

# Workshop on impacts of the EU-UK Trade and Cooperation Agreement on fisheries and aquaculture in the EU

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## Part II: Trade aspects



**Fisheries**





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### **Abstract**

This study is the second research paper in a series of three, commissioned for a PECH Committee Workshop. It applied the MAGNET model to quantify the impact of the EU-UK TCA on fish related sectors. The results show negative impacts on trade, production and consumption of fisheries and aquaculture products for both parties. For the EU, the biggest losses are found in the fish processing sector. The overall impact is driven by increased trade costs whereas the impact of a reduced total allowable catches is rather limited.

This document was requested by the European Parliament's Committee on Fisheries.

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## LINGUISTIC VERSIONS

Original: EN

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Manuscript completed in January 2022

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### **Please use the following reference to cite this study:**

Bartelings, H and Smeets Kristkova, Z 2022, Research for PECH Committee – Workshop on impacts of the EU-UK Trade and Cooperation Agreement on fisheries and aquaculture in the EU – Part II: Trade aspects, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels

### **Please use the following reference for in-text citations:**

Bartelings and Smeets Kristkova (2022)

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## LIST OF ABBREVIATIONS

<b>AVE</b>	Ad-valorem equivalent
<b>CFP</b>	EU's Common Fisheries Policy
<b>CGE</b>	Computable General Equilibrium
<b>EEZ</b>	Exclusive Economic Zone
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FAPs</b>	Fisheries and aquaculture products
<b>FTA</b>	Free Trade Agreement
<b>GTAP</b>	Global Trade Analysis Project
<b>MAGNET</b>	Modular Applied GeNeral Equilibrium Tool
<b>NTM</b>	Non-Tariff Measure
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PECH Committee</b>	European Parliament's Committee on Fisheries
<b>SDG</b>	Sustainable Development Goals
<b>SPS</b>	Sanitary and phytosanitary measures
<b>TACs</b>	Total Allowable Catches
<b>TCA</b>	EU-UK Trade and Cooperation Agreement
<b>TFC</b>	Trade Facilitation Costs
<b>UNCTAD</b>	United Nations Conference on Trade and Development
<b>WTO</b>	World Trade Organization

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## **EXECUTIVE SUMMARY**

Following the provisional application of the EU-UK Trade and Cooperation Agreement (TCA) as of 1 January and entry into force on 1 May 2021, it is a very timely moment to investigate its potential trade and economic impacts both on the EU and the UK. As several trade and cooperation aspects such as the agreements on the total allowable catches (TACs) came into force only recently, ex-ante approaches are needed to understand the range of the potential trade and economic impacts of the TCA. This study aims to contribute to this by simulating an impact of the TCA in various scenarios that explore the possible combinations of trade and TACs measures.

### **Methodological approach and scenario design**

To make a comprehensive impact analysis, the methodological approach needs to consider the interconnection of fisheries and aquaculture with other actors in the economy – producers, processors, consumers and traders, and capture their interactions in the context of an open economy, with possible implications for the non-EU markets. CGE (Computable General Equilibrium) models are appropriate tools to address these needs. This study applied a CGE model MAGNET (Modular Applied GeNeral Equilibrium Tool) to quantify the impact of the TCA on fish related sectors. The commodity and regional aggregation of MAGNET was built tailored to the needs of this study, i.e., to provide insights into the impacts on the markets of wild fisheries products, fish processing products and aquaculture products for the most important fish producing EU Member States (selection of 9 regions), the UK and most relevant trading partners such as Iceland and Norway.

### **Impacts of the TCA on trade in Fish and Aquaculture Products (FAPs)**

The terms of the new relationship established in the TCA bring negative impacts on aggregate trade balance in FAPs both for the UK and the EU (about -1% in the EU and -20% in the UK). Whereas the UK trade balance declines in all FAPs, in the EU, trade in fish processing products is the main driver of the trade balance loss. Due to the imposition of trade barriers, the UK's increased TACs do not create advantage on the export markets. On the other hand, EU Member States which fish outside of the UK Exclusive Economic Zone (EEZ) such as Spain are expected to export more (+0.6%) due to the increased competitiveness on the EU Single Market. Third countries benefit from Brexit by taking over the respective trading positions of the EU and the UK. Asian and American countries take advantage in processed fish trade whilst Norway, Iceland, the rest of Europe and Russia compete more in the sector of fisheries and aquaculture. Despite the trade reorientation to the other territories, total value of trade declines, leading to a trade diversion effect of the TCA.

### **Impacts of the TCA on production of FAPs**

The TCA is expected to cause a reduction in production volume of FAPs (-0.7% for the EU and -3% for the UK). The production impacts of the TCA on the EU are dominated by fish processing and much less by wild fisheries, where the reduction of TACs is moderate on the aggregate level and there are possibilities to adjust by shifting fish landings to other EU countries such as Spain. On the aggregate level, the decline of fish processing production is rather moderate (-2.5%), but zooming into the EU Member State level, more notable shocks are noticed, with declines of production volume up to 11% in Ireland, 6% in Sweden and 5% in the Netherlands. Producer prices of FAPs in the EU remain almost unaffected by the TCA (+0.5%) except for Ireland, which will see slightly stronger price inflation (1%).

Regarding the UK, the effects on production volume vary - positive effects are expected for wild fisheries due to the increased TACs (+3%), but negative effects on the aquaculture sector (-8%) due to the increased trade costs. The excess supply of landed fish results in a drop of domestic producer prices of wild fisheries (-3.5%) which takes away all gains for the wild fisheries producers in terms of value of landed fish.

Looking separately at the TCA measures shows that increased trade costs have more profound impacts than the TACs measures. For the EU, production value of FAPs is expected to decline by about 40 million USD with only TACs in place and by about 130 million USD including also the non-tariff measures (NTMs) (-140 million USD for fish processing). As for the UK, the gains in production value from increased TACS (about 40 million USD) are overruled by losses due to the NTMs (over 200 million USD).

## Impacts of the TCA on consumers of FAPs

With respect to the TCA impacts on consumers, a moderate increase in consumer prices and a reduction in consumption of FAPs across all countries can be expected (-0.6% in the EU and -0.8% in the UK). On the aggregate EU level, the impacts on consumer prices are quite limited (about 0.6%), although some EU Member States may see more pronounced impacts, particularly Ireland with price increases of 5%, and the Netherlands and France with price increases of 1.5%. In the UK changes in consumer prices are less than +1%. EU consumers can more easily substitute fish from the UK by fish from the EU, as for the UK, the substitution possibility is more limited. As for the fish consumed in food services, negative impacts are expected, mainly for the UK, driven by a decline of purchasing power of households.

## Economy-wide impacts of the TCA

The macroeconomic and Sustainable Development Goals (SDG) perspective shows some trade-offs in the impacts of the TCA on both parties. In general, the UK economy is notably more affected by the TCA (4% decline of GDP vs 1% for the EU). However, the UK's primary agricultural sector may benefit from increased production due to a higher reliance on domestic resources.

## Conclusions and recommendations

The TCA is a lose-lose situation to all affected parties and notable welfare losses can be expected due to increased protectionism and misallocation of resources. Parties outside of the EU and the UK, like Norway and Iceland, are expected to increase their trade in FAPs with both the UK and the EU.

The overall impacts of the TCA are larger for the UK than the EU, with Ireland being a notable exception. For the EU the main impact is not on the wild fisheries but on the fish processing sector, due to the increased trade costs. The following set of recommendations are proposed:

- The impact on the fish processing sector could be reduced by a removal of the non-necessary NTMs trade cost burdens by for instance providing a mutual recognition of the origin and quality of the fisheries products.
- As the fish processing sector is most negatively impacted, specific measures to support the EU fish processing industry could be considered. For instance, the Brexit Adjustment Reserve (Regulation (EU) 2021/1755 of the European Parliament and of the Council of 6 October 2021) could also incorporate measures to support fish processing businesses. It may also be worthwhile to further analyse the impact of re-exporting tariffs on fish related products imported from non-EU countries and exported to the UK.

- On the aggregated sector level the impact of the TCA on wild fisheries is relatively small (-40 million USD), particularly when compared to the impact on fish processing (-170 million USD). However, this does not mean that individual companies are not impacted. It would be worthwhile to carry out complementary case studies to assess company-level impact of the reduced TACs.

## 1. INTRODUCTION

In the last five years, when the conditions and the realization of the Brexit scenario were still unclear, a plethora of studies was produced that discussed the potential impact of the UK leaving the EU, mostly advocating expected losses for both parties. The potentially negative impacts of Brexit were also discussed in the fisheries context, see the studies of Bartelings and Smeets Kristkova (2018), Goulding et al. (2017), Turenhout et al. (2017), Phillipson and Symes, (2018), Billiet, 2019 and Gallic et al. (2018).

The EU and the UK signed the TCA that provides the terms and conditions under which the two big economic players will trade and cooperate on 30<sup>th</sup> December 2020. An important outcome in the area of trade is the continuation of free trade in goods, with zero tariffs and no import quotas. However, a large part of the implicit trade costs is related to non-tariff measures (NTMs), which are caused by newly implemented safety control, so-called sanitary and phytosanitary (SPS) measures and increased bureaucracy, leading to a rise of trade facilitation costs (TFCs). Therefore, even a scenario with zero import tariffs may negatively affect trade flows due to increased trade costs. Concerning fisheries, the TCA represents a compromise between the two parties, as it allows the UK to gradually gain a higher share of fish access from its own waters (up to 25% at the end of five years), but from 2026 on, a second stage of the TCA comes into force when all options including a complete control of the UK over its fishing grounds are open.

With the TCA in force now, it is a very timely moment to investigate its potential trade and economic impacts. Ex-ante approaches are needed to understand the range of the potential trade and economic impacts. This study aims to contribute to this by simulating an impact of the TCA in various scenarios that explore the possible combinations of trade and TACs measures.

The study is structured as follows. First the methodological approach (Annex) and the construction of the TCA scenario is explained (Chapter 2). Subsequently, the results of the ex-ante impact analysis are provided in Chapter 3. Finally, Chapter 4 concludes by formulating main conclusions and policy recommendations.

## 2. DESCRIPTION OF THE TCA SCENARIOS

### KEY FINDINGS

- Aggregate fish access reductions that follow from the TCA are rather moderate, with the biggest impacts foreseen in the access to pelagic fishes (Ireland -18%, Germany, Belgium, Netherlands -13%). If unused quotas are taken into account, the impacts are even more moderate (with almost no impacts on the EU's demersal fisheries).
- The largest gains in the fish access for the UK would be in the group of pelagic fish (23%) followed by demersal fish (16%).
- Two sources of trade barriers are considered in the scenario analysis – non-tariff measures (NTMs) and trade facilitation costs (TFCs) and their aggregate levels vary from 3% for services up to 20% for agriculture and fisheries.

### 2.1. Design of the policy scenarios

This study makes use of the dynamic version of the MAGNET model which allows to simulate changes in time and provides flexibility in choosing the desired time horizon. The focus is on the period 2021-2025 in which the crucial TCA changes are implemented. The first starting point is to construct a reference case scenario - Baseline, which will simulate the fictional future of EU-UK relations without the existence of the TCA (

Table 1). In this scenario, both tariff and non-tariff measures are non-existent as the EU and the UK remain under the EU Single Market. Similarly, there are no fish access restrictions. This baseline scenario is useful as a reference point to determine the costs of the TCA.

**Table 1: Overview of the MAGNET scenarios in the adjustment period**

	Scenario name in MAGNET	2021-2025 - Adjustment Period			
		Fish Access	TFC	NTM	Tariffs
<b>Baseline</b>	BaseGDPEndoBrexit	no change	zero	zero	zero
<b>TCA</b>	Brexit_EU_UK_TCA_fis haccess_TFC_NTM	TACs reduction	5%	from 3 - 20%	FTA (zero)
<b>TCA_QA</b>	Brexit_EU_UK_TCA_fis haccessQA_TFC_NTM	TACs reduction with adjusted quota uptake	5%	from 3 - 20%	FTA (zero)

Source: authors' design

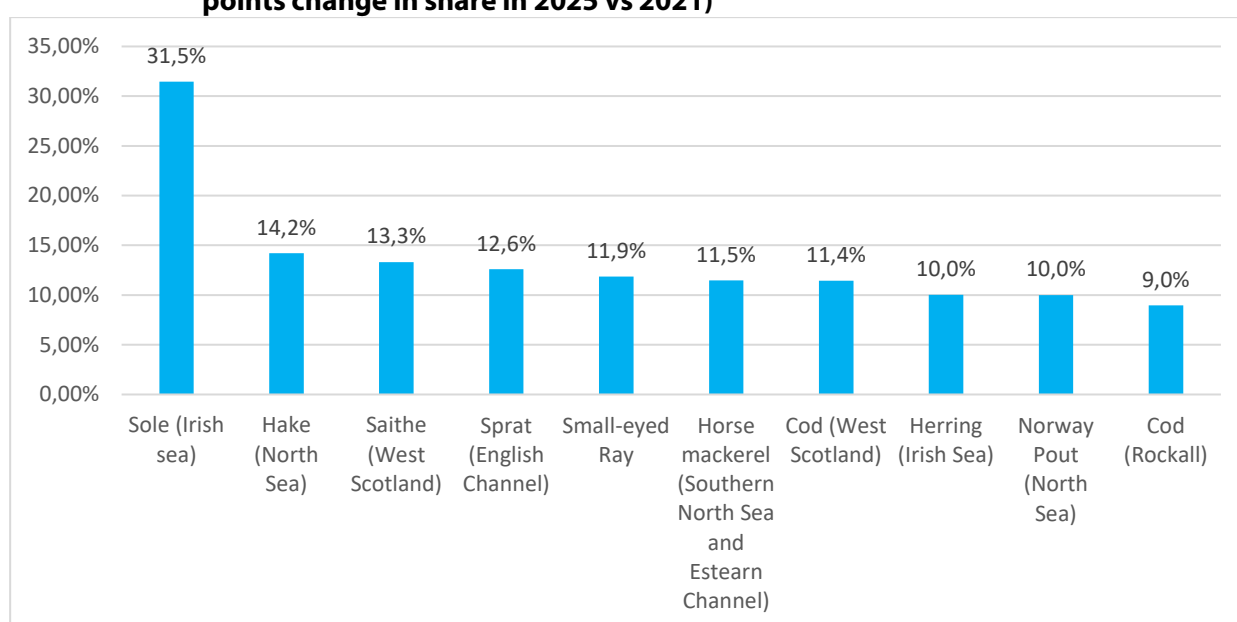
The TCA scenarios are implemented in the adjustment period (2021-2025) and take into account the main features of the TCA. First, a gradual decline of TACs for the EU fishers is implemented. Two alternative options for the TACs decline are considered, either under the conditions of a constant (TCA) or an adjusted quota uptake (TCA\_QA). Regarding trade measures, non-tariff trade measures are imposed, distinguishing two sources of trade costs – TFCs and NTMs. Because of the existence of the free trade area between the EU and the UK, import tariffs remain at zero levels as in the baseline. In the

scenario analysis the impacts of the TCA with respect to the baseline are calculated and, where relevant, a decomposition of the impact of individual drivers (TACs reduction and trade shocks) is presented.

