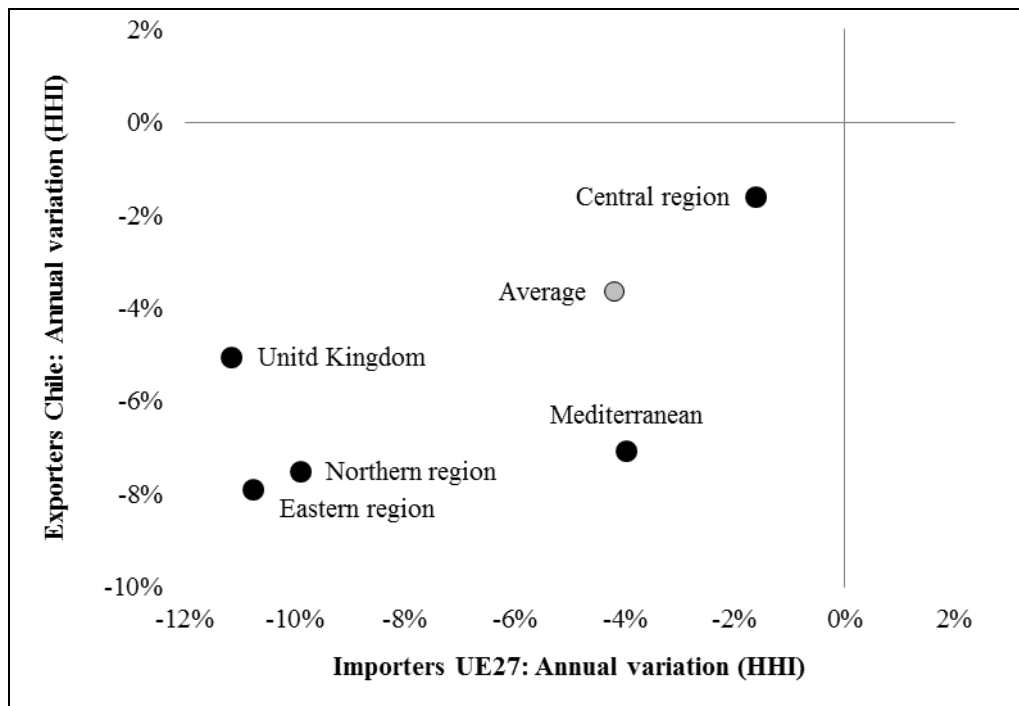
The grape market has never been concentrated (figure 4) and it is becoming less concentrated, on both the export and the import side, throughout Europe, except in the United Kingdom.



Source: Author's calculations based on data from the Chilean Exporters Association

Figure 4. Table grapes: trend of international trade structure

The apple market shows a similar development (figure 5). The import side moves from a “moderate” to a “low” concentration on the index while for importing regions that have always had a low concentration there is also an increase in the number of companies (Annex tables 4 and 5).



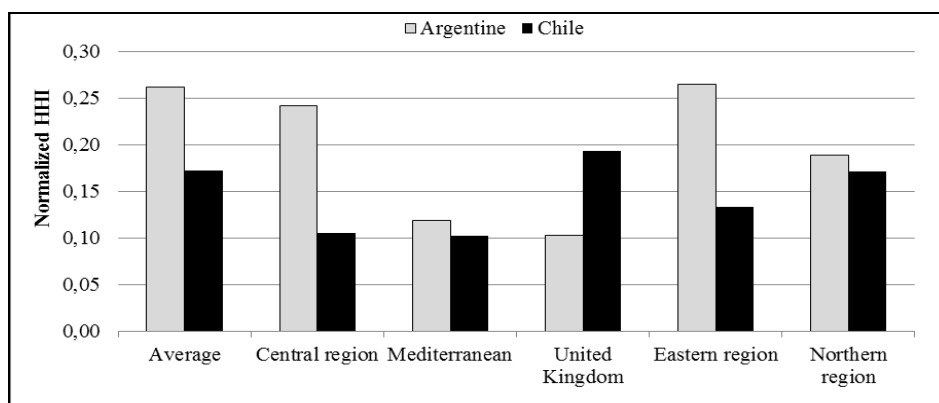
Source: Author's calculations based on data from the Chilean Exporters Association

Figure 5. Apples: trend of international trade structure.

