Draft version

The environmental unintended consequences of a potential EU-MERCOSUR free trade agreement. An analysis for the agri-food industries in Spain.

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Introduction

On 28 June 2019, the European Union and MERCOSUR (Argentina, Brazil, Paraguay and Uruguay)[1] reached a Free Trade Agreement which will consolidate a strategic political and economic partnership for both parties. The Agreement, pending final ratification, is in terms of population and tariff savings, the largest the EU has ever signed globally. This agreement is expected to significantly boost bilateral trade flows and impact economic welfare for Spain, with a positive impact of 0.08% for GDP and an increase of 22,088 jobs.

The current context of growing global geopolitical competition revitalizes the association between the EU and MERCOSUR. Agreement ratification would position EU as the first major trading partner of the Latin American bloc, which neither the United States nor China have achieved, gaining preferential access to the fifth world economy, made up of the four MERCOSUR partner countries (Latorre et al., 2021). Latin America is considered by EU Member States and particular by Spain, as a key region in their trade agenda. In effect, Spain's trade in goods and services with MERCOSUR represents 4.5% of trade, double the EU average (Banco de España, 2019).

In fact, the political changes in Colombia, Brazil and Chile favored a cooperation track in Latin America and the Caribbean (LAC), generating an opportunity for the development of the EU Summit with the Community of Latin American and Caribbean States (CELAC) in July 2023. This meeting provided a turning point for the future ratification of the free trade agreement between the EU and MERCOSUR founding partners. The next EU-CELAC Summit could be a key moment to achieve the signing of the agreement.

The potential ratification of the EU-MERCOSUR trade agreement has opened debate in Europe about the potential environmental effects. Some voices argue that the analysis has focused only on comparative advantages and underestimates the potential environmental impact. Issues such as the risk of deforestation, increased greenhouse gas emissions and loss of ecosystems and biodiversity are potential consequences of trade liberalization affecting a wide range of sectors (e.g. agriculture,

[1]Bolivia has signed on July 17, 2023 in Brasilia the Protocol of accession to MERCOSUR, and has 4 years to gradually adopt the agreements.

livestock, mining, automobiles, chemicals, etc.)[2]. In fact, a report by the EU (European Commission, 2013) reports that during the period 1990-2008, the EU was responsible, through its imports, for around 36% of all deforestation linked to the international trade agricultural and livestock products.

The EU-MERCOSUR agreement has a specific section on the liberalization of agri-food products, where some of the products will be subject to partial liberalization with the inclusion of maximum duty-free tariff quotas or lower tariffs (European Commission, 2019) to be progressively implemented over 6 to 10 years. In addition, the EU will liberalize imports, corresponding to 82% of agricultural imports. Duties on 93% of tariff lines for EU agri-food exports will also be phased out.

Consequently, the ratification of the EU-MERCOSUR agreement will shift production and specialization in more complex sectors, as a result of tariff and quota reductions, reconfiguring global production-value chains- and the proportion of CO2 emissions at regional, intraregional and global level; therefore, it is relevant to carry out a comparative analysis of CO2 emissions, linked to the variation in agricultural and livestock imports between Spain and the MERCOSUR region, which have not received attention in the analysis of the agreement.

Creating a new free trade zone with MERCOSUR countries would lead to an even further deepening of deforestation dynamics and Green House Gas (GHG) emissions. While the Spanish Ministry of Ecological Transition is commitment to curb climate change and deforestation implementing different regulations, it is not taking into account the effects of the EU-MERCOSUR agreement in terms of GHG emissions. In fact, its "Integrated National Energy and Climate Plan" (PNIEC) - the document that guides Spain's emissions reductions until 2030 does not include accounting for emissions linked to import and export trade, which is a key component of the EU-MERCOSUR agreement. Although, the trade Agreement includes a specific section, Chapter 14 on Trade and Sustainable Development, which states that increased trade should not be to the detriment of the environment or working conditions, and instead, it should promote sustainable development (European Commission, 2019), the practical implementation of this section is not entirely clear.

Thus, our main goal is analyse the estimated direct and indirect impacts of the EU-MERCOSUR agreement in terms of greenhouse gas emissions (GHG). How will the path towards 2030 Spanish emissions targets be affected?

Several papers have already analysed the potential effects of the EU-MERCOSUR agreement and there is no consensus on general economic and welfare potential outcome.