## 2.2. TACs implemented in the TCA scenarios

The reduced TACs for the EU is defined in the TCA, Annex 1 Fish. The changes in the TACs shares are agreed for about 145 individual fish stocks and the reductions differ importantly across the different species. Figure 1 illustrates the top 10 most affected fish stocks, where sole from the Irish sea would see an increase of about 30 percentage points for the UK (from a 31% share in 2021 to a 63% share in 2025), followed by hake (14%) and others. To implement these changes in fish access in the TAC scenario, the individual fish stocks need to be aggregated to four composite fish families that are modelled in MAGNET: crustaceans, demersal, pelagic and others.

**Figure 1: Top 10 fish stocks with the highest increase in the UK's fish access (percentage points change in share in 2025 vs 2021)**



Source: TCA (2021) and authors' processing

In the process of aggregation, various sources of information need to be used, such as the values of fish stocks before the change, mapping to all fish landings in the respective category, information on the quota uptake and fish prices to estimate fish landing value before and after the change. These inputs and the resulting aggregated TACs reductions per fish families were provided by Stewart et al. (2021).

Table 2 provides the overview of the TACs reductions for each of the aggregated fish groups. Under the assumption of a constant quota uptake, the most negatively affected countries are Ireland, Belgium, the Netherlands and Germany, which would be hit most in the landings of pelagic fishes (-18% for Ireland, -13% for Belgium and Germany). The reduction in TACs of demersal species is smaller, about 5%, except for the Netherlands and Ireland where it can be up to 13%. The impact in shellfish (crustaceans) fish access concerns mostly Ireland. These impacts are calculated under a constant quota uptake. In reality, for various fish stocks, data shows that quotas have not been fully exploited. This may indicate that it is not economically beneficial to catch all the quota. As fishers are economic agents, they are expected to maximize profit and not quota uptake. With the possibility of increasing the quota uptake, to compensate for the fish reduction in the TCA the aggregated impacts of reduced fish access

for the EU countries would be rather small (Table 2). The most affected countries would be again Ireland, the Netherlands and Germany, where pelagic fish access would be reduced by 6% (Netherlands) up to 18% (Ireland). Independently of the assumptions on quota uptake, the UK will benefit from higher fish access for pelagic fish (23%), followed by Demersal (16%) and shellfish (3%)<sup>1</sup>. In the results section, the study reports the impact of the constant uptake of the quota but in the sensitivity analysis (chapter 3.6), the impacts of the adjusted uptake of the quota are explored as well.

**Table 2: Aggregated TACs reduction based on the TCA**

Species group/ Country	Constant uptake			Adjusted uptake		
	Demersal	Pelagic	Shellfish	Demersal	Pelagic	Shellfish
<b>BEL</b>	-5%	-13%	0%	0%	-2%	0%
<b>DNK</b>	-5%	-7%	0%	0%	-2%	0%
<b>EST</b>	0%	0%	0%	0%	0%	0%
<b>FIN</b>	0%	0%	0%	0%	0%	0%
<b>FRA</b>	-4%	-2%	0%	-1%	0%	0%
<b>DEU</b>	-7%	-13%	0%	0%	-11%	0%
<b>IE</b>	-13%	-18%	-9%	0%	-18%	0%
<b>LV</b>	0%	0%	0%	0%	0%	0%
<b>LT</b>	0%	0%	0%	0%	0%	0%
<b>NL</b>	-13%	-12%	0%	0%	-6%	0%
<b>POL</b>	0%	0%	0%	0%	0%	0%
<b>POR</b>	0%	0%	0%	0%	0%	0%
<b>ESP</b>	-1%	0%	0%	0%	0%	0%
<b>SWE</b>	-1%	-2%	0%	0%	-1%	0%
<b>UK</b>	16%	23%	3%	16%	23%	3%

Source: Stewart et al. (2021)

### 2.3. Tariff and non-tariff trade measures implemented in the TCA scenarios

Although the TCA maintains the free-trade zone between the UK and the EU with no tariffs<sup>2</sup>, there will be an expected increase in trade costs due to exiting the European Single Market. These trade costs refer both to i) non-tariff measures and ii) trade facilitation costs.

NTMs raise costs associated with regulatory differences across countries such as labelling requirements, health standards, control procedures, etc. The NTMs are probably the most significant economic measures of the TCA, because they affect trade in all sectors of the economy with potentially quite damaging impact. There are various sources that estimate the costs of NTMs and their economic impact. Earlier studies to be mentioned are for instance Egger et al. (2015), Yu et al. (2017), Francois et al. (2013) or Rojas-Romagosa (2016). Recently, new statistics on NTM measures and the impacts on trade were released by UNCTAD and World Bank (2019). The average ad-valorem equivalent (AVE) of

<sup>1</sup> For this moment, the study assumes that the UK will have enough capacity to make use of the newly created excess fish stock quota resulting from the TCA.

<sup>2</sup> An exception to this are the import tariffs applied by the UK on processed fish from the EU with origins from non-EU countries. This is left out of the analysis because MAGNET model does not provide the necessary detail to trace the impact of this type of import tariff.

NTMs is about 11% for technical measures, with rates reaching 25% for some of the agricultural commodities such as animal products.

An important contribution to the empirical estimation of the impact of NTMs was done by Cadot and Gourdon (2016) who used a new dataset of NTMs in 65 countries and estimated direct ad-valorem equivalents of sanitary and phytosanitary measures, Technical Barriers to Trade and other NTM measures. The results also show that agricultural and food products have the highest NTM costs due to the role of the Sanitary and Phytosanitary measures. For instance, trade in animals is found to have up to 30% AVE rates, which is comparable to the UNCTAD study. In case of trade in fish related products, fish related product exporters need to newly arrange an export health certificate for their fish related products which significantly delays the exports procedures and leads to an additional increase in trade costs. The authors also find that the presence of Regional Trade Agreement reduces the NTM burden (on average by 3 percentage points in terms of AVE rates and about 25% in terms of total NTM costs). This is explained by the fact that the presence of an RTA reduces compliance costs due to mutual recognition, better consumer information and reduced home bias for consumer demand from abroad. The rates estimated by Cadot and Gourdon (2016) were implemented by the study on the “Costs of Brexit” (Fussachia et al., 2020), where the authors simulate both No Deal and FTA scenarios.

In Shepherd and Peters (2020) the authors explore the role of NTMs on the post-Brexit relations between the EU and the UK. The authors simulate the possible impacts of leaving the EU using a panel data gravity to assess the trade promoting effect of the EU membership. This approach allows to identify the relative importance of NTMs in FTAs, customs unions and the European Single Market. However, direct AVE rates are not retrievable from this document. A useful source of NTM application for the Brexit case is the study of Dhingra et al. (2017) which provides the NTM costs estimated between the USA and the EU. For the optimistic scenario (assuming that the UK remains in the European Single Market), the authors assumed that the UK faces one-quarter of reducible NTMs faced by the USA, whereas in the pessimistic scenario this amounts to three-quarters. These NTM rates were consequently adopted by Freund and Springman (2021) in the study that focused on analyzing the impact of Brexit on food systems and diets in the UK.

The trade facilitation costs are related to the compliance with the administrative matters valid for non-EU countries, which include a proof of origin, export licenses and others. Details about concrete TFC measures can be found for instance in the KPMG study (2018) and Berkum et al. (2017). In Fussachia et al. (2020), the trade facilitation costs are considered to amount to 5.5% of transaction value, of which 2% are border control costs and 3.5 % rules-of-origin costs. This is in line with TFC rates of 5% applied by Berkum et al. (2017) for the border control checks. Additional custom formalities would further raise trade facilitation costs should the TCA adopt a WTO regime instead of the FTA.

**Table 3: Overview of the trade measures applied in the study**

Rates applied in MAGNET	NTMs	TFC	Total
Agriculture and food processing	15	5	20
Forestry, coal gas	5	5	10
Chemical and petrochemical	7.5	5	12.5
Other industry	5	5	10
Services	3	0	3

Source: authors' design

Having reviewed the most relevant sources of trade costs of the TCA, attention is paid now to implement these rates in the scenarios. The NTM rates applied in MAGNET (Table 3) are based on the rates shown in Table 3, with some aggregations over commodities. The highest NTM rates are applied for the primary and food processing commodities (15%), followed by the chemical and petrochemical sector (7.5%), manufacturing (5%) and services (3%). On the top of NTMs, TFC costs of 5% are imposed (except for services, which has a high rate of digitalization). The total non-tariff and trade facilitation costs range from 3% in services to 20% in primary agriculture and food processing.

### 3. ECONOMIC IMPACTS OF THE TCA ON FAPS

#### KEY FINDINGS

- The TCA is expected to bring negative impacts on trade balance in fisheries and aquaculture products (FAPs) (about -1% in the EU and -20% in the UK), reduction in production volume of FAPs (-0.7% for the EU and -3% for the UK) and a decline in consumed quantity (-0.6% in the EU and -0.8% in the UK).
- Although the EU and the UK compensate for the loss of trade by trading more with Norway and other non-EU countries, the total volume of trade decreases as a result of the TCA.
- The UK's fisheries and aquaculture markets are affected more than the EU's, although some EU countries will also see more pronounced impacts, particularly Ireland. On the other hand, Spain may slightly benefit due to the increased competitiveness on the EU Single Market.
- The biggest losses in terms of exports (-150 million USD) and production volume (-2% in the EU and up to -10% in Ireland) are found for the EU's fish processing sector, which requires further attention by governments to mitigate the negative impact of the TCA.
- The increased trade costs have larger impacts than the reduced total allowable catches (TACs). For the UK, the increased trade costs overrule the advantage of increased TACs in the wild fish sector.

#### 3.1. Baseline results

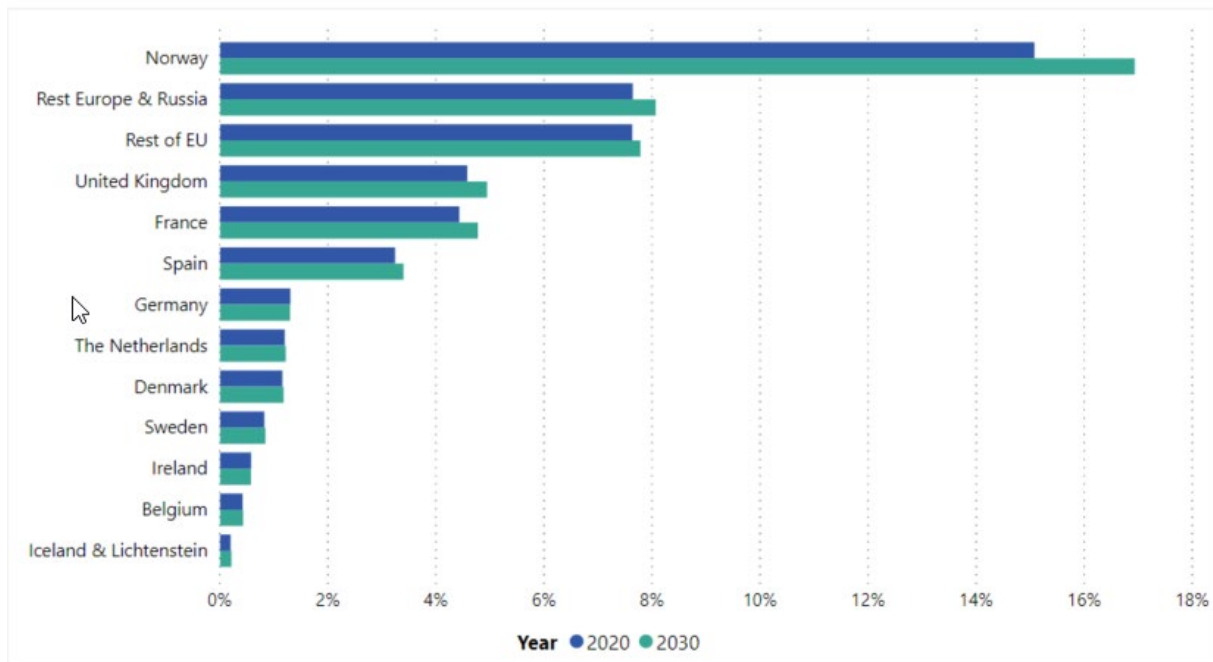
To analyse the impact the TCA will have on the fish producing sectors and the economy, a simulation is performed of how the economy and the fish producing sectors would develop by 2030 without any trade limitations between the EU and the UK. Analysing the way the fish markets and fish trade would develop without any trade barriers gives some idea of where potential problem areas could be. The scenario analysis then provides deeper understanding into the impacts of Brexit and makes an estimation of the potential macro-economic costs of these trade barriers.

The baseline assumes that the availability of fish stocks remains constant over the period 2019-2030. The fish stocks values for the years 2014-2019 have been taken over from FAO (2020). Based on aquaculture growth projections of the FAO a moderate technological development is assumed in aquaculture production worldwide in the period 2014-2030 (World Bank, 2013). The assumed GDP and population growth are based on the Shared Socioeconomic Pathway 2 (SSP2) scenario of the Intergovernmental Panel on Climate Change (IPCC) (O'Neill et al., 2017). The SSP2, with moderate GDP and population growth, is referred as the middle of the road and therefore considered as a suitable baseline (Riahi et al., 2017). Overall, baseline results are consistent with the latest prospects and trends from the OECD-FAO agricultural outlook at the 2028 horizon (OECD/FAO, 2019). Further, a discard ban is implemented in the period 2015-2020 and an increase in operational cost of fishing based on Buisman et al. (2013). Both the cost of labour and the cost of services will increase by 15%.

