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## Post-Brexit Implications on Irish Freight Transport and Logistics Sector

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# Post-Brexit Implications on Irish Freight Transport and Logistics Sector

September 2020



## **Smart Sustainable Solution for Business Processes (3S Research Group)**

3S Group is a growing research unit based in College of Business, Technological University Dublin (TU Dublin). The group is founded in 2008 with a vision to become fully recognised national and international leading centre in business process modelling and analytics. The team at 3S Group work on cutting-edge technologies including real-time simulation, optimisation and data analytics while leveraging on College of Business's established expertise in strategy, operations management and business development to address locally relevant and globally challenging problems. 3S Group mission is to engage and contribute significantly to the body of knowledge of business processes modelling and optimisation by:

- Collaborating with national and international Industrial partners;
- Providing accurate, quality and innovative solutions for business problems;
- Working closely with clients using proactive planning and modelling techniques;
- and Capturing innovation opportunities that support businesses in the emerging markets.

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## Disclaimer

This report is the result of months of effort by the 3S research team in the College of Business, Technological University Dublin. It seeks to provide an objective assessment of the Brexit risks and consequences for the Freight, Logistics and Transportation sector in Ireland. The results and recommendations in the report are the sole responsibility of the authors. They do not reflect official policies or positions of the Irish Government or the European Commission.

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## ACRONYMS & DEFINITIONS

<b>AEO</b>	Authorised Economic Operator. AEO status is a certified standard authorisation issued by customs administrations in the EU. It certifies that an economic operator met certain standards in relation to safety and security, compliance with customs rules, financial solvency, and managing commercial records
<b>AUW</b>	Average Unit Weight: a metric introduced by the Irish Maritime Development Office to convert the trade volume expressed in tonnes into the number of vehicles.
<b>Cabotage</b>	It is the loading and unloading of goods between 2 points in a country by vehicle that is not registered in that country
<b>CSO</b>	Central Statistical Office in Ireland
<b>Dry Bulk</b>	It is a commodity cargo that is transported unpackaged in large quantities. Commodities in this category could include iron ore, coal, cement, and alumina
<b>DTTAS</b>	Department of Transport, Tourism, and Sport
<b>DAFM</b>	Department of Agricultural, Food, and the Marine
<b>EU26</b>	European Union: include all Member States in the EU excluding Ireland and the UK
<b>EU27</b>	European Union: include all Member States in the EU excluding the UK
<b>FTA</b>	Free Trade Agreement: the EU and third countries agree an FTA, with duty-free trade for most products, although with some tariffs on sensitive products in selected agri-food sectors. The agreement includes a risk of emerging regulatory divergence between the EU and the third countries in both goods and services.
<b>Great Britain</b>	Made up of England, Scotland, and Wales
<b>Great Repeal Bill</b>	It is the European Union Withdrawal bill published by the UK government on 13 July 2017. This is a constitutional legislation sets out the government proposals to transforming existing EU laws into UK laws
<b>GVMS</b>	Good Vehicle Movement Service: is a UK government border control information technology system for coordinating

the movement of vehicles. It is part of the government's measures for dealing with post-Brexit trade.

<b>HGV</b>	Heavy Good Vehicles: trucks with a total weight more than 3,500 Kg
<b>HMRC</b>	UK Customs Authorities
<b>HSE</b>	Health Service Executive in Ireland
<b>IMDO</b>	Irish Maritime Development Office: Ireland's national dedicated development agency for the shipping and shipping services sector
<b>Liquid Bulk</b>	Liquid bulk cargo is carried unpackaged and transported by ships that are referred to as tanker. Commodities range from petrol for cars, cooking oil for home consumption to liquified natural gas
<b>Lo/Lo</b>	Lift-on/Lift-off ships are cargo ships with on-board cranes or other lifting devices to load and unload cargo
<b>MRN</b>	Transit Movement Reference Number: is the customs registration number that enables the customs authority to identify and process the export packages
<b>North Sea-Mediterranean Core Network Corridor</b>	It is one of the most important connections within the comprehensive Network linking the important nodes in the EU's Trans-European Transport Network (TEN-T) policy
<b>Ro/Ro</b>	Roll-on/Roll-off ships designed to carry wheeled cargo, such as cars, trucks, semi-trailer trucks, trailers, and railroad cars, that are driven on and off the ship
<b>SPS</b>	Sanitary and Phytosanitary Measures: Measures to protect human, animal or plant life and health
<b>TAD</b>	Transit Accompanying Documents: must accompany the goods during transit and be presented along with the goods at an office of transit or at the office of destination
<b>The UK Land-bridge</b>	Describes the movement of goods between Ireland and Continental Europe via the UK road and ports network
<b>Transit</b>	The act of trucks passing through territory belonging to another country in their way to their destination
<b>UK</b>	The United Kingdom: made up of England, Scotland, Wales, and Northern Ireland

**Unitised Goods**

Goods which are shipped in Roll-on/Roll-off and Lift-on/Lift-off shipping modes

**WTO**

World Trade Organisation

## ASSUMPTIONS

Brexit will open up the possibility of changes in many policies and operational models, all of which could have material consequences for the UK's relationship with other European countries. Most of these changes have not been agreed yet, causing an environment of uncertainty for the trade relationships between Ireland, the UK and the EU. These circumstances influence the availability of data in some parts of the study. Assumptions, therefore, were made to bridge these gaps and help to design the underlying structure of the scenario mapping model. The assumptions in the study are twofold: 1) common assumptions hypothesised in the developing of the scenario mapping model, and 2) scenario-specific assumptions applied to specific scenarios according to their nature and dynamics. Below is a summary of the common assumptions in the study. Full details about the assumptions (i.e. common and scenario-specific assumptions) and their rationale will be presented in Chapters 3 and 4 of this report.