Diao et al. (2003) find a 0.3% and 2 to 4.4% GDP increases for EU and Mercosur, respectively. However, Boyer and Schuschny (2010) show a 0.2% GDP decrease for the EU. Nevertheless,

[2] The elimination of trade duties and the addition of new preferential quotas will lead to an increase in exports of raw materials from Latin America to the EU, mainly agricultural and mining products. For its part, the EU will increase the volume of exports to MERCOSUR, mainly in the automotive and agrochemical sectors.

these papers didn't have the detailed agreement conditions of 2019. More recent papers have focus on specific countries such as Latorre, Cabrera and Ortiz Valverde (2020) for Brazil or Latorre et al. (2021). Few of them have a detailed focus on environmental effects. Mercado Cordova & Koo (2023) analyse the effects of EU-MERCOSUR agreement for GHG emissions and land use—albeit with low sectoral detail

Our novelties related with the previous literature is to have a detailed focus on agri-food sectors and to pay attention to Spain's emissions displacement particular in these sectors. Additionally, we introduce Bolivia in the simulation scenarios

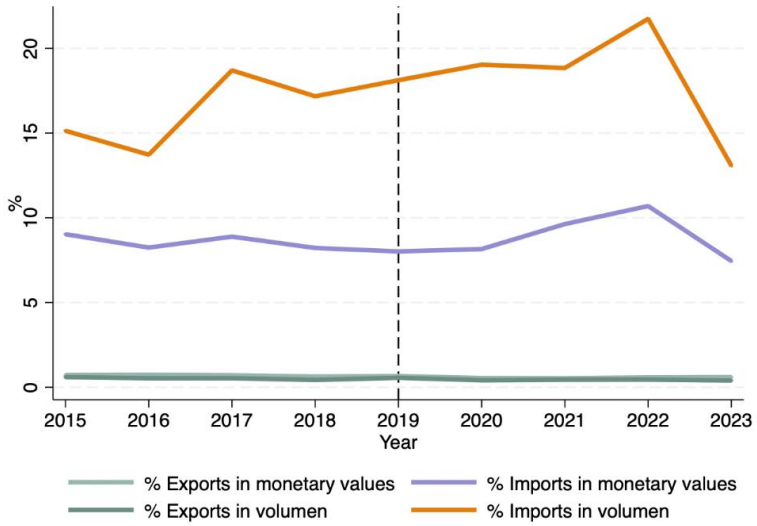
Trade between MERCOSUR and Spain

The analysis of the potential effects of emissions derived from the potential EU-MERCOSUR agreement, specifically in the agri-food and fisheries sector, requires to know the trade magnitude and its recent evolution. Therefore, in this section we proceed to update and expand the report on the analysis of bilateral trade between Spain and MERCOSUR, focusing on agri-food and fishery products, a document published in 2023 by the Ministry of Agriculture, Fisheries and Food.

MERCOSUR's weight in Spain's trade

To understand the potential results of the agreement, it is necessary to analyze the weight of agri-food sector and fishery exports and imports in Spain-MERCOSUR trade. Figure 1 shows the weight of Spanish of agri-food sector imports and exports from and to MERCOSUR over total Spanish agri-food imports and exports, respectively.

Figure 1: Share of MERCOSUR in the Spanish trade of agrifood products.



Share of imports is higher than that of exports, measured in terms of value as well as volume. In 2023, Spanish agri-food sector exports to MERCOSUR accounted for 0.6% by value of total Spanish agri-food sector exports to the world, while agri-food sector imports from MERCOSUR

accounted for 7.45% of total Spanish agri-food sector imports[3]. The weight of agri-food sector exports from Spain to MERCOSUR measured in volume has a lower weight (0.4%) over the total exports of the Spanish agri-food sector, while, on the other hand, the weight of imports measured in terms of volume from MERCOSUR has a higher weight than that measured in value (13.08%). This analysis of the weight of MERCOSUR in Spain's trade allows us to identify the different role played by value and volume in the trade structure. In terms of evolution, since 2015, exports of the agri-food sector from Spain to MERCOSUR had an increasing trend, reaching in 2023 the record figure of 374 million euros at 2021 prices[4] (hereinafter M€), except for 2020 (304M€), year in which there is a decrease in the historical series (because of the situation generated by the pandemic), followed by a subsequent recovery in 2021 (321M€) and continuing a growth path. Therefore, exports from Spain to MERCOSUR do not appear to have seen any change in trend in 2019, which would allow us to associate a positioning of companies with the signing of the agreement. In terms of volume, exports decreased by 18.4% from 2022 to 2023.