Europe produces about 10% of the world production of fish related products. The production of fish related products is quite diverse, as Figure 2 shows. Norway is the largest producer of fish related

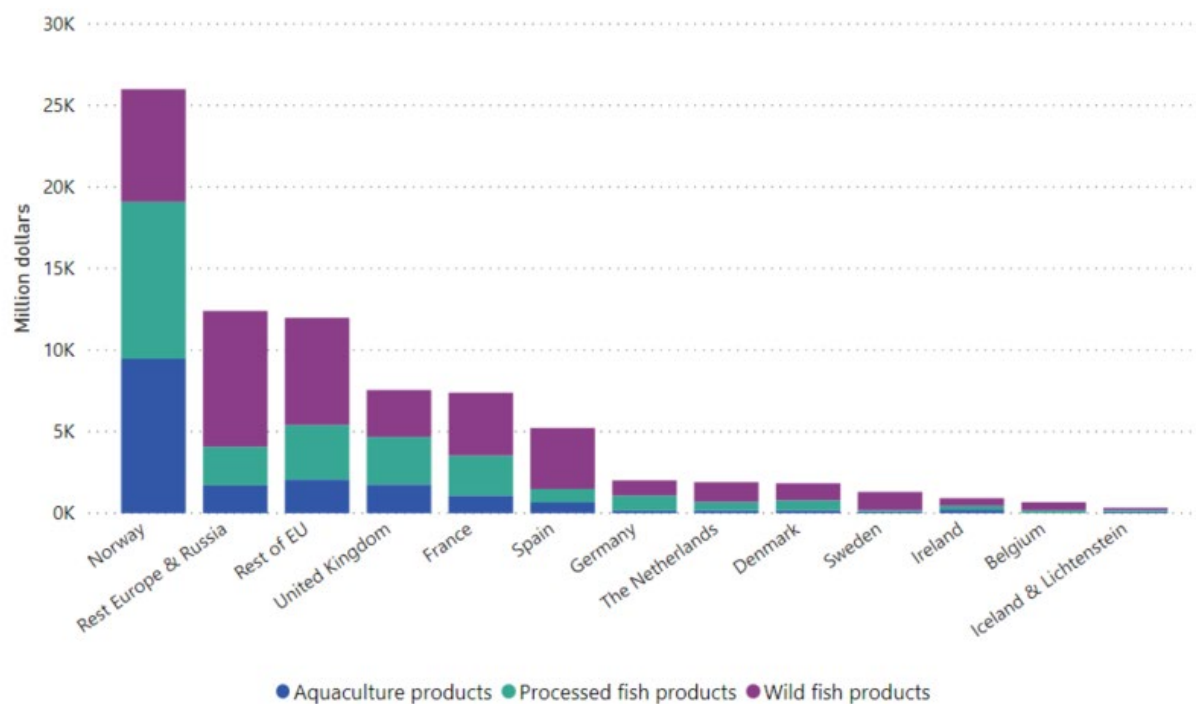
products in Europe. Production of fish related products is expected to increase moderately between 2020 and 2030.

**Figure 2: Production volume share of fish related products Europe (%), 2020-2030**



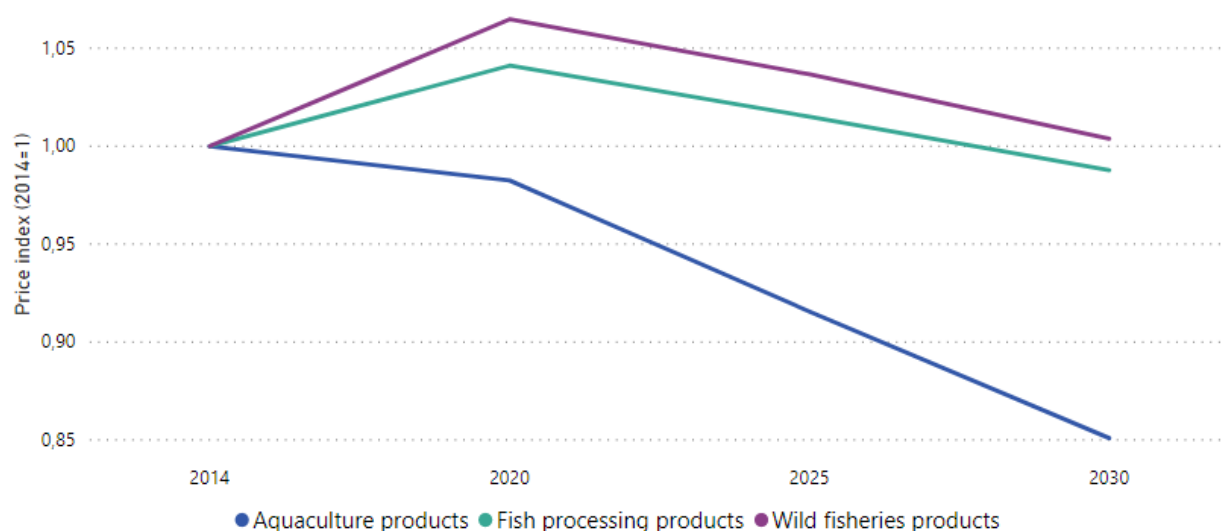
Source: MAGNET results

By 2030 wild fisheries production is still expected to be higher than aquaculture production in Europe. Figure 3 shows the production of various fish related products in 2030 in Europe. Again, Norway produces the largest amount of aquaculture products. However, the growth of aquaculture is expected to outpace the growth of fisheries due to limited fish stocks and expected technical change in the aquaculture sector. It is expected that aquaculture will grow as large as wild capture in Norway by 2030. In the EU aquaculture also grows by 2030 but wild fish remains larger than aquaculture fish.

**Figure 3: Production volume fish related products 2030 (million USD, in constant prices 2014)**

Source: MAGNET results

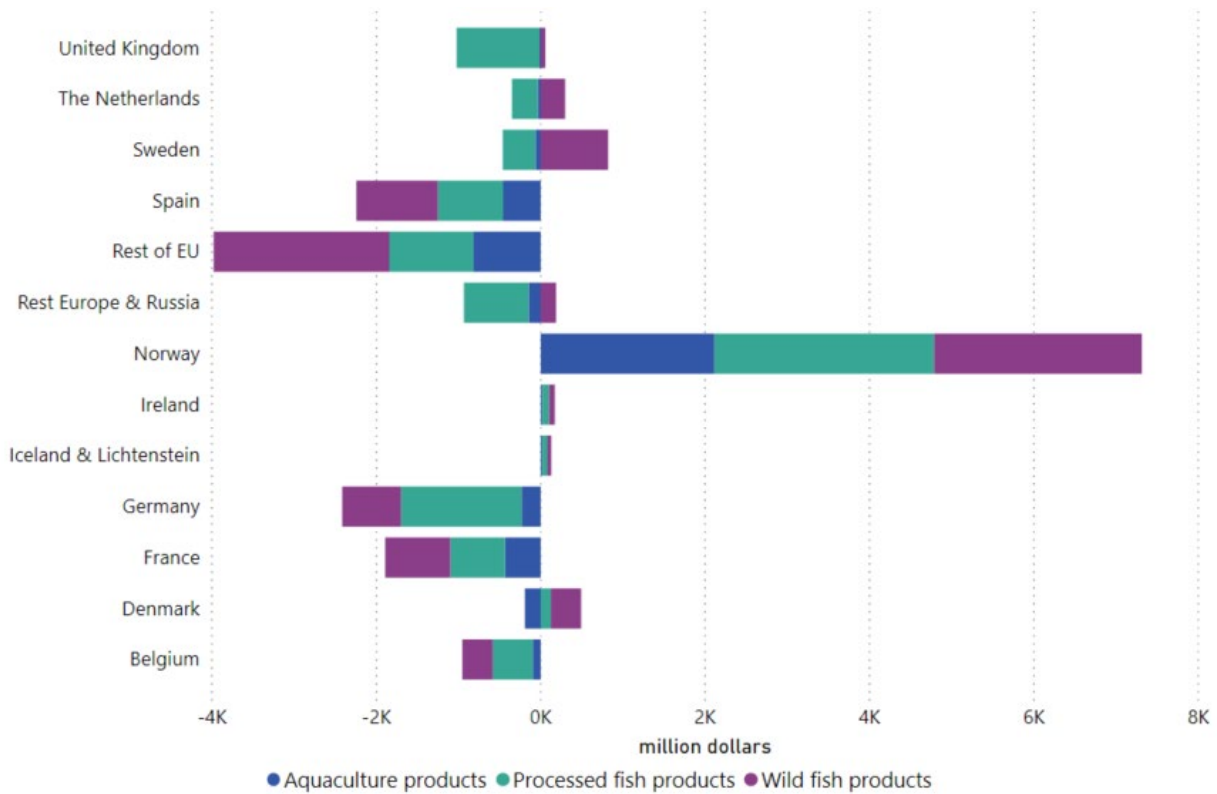
Prices for wild fisheries products in the EU are expected to rise between 2014 and 2020 and then decline as Figure 4 shows. This is mostly due to a decline in aquaculture prices. Aquaculture production is expected to become more feed efficient and will therefore be able to reduce its cost price. To stay competitive with aquaculture fish, wild fish prices will also slightly decline.

**Figure 4: Development of fish prices in the EU (fish price index)**

Source: MAGNET results

Most of the countries in Europe are net importers of fish related products as Figure 5 shows. Only the northern European countries (Norway, Sweden and Denmark) are net exporters of fish related products. This is not expected to change in 2030 in a business-usual-scenario.

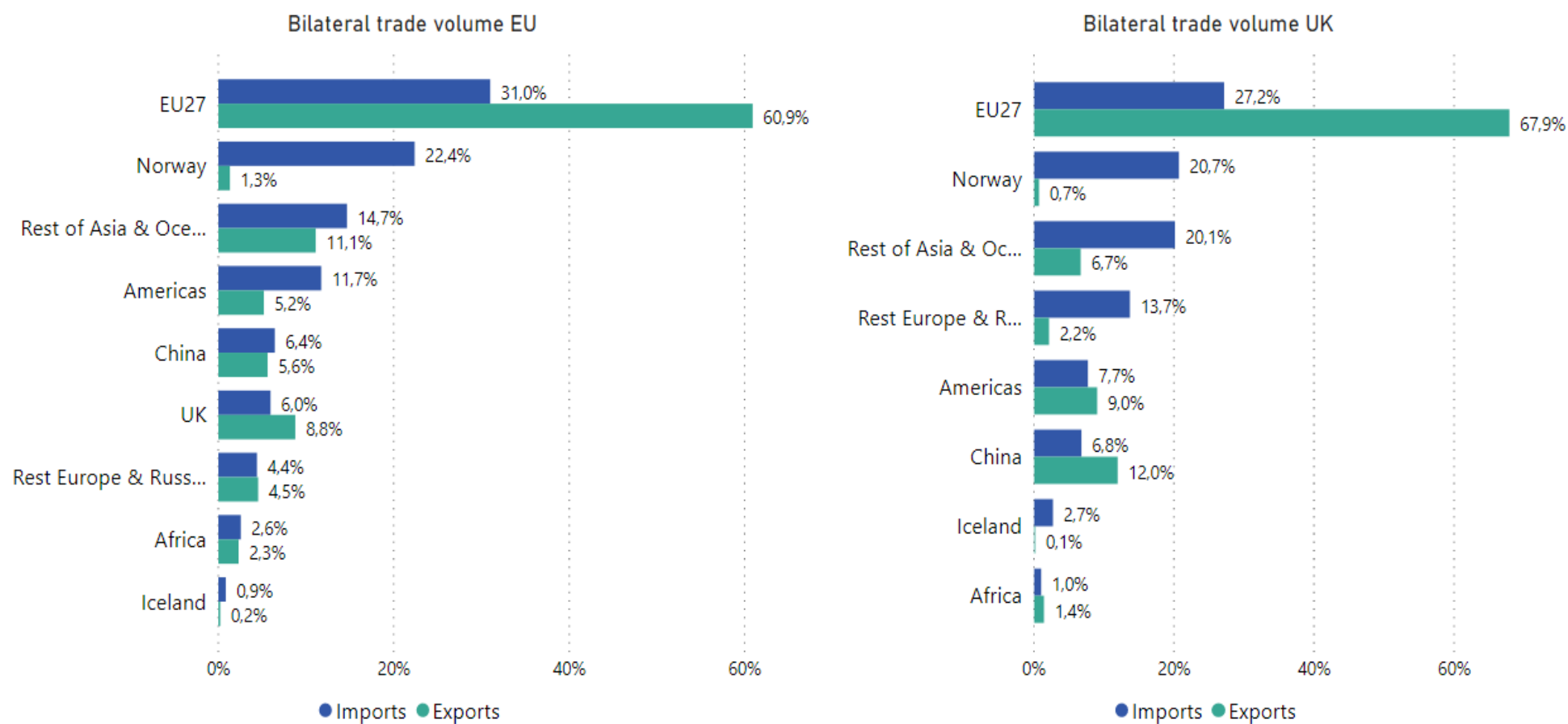
**Figure 5: Net trade in fish related products by 2030 (million USD)**



Source: MAGNET results

There is a lot of intra-EU trade in fish related products. The EU27 trades most of its fish related products within the EU. The most important trading partners outside of the EU27 are Norway, Asia and China. UK belongs to top 5 trading partners (excluding intra-EU trade) as Figure 6 shows. In the business-as-usual scenario in 2030, the EU27 is the most important trading partner for the UK. The UK also imports a lot from Norway and Asia in particular. It is clear that in the business-as-usual scenario, the UK is more dependent on the EU27 for its fish product trade than the other way around. Of course, for individual Member States like Ireland the situation may be different.