1. The study models the Ro/Ro freight traffic between Ireland, the UK and EU26 within three shipping corridors: 1) the East/West Corridor that links Ireland and the UK through five maritime routes (Dublin-Heysham, Dublin-Liverpool, Dublin-Holyhead, Rosslare-Fishguard and Rosslare-Pembroke), 2) the UK Land-bridge that links the UK with the EU26 via the UK roads and Dover-Calais maritime route, and 3) the Direct Route to Continental EU26rope, which includes direct shipping services from Ireland to other EU26 countries via the Dublin-Cherbourg, Rosslare-Cherbourg, Dublin-Rotterdam and Dublin-Zeebrugge routes.
2. A truck that drives along these routes is fully loaded and carries one type of product at a time. Different products cannot be consolidated in the truck.
3. Trucks are not performing cabotage operations at the UK territories.
4. The number of check facilities at UK ports is assumed to be comparable to the respective figures of the number of check facilities in Dublin and Rosslare Port, according to the Government of Ireland's contingency action plan for preparing for the withdrawal of the UK from the EU.
5. All UK ports, following the transition period, are assumed to have customs and SPS inspection facilities with adequate capacity of check officers (i.e. customs and health officers).
6. Trucks flow, to/from Ireland, is based on a door-to-door flow from a random point of origin to an arbitrary point of destination in Ireland or on mainland Europe.

## EXECUTIVE SUMMARY

In order to identify the risks of Brexit, the Department of Transport, Tourism and Sport (DTTAS) of Ireland requested support from the European Commission to assess the risks of Brexit and prepare actions to mitigate Brexit's impact on the freight, transport and logistics sector in Ireland. This was enacted under Regulation (EU) 2017/825 and the Structural Reform Support Programme (SRSP Regulation). The Directorate General for Structural Reform Support (DG REFORM) invited the Technological University Dublin (TU Dublin) to develop a scenario mapping framework, in an attempt to support DTTAS by modelling a range of post-Brexit scenarios. These are predicted scenarios which may come into effect following the end of the Brexit transition period, on December 31, 2020. The project also provides the stakeholders in the Irish logistics and transportation sector with a clearer vision on how the overall supply chains of Ireland may be affected. A further investigation into food supply chains takes place with a particular focus on supply chains whose products are often time-sensitive.

The study quantifies the impact that new custom checks and Agri/SPS inspection procedures could have on agri-food supply chains. It is possible that these checks will be introduced at both EU27 and UK ports. The analysis shows the potential risks to the Irish agri-food supply chain. These risks are

explained through a range of non-tariff barriers and Ireland/EU transport connectivity scenarios. There is potential for disruption in the long-established transportation routes between Ireland, the UK and Continental European markets. Direct shipping routes (i.e. links directly between Ireland and the EU26) have therefore been considered in this case. This consideration comes from the perspective of both practitioners in the field and experts from social, environmental, and economic disciplines.

The study demonstrates how Irish agri-food supply chains are uniquely exposed to Brexit. Ireland has had strong ties with the UK market and has been a supplier for many decades. In 2018, agri-food exports from Ireland to the UK reached €5.6 billion, while imports from the UK yielded €4.5 billion. Overall, this provided Ireland with a trade surplus of more than €1 billion.<sup>1</sup> In addition, about 38% of Irish unitised exports to Continental Europe transits via the UK land-bridge.<sup>2</sup> Brexit poses an unprecedented risk to the competitive advantage that Irish agri-food products have cultivated in UK markets. This study reveals that the delivery time for all products will increase, in each scenario, which will diminish product shelf-life. This risk, of course, will affect both the value and

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<sup>1</sup> Department of Agriculture, Food and Marine (DAFM), 2019, Brexit Fact Sheet: Irish Agri-Food Sector.

<sup>2</sup> Irish Maritime Development Office (IMDO), 2017, The Implications of Brexit on the Use of land-bridge.

quality of certain products, which in turn affects their competitiveness.

## FINDINGS

### *Introduction of new border checks at EU27 and British ports*

- The Irish Government plans to ensure that there is sufficient checks infrastructure at both Dublin Port and Rosslare Europort. This will maintain a smooth inbound flow of traffic (non-agri and agri-food), under limited and moderate check delay scenarios. If further delays are experienced at Irish ports due to checks (High-Check-Delay scenario), the inbound transportation time for trucks will increase to up to four days for non-agri, and three days for agri-food products.<sup>3</sup> The Government has planned to have minimal check interventions on the inbound trucks, for customs checks in particular. This will prevent substantial congestion at Irish ports. These strategies require the full support of the Irish business community. This includes taking actions against missing custom declarations or inspection paperwork at each checkpoint.
  - If the UK and EU fail to agree on a common food safety regulation, it is expected that there will be an increase in the level of SPS inspections at borders.
- These checks will have a significant effect on agri-food products at all EU27 and British ports. An expected increase delivery time of up to 252% for agri-food exports from Ireland to Britain is anticipated under the High-Check-Delay scenario.<sup>3</sup> This result has been reached in comparison to the As-Is scenario (i.e. no border checks).
- About 85% of the trade between Ireland and Britain flows through two routes: Dublin-Holyhead and Dublin-Liverpool. Any increase in checks at the three ports (Dublin, Liverpool or Holyhead) must be alleviated to maintain the traffic flow between Ireland and the UK.
  - Minimising transit delay via the UK land-bridge is crucial in maintaining the smooth flow of trade between Ireland and the EU26. The model exhibited a slight increase in the transit time for Irish exports to the EU26 via the UK land-bridge – a 17% increase compared to the As-Is scenario.<sup>4</sup> This result was obtained under the scenario of applying the longest transit check delay at UK ports. The assumption that UK authorities will provide adequate capacity of Offices of Transit at western UK ports in all tested scenarios played a significant role in this result.
  - The inbound flow from the EU26 to Ireland has seen a substantial increase in

<sup>3</sup> For more information about check delay scenarios and their outcomes regarding the inbound traffic flow to Ireland, please refer to section 4.2, Chapter 4.