The imports from MERCOSUR to Spain, taking 2015 as a reference, have increased by 17.5% (2.08% per year), reaching figures of 3640 M€ in 2023. But there is also a large decrease from 2022 to 2023. This is caused by the war in Ukraine. In 2022, the war causes Spain to be unable to import cereals from Ukraine, so alternative markets are sought; thus, the volume of cereal imports from MERCOSUR to Spain increases. In 2023, trade with Ukraine, a priority market for cereals, is resumed, which generates a reduction in imports from MERCOSUR. This performance, associated with the cereals market, could be pointed out as a potential of the possible effects associated with the ratification of the agreement, since its improvement in relative prices would help to recover part of the market.

Considering that the weight of imports of agri-food sector from MERCOSUR to Spain is much higher than the weight of exports, this means that the trade balance in 2023 is negative -3274 M€, representing a reduction of 34% with respect to 2022.

Most important agri-food sector products in trade between Spain and MERCOSUR

After knowing the evolution of the weight of trade between Spain and MERCOSUR, it is important to identify which are the most important products, products that are probably the most affected. As in the previous section, the data are taken from the Interactive Report on Foreign Trade, available on the website of the Ministry of Agriculture, Fisheries and Food. The agri-food sector products are aggregated using the Global Trade Analysis Project (GTAP) database, which facilitates the subsequent impact analysis. Figure 2 shows the weight of products exported from Spain to MERCOSUR, while Figure 3 shows the products imported by Spain from MERCOSUR.

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[3] The data presented in this section corresponds to MERCOSUR without Bolivia, the inclusion of Bolivia does not alter the weights since both exports and imports from Bolivia to Spain represent a very small weight with respect to the magnitude of MERCOSUR. Including Bolivia, the weight of agri-food sector imports from MERCOSUR to Spain goes from 7.45% to 7.47%.

[4] The value calculations have been deflated with the 2021 consumer price index to avoid the effects of general price increases on comparisons.

The figure demonstrates the difference between the most exported products and the most imported products, which are different.

Figure 2 illustrates the behavior and weight of the main products exported from Spain's agri-food sector to MERCOSUR, from 2015 to 2023. In 2023, the set of products skins and leather (24.4%), vegetable oils (23.3%) and fruits and vegetables (20.6%) and beverages and tobacco (13.3%), account for 81.6% of the value of exports of the agri-food sector with MERCOSUR.

Figure 2: Evolution of agri-food product distribution of the exports from Spain to MERCOSUR.