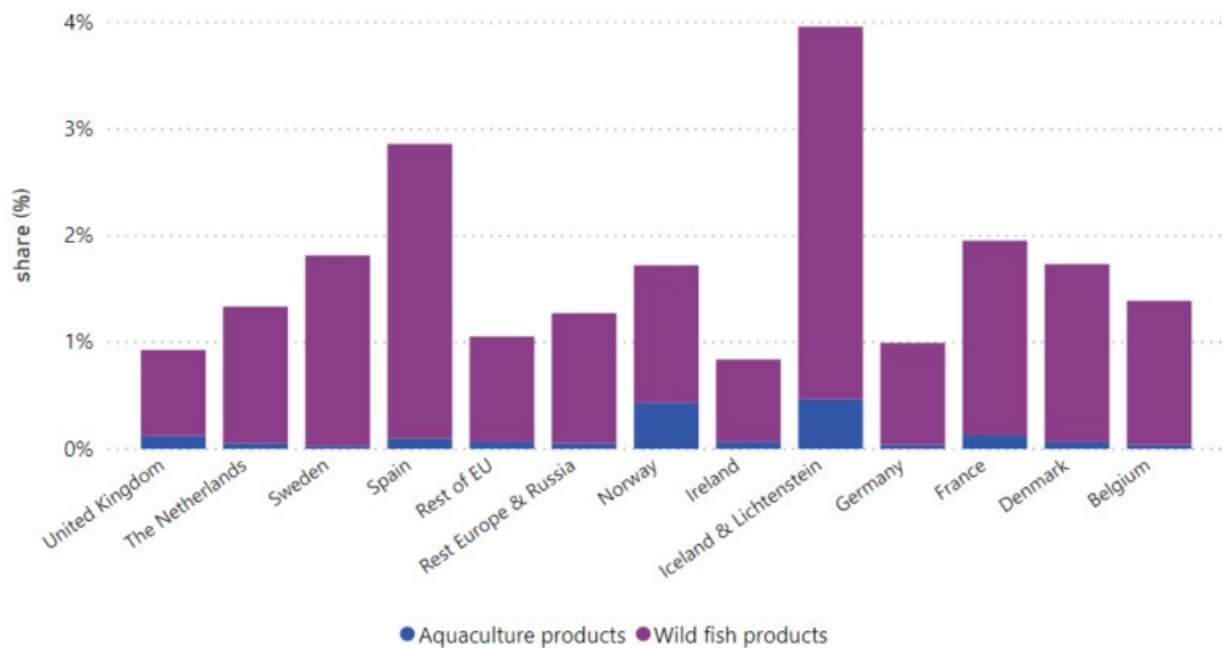
**Figure 6: Structure of bilateral trade of fish related products of EU and the UK with the main trading partners by 2030 (%)**



Source: MAGNET results

Figure 7 shows the importance of fish related products for the nutritional needs in a country. The importance of fish related products differs between the countries in Europe. About 4% to 15% of calories consumed come from fish related products.

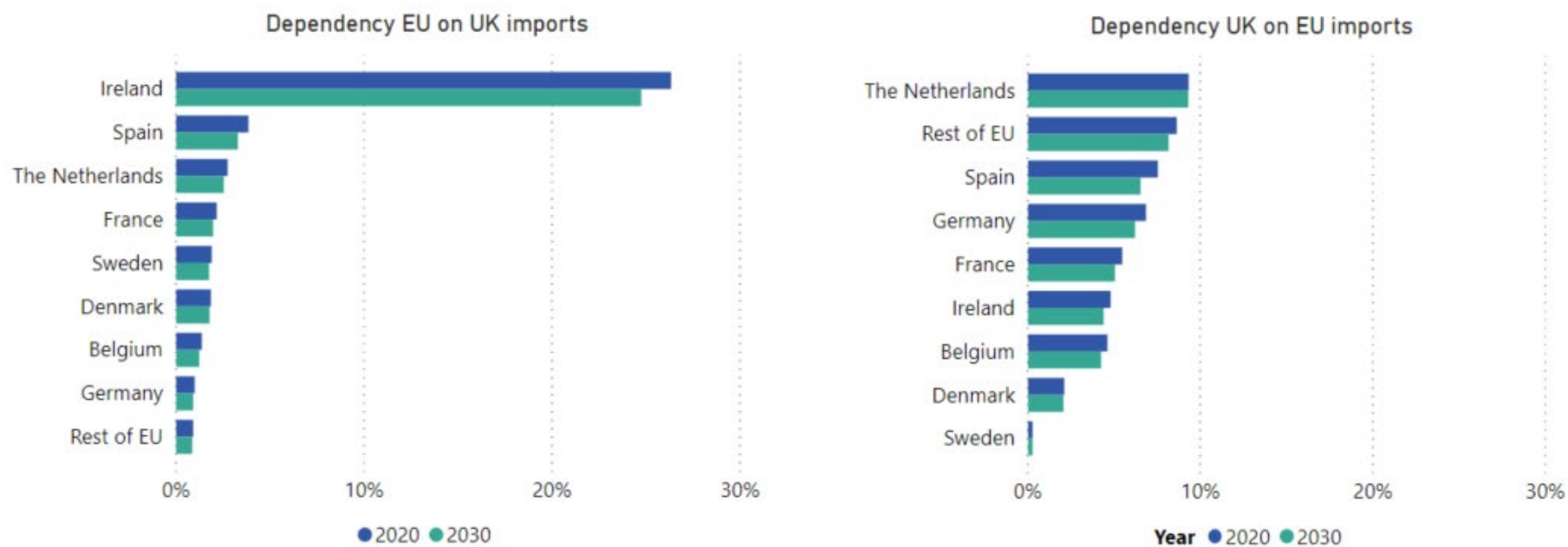
**Figure 7: Caloric consumption of fisheries products (% share of caloric consumption of fish related products in total caloric consumption)**



Source: MAGNET results

As the disruption of trade patterns due to the TCA can have an impact on the availability of food in a country, it is relevant to show the dependency of food consumption in European countries on the import of food products from the UK and vice versa (Figure 8). Especially Ireland is dependent on the import of food products from the UK. The UK, by contrast, is dependent on food products from the Netherlands, Rest of EU, Spain and Germany.

**Figure 8: Dependency of the EU on UK food imports and vice versa by 2030 (%)**

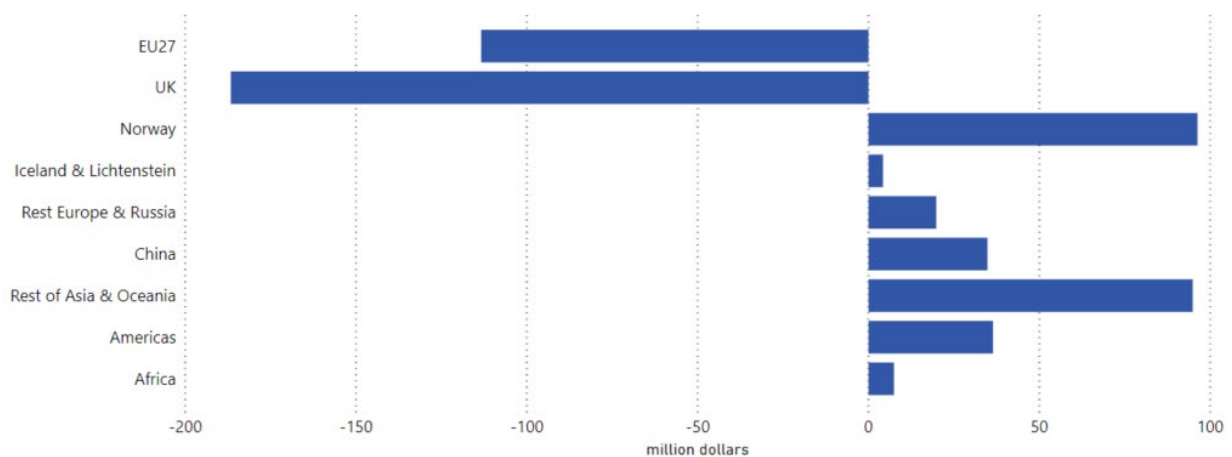


Source: MAGNET results

### 3.2. Impacts of the TCA on trade in FAPs

This subchapter provides an aggregate picture of the trade impacts of the TCA. Figure 9 shows that both the EU and the UK are foreseen to be negatively affected by the TCA implementation with a deterioration of the trade balance, which in the case of the UK amounts to - 190 million USD; the EU trade balance losses are about 110 million USD. Expressed in percentage change, the trade balance in the UK would decline by 20% and in the EU by 1%. On the other hand, several non-EU countries and regions benefit from this situation by improving their trade balance in fisheries and aquaculture products (+ 100 million USD), notably Norway and Rest of Asia and Oceania.

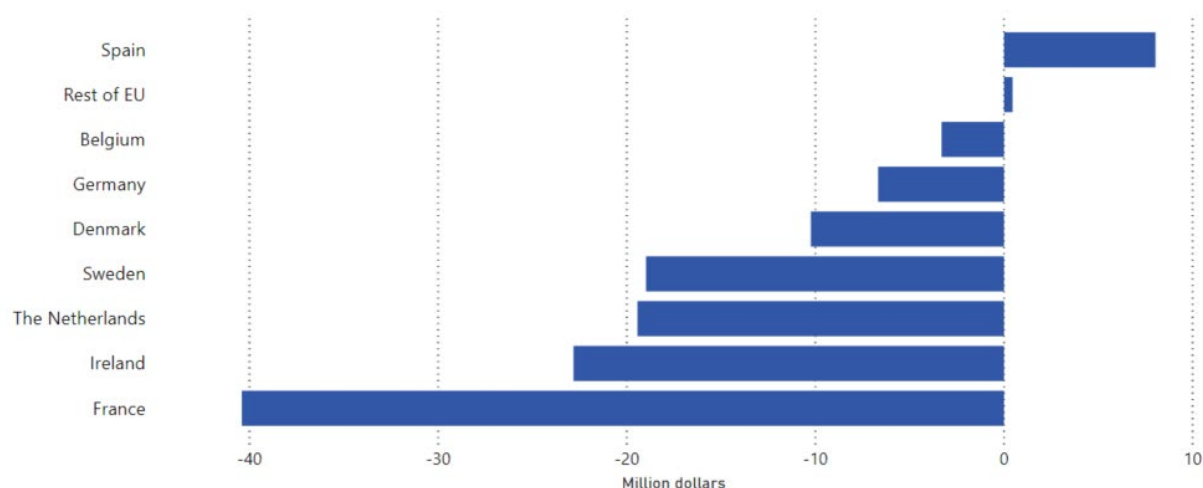
**Figure 9: Impact of the TCA on the trade balance with fish related products (absolute change versus baseline, million USD)**



Source: MAGNET results

Zooming into the individual EU Member States (Figure 10), it is found that the negative impact is expected for most countries except for Spain and Belgium, which may benefit from the TCA. The largest declines are recorded in France (-30 million USD), followed by Sweden (-20 million USD) and Ireland (-18 million USD).

**Figure 10: Impact of the TCA on the trade balance with fish related products in EU Member States (absolute change versus baseline, million USD)**

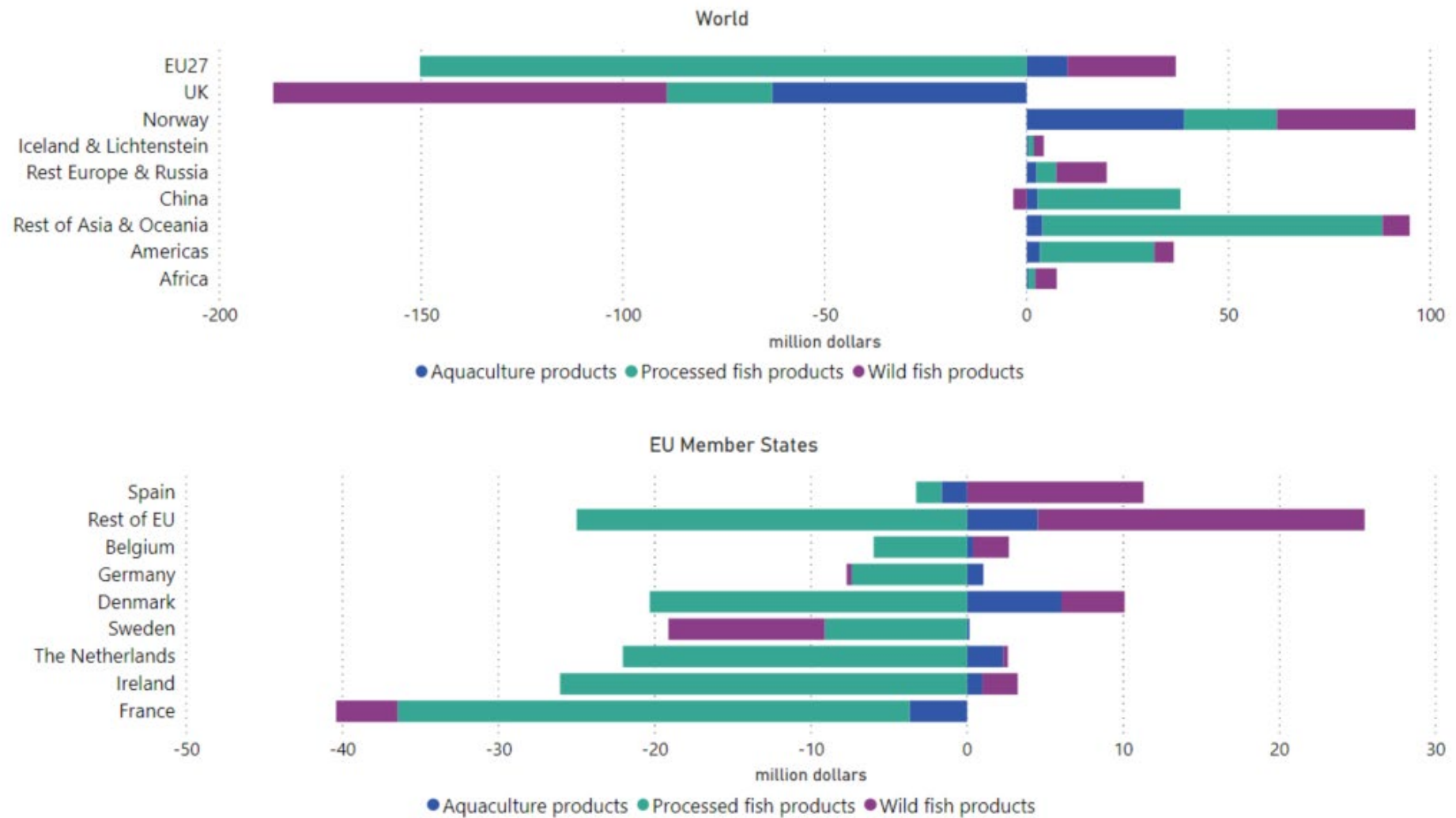


Source: MAGNET results

To understand better what determines the negative impacts on the fish trade balance in the EU and the UK, Figure 11 provides an overview of the composition of the trade balance in the fish related products for aggregate regions and for EU Member States. On the aggregate EU level, the negative trade balance is driven by fish processing products whereas the trade balance in wild fisheries products improves. Although the TCA enforces a gradual reduction of TACs for the EU fishers, this is not projected to materialize in decreased EU wild fish exports. This has to do with the imposition of the non-tariff trade measures that remove some of the competitive advantage for the UK exporters. In case of the EU, a large part of trade in wild fish is intra-EU trade and therefore remains unaffected by the TCA. This is different for the UK, which exhibits a large trade dependency on the EU, see Chapter 4.1, and the UK's trade balance deterioration occurs concerning all fish commodities. When observing the impacts on third countries, it is interesting to note that Asian and American countries can take advantage in processed fish trade whilst Norway, Iceland, and the rest of Europe and Russia compete relatively more in the segment of wild fish and aquaculture fish.