<sup>4</sup> For more information about transit check delay scenarios and related outcomes, please refer to section 4.3, Chapter 4

transit times, ranging between six and nine days according to the duration of check delay.<sup>4</sup> Dover presents a critical bottleneck in these scenarios, with significant truck congestion observed. This is due to the high trade volumes which flow along the Calais-Dover route. When this is modelled in conjunction with the ‘hypothesised’ limited number of Offices of Transit at Dover (i.e. the assumption is based on the limited space available to develop new check facilities at Dover), this is the conjectured result. This delay could have a significant negative impact on imports from the EU26 to Ireland, particularly for products with limited shelf-life.

#### *Accessibility to mainland Europe through direct shipping service*

- The best alternative to the UK land-bridge for most Irish exporters, if longer transit check delays arise, is the direct maritime routes to/from Continental Europe. For example, selecting the routes from Dublin or Rosslare to Cherbourg increases product delivery time by only 34%.<sup>5</sup> However, it provides hauliers and traders with a cheap shipping service and more control over shipping and delivery time, particularly if the check delay via the UK land-bridge remains uncertain. The current sailing frequencies of the direct shipping services are limited in general

(including routes that link Ireland with France, Netherlands and Belgium). This presents a risk for operators who may wish to avoid the UK land-bridge in the proposed new scenarios.

- The increase in the freight capacities of the Dublin-Rotterdam and Dublin-Zeebrugge routes, announced recently by Dublin Port and CLdN Ro-Ro SA, was found to be enough to satisfy the expected increased demand on the direct shipping services to Europe. The model showed no delays or bottlenecks at the ports of origin, for both services under all tested scenarios. Both routes are considered effective alternatives to the UK land-bridge for products with longer shelf-life.

#### *Adequacy of border checks infrastructure at UK Ports*

- The limited space at Holyhead Port for building new check facilities presents a risk for the trade between Ireland, the UK and the EU26. The trade flow between Ireland and Britain, and Ireland and the EU26 could be delayed by up to 49% and 21% respectively, under the Limited-Check-Delay scenario, if Dublin-Holyhead route is suspended due to the lack of checks infrastructure.<sup>6</sup> These delays are expected to increase under higher check delay scenarios (i.e. Moderate-Check-Delay and High-Check-Delay). These

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<sup>5</sup> For more information about the scenarios of selecting direct shipping service to Ireland, please refer to section 4.4, Chapter 4  
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<sup>6</sup> For more information about the model outcomes in the case of Dublin-Holyhead route suspension, please refer to section 4.5, Chapter 4

delays will occur if freight services are diverted from Dublin to Liverpool and Dublin to Heysham, rather than the current Dublin to Holyhead route. Both are considered to be long-sea routes (i.e. sailing time can reach up to nine hours). They also have lower sailing frequencies compared to the Dublin-Holyhead route.

- Traffic management guidelines for the motorway network around Dublin, Holyhead and Dover have not been published to date. It is unclear if the motorways around the ports could absorb the expected trucks congestion. Bottlenecks in times of high traffic on any of the motorways adjacent to the ports could have severe implications for the flow and consistency of product delivery times. A lack of such guidelines adds to the uncertainty surrounding check procedures. Traffic management guidelines should provide guidance on traffic planning, traffic calming and management, road closures and diversions. It should also focus on how these issues could be implemented and monitored in the context of expected disruptions post-Brexit.

## RECOMMENDATIONS

### *Transportation policies*

- Both the logistics and transportation sectors in Ireland need clear guidelines on what border checks procedures may look like, once these checks have been agreed with the UK. Publishing information in

order to clarify any ambiguity surrounding the non-tariff-barriers risk is essential. These guidelines will enable haulage companies, and all those involved in Irish supply chains, to develop well-informed mitigation strategies.

- The objective for all Irish authorities is to limit level of customs intervention on both inbound and outbound trucks as much as possible. According to the model results, this policy reduces delays at the Irish checkpoints and will facilitate the inbound flow of traffic to Ireland in general.
- The UK government has stated its intention to apply a digital solution (Good Vehicle Movement Service (GVMS)) to transit checks. It is their opinion that this will maintain the efficiency of the inbound/outbound traffic flows between Ireland and EU26, via their land-bridge. However, what is still unclear is which ports in the UK will apply these solutions, and which will take a more traditional, paper-based approach. Businesses in Ireland require further clarification on this issue, as paper-based transits procedures may cause delays.
- Hauliers and freight forwarders alike are urged to become familiar with the GVMS solution, along with any of the required declarations and paperwork which may need to be submitted at an office of transits at UK ports. This will help to minimise delays for trucks using the UK land-bridge.