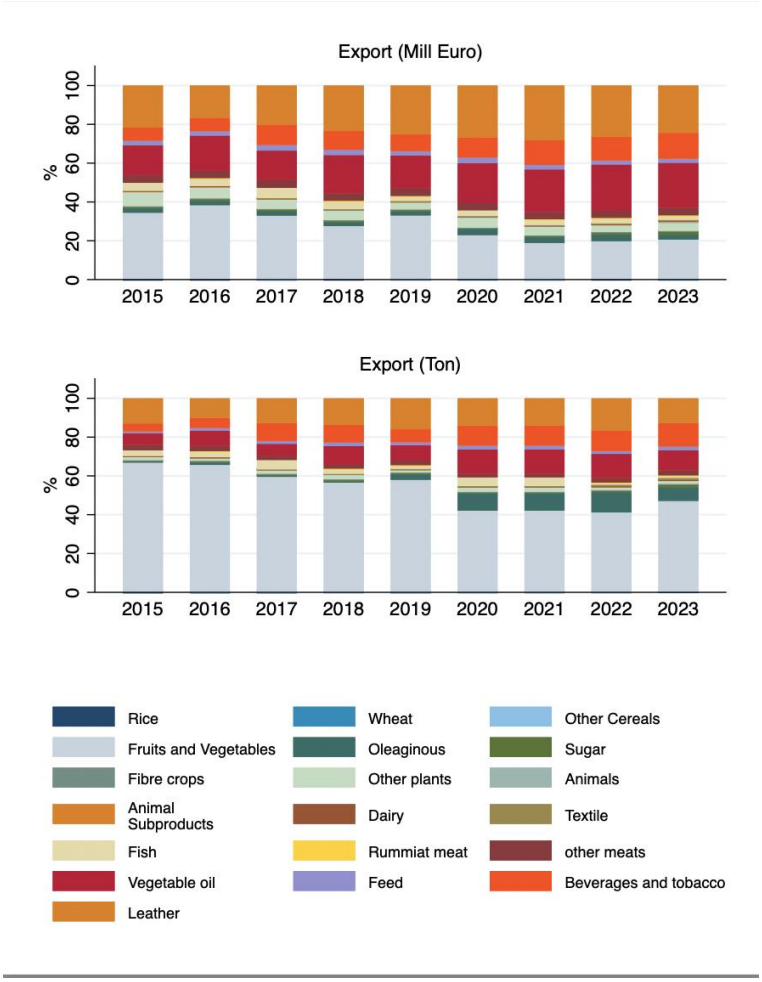
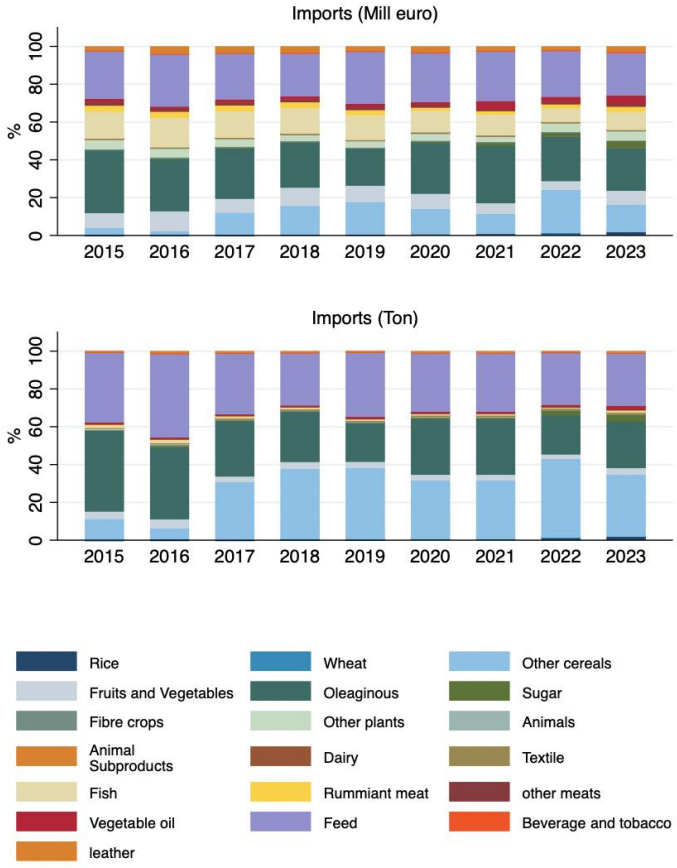


Figure 3 shows the weight of the main agri-food sector products imported by Spain from MERCOSUR. The agri-food sector products with the highest import value are soybeans, 773.3 M€ (belonging to the group of oilseeds, 22.6% of the total), soya cakes, 733, 8 million (considered in the feed and food preparations group, 22.4%), maize, 527.7 million (in the other cereals group, 14.5%), crustaceans, 271.8 million (in the fisheries group, 9.6%) and coffee and tea, 189.3 (in the other plants group, 4.5%). The 5 products most imported by Spain from MERCOSUR, in terms of value, account for 73.8% of the products of the agri-food sector.

The order in terms of relative weight, over the total products imported to Spain from MERCOSUR, of the most imported products in 2023 is more similar to 2021 than to 2022. The reason, as we have pointed out above, is the war in Ukraine and the impossibility of importing cereal from that country. As for the weight of imports of other cereals, they have undergone a sharp increase from 10.6% to 22.8%, in the period of the veto with Ukraine. However, when imports from Ukraine are resumed, imports of these other cereals fall again to 14.5%, being a higher weight than in 2021. This may indicate that with the liberalization of EU-MERCOSUR trade, it may regain part of the market share it had in 2022.

Figure 3: Evolution of agri-food product distribution of the imports of Spain from MERCOSUR.