On the individual EU Member State level, it is seen that all EU countries face a decline in the trade balance in fish processing products. On the other hand, except for Sweden and France (and negligibly in Germany), the trade balance in wild fisheries and aquaculture products increases and consequently mitigates the negative impact on fish processing products. The Other EU regions also seem to benefit in trade of wild fish. The total impact then varies per EU Member State, with the biggest decline in the trade balance in fish related products in France, Ireland and Netherlands. Due to the fact that Spain and other EU regions fish outside of the UK Exclusive Economic Zone (EEZ), the TACs reduction in the TCA does not apply for them. Therefore they increase their competitiveness on the EU Single Market which is manifested by increased exports.

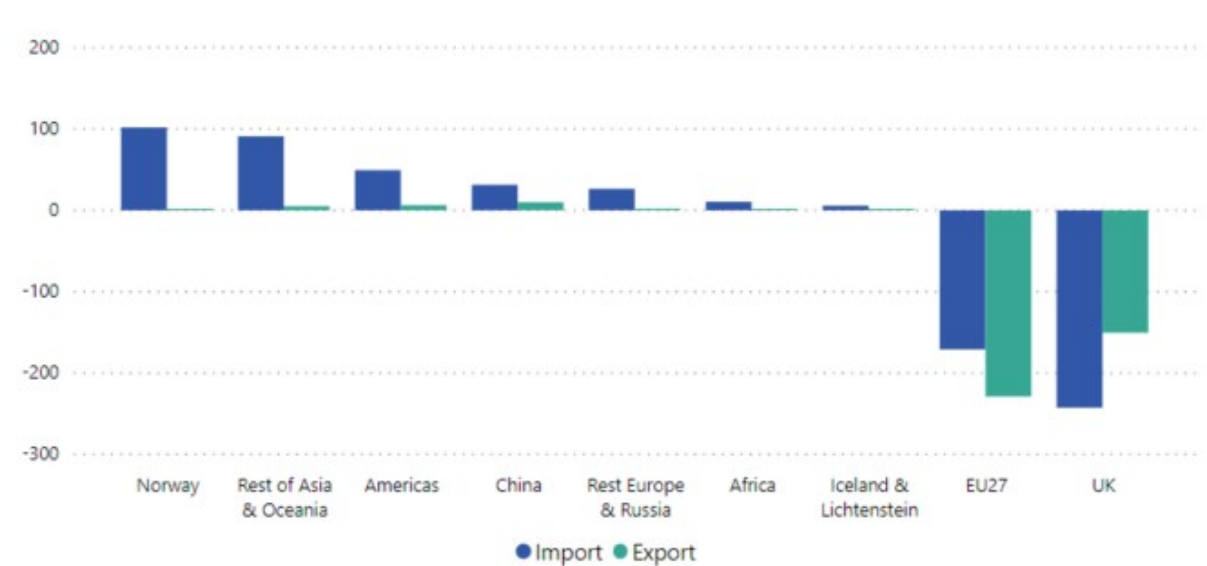
**Figure 11: Balance of trade in fish related products worldwide and zooming in on EU Member States (in million dollars, absolute difference from baseline)**



Source: MAGNET results

Figure 12 provides details of bilateral trade flows distinguishing exports and imports with the EU and the UK. This informs about possible trade creation and trade distortion effects. As for trade creation, various non-EU countries increase trading with the EU, mostly in terms of imports. The highest is the increase in value of imports of fisheries products from Norway and Rest of Asia and Oceania to the EU, which would amount to 100 million USD. On the other hand, there is a notable decline in imports of fish related products from the UK, amounting to -250 million USD compared to the baseline scenario. There would also be losses on the export markets, the exports from the EU to the UK would contract by more than 200 million USD. Although the EU would reorient partially on other markets such as China and the Americas, this would not compensate for the loss of UK markets. It is also noteworthy that the TCA would cause a reduction in the intra-EU trade itself which is explained mostly by developments in the processed fish markets, as discussed below.

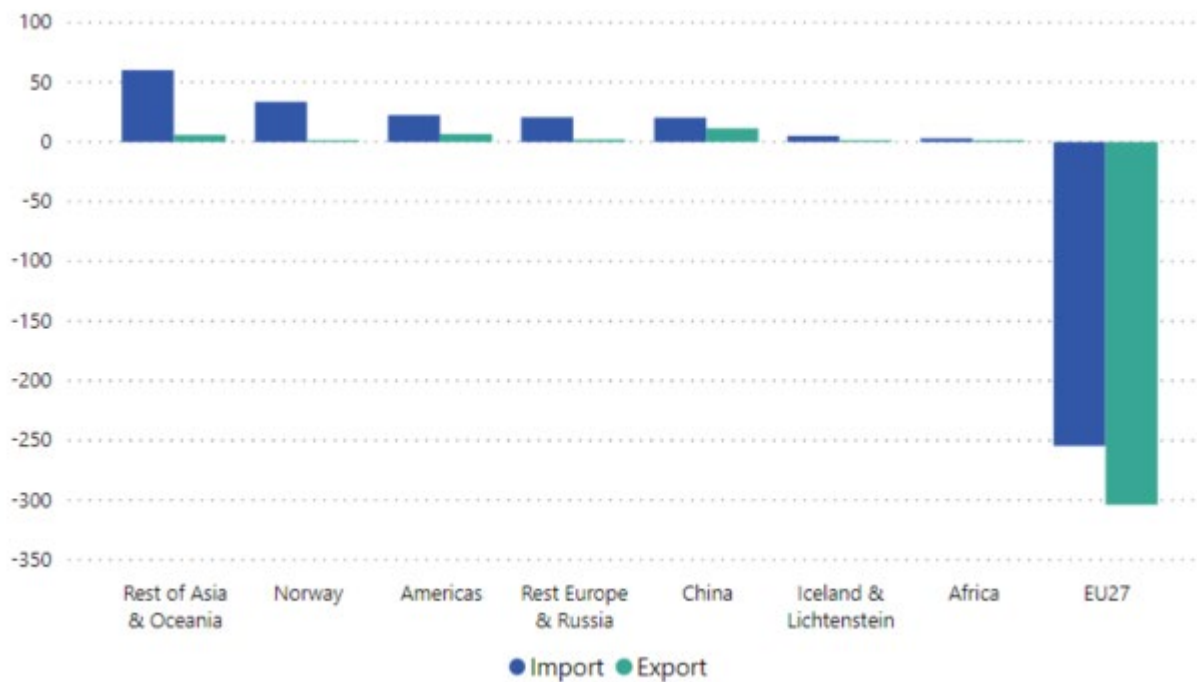
**Figure 12: Bilateral trade in fish related products with the EU (million USD, absolute difference from baseline)**



Source: MAGNET results

Figure 13 provides similar information from the point of view of the UK market. Analogically, a restructuring of the trading partners would happen in the UK as well, with the EU gaining less importance and Rest of Asia and Oceania, Norway and the Americas taking over as new importing markets. There is also a notable contraction of export values from the UK to the EU amounting to 300 million USD. It is also found that the UK's decline in exports to the EU is larger than the decline of imports from the EU.

**Figure 13: Bilateral trade in fish related products with the UK (million USD, absolute difference from baseline)**



Source: MAGNET results

### 3.3. Impacts of the TCA on production and producer prices of FAPs

This subchapter investigates the impact of the TCA on producers of fisheries and aquaculture products. Concerning the EU, as follows from the trade analysis, the fish processing sector is the most negatively impacted (Figure 14), but the differences compared to the baseline are rather small (about 2% decline in production volume compared to baseline). The impacts on the wild fisheries sector are negative but small, which is also related to the relatively minor aggregate TACs reductions for the EU.

As for the UK, the largest decline in production volume is noticed in the aquaculture sector (-8%). On the other hand, the increased TACs will result in a higher volume of landed fish in the wild fisheries sector (+ 2.45%). The impacts on the volume of fish processing sector in the UK are marginal. It is also seen that the impacts on producer markets in the EU and the UK are transmitted to the fish sectors outside of the EU, namely Norway and Iceland, which benefit from increased production volumes in all FAPs (increases are however rather small, around 1% compared to the baseline). The developments in producer prices show very different impacts for the EU compared to the UK markets. Whereas in the EU, fish prices remain almost constant compared to the baseline situation, in the UK there is a notable drop of wild fish prices (-3.7%), which is also transmitted to a decline in producer prices in fish processing (-1.2%). The development in fish prices in the UK is caused by the increased UK's TACs in combination with higher trade costs and weakened consumer demand, which reduce the absorption capacity of the excess supply in the domestic and foreign markets.

**Figure 14: Production volume and price impacts of the TCA on the main regional players (% change versus baseline)**



Source: MAGNET results

Figure 15 provides an EU Member State detail on the impact of the TCA on production volume and producer prices. As already mentioned in the trade section, fish processing industries are foreseen to be the most negatively hit, with the strongest impact seen in Ireland (-11%), followed by Sweden (-6%) and the Netherlands (-5%). Declines below 5% are also noted for Belgium, Denmark and France. Various EU countries would also see a decline in the production volume of wild fisheries, due to a reduced access to UK waters, but the impacts are relatively small (-3% in Ireland and about -1% in the Netherlands, Belgium and Denmark). As for the aquaculture products, the impacts vary per Member State, with significant negative impacts on Ireland (-4%) but positive impacts on the remaining EU countries (about 1% increase mainly in Belgium, Denmark and Germany). With respect to the intra-EU fish producer prices, the changes are rather negligible (about 0.5%); only in case of Ireland, the development of prices deviates from the rest of the EU, with increasing prices in all FAPs, particularly in aquaculture products (+2%). This is related to the interconnection of aquaculture markets between the UK and Ireland.

**Figure 15: Production volume and price impacts of the TCA – country detail (% change versus baseline)**

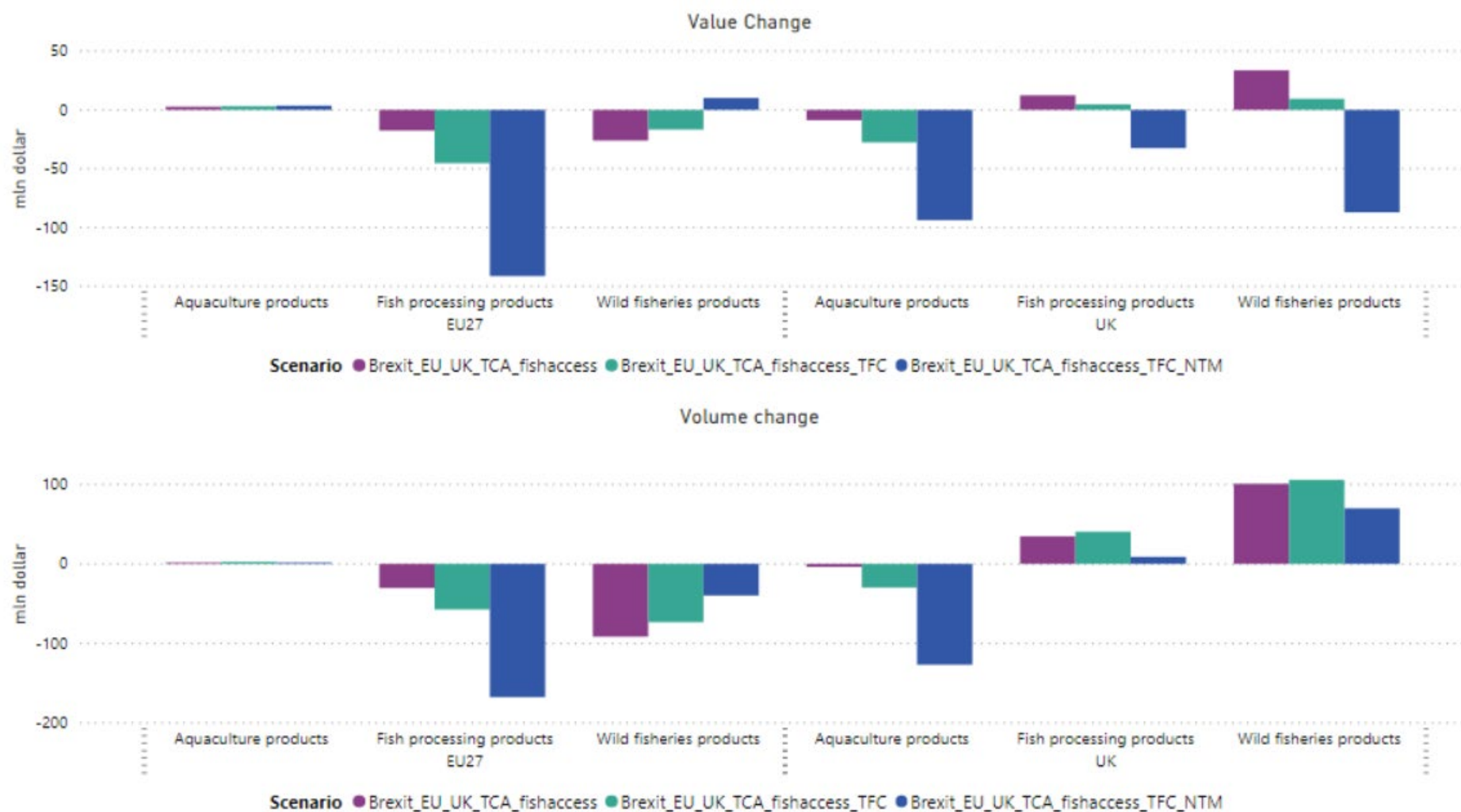


Source: MAGNET results

To better understand what determines the total impact on producers of fisheries and aquaculture products, a decomposition of the individual drivers is presented in Figure 16. Considering only the isolated impact of a reduced TACs for the EU as defined in the TCA, the impact on the UK wild fisheries production value and volume would be positive. This would also be transmitted to the fish processing sector. However, the aquaculture sector would be negatively affected due to certain competition between the individual FAPs. When including the additional trade measures such as TFCs and NTMs, the advantages in wild fisheries and fish processing sectors in the UK disappear. It is found that the NTM measures have quite a damaging impact, leading to a loss of almost 90 million USD for wild fisheries and 30 million USD for the fish processing sector. Damaging impacts are also found for the aquaculture sector, which records a decline in production value up to 94 million USD. Note that in volume terms, fish landings and production of fish processing increases even with the trade measures in place, although due to the drop in producer prices, the fish producers end up with a decrease in production value.