- It is predicted that the amount of custom declarations and related paperwork will significantly increase following the introduction of new border checks. Despite this, there is a lack of expertise available for trading and haulage companies, in relation to the expected administrative burdens. This burden will only increase the risk of delays at the borders if documentation has been filed incorrectly or has been lost in transit. Governmental authorities, shipping companies and road freight operators must reach an administrative agreement in this regard. This agreement should also support traders and operators when dealing with these expected administrative burdens.
- The Dublin-Holyhead route is critical to the Ro/Ro trade which takes place between Ireland and Britain alone, and also between Ireland and mainland Europe, via the UK land-bridge. Both Irish and EU authorities are advised to give special attention, in their negotiations, to the status of Holyhead Port. Holyhead is currently not a designated entry point for the common transport convention. In addition, the port does not have sufficient space for the new kinds of checks (custom, SPS or transit checks).
- The EU-UK agreement must focus on issues surrounding the Ro/Ro trade for ports on both sides. In particular Holyhead, Dover and the Eurotunnel must be considered. Mutual recognition of operators' permits, licences and qualifications is recommended to be agreed. This will enable lesser check delays and, in turn, smooth the flow of traffic.
- An agreement should be reached between the EU and UK that supports common food safety regulations. This would reduce the level of SPS checks for agri-food products. It would also reduce delays at ports while maintaining the traffic flow. This will be particularly significant for Holyhead, Dover and the Eurotunnel.
- According to port operators and transportation companies, it is expected that the introduction of border checks at Dublin, Holyhead and Dover will cause bottlenecks at these ports, and also on the adjacent motorway networks. At the time of writing this report, these three ports handle a large portion of the trade between the EU27 and the UK. Warnings regarding the limited space at these ports and in their hinterlands have been expressed. Clear and timely traffic management plans must be published as guidance to all border entry points between the EU27 and the UK.
- Providing adequate inspection facilities at the border entry points in the UK is essential. Inspection guidance must be published, which includes practical information on the development and capacity of inspection facilities, in particular on the UK side. These clarifications will mitigate any fears that

traders and logistics operators have about potential bottlenecks at the ports.

### *Freight and logistics operations*

- Haulage and transportation companies in Ireland are encouraged to apply for authorised consignee status (i.e. Authorised Economic Operator). This will enable them to avoid delays at border checks points and Offices of Transit in Britain.
- Further discussions are suggested to take place between the shipping companies, and freight and logistics operators. They can decide what are the best operational and economic models when increasing the frequency of direct shipping services to mainland Europe. There are sufficient alternatives to the UK land-bridge, particularly for supply chains dealing with products that have a longer shelf-life.
- Logistic and transportation companies must prepare for a surge in demand for refrigerated vans and trucks (reefers). To maintain quality standards, many supply chains may be required to use reefers as storage facilities on wheels.
- Around 85% of the inbound trade to Ireland is imported via Dublin, which increases the risk of bottlenecks at Dublin Port. There is a similar figure for Irish exports to the UK via Holyhead Port. Irish logistics, freight and ferries operators are encouraged to communicate about the viability of increasing the sailing frequencies for both the Rosslare-Fishguard and Rosslare-Pembroke

shipping routes. The addition of shipping capacities and increased use of Rosslare port should mitigate the potential disruptions in connectivity between Ireland, the UK and the EU26.

### *Products trade and supply chains*

- Opening new markets in Europe and beyond is encouraged as a mitigation strategy for the trade uncertainty in relation to the UK. However, redesigning well-established supply chains will not be a simple task. Many of these are based in the UK market. Hence, such a mitigation strategy is considered to be a long-term contingency plan.

## CHAPTER 1: IRELAND-UK TRADE RELATIONS AND SUPPLY CHAIN: BREXIT IMPLICATIONS

### 1.1. Brexit timeline and transition period

On 23 June 2016, the United Kingdom voted by referendum to leave the European Union. On 29 March 2017, the UK officially notified the EU27 of its intention to withdraw from the European Union under Article 50 of the Lisbon Treaty. This notification triggered the start of a two-year window for the UK to agree on a withdrawal agreement with the EU27. Accordingly, the UK was expected to leave the EU on 29 March 2019. However, the UK government requested an extension to Article 50 until 30 June 2019. This followed a vote in the House of Commons against the Withdrawal Agreement that had been reached with the EU27 on 14 March 2019. The UK requested a further extension, as the British parliament could not reach a majority agreement on any of the Brexit proposals put forward in the House of Commons on 1 April 2019. At an emergency EU summit, the UK and EU27 agreed that the UK could extend Article 50 until 31 October 2019. On 17 October, the UK finally agreed on a Withdrawal Agreement with the EU27. However, the UK parliament requested additional time to review it. This request was

granted by the EU27 on 28 October 2019. A further extension was then granted, and accordingly the UK officially left the European Union at 11pm on 31 January 2020. This act began a transition period that is due to end on 31 December 2020.

During this transition period, the UK remains in both the EU customs union and single market, so that trade arrangements, travel and labour rules apply. The UK is still bound to EU laws, and the European Court of Justice has final say in legal disputes. Despite this, the UK no longer has a presence in the European Parliament, European Council or European Commission, and no longer participates in the EU decision-making process. It has also lost its voting rights in the EU Council. However, UK representatives will have the right to participate in EU27 meetings where discussions are relevant to Britain.<sup>7</sup>

The negotiations currently taking place will shape the future relationship between the European Union and the UK. A UK-EU free-trade agreement is the top priority of these negotiations. The UK and EU27 aim to maintain trade with no tariffs, quotas or

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<sup>7</sup> House of Commons Library, Brexit next steps: the transition period  
<https://commonslibrary.parliament.uk/brexit/negotiations/brexit-next-steps-the-transition-period/>

other barriers. Both sides need to agree on a level playing field, which determines how far the UK can deviate from certain existing EU regulations. In addition to trade, many other aspects are being negotiated. These include data-sharing and security, aviation standards and safety, access to fishing waters, electricity and gas supplies, and regulations surrounding medicines.