Methods and data

Our baseline model

Our baseline model is a multiregional input-output model (MRIO) constructed upon data from Global Trade Analysis Project (GTAP). We aggregate the countries covered by GTAP up to $r =$

8 regions: Spain (ESP), the rest of EU-27 (REU), MERCOSUR countries[5] and the rest of the World (ROW). GTAP covers $n = 65$ industries and commodities. We choose this database since it provides sufficient detail on agricultural and food processing sectors for the purposes of our research.

GTAP has full information on regional supply and use tables (SUTs). We derive symmetric input-output tables (IOTs) for domestic and foreign industries ($\mathbf{Z}^{o=d}, \mathbf{Z}^{\bullet d}$) following Eurostat (2008, p. 349).[6,7] Let **x** stand for gross output. From these IOTs we derive the corresponding input coefficients:

$$\mathbf{A}^{o=d} = \mathbf{I} \otimes \mathbf{Z}^{o=d}(\hat{\mathbf{x}})^{-1} = \begin{bmatrix} \mathbf{A}^{11} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \mathbf{A}^{rr} \end{bmatrix}$$
$$\mathbf{A}^{\bullet d} = \mathbf{I} \otimes \mathbf{Z}^{\bullet d}(\hat{\mathbf{x}})^{-1} = \begin{bmatrix} \mathbf{A}^{\bullet 1} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \mathbf{A}^{\bullet r} \end{bmatrix} \quad (1)$$

where a circumflex indicates that a vector is turned into a diagonal matrix.

GTAP does not provide a full trade pattern for an interregional input-output model *à la Isard* Haga clic o pulse aquí para escribir texto., like other inter-country models do (e.g.: WIOD, FIGARO). But we do have data on total imports/exports by commodity coming from/bounded to each region. As a consequence, we opt to model interregional trade as for Riefler & Tiebout Haga clic o pulse aquí para escribir texto.. We build a trade coefficients' matrix (**C**) on the basis of aggregated trade data and use it allocate each region's imports and exports Haga clic o pulse aquí para escribir texto.. Let $\mathbf{t}^{od}$ stand for trade flows of region o bounded to region d. Let matrix a matrix trade flows be defined as:

$$\mathbf{T} = \begin{bmatrix} \emptyset & \cdots & \hat{\mathbf{t}}^{1R} \\ \vdots & \emptyset & \vdots \\ \hat{\mathbf{t}}^{R1} & \cdots & \emptyset \end{bmatrix} \quad (2)$$

Let **i** be a summation vector of ones with appropriate dimensions. Let $\mathbf{m} = \mathbf{iT}$ stand for the total imports by industry in each region. Our matrix of trade coefficients is defined as:

$$\mathbf{C} = \mathbf{T}(\widehat{\mathbf{m}})^{-1} = \begin{bmatrix} \emptyset & \cdots & \hat{\mathbf{c}}^{1R} \\ \vdots & \emptyset & \vdots \\ \hat{\mathbf{c}}^{R1} & \cdots & \emptyset \end{bmatrix} \quad (3)$$

[5] Argentina (ARG), Bolivia (BOL), Brazil (BRA), Paraguay (PRY) and Uruguay (URU).
[6] Model D: industry-by-industry symmetric table based on fixed product sales structure assumption.
[7] A dot • represents summation across a given dimension—e.g.: sum across import origins.

We know domestically produced final demand $\mathbf{f} = \mathbf{F}^{o=d}\mathbf{i}$ from our regional SUTs. Therefore, we can calculate gross output by industry in our MRIO model as:

$$\mathbf{x} = [\mathbf{I} - (\mathbf{C}\mathbf{A}^{\bullet d} + \mathbf{A}^{o=d})]\mathbf{f} = \mathbf{L}\mathbf{f} \tag{4}$$

We link our baseline MRIO to GTAP's set of GHG emission coefficients (**g**), thus accounting for direct and indirect emissions embodied in production (**e**) including, feedback effects via global trade:

$$\mathbf{e} = \hat{\mathbf{g}}\mathbf{L}\mathbf{f} \tag{5}$$

This is: we calculate the production-based emissions of each region/industry in our model. Note, other environmental footprint measures exist. See Wood (2017) for a discussion.