Benchmarking: For both products, a comparison between Chile and Argentina is instructive (table 6). In the latter, exports of apples have fallen while table grape exports are stable, but their market concentration is high or moderate, and in all cases significantly higher than in Chile. The number of apple exporting companies is stable (44), but the number of table grape exporters has fallen (from 50 to 41).

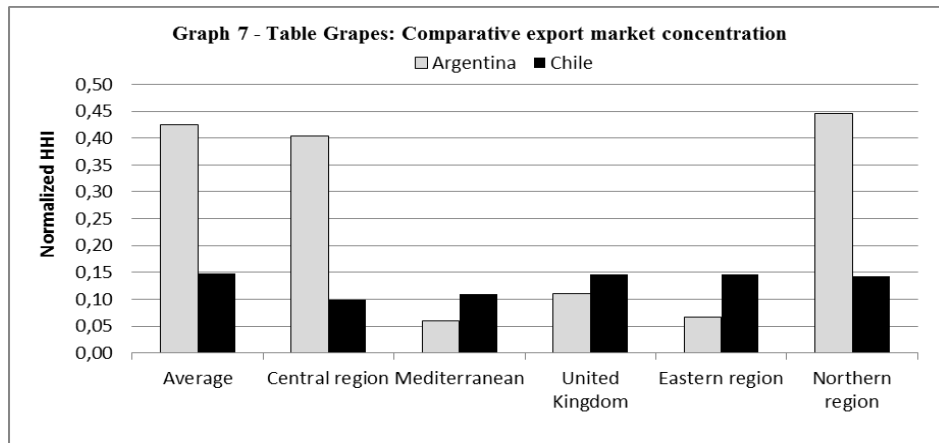
For both products, the economic concentration of exporters is higher in Argentina than in Chile (Herfindahl-Hirschman Index, normalised) with some exceptions: exports of apples to the United Kingdom (figure 6) and table grapes to Eastern Europe (figure 7).

As Argentina has no Free Trade Agreement with the European Union, Argentinian exporters have not only been unable to profit from new market opportunities but have paid some 30 M. € per year (300 M. € between 2003, the first year of the EU-Chile FTA, and 2012) in EU import duties. Due to the seasonal effect, it is primordial to keep Bartlett or William pears in cold storage until October, when no EU import duties apply, they have to face storage costs and the loss of market opportunities during those months of the campaign. It is inescapable to conclude that, in the absence of an FTA, Argentine exporters not only fail to take advantage of new market opportunities but have to face import duties and additional storage costs.



Source: Authors' calculations based on data from the the Customs of Chile and Argentina (table 6)

Figure 6. Apples: Comparative export market concentration.



Source: Authors' calculations based on data from the the Customs of Chile and Argentina (table 6)

Figure 7. Table grapes: Comparative export market concentration

4 Conclusions

Chile's fruit and vegetable sector has taken advantage of the FTA with the European Union. Their exports have seen a sustained growth, in clear contrast with neighbouring Argentina, which has no FTA with the EU. It is important to know how this rent is shared among the different actors of the food chain. Who profits from this increased economic rent?

In order to answer this question, this research has been focused on the evolution of the degree of concentration on both the export and the import side. The findings are that concentration has fallen markedly since the beginning of the last decade and competition reinforced in both markets. This increased competition has been a remarkable advantage for both Chilean producers and European consumers of fruit and vegetables.

The decrease in the Normalized HHI for Chilean exporters and EU importers is directly related to the increase in Chilean export and EU import companies. For Argentina, the higher normalized HHI is the result of a less dynamic evolution, as it has been shown in the two case studies for apples and table grapes. This quantitative result is reinforced by a qualitative analysis of Chile's new exporters. A significant majority of them are also farmers who have benefited from a number of public interventions^{††}. In Argentina, only one enterprise that both produces and exports has registered a significant growth, a consortium composed of 23 companies and 260 producers.