Brexit is expected to cause large-scale transformations in Irish supply-chain management, which will result in a wide range of challenges. The transportation and logistics sector, for instance, will see unprecedented changes. In fact, this sector is among those likely to be worst affected following the end of the transition period. This has been a theme throughout the published reports in relation to Brexit.

Irish supply chains are connected to the UK through ties and relations dating back decades. Not only do many Irish products wind up on UK shelves, Irish traders have been using the land-bridge to reach wider Europe for many years. Not only is the land-bridge the most economically viable way, it is also the quickest. Those transporting time-sensitive goods, among others, are guaranteed a speedy turnaround between Ireland and the UK.

## 1.2. Overview on Ireland-UK trade relations

There has been a trading relationship between Ireland and the UK for hundreds of years. In 2018, the UK was Ireland's third largest export market for all products, only behind the USA and Belgium. The UK was also Ireland's largest source of imported goods, accounting for just under a quarter of Ireland's total imports.<sup>8</sup> Although the UK remains one of Ireland's most important trading partners, the total trade has gradually declined over time. In 1953, 91% of Ireland's exports were to the UK. By 2018, this had fallen to 11.5%. There is also substantial cross-border trade between Ireland and Northern Ireland. In 2018, 36% of Northern Ireland's exports went to Ireland, compared to 6% to the UK as a whole, while 28% of Northern Ireland's imports were from Ireland, and only 3% from the UK as a whole.<sup>9</sup>

## 1.3. Brexit implications for the logistics and transportation sector

The current frictionless nature of supply chains between Ireland and the UK has benefited the logistics and transportation sector in general. In the event of a no-deal Brexit, on the proposed trade agreement, Ireland's overall economy will face a number of serious economic and operational challenges, which include:

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<sup>8</sup> Data from the Irish Central Statistics Office statistical database (CSO).

<sup>9</sup> Briefing Paper by Matthew Ward, 2020, Statistics on UK trade with Ireland, CBP 8173

- The introduction of new borders checks and customs procedures (i.e. non-tariff barriers)
- Uncertainty surrounding land-bridge efficiency, if non-tariff barriers are applied
- If there is divergence between UK and EU regulatory standards for agri-food products, then SPS checks may be required on imported goods, while the labelling requirements for food products could also change
- Potential disruption due to the lack of mutual recognition for operator permits and transport documents between the EU27 and the UK
- A general downturn in both the Irish and UK economies, which may reduce demand and capital available for investment, therefore making it more difficult to borrow for both corporations and the average person

Since it is impossible to discuss all Brexit challenges in a single study, this research will focus on three main risks which will affect the logistics and transportation sector and supply chains, post-Brexit. These risks are non-tariff barriers, uncertain access to the UK and EU27 markets, and the adequacy of check facilities at UK ports.

### 1.3.1. Non-tariff barriers

In the world of trade, tariffs are a singular constant. However, there are many non-

tariff barriers that Irish companies may face. These are everything beyond a simple tax on imported or exported products. Non-tariff barriers encompass a heterogeneous group of risks, grouped in two broad categories: sanitary measures and technical barriers of trade. While sanitary measures include regulations to protect human, animal and plant life, technical barriers to trade include standards and certification procedures.<sup>10</sup> Although cost is a huge implication of Brexit, non-tariff barriers in relation to trade cannot be ignored. Any applications for checking points at Irish or UK ports will affect access to the UK market. Regardless of the product, new checkpoints between Ireland and the UK may cause significant delays. It is important for many supply chains to minimise transportation time and delays in order to maximise the remaining shelf-life of their products, while providing consistent delivery services. If a company loses a day or more at UK ports, this will affect the value of their products and, in turn, their competitiveness. Some of the possible non-tariff barriers we will discuss here are checks, regulations and custom declarations, Table 1-1.

These checks, regulations and customs declarations can be applied to all trucks moving between Ireland and the UK, and also Ireland to mainland Europe, via the UK land-bridge. The nature of checks will depend on the border-control regulations

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<sup>10</sup> Stephen Byrne & Jonathan Rice, 2018, Non-tariff Barriers and Goods Trade: a Brexit Impact Analysis, Central Bank of Ireland

and policies which the UK adopts after the transition period.

If there is significant regulatory divergence between the UK and EU, this may contribute to increased delay for inbound trucks to the UK via UK ports, to get physically checked, get clearance, and finally leave. If there is no mutual recognition for drivers’ permits and operators’ qualifications, this could also lead to further delay.<sup>11</sup> Currently, truck drivers (i.e. Irish or EU26 citizens) enjoy the freedom that their European qualifications, transport documents and immigration status are recognised in the UK. However, when Britain leaves the European Union, this freedom may no longer apply, particularly for EU26 drivers. Moreover, border and other custom costs may apply for operators. These include official check costs and pre-declaration costs. While these are not tariff barriers, they will take time and incur cost to complete.