Three possible scenarios

We predicate 3 scenarios related to the EU-MERCOSUR free trade agreement. In scenario, we re-estimate the trade coefficient matrix according to the Spanish expected export variations $\tilde{\mathbf{C}}$. In addition, as per Grossman & Krueger (1991), in scenarios 2 and 3 we simulate a partial and full technological approximation of MERCOSUR towards the EU's average technology. In scenario 2, we combine the MERCOSUR and EU technological structures for agricultural and food processing sectors —i.e. their technical coefficients. We substitute the MERCOSUR's intermediate purchases' structure for these sectors using our new coefficient set. Thus, we model the effect of a partial technological transfer from the EU to MERCOSUR potentially triggered by the free trade agreement. In scenario 3, we fully substitute the technological structure of MERCOSUR's agricultural and food processing sectors with the EU's technological structure. Hence, we introduce new $\widetilde{\mathbf{A}}^{\bullet d}$ and $\widetilde{\mathbf{A}}^{o=d}$ matrices which lead to alternative inverse matrices $\tilde{\mathbf{L}}$ We then measure variations on production-based emissions as:

$$\Delta\mathbf{e} = \frac{\hat{\mathbf{g}}\tilde{\mathbf{L}}\mathbf{f} - \hat{\mathbf{g}}\mathbf{L}\mathbf{f}}{\hat{\mathbf{g}}\mathbf{L}\mathbf{f}} \times 100 \tag{6}$$

All our trade shocks based on the results Latorre, et al. (2021) . Latorre, et al. (2021) estimate the effects trade tariff changes induced by EU-MERCOSUR free trade agreement using a Computable General Equilibrium model (CGE). They report detailed results by product on exports from Spain to each country in MERCOSUR. Latorre, et al. (2021) also report changes in Spanish imports. Therefore, their results can be used to shuffle our trade matrix. The agreement will be implemented in phases. So, we include estimates for the 1st, 5th, 11th, 16th year after it comes to force. For all three scenarios, we study how these potential environmental impacts might affect Spain in meeting her established goals on GHG emissions 'reduction in the short run.

The basic data used in this section are extracted from the Interactive Foreign Trade Report available on the website of the Ministry of Agriculture, Fisheries and Food[8]. Export and import dynamics are analysed in value (million euros) and volume (expressed in tons). In order to eliminate the effect of price changes in the period of analysis, these are deflated with the consumer price index; however, it should be noted that the evolution of the series of values can still hide changes in relative prices that are not corrected, either by the general evolution of prices or by technological changes unrelated to the evolution of the volume of goods. Therefore, it is important to make an analysis of volumes that are closely linked to the degree of Green House Gas (GHG) emissions.

The data since 2015 is presented below, in order to analyse any change in trend because of the signing of the EU-MERCOSUR treaty subscription agreement, given in 2019; that is, if a change in trend is reflected as a strategy in anticipation of the ratification of the agreement. Additionally, it is important to consider that from 2015 to date there have been international events that significantly affected international trade, events unrelated to the signing of the agreement, such as the health crisis created by COVID-19 or the war between Ukraine and Russia.

In addition, Bolivia's entry into the agreement is noteworthy. Although it was not a member of MERCOSUR at the time of signing in 2019, it will be a member at the time of the potential ratification of the agreement and will be a full member during the execution of the agreement[9]. Therefore, the results distinguish with and without Bolivia's participation.

[8] https://www.mapa.gob.es/es/ministerio/servicios/analisis-y-prospectiva/comercio-exterior/powerbi-comex.aspx
[9] Bolivia to have full rights in 2028.