This analysis is obviously partial, limited to a single group of products and a single country. Therefore, this article has not the objective of drawing general conclusions on the economic and social impact of Free Trade Agreements, but it is inescapable to affirm that in this case the FTA has decreased market concentration considering that the winners are both the Chilean producers and EU consumers.

This conclusion differs from other studies such as that by the IATP (2010) which underlined "the role of trade agreements in concentrating markets both within the U.S. and within the region" or by Wise and Rakocy (2010) on the "Smithfield and the NAFTA" case.

Several factors can contribute to explaining the discrepancy. Pork, fruit and vegetables are commodities but the overall degree of food chain integration is completely different: While the pork chain is highly concentrated, the latter is more competitive. The case of "Smithfield and the NAFTA" has been able to mobilize the comparative advantage of Mexico with any, or very limited, sunk costs.

The results cannot be understood without taking into account two technological changes that took place during the period, contributing to transform market opportunities into economic realities. The **internet** has reduced sunk costs, which is particularly relevant for exporters in developing countries (Freund and

^{††} CORFO (Corporación de Fomento de Chile), FDI (Fondo de desarrollo e innovación); FAT (Fondo de Asistencia Técnica); PROFO (Proyecto de Fomento productivo); PAG (Programa de Apoyo a la gestión de la Empresa); PDP (Programa de desarrollo de proveedores) and FONTEC (Fondo nacional de desarrollo productivo y tecnológico).

Weinhold, 2000; Clarke and Wallsten, 2006). Increasing **containerisation** has not only stimulated the international trade but also has allowed small and medium exporters from developing countries to have full access to maritime transport (Hummels, 2007; Novo-Corti and Gonzalez-Laxe, 2009; Bernhofen, El-Sahli and Kneller, 2013).

For European producers of fruit and vegetables, the fact that European consumer welfare has increased is potentially another advantage. We share the view of Compés et al (2013) that "If a trade agreement is efficient, it generates enough wealth so that the winners can compensate the losers and increase the global wealth". If there are losers amongst European producers, there is a basis for possible compensation.

The final conclusion is that for this kind of case study it is really useful to assess the economic consequences of Free Trade Agreements. Models "Ex ante" are used for evaluations and as powerful tools, before the event. "Ex post" analyses are needed in order to feed the discussions on their impact after the event.

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STATISTICAL ANNEX

Table 1.

Chile and Argentina: main products exported to the EU (1000 Euro)

Details of fruit and vegetable	Chile 2003	Argentina 2003	Chile 2012	Argentina 2012
Onions	8.392	28.846	15.666	27.902
Other vegetables	1.427	2.035	787	0
Table grapes and raisins	169.870	35.620	308.265	37.627
Apples and Pears	184.013	180.501	187.805	109.992
Stone fruits	41.633	18.398	80.808	6.959
Kiwis, Blueberries and other berries	69.609	2.508	143.145	38.068
Citrus	7.416	202.401	10.438	208.596
Avocados	8.055	935	59.717	667
Other fruits	19.017	288	72.560	12.482
Total Import F&V	509.432	471.533	879.191	442.294

Source: Authors' calculations based on data from COMEXT (Eurostat)

Table 2.

Chile: Evolution of companies exporting to the EU27

Export/years	2003	2004	2005	2006	2007	2008	2009	2010	2011
Companies	253	291	299	315	339	346	370	417	390
Table grapes	140	153	160	167	175	186	178	209	192
Apples	82	90	92	94	101	99	102	97	101
Pears	61	59	62	63	64	58	55	55	57
Blueberries	28	26	23	30	40	45	36	50	60
Citrus	16	19	24	24	34	30	27	34	33
Kiwi	70	73	68	75	77	85	99	107	105
Stone fruits	92	102	97	100	104	112	113	112	102
Frozen fruits	45	52	51	53	64	66	61	56	61
Avocados	13	38	46	73	57	50	80	66	48

Source: Authors' calculations based on data from the Customs of Chile

Table 3.