Many companies and stakeholders have also expressed concerns about administrative burdens in the event of new customs procedures being applied. If new customs

*Table 1-1: Examples of non-tariff barrier types*

Non-Tariff Barriers	Examples	Notes
<b>Checks</b>	Products standards, safety regulations, SPS, immigration, security	These may disproportionately affect food produce, as they often have sensitive shelf-life.
<b>Regulations</b>	No mutual recognition for driver documents & licences, regulatory divergence of procedures	Any regulatory divergence between the UK and the EU may have serious consequences for several industries, including truck drivers.
<b>Custom Declarations</b>	Official checks cost, pre-declaration costs	While these are not tariffs, they will take time and money to complete.

<sup>11</sup> FTA Ireland, 2019, Brexit FTAI Position Paper

checks are introduced at UK ports for Irish exports to the UK, companies will need to absorb the cost of these additional checks and required declarations, whether by hiring a designated workforce to manage the administrative tasks or outsourcing to a broker.

### 1.3.2. Accessibility to the UK and EU27 markets

As explained in the previous section, there are many factors to consider in relation to access to the UK and EU27 markets following the end of the transition period. One of these is the quality of access that Irish traders will have to UK markets. This is one of the leading issues for Ireland as a whole. Currently, there is an over-reliance on the UK market for many Irish industries. For example, Irish cheese companies export over 57% of their cheddar cheese to the UK market alone. This is only one sector of many that have realised, on examination of their supply chains, that they have over-invested in one market. If we take into consideration

some of the non-tariff barriers discussed above, how are these going to affect Irish exporters to the UK market? This question has been examined throughout the interviews with experts and stakeholders. Many have brought up the possibility that the UK will no longer be a viable market, simply due to access issues. Border checks at the UK can and will affect most companies trying to access the UK market. Currently this is something companies are preparing for.

Border checks affect companies in the food supply chain, as strict guidelines surround products for human consumption. Although EU regulations state that only a specific percentage of trucks which carry agri-food products are to be inspected, it is still not clear what the UK's proposed legislation on the level of physical and SPS checks at UK borders will be. The UK government, in its latest announcement on the border control plans after the transition period, announced that there will be an increase in physical checks and sample-taking after July 2021.<sup>12</sup>

Reintroducing border controls will not only affect the bilateral trade between Ireland and the UK, but also trade with other EU members. The land-bridge has been used for decades as the quickest route to wider Europe. Therefore, it will be imperative for many stakeholders to look at their current business model. The OECD estimates that

delays and costs related to products crossing the borders could increase trade cost by up to 24% of the goods original value.<sup>13</sup> The land-bridge is by far the most efficient route for trade between Ireland and mainland Europe.<sup>14</sup> However, with border controls, it may no longer be the quickest, most effective route. A more direct route may be required. In addition to the expected border delays, if the UK introduces regulations that constrain the issuing of driving permits or the cabotage operations which many Irish companies currently perform, the seamless flow and flexibility of the land-bridge may be at stake.

It is also still unclear if the current mutual-recognition status of transport documents, drivers' qualifications, and operator licences will continue following the transition period. Failing to maintain this status will affect Ireland more than any other EU state. This may cause disruptions to road transport and logistical operations between Ireland and mainland Europe via the land-bridge.

Moreover, both international and EU26 drivers (i.e. any non-Irish or non-UK citizens), working for Irish and UK companies, may face additional immigration checks at UK borders if the Common Travel Area does not allow unfettered access to each jurisdiction for those drivers. Disruption to vehicle

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<sup>12</sup> GOV.UK, 2020, Border planning by the end of the transition period, <https://www.gov.uk/government/news/government-accelerates-border-planning-for-the-end-of-the-transition-period>.

<sup>13</sup> OECD, 2013. Trade Costs: What have we Learned? A Synthesis Report. OECD Trade Policy Paper No. 150. TAD/TC/WP (2013)3/FINAL

<sup>14</sup> Freight Transport Association Ireland, 2019, Brexit Position paper

movement via the land-bridge, in this case, is highly expected.

Another uncertainty surrounding the use of the land-bridge is the lack of an agreement between Ireland and the UK ensuring fair treatment of Irish and other European operators in the case of disputes. Therefore, depending on the EU-UK agreement, the demand on the direct shipping services to mainland Europe may shift substantially. New direct shipping routes to mainland Europe could be introduced via France, the Netherlands and Belgium.

### 1.3.3. Readiness of checks facilities and infrastructure at ports

Agri and non-agri food products must be imported/exported via ports that have Border Control Post (BCP) facilities, along with a suitable number of inspection bays. Ports must be equipped with adequate check facilities, parking spaces, traffic management systems, and handling equipment. These will all be required in order to conduct the required customs and SPS checks. The EU Commission inspects port facilities periodically, to confirm their compliance with EU regulations. At the ports, the products are checked by veterinarians, health authorities and custom officers. Check types are determined based on product types, checks procedures and the regulations for the country of destination.

Following the transition period, border checks are expected to take place at connection ports between Ireland, the UK and EU26 (i.e. Dublin, Rosslare Europort, Heysham, Liverpool, Holyhead, Fishguard, Pembroke, Dover, Calais). The connectivity with EU27 Member States and the UK must be maintained efficiently before the end of the transition period. This would be through measures that include preparing adequate staffing, IT, infrastructure, and operational requirements.<sup>15</sup>

Based on field visits to Dublin and Rosslare ports, it is noted that port operators and Irish governmental departments have prepared various measures to mitigate the potential disruptions of check delays. France has also revealed plans to invest around €50m to expand its ports infrastructure, roads, parking areas, checkpoints building, and equipment. For instance, Calais spent around €6m on infrastructure preparations in order to equip the port for the original Brexit deadline of 29 March 2019. These facilities can and will be employed after the end of the transition period on 31 December 2020.