Results

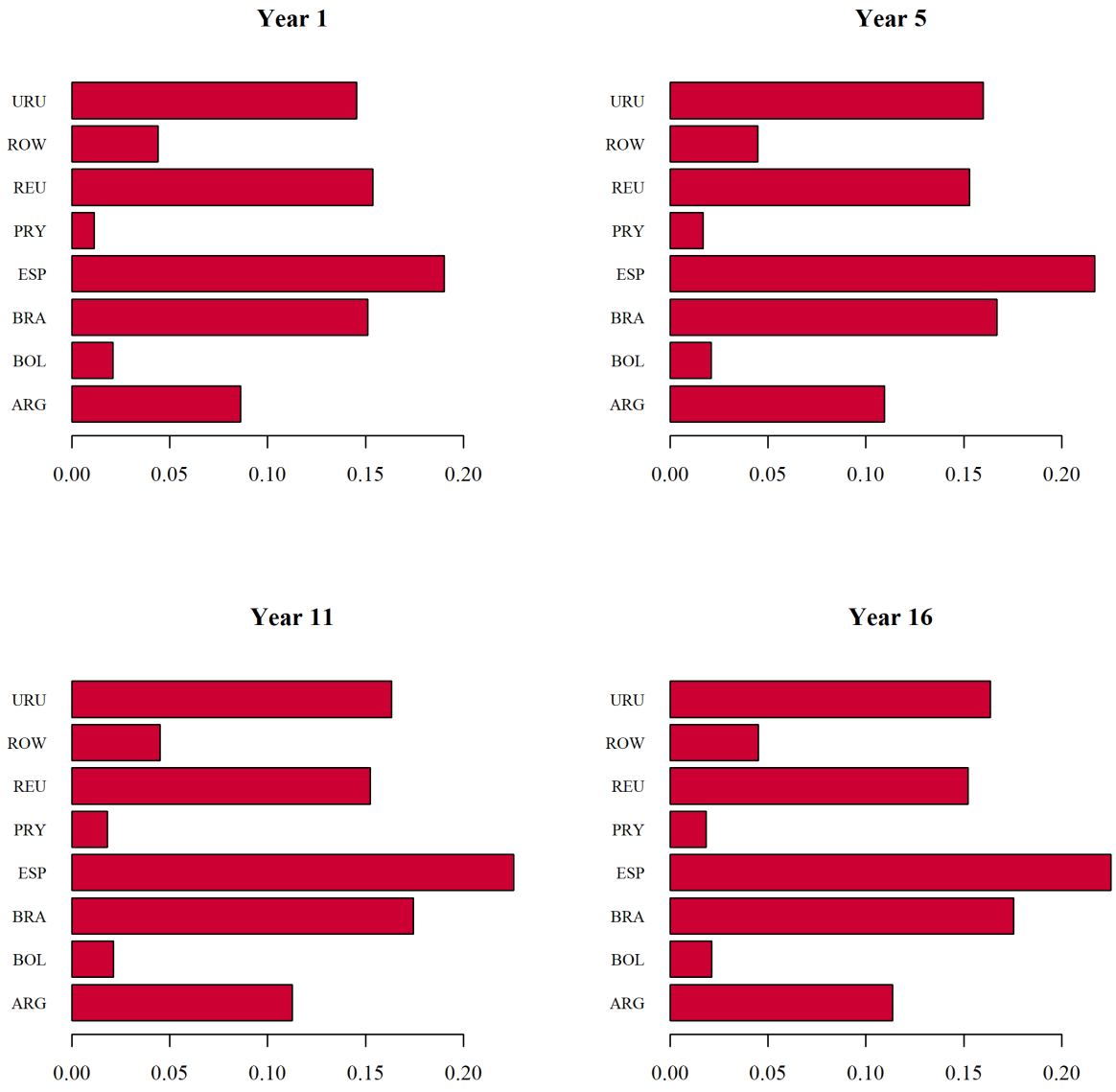
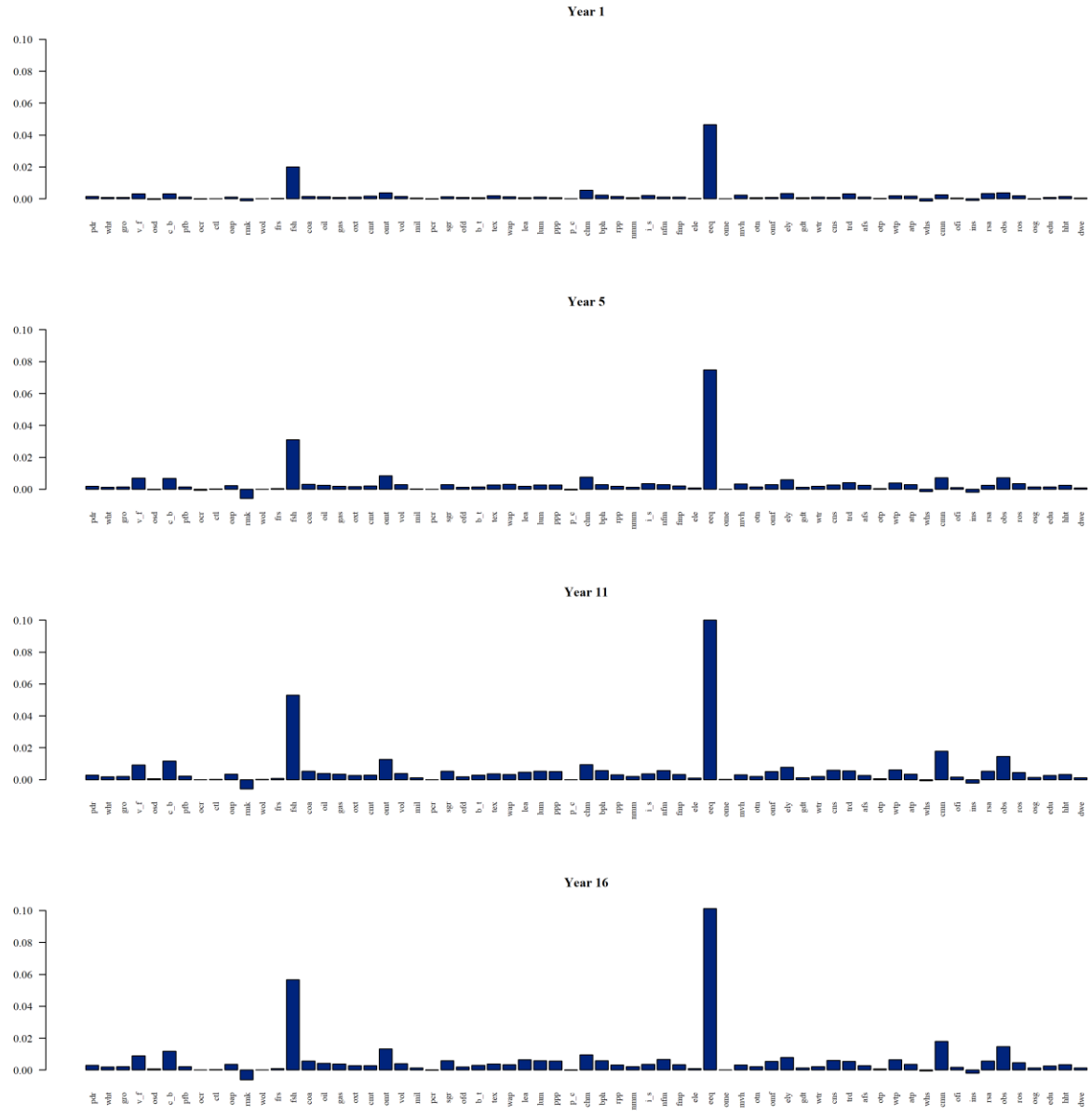