A different situation is foreseen in the EU markets. A decline in wild fisheries (-26 million USD in value and -90 million USD in volume) and fish processing sectors (-17 million USD in value and - 30 million USD in volume) is foreseen due to the reduced TACs. As for the wild fisheries producers, their original disadvantage from the reduced TACs turns into an advantage after the imposition of the NTM measures (+10 million USD in value) because of increased intra -EU trade and resulting increase in fish prices. This clearly shows that trade measures overrule the TACs measures. In concrete, the EU wild fisheries producers increase their value of landed fish because they can take over the lost markets due to the departure of the UK. However, when considering the developments on the fish processing EU markets, the little gains in the EU wild fisheries are heavily overruled with losses in fish processing particularly due to the NTMs. To summarize, there is a lose-lose situation for both parties, resulting from the imposition of trade measures.

**Figure 16: Decomposition of the impact of the TCA on production value and volume (% change versus baseline)**

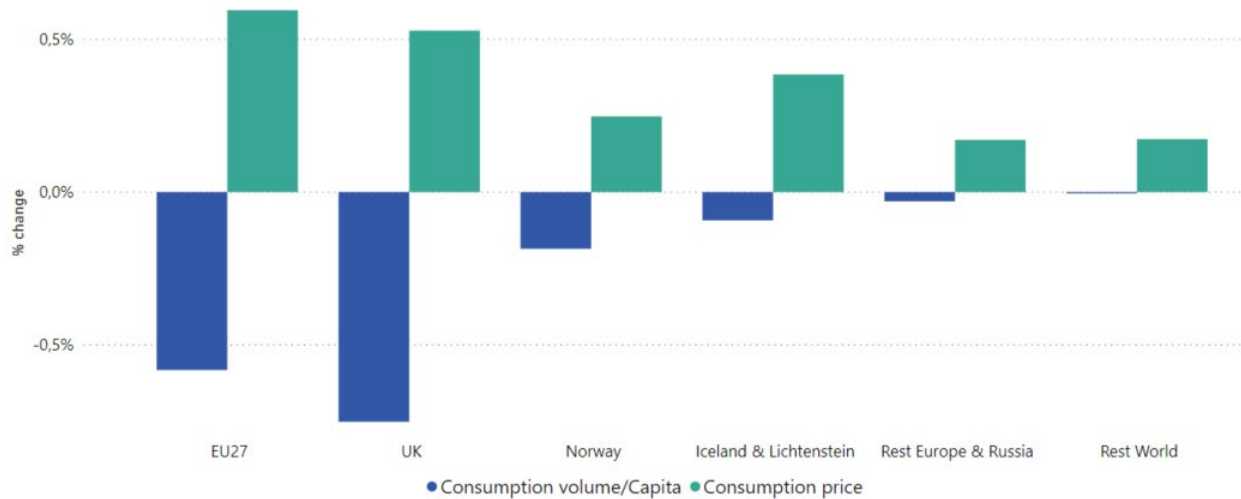


Source: MAGNET results

### 3.4. Impacts of the TCA on consumption and consumers of FAPs

This subchapter explores the consumer side of the TCA impacts. Figure 17 shows that consumer prices of fish related products are foreseen to increase slightly (about 0.5% - 1% for the aggregate EU and the UK), which results in a reduction of per capita fish consumption (less than 1% in the EU and the UK). The increase in consumer prices, which is related to the increase in trade costs is transmitted outside of the EU as well, with similarly small impacts (around 0.2% changes compared to the baseline).

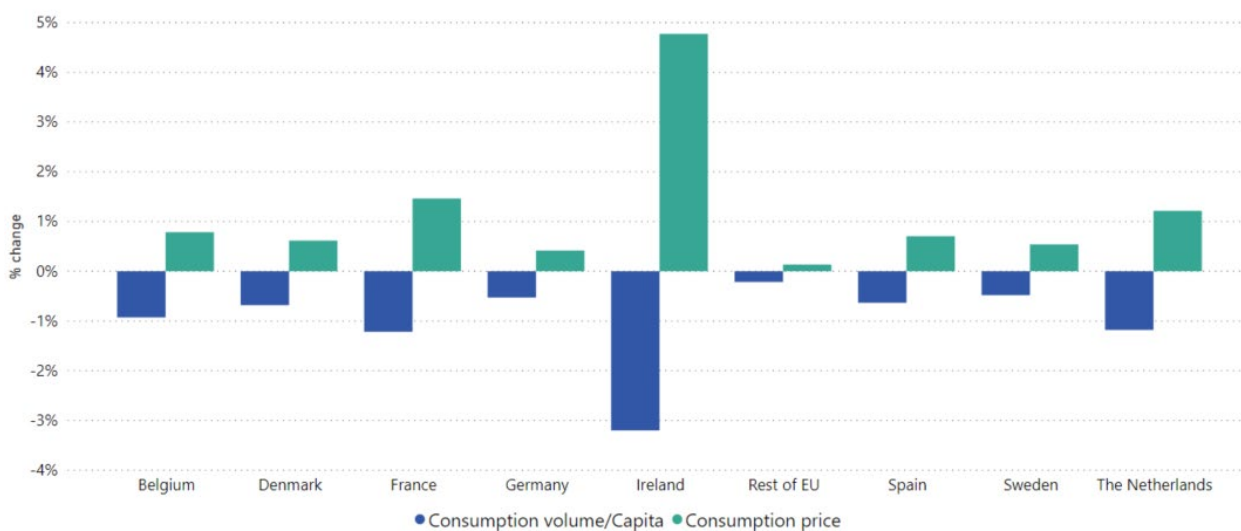
**Figure 17: Impact of the TCA on consumers – main parties (% change versus baseline)**



Source: MAGNET results

Zooming into the consumer impacts across the different EU Member States (Figure 18), it is found that Ireland would face the largest impacts, with a projected decline in total fish consumption by 3% and an increase in fish prices up to 5%. The other countries would see consumer impacts in range of 1% or less.

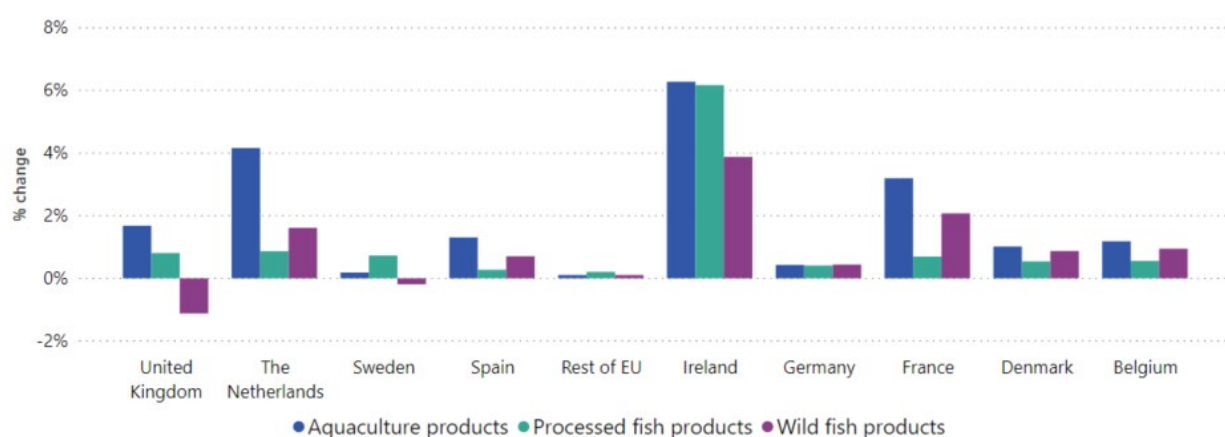
**Figure 18: Impact of the TCA on aggregate consumption volume of FAPs – EU Member States (% change versus baseline)**



Source: MAGNET results

Figure 19 further shows a detail in the impact of the TCA on consumer prices of individual fisheries and aquaculture products. It is found that the aggregate increase in consumer fish prices is driven mostly by increases in prices of aquaculture products, in Ireland up to 6%, in Netherlands and France above 3%. The increase in consumer prices of processed fish is more moderate, around 1%, except for Ireland where fish processing prices increase almost as much as for aquaculture products. Prices increase as much in Ireland because Ireland is quite dependent on imported processed fish from the UK, which is difficult to displace. The trade barriers result in less imported processed fish, which leads to higher prices. With respect to the wild fisheries products, in the UK, consumer prices decline as a consequence of the excess supply of caught fish. In the EU, wild fish consumer prices are expected to rise.

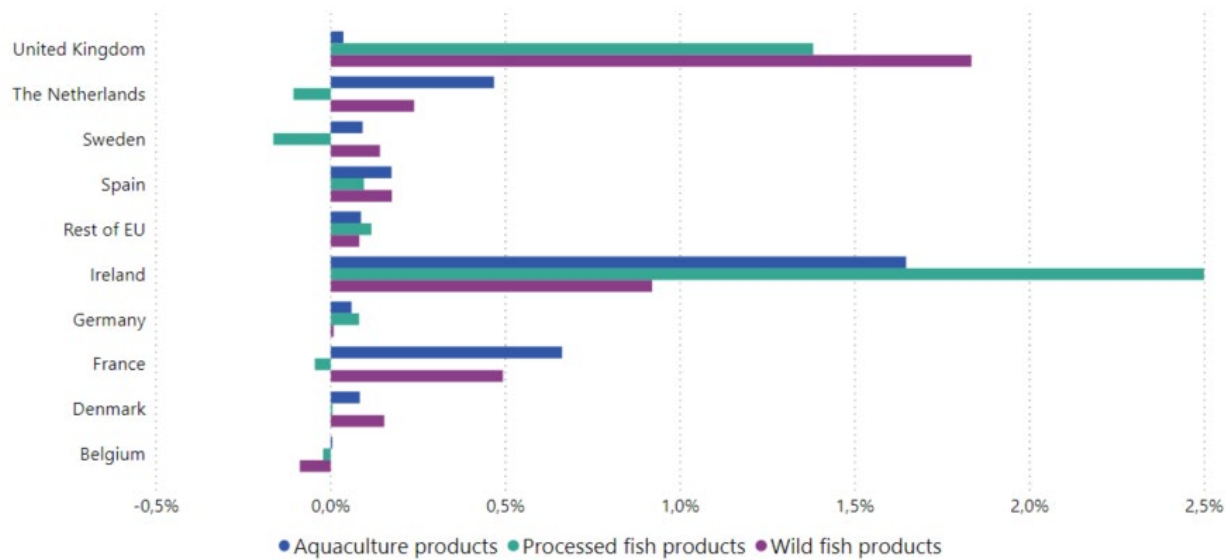
**Figure 19: Impact of the TCA on consumption volume – FAPs detail (% change versus baseline)**



Source: MAGNET results

It is also important to assess to which extent the TCA impacts nutrient dependency of fish related products. This is assessed by analysing the share of domestic consumption in total fish consumption (Figure 20). Both the EU and the UK will see an increased share of domestic fish consumption. In the UK, the increase is most notable for wild fisheries, which is expected due to higher control over its marine waters. UK consumers are also expected to purchase more domestically processed fish. Regarding the EU, the largest impacts are faced by Ireland, which has an increased reliance on domestic fish processing in consumer demand. Concerning other EU Member States, an increased share of domestic producers in consumer demand is mostly relevant for wild fisheries products and aquaculture.

In addition to the changes in the domestic share in consumption of fisheries and aquaculture products, there are also changes in the composition of foreign sources of FAPs. From the nutritional point of view, the TCA impacts on fish consumption have repercussions for the aggregate protein nutrient dependency of the EU Member States and the UK. As the trade section already showed, both for the EU and the UK, other territories become more important as providers of fish protein. In case of the UK, there is a higher need to replace the EU by non-EU countries to supply for fish protein. This has to do with the asymmetric dependence on fish imports by both players. In case of the EU, the reduced importance of the UK as a provider of fish protein can be compensated by domestic EU producers.

**Figure 20: Impact of the TCA on the share of domestic consumption in total consumption (%)**

Source: MAGNET results

In addition to the changes in the domestic share in consumption of fisheries and aquaculture products, there are also changes in the composition of foreign sources of FAPs. From the nutritional point of view, the TCA impacts on fish consumption have repercussions for the aggregate protein nutrient dependency of the EU Member States and the UK. As the trade section already showed, both for the EU and the UK, other territories become more important as providers of fish protein. In case of the UK, there is a higher need to replace the EU by non-EU countries to supply for fish protein. This has to do with the asymmetric dependence on fish imports by both players. In case of the EU, the reduced importance of the UK as a provider of fish protein can be compensated by domestic EU producers.

The results thus far considered only fisheries and aquaculture products consumed directly by households. Part of the consumption however takes place in the food services sector.

Figure 21 shows the impact of the TCA on the consumption price, value and volume of food services. Compared to the EU where the reduction in food services consumption is rather moderate (less than 0.5%), in the UK changes are more pronounced - the value of food services is reduced by 2%, which is driven by a decline in consumer prices paid for food services (-1.5%) and the quantity consumed (-0.3%). The evolution in the market of food services is very much driven by the general macroeconomic situation. As shown in the following chapter, the negative impact of the TCA on the economy is reflected in declining wages and capital prices. This makes services including food services sectors cheaper.