The UK has also announced intentions to build border facilities and checks infrastructure at UK ports. However, with less than three months remaining in the transition period, it is unclear how the UK plans to develop all the required check facilities at ports. Liverpool is seen, by the

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<sup>15</sup> Government of Ireland, 2020, Preparing for the withdrawal of the United Kingdom from the EU: Contingency Action Plan



stakeholders, as the port that is most prepared for Brexit, due to investment it received for expanding container handling capacities, and providing suitable equipment and technology for performing import and export checks procedures. The UK business community has warned that other ports are not prepared with the adequate checks infrastructure to carry out the required new border checks after the transition period. It is expected that a significant portion of freight traffic will be diverted to Liverpool, and that it will be equipped to carry out the necessary checks required after July 2021.

Stena Line, the largest ferry operator in the Irish Sea, has also warned about Holyhead Port, which, as the UK's second-largest port, is currently not prepared to check products of animal origin or carry out freight checks.<sup>16</sup> This is due to its limited space and infrastructure. The same concerns were expressed by the current operators of Dover and the Eurotunnel. They stated that the Eurotunnel has no space to accommodate additional border checks, while Dover Port is designed as a gateway which keeps the flow of Ro/Ro traffic moving, rather than as a depot that accommodates check facilities.<sup>17</sup>

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<sup>16</sup> BBC News, 2020, Ports plan for Brexit Irish Sea checks, <https://www.bbc.com/news/business-51351677>

<sup>17</sup> Financial Times, 2020, Dover-Calais post-Brexit trade plagued by uncertainty, <https://www.ft.com/content/7efb877a-8b58-4f7d-9a35-4d21de6638e4>

## CHAPTER 2: TRADE BARRIERS BETWEEN IRELAND, THE UK AND THE EU26, AND IMPACT ON THE AGRI-FOOD SECTOR

### 2.1. Importance of agri-food to Ireland

Agriculture has been a source of food and income for Ireland's economy for generations. In the past the Irish economy was almost fully dependent on its exports. That pressure of dependency lessened after the decision to join the European Union in 1973. Ireland's largest indigenous industry is the agri-food industry, employing 8.4% of the working population. These jobs are dispersed throughout the country, especially rural areas. The sector reached revenues of €26 billion in 2015. This of course contributed enormously to the viability of Ireland's rural and coastal communities. As an export-orientated sector, agri-food businesses account for 10.7% of the total products exported.<sup>18</sup> Agriculture still plays a major role in the contemporary economy, accounting for 7.8% of Gross National Income and exports that totalled €12.2 billion in 2016. Although the total share of Irish exports to the UK has declined from 50% in 1973 to around 17% today, the UK remains the key export market for Irish agri-food exports. The European Union market has also been growing, increasing by 16% from 2016 to 2017.<sup>19</sup>

The Irish agri-food sector consists of 24 categories. Beef exports have experienced continuous stability and growth over the years. Dairy is the only other category that has a similar position in Irish agri-food. Ireland produced 588,400 tonnes of beef in 2016, and it was ranked the fifth largest producer of beef in the EU. Over 90% of the beef produced in Ireland is exported where the UK is the major market for Irish beef products.<sup>20</sup>

Irish farmers face major challenges to the sustainability of their agri-food products. These challenges cannot be solved locally due to the nature of the threats. Climate change, rising energy costs, food security, rural decline and political uncertainty are all challenges faced by Irish farmers as a whole. The Irish Government recognises the opportunities that global expansion provides, and aims for Ireland to become a world leader in sustainable agri-food production, despite the risks. An agri-food strategy group comprised experts and academics in the sector was formed in 2014 to address what strategic initiatives were required to ensure the continued development of the Irish agri-

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<sup>18</sup> Economics and Planning Division, 2019, Annual Review and Outlook for Agricultural, Food, and the Marine, DAFM

<sup>19</sup> Bord Bia Irish Food Board, 2019, Export Performance & Prospects

<sup>20</sup> Trevor Donnellan & Kevin Hanrahan, 2016, Brexit: Potential Implications for the Irish Agri-Food Sector, Teagasc

food industry, which is both internationally competitive and resilient.<sup>21</sup>

A strategy developed by the Irish Government, Food Wise 2025, recognises the importance of reacting and adapting to developments in the sector arising from the various challenges that arise in the future, with a specific emphasis on environmental uncertainties. In addition, the importance of communication between consumers, Irish farmers and suppliers is emphasised. **Error! Bookmark not defined.** An understanding of domestic consumers' needs along with distant/international markets will create a more resilient industry.

Determining how to position Irish food in international markets is also explored. The report highlights that a focus on international export markets has been a longstanding one. Although there are mature markets such as the UK, emerging markets such as China necessitate the development of talent throughout the supply chain. In a recent publication,<sup>22</sup> the IFA restated the need for viable prices for farmers, and a profitable return on their investments.

For many years, the UK and Ireland have been each other's largest export markets for agricultural produce. Therefore, the establishment of borders and tariffs between the UK and Ireland would have a major impact on the Irish agricultural sector. From a UK perspective, their farmers and fishermen will no longer have access to EU

subsidies under the Common Agricultural Policy and Common Fisheries Policy. This could result in a rise in demand for national support, which could have a negative impact on the competitiveness of Irish agri-products in the UK. EU cannot see a trade agreement with the UK separate from divergences in state aid. Also, the proposed EU-UK trade agreement should determine how the UK will comply with the regulations set by the EU around the agri-sector. These include regulations surrounding pesticides, the environment and consumers, such as packaging and food labelling.