Figure 4. Potential GHG emissions' variation by country after shocking Spanish exports.



Evaluation of the emissions results and Spanish GHG emissions targets

After obtaining the effects of the EU-MERCOSUR agreement on emissions for Spain, we take them into consideration to analyse the effects on reaching 2030 objectives. According with the Regulation (EU) 2023/857 of the European Parliament and of the Council of 19 April 2023[10] Spain must decrease GHG emissions by 37.7% in 2030 compared to 2005, to achieve the objectives set

[10] This regulation amends Regulation (EU) 2018/842 on binding annual greenhouse gas emissions reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and Regulation (EU) 2018/1999

by the European Union. The emissions forecast in Spain until 2025, which would be compatible with Spain's emissions targets, are shown in the following table 1.

Table 1: Spanish emissions compatible with 2030 target

2021	2022	2023	2024	2025
200 997 922	198 671 005	192 805 142	186 904 935	181 004 72

Since there are no specific 2030 environmental targets for the agri-food sector, we assume that this sector must make the same average reduction as the rest of the economy, set at 37.7%.

We consider 2 scenarios:

1) The shock of the EU-MERCOSUR agreement occurs in a context where emissions will be reduced at the same annual rate as the agri-food sector has made during 2005-2023 up to 2030.
2) Additional measures designed to accelerate the reduction of GHG emission in the agri-food sector are implemented and the reduction rate is accelerated. We will use data from the analysis carried out by the European Environment Agency[11] and results from our second simulation scenario in our impact analysis section. In this simulation scenario we consider the change in technology which may occur in the agri-food sector due to EU-MERCOSUR agreement.

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[11] https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-from-agriculture

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