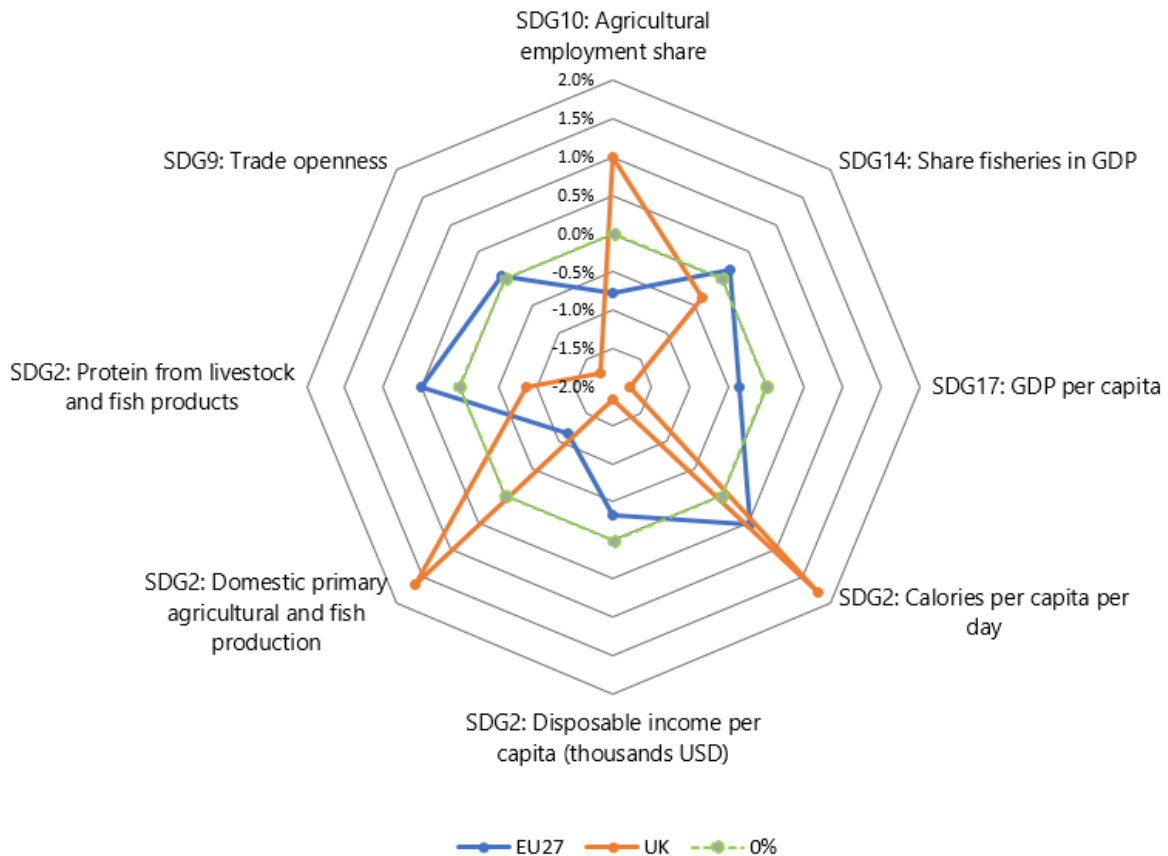
**Figure 21: Impact of the TCA on food services consumption (% change versus baseline)**

Source: MAGNET results

### 3.5. Economy-wide impacts of the TCA

Although it is not the primary focus of this study, it may be instructive to assess the impacts of the TCA on fisheries and aquaculture products in the context of the whole economy. Sustainable Development Goals indicators (United Nations, 2021) are increasingly used to provide a multi-criteria assessment of policy impacts. Figure 22 shows selected Sustainable Development Goals indicators<sup>3</sup> for the EU and the UK. It is found that the impacts on the UK are more pronounced than on the EU. The UK's economy in terms of GDP per capita and disposable incomes would shrink by 4% compared to the baseline whereas for the EU the decline is only 1%. Another more visible impact is found in case of trade openness, which would be reduced by 4% in the UK, but not affected in the EU. This would however bring some advantages for the UK's domestic agri-food producers that would see an increased share in agricultural employment and production volume, resulting in a higher caloric supply. Interestingly, the share of fisheries in GDP slightly increases in the EU but declines in the UK. This is yet another perspective on the impact of the TCA on fisheries, confirming that the combination of measures in the TCA is more harmful for the fisheries sector in the UK than in the EU (measured as a change of their relative position in the economy).

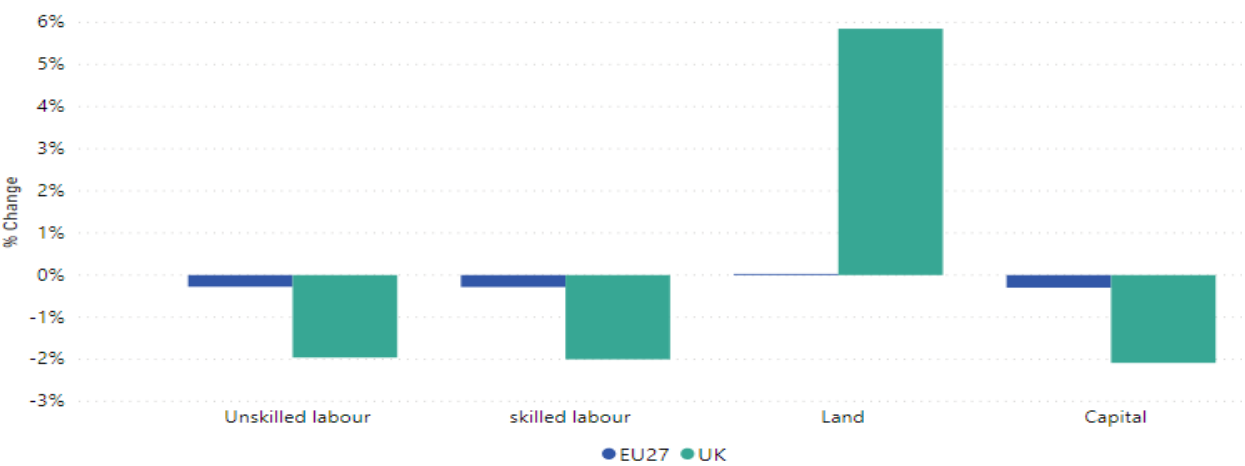
<sup>3</sup> The MAGNET SDG Indicator module provides results for a set of over 100 indicators grouped under the aggregate 17 SDG goals (Shutes et al., 2017), available upon request.

**Figure 22: Impact of the TCA on selected SDG indicators (% change versus baseline)**

Source: MAGNET results

Given that the key developments in the economy are influenced by the production factors markets (such as labour and capital markets), it may be instructive to provide an overview on their impacts. Figure 23 provides an aggregate picture on the development of prices of labour, capital and land in the EU and the UK. Whilst for the EU, the changes are negligible (around 0%), for the UK both capital rents and wages are expected to decline (-2%), which is related to the overall decline of GDP and demand. The imposition of trade measures results in a suboptimal allocation of resources, where the export-oriented industries suffer, leading to lower production and decline of wages. The increase in land rents in the UK deviates from this trend and is explained by an increase in domestic production of agricultural products, due to a higher reliance of agricultural supply on domestic producers.

**Figure 23: Impact of the TCA on price production factors (% change versus baseline)**



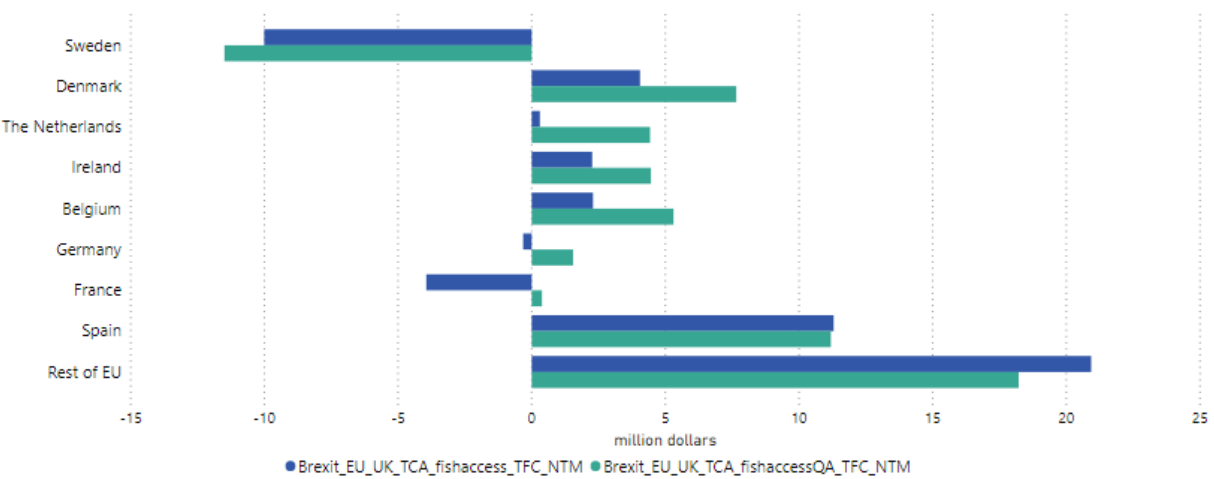
Source: MAGNET results

**3.6. Trade and production impacts of unused quota uptake in the TCA**

There is an evidence that various fish stocks quotas are not exploited fully. There may be various economic reasons that fishers do not fish all their available stocks. Unused quota may indicate that the cost of fishing the extra quota are higher than the expected revenue or that either choke species or available seadays are preventing the fishers from fully using the quota. In view of this, it is sensible to expect that the impact of TAC reductions as defined in the TCA will be more moderate due to the possible adjustment by the unused quota. This possibility is explored in a sensitivity analysis which focuses on the impacts on wild fisheries production and trade balance.

Figure 24 shows that under the assumption of adjusted quota uptake, the negative impacts of the TCA on trade balance of wild fisheries in some countries disappear. This is at the expense of other EU Member States (rest of EU) with marine waters outside of the UK-EEZ economic zone that benefited from the TCA due to increased trade competitiveness.

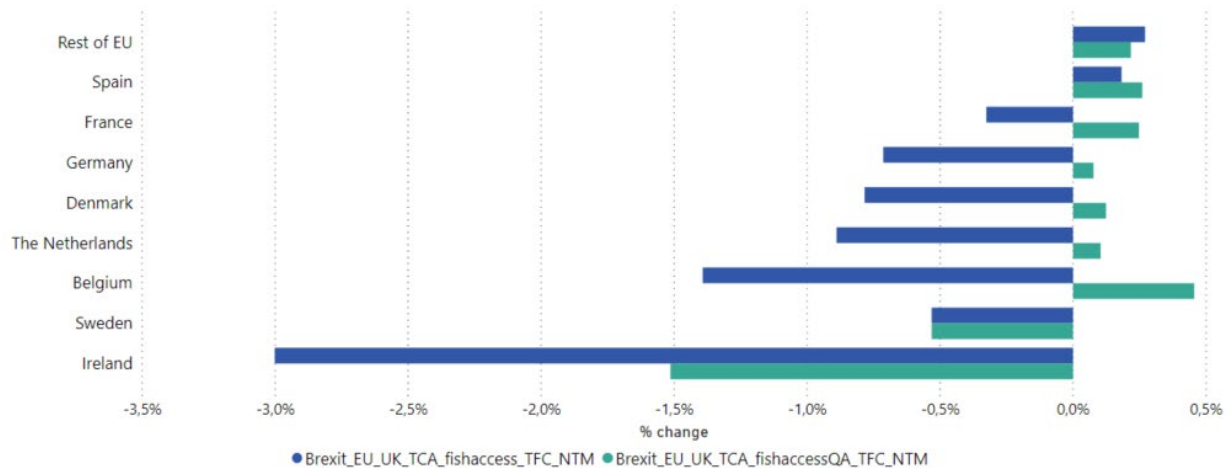
**Figure 24: Impact of the TCA with quota adjustment on the trade balance of wild fisheries (million USD, absolute difference from baseline)**



Source: MAGNET results

With respect to the production volume (Figure 25), the negative impacts of the reduced TACs for the EU (about - 1%, up to -3% in Ireland) would be avoided by using the remaining quota. In this case, several EU Member States would report more moderate decline or even a small positive increase (in range of 0.4%).

**Figure 25: Impact of the TCA with quota adjustment on production volume of wild fisheries (% change vs baseline)**



Source: MAGNET results

### 3.7. Summary of the findings

This chapter summarizes the findings by providing a comparison of the TCA impacts across the key actors in the economy.

Figure 26 visualizes the impacts across the different fisheries and aquaculture sectors. As follows from the analysis, the exporters and producers of processed fish are expected to be negatively affected across all EU Member States and the UK. In the wild fisheries sector, the losses on the export side are not so uniform, where some of the EU Member States even benefit (Spain) and surprisingly, the UK loses, despite the increased access to its fish stocks. There are also positive trade-offs in the exports of aquaculture products, where again the UK faces a loss in export markets, whilst some EU countries such as Belgium, Denmark and Germany take advantage of that. These developments are further transmitted to third countries. Clearly, Norway, Iceland, and the Rest of Europe and Russia will benefit from the TCA by claiming the lost trade routes between the EU and the UK. The impacts on more geographically distant countries such as Africa or the Americas are negligible.

As for the consumer impacts, they are rather small. Very little changes are expected in value terms – the consumers will pay a higher price but they will consume slightly less, leading to an almost unchanged consumer budget spent on fisheries and aquaculture products. The exception is Ireland, where the increased consumption value is driven by prices, whereas the volume of consumed fish decreases.

All figures included in this study can be found at the following location: [https://dashboards.wecr.wur.nl/reports/powerbi/Magnet/brexit\\_templateGraphsReport](https://dashboards.wecr.wur.nl/reports/powerbi/Magnet/brexit_templateGraphsReport). Access can be granted on demand.