Chile: Evolution of economic concentration in exports top UE27

Export/years	2003	2004	2005	2006	2007	2008	2009	2010	2011
HHI average	1.230	984	1.070	972	987	920	1.034	944	701
Table grapes	527	469	488	500	446	438	407	373	456
Apples	1.031	909	868	936	987	920	789	850	701
Pears	1.241	1.099	1.241	1.277	1.438	1.375	1.375	1.638	1.828
Blueberries	2.753	4.365	5.914	4.437	3.043	2.549	2.793	2.214	2.144
Citrus	1.674	2.032	1.924	2.265	1.887	2.029	2.565	1.559	2.695
Kiwi	567	485	603	620	595	578	583	598	669
Stone fruits	857	593	627	659	560	568	576	641	642
Frozen fruits	1.230	984	1.070	972	797	708	1.034	944	697
Avocados	3.390	2.593	2.303	1.708	2.002	2.250	1.867	1.879	1.877

Source: Authors' calculations based on data from the the Customs of Chile

Table 4.

UE27: Evolution of the companies importing of Chilean fruit

Import/Years	2003	2004	2005	2006	2007	2008	2009	2010	2011
Companies	458	553	565	540	594	591	584	596	587
Table grapes	196	212	216	205	216	237	222	235	243
Apples	184	219	244	251	249	245	224	223	232
Pears	106	119	120	120	125	121	120	119	125
Blueberries	49	51	40	39	44	43	47	58	68
Citrus	28	36	40	45	48	49	49	57	38
Kiwi	149	165	181	187	199	208	200	192	172
Stone fruits	165	215	221	214	220	224	201	195	191
Frozen fruits	0	0	0	0	0	0	0	0	0
Avocados	16	29	35	55	63	58	76	57	47

Source: Authors' calculations based on data from the Chilean Exporters Association

Table 5.

UE27: Evolution of economic concentration in Chilean fruit importers

Import/Years	2003	2004	2005	2006	2007	2008	2009	2010	2011
HHI average	788	752	709	711	655	598	615	621	617
Table grapes	536	572	582	627	592	560	497	561	457
Apples	718	656	554	554	564	526	535	560	527
Pears	859	848	726	747	718	636	668	657	681
Blueberries	1.954	3.460	4.257	3.755	2.959	2.404	2.689	2.197	1.751
Citrus	1.810	1.876	2.047	2.170	1.128	1.174	2.255	1.486	3.388
Kiwi	666	385	610	514	462	367	476	478	510
Stone fruits	673	616	692	674	572	487	563	585	553
Frozen fruits									
Avocados	2.269	2.415	2.292	1.470	1.643	2.217	1.678	1.680	2.724

Source: Authors' calculations based on data from the Chilean Exporters Association

Table 6.

Chile and Argentina: Comparative Analyses of export structure

Region/Country	Apples (HHI 2011)						Table Grapes (HHI 2011)					
	Chile			Argentina			Chile			Argentina		
	HHI	n	Norma-lized	HHI	n	Norma-lized	HHI	n	Norma-lized	HHI	n	Norma-lized
Average	701	101	0,1717	1651	44	0,262	456	192	0,1483	3305	40	0,4242
Central region	447	81	0,1053	1728	31	0,2419	293	162	0,0984	3105	39	0,4044
Mediterranean	470	70	0,102	1019	24	0,1188	444	87	0,1087	1000	15	0,0599
United Kingdom	1158	43	0,1935	1173	17	0,103	598	91	0,1457	2126	8	0,1099
Eastern region	1.860	11	0,1328	8.670	2	0,265	1.234	23	0,147	1.749	8	0,0662
Northern region	1.807	15	0,1709	2.134	13	0,1887	1.511	16	0,1424	7.204	6	0,4458

Source: Authors' calculations based on data from the Customs of Chile and Argentina