**Figure 26: Summary of the TCA impacts on fisheries and aquaculture products**

Fish product AggregatedRegion	Aquaculture products				Processed fish products				Wild fish products			
	Production	Consumption	Import	Export	Production	Consumption	Import	Export	Production	Consumption	Import	Export
EU27	↗	↗	↘	↗	↘	↘	↘	↘	↗	↗	↘	↗
Belgium	↗	↘	↘	↗	↘	↘	↗	↘	↗	↘	↘	↗
Denmark	↗	↘	↘	↗	↘	↘	↗	↘	↗	↘	↘	↗
France	↗	↗	↗	↗	↘	↗	↗	↘	↗	↗	↗	↘
Germany	↗	↘	↘	↗	↘	↘	↘	↘	↘	↘	↘	↘
Ireland	↘	↗	↘	↗	↘	↗	↘	↘	↘	↗	↘	↘
Rest of EU	↘	↘	↘	↗	↘	↗	↘	↘	↗	↘	↘	↗
Spain	↗	↗	↗	↗	↘	↘	↘	↘	↗	↗	↘	↗
Sweden	↘	↘	↘	↘	↘	↗	↗	↘	↘	↘	↘	↘
The Netherlands	↘	↗	↘	↗	↘	↗	↗	↘	↘	↗	↘	↘
UK	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘
Norway	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Iceland & Lichtenstein	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Rest Europe & Russia	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
China	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Rest of Asia & Oceania	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Americas	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Africa	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Total	↗	↗	↗	↗	↗	↗	↘	↗	↗	↗	↘	↘

Source: MAGNET results

Note: colour red represents changes below - 1%, coloured green represents changes above 1%, coloured yellow represents changes between 0%-1% (positive or negative).

## 5. CONCLUSIONS AND POLICY RECOMMENDATIONS

### KEY FINDINGS

- The TCA is a lose-lose situation where both the UK and the EU will suffer from reduced trade, production and consumption. The impacts however are fairly limited, especially for the EU.
- As the UK is more dependent on its trade with the EU than vice versa, the impact for the UK will be more pronounced than the impact for the EU. On EU Member State level Ireland will be the most impacted.
- Fish processing is impacted the most of the fish related sectors and it may be worthwhile to further analyse how the impact on the sector can be minimized.
- On an aggregated sector level the reduced access to the UK Exclusive Economic Zone (EEZ) has only a limited impact on the performance of the wild fisheries sector in the EU, although on the company level there still maybe more noticeable impact, calling for a case study approach to investigate this in detail.

This study analysed the impact of the TCA on the fish related sectors. It looked at the entire economy and analysed the impact on the economy, producers and consumers of fish related products. Overall, the TCA has a small but negative impact on both the UK and the EU. The TCA is a lose-lose situation to all affected parties and notable welfare losses can be expected due to increased protectionism and misallocation of resources. Parties outside of the EU and the UK, like Norway and Iceland, are expected to increase their trade in fish related products with both the UK and the EU and will emerge as winners.

Overall, the UK is more dependent on the EU for its imports and exports of fish related products than the EU is dependent on the UK. Therefore overall, the impacts of the TCA are larger for the UK than the EU. Ireland is a notable exception, 54% of its imports of fish related products come from the UK. This means that Ireland will be impacted more severely by the TCA. Trade between the UK and the EU decreases due to increased trade costs and non-tariff measures. To some degree these trade flows are displaced. Norway and Iceland trade more with both the UK and the EU and the EU increases its intra-EU trade. However, the model predicts that not all trade is replaced and the overall trade in fish related products declines. Spain benefits from the reduction in trade and takes over some of the trade from the UK to the EU.

The MAGNET model confirms in a set of different scenarios that increasing TACs produces excess supply of fisheries products on the UK market that cannot be easily absorbed due to a parallel existence of trade barriers and a weakened consumer demand. Therefore, while the increased TACs has a positive impact on the volumes produced by the UK fishers it has a negative impact on the price and the overall value of the sector. In contrast the European fishers are only moderately impacted. On aggregated level the reduction in TACs is very modest. Of course, the model can only analyze the situation on an aggregated sector level. There may be a higher impact on individual fishers who are used to fishing in the UK EEZ.

In light of the above, for the EU the main impact is not on the wild fisheries sector but on the fish processing sector. The increased trading cost and non-tariff measures negatively impact the fish processing sector in the EU. It is important to mention here that the negative results on fish processing

may be in reality even higher. While there is a free trade between the EU and the UK (the TCA) for fish related products, the UK imposes trade tariffs on re-exported fish related products from the EU. This means fish related products that are imported from third countries, processed and exported to the UK will face tariffs. This type of re-exporting is quite common for the fish processing industry especially and will be impacted by the TCA. However, the MAGNET model cannot yet track the origin of imported fish used in the fish processing industry and therefore the impact of these tariffs is not part of this analysis. This further increases the impact which the fish processing sector faces due to the TCA in reality.

In both, the EU and the UK, consumers suffer due to the TCA. In general fish related products become more expensive and less fish is consumed per capita. In both regions, the base data shows that consumers buy a high percentage of imported fish related products, i.e. EU consumes over 50% imported fish related products, and this becomes more expensive. The MAGNET model predicts that consumers will switch from imported fish related products to cheaper domestic fish related products. This may require a shift in consumer preferences.

Based on this study, the following set of recommendations could be considered:

- The impact on the fish processing sector could be reduced by a removal of the non-necessary NTM trade cost burdens by providing a mutual recognition of the origin and quality of the fisheries products.
- As the fish processing sector is most negatively impacted, specific measures to support the EU fish processing industry could be considered. For instance, the Brexit Adjustment Reserve (Regulation (EU) 2021/1755 of the European Parliament and of the Council of 6 October 2021) could also incorporate measures to support fish processing businesses. It may also be worthwhile to further analyse the impact of re-exporting tariffs on fish related products imported from non-EU countries and exported to the UK.
- On the aggregated sector level the impact of the TCA on wild fisheries is relatively small (-40 million USD), particularly when compared to the impact on fish processing (-170 million USD). However, this does not mean that individual companies are not impacted. It would be worthwhile to carry out complementary case studies to assess company-level impact of the reduced TACs.

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## ANNEX – METHODOLOGICAL APPROACH

### A.1 Description of the applied CGE model MAGNET

The Modular Applied GeNeral Equilibrium Tool (MAGNET)<sup>4</sup> is a recursive dynamic, multi-regional, multi-commodity CGE model, covering the entire global economy (Woltjer and Kuiper, 2012). As with other CGE models, MAGNET explicitly represents the economic linkages across the sectors of each regional economy. This is particularly important when analysing policy effects in sectors that are vertically linked with each other, such as fertilizers, agriculture and biofuels. It is built upon the GTAP (Global Trade Analysis Project)<sup>5</sup> model (Hertel, 1997) and has been widely used for policy analysis (Nowicki et al., 2009, Woltjer, 2011, Doelman et al., 2019, Kuiper and Cui, 2020, Latka et al., 2021). The MAGNET model is modular in nature and extends the GTAP model through the addition of a number of policy-relevant modules. The MAGNET model and the underlying GTAP database provide all values in US Dollars as all data must be consolidated to the same currency.

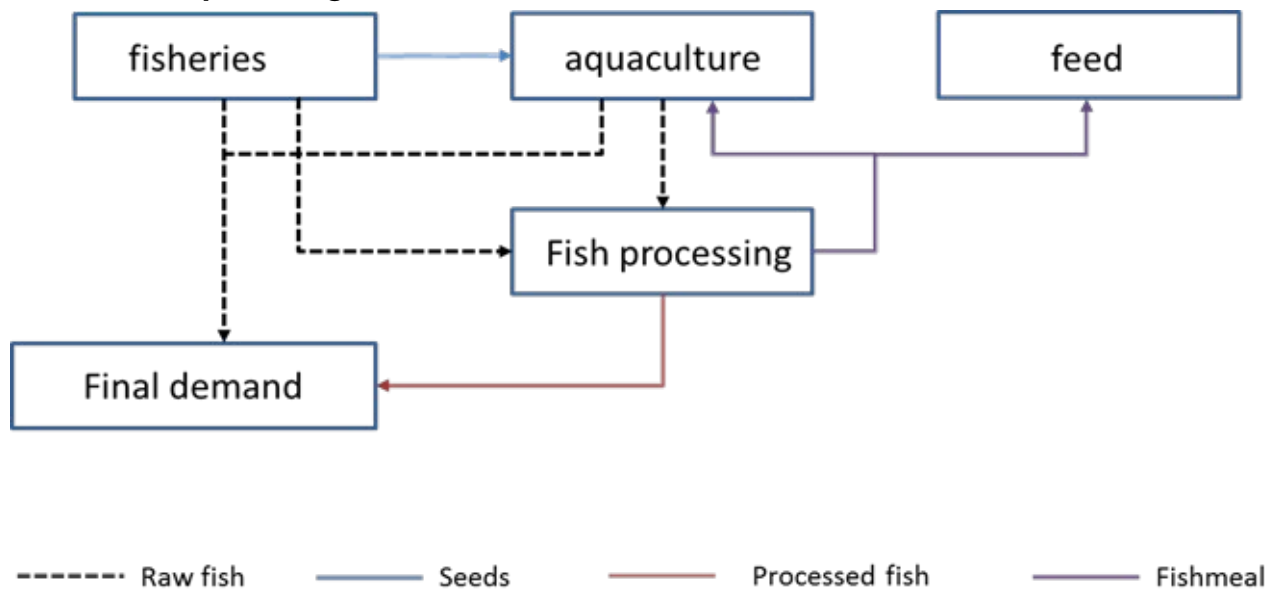
### A.2 Modelling FAPs in MAGNET

The fish module in MAGNET which is developed for the Horizon 2020 project SUCCESS (Bartelings and Smeets Kristkova, 2018) allows analysis in the context of the "blue economy", sustainable management of natural resources and global food security. MAGNET splits the GTAP fish sector (fsh) into six sectors: one wild captured fisheries sector that can catch 4 types of fish families i.e. diadromous fish; demersal fish; pelagic fish; and other marine fish, and five aquaculture sectors based on fish families, rather than species, i.e., diadromous fish (salmon and trout), fresh water fish (carp, tilapia, pangasius, other fresh water fish), farmed marine fish (sea bass and other marine fish), molluscs (clam, mussel, oyster) and crustaceans (shrimp, other shellfish). According to Eurostat (2021), in 2014, these sectors contribute to 93.6% of the added value generated by the aquaculture sector, i.e., diadromous fish (37.8%), fresh water fish (4.5%), farmed marine fish (28.1%), molluscs and crustaceans (23.2%). The remaining 6.4% of total added value mostly come from the production of algae and aquatic plants.

Furthermore, the fish module includes one fish processing sector which processes fisheries and aquaculture products according to consumer demand. This sector also produces fishmeal. **Error! Reference source not found.** schematically shows how the different fish sectors are modelled in MAGNET. Fisheries and aquaculture both produce respectively fisheries products and aquaculture products. These products can be directly consumed by households and government (final demand) or they can be sold to the fish processing sector. This sector will process the fish related products and sell the final product called "fish processing products" to households and government. As a by-product the fish processing sector produces fishmeal. This will be sold to the feed sector. Feed is explicitly modelled, and attention is given to the competition between aquaculture and cattle sectors for available feed.

<sup>4</sup> The MAGNET consortium includes [Wageningen Economic Research \(lead\)](https://www.wageningenur.nl/en/our-research/our-research-centres/wageningen-economic-research), the European Commission's Joint Research Centre (JRC) and the Thünen-Institute (TI) <https://www.magnet-model.eu/>

<sup>5</sup> The [Global Trade Analysis Project](https://www.gtap.org/) (GTAP) is a global network of researchers and policy makers conducting quantitative analysis of international policy issues.

**Figure 27: Schematic representation of interactions between fisheries, aquaculture and fish processing sectors in MAGNET**

Source: Bartelings and Smeets Kristkova (2018)

### A.3 Sectoral and regional aggregation used in the analysis

This study focuses on the impacts the TCA will have on the most important fish producing countries in the EU and the impacts on the UK. As trade in fish related products is of major importance, the study also includes Norway and Iceland<sup>6</sup> as important trading partners of the EU. The rest of the world is also grouped into logical geographical clusters.

In total 18 countries/regions have been included:

- EU (9 regions): Denmark; Netherlands; France; Ireland; Germany; Sweden; Belgium; Spain; rest of EU.
- Rest Europe and Russia (4 regions): United Kingdom; Norway; Iceland & Lichtenstein; Rest Europe & Russia.
- Rest of the world (6 regions): China (including Hong Kong); Mongolia and Taiwan; Rest of Asia & Oceania; USA and Canada; South and Central America; Africa.

A CGE model like MAGNET represents the entire economy. The GTAP database provides data about 57 sectors in the economy. In this study fish product data are further disaggregated into 1 wild fisheries sector, 5 aquaculture sectors, 1 processed fish sector. To analyze the impact the TCA may have on food services like retail and restaurants a food service sector is split out. The entire sectoral aggregation is shown below. The sectors/commodities in bold are the sectors which are specifically focused on in this study.

<sup>6</sup> Note that the [Global Trade Analysis Project](#) (GTAP) database does not distinguish Iceland as a separate country but instead only presents data for Iceland and Lichtenstein together.

Sectoral/commodity Aggregation:

- Aquaculture and wild fisheries (6 commodities): **Crustaceans (Crust); Diadromous fish (Diad); Freshwater fish (Fresh); Marine fish (Marin); Molluscs (Molus); Wild fisheries (fsh)**
- Primary agriculture (6 commodities): Paddy rice (pdr); Wheat (wht); Other grains (grain); Oilseeds (oils); Vegetables, fruits and nuts (hort); Other crops (crops)
- Livestock (6 commodities): Cattle and sheep (cattle); Pigs and poultry (pigpoul); Raw milk (milk); Meat (cmt); Meat product (omt); Dairy (dairy)
- Processed food (4 commodities): Sugar processing (sugar); Vegetable oils and fats (vol); Other food and beverages (ofd); **Fish Processing (fishp)**
- Feed (4 commodities): Animal feed (feed); Crude vegetable oil (cvol); **Fishmeal (fishm)**; Oil cake (oilcake)
- Industry and services (19 commodities): Biodiesel (biod); Biogasoline (biog); DDGS (ddgs); Chemicals (chem); Coal (coa); Crude oil (c\_oil); Electricity (ely); Electricity from hydro (ely\_h); Electricity from wind and solar (ely\_w); Ely fossil (ely\_fossil); Fertilizer K (fert\_k); Fertilizer N (fert\_n); Fertilizer P (fert\_p); Forestry (frs); Fossil gas (gas); Other industry (othind); Petroleum (petro); Services (serv); **Food services (food\_serv)**



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This study is the second research paper in a series of three, commissioned for a PECH Committee Workshop. It applied the MAGNET model to quantify the impact of the EU-UK TCA on fish related sectors. The results show negative impacts on trade, production and consumption of fisheries and aquaculture products for both parties. For the EU, the biggest losses are found in the fish processing sector. The overall impact is driven by increased trade costs whereas the impact of a reduced total allowable catches is rather limited.

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