A no trade agreement will potentially have a very negative impact on the Irish economy. The agri-food sector in particular may experience:

- A loss of preferential market access to the UK, so that EU27 exports to the UK will decline
- The need to develop supply chains to less profitable EU27 markets
- Diverted Irish exports, which will negatively affect EU market prices
- A decline in the volume of Irish agricultural output (due to lower farm prices)
- Lower Irish farm incomes
- A fluctuating sterling/Euro exchange rate
- A decline in competitiveness of EU27 exports to the UK (and vice versa)
- Possible impact on Ireland of future UK agricultural and food policy developments

<sup>21</sup> Monaghan, Downey & Purvis, 2015, Opportunities for Sustainability Competitive Irish Agriculture

<sup>22</sup> IFA, 2020, Submission to the Political Parties and Dáil Candidates for the 2020 General Election

Brexit continues to represent a major market disturbance for Irish farmers in all sectors.<sup>23</sup> For example, up to 50% of all Irish beef exports go to the UK and there is currently no alternative market available. The most vulnerable sector is livestock. The Irish Farmer Association (IFA) also identified other exposed sectors such as dairy (cheddar cheese and butter in particular), mushrooms, pigs and forestry<sup>24</sup>.

## 2.2 No trade agreement scenario

The immediate economic effects of Brexit will be directly related to the trade decisions the UK and EU27 take. In 2018, the trade values of the agri-food exports and imports between Ireland and the UK exceeded €5.2 billion and €4.1 billion respectively.<sup>25</sup> According to the Irish Government, the agri-foods industry, specifically meat and dairy products, are uniquely exposed to the risks of no trade agreement. Under this scenario, trade will be governed by WTO rules and other historical WTO agreements. In this case, the EU27 and UK will impose MFN tariffs on each other's goods. These tariffs are not bounded by other agreements or arrangements. In this situation, it is assumed that the UK will comply with plurilateral commitments on tariffs in the WTO. These agreements grant duty-free trade on a range of listed products between the signatories.

<sup>23</sup> Matthews, A., 2017, Brexit impacts on Irish Agri-food exports to the UK. *Eurochoices*, 16(2), 26-32

<sup>24</sup> IFA, 2017, Brexit: The Imperatives for Irish Farmers & the Agri-food Sector

<sup>25</sup> DAFM, 2018, Brexit Fact Sheet, Irish Agri-food Sector

This means that most favoured nation (MFN)<sup>26</sup> tariffs would not apply across the boarder on EU-UK trade. Furthermore, the EU uses so-called tariff rate quotas (TRQs) on a range of products. This allows imports from third countries to enter the EU with zero or low tariffs up to a certain quantity for a given period; with MFN tariffs this is only applicable when imports exceed the quota.

## 2.3 Introduction of tariffs on trade

It is inevitable that the introduction of tariffs will play a pivotal role in any potential trade agreement between the EU27 and the UK. MFN tariffs under a WTO agreement is a complex and dynamic addition to any trade relationship. For example, as a member of the EU customs union, Irish exporters to the UK benefit from preferential tariff protections (or rents). These are the difference between the prices that now prevail on the UK market behind this tariff protection, and the prices that Irish exporters will receive once Ireland accesses the UK market as a third country.<sup>27</sup> Considering the current output prices for Irish agri-food products, the withdrawal of this preferential tariff rent would have a strong impact on prices, Figure 2-1. Cattle, in particular, would be very sensitive to price changes.

<sup>26</sup> MFN is the cornerstone of non-discrimination among WTO members. Any favourable treatment provided by a WTO member to any other country must immediately and unconditionally be provided to all other WTO members.

<sup>27</sup> Matthews, A., 2017, Brexit impacts on Irish Agri-food exports to the UK. *Euro-choices*, 16(2), 26-32.

### 2.3.1 Tariffs on dairy product categories

As Figure 2-1 shows, dairy is in a stronger position compared with other agri-food categories. The compound annual growth rate (CAGR) between 2015 and 2019 for the output price index for milk was 4.5%. This grew 6.8% more than the price of cattle and 3% more than the agricultural output average. Although the annual growth looks encouraging and close to world market prices, the output price of milk is extremely volatile, increasing by 30% from 2016 to 2017, only to drop by 7% in 2018. This has a huge impact on market prices for dairy products such as cheese, butter and pasteurised milk. This highlights how vulnerable they are to additional costs that the introduction of tariffs would impose. For example, the Irish cheddar cheese industry is heavily dependent on the UK market and would be negatively affected by the no trade agreement outcomes. Based on a case study undertaken by IBEC in 2017, if existing routes to markets are maintained, with no diversification in products, the Irish cheddar industry would lose a staggering €196m in market value under punitive WTO terms.<sup>28</sup>

### 2.3.2 Tariffs on meat product categories

Compared to dairy prices, meat output prices are a lot less resilient to the impacts of tariffs. On average, livestock output prices in Ireland have fallen on average by nearly -1% annually since 2015. This is a result of supplies from major international beef exporters and continued price competition in EU and international markets. Therefore, there is limited room for additional tariff costs in an already increasing cost base.<sup>29</sup> If current UK tariff protections are reduced by 50%, the impact on meat prices would be substantial (UK beef prices down by 15%, pork prices by 3%, poultry prices by 6% and lamb prices by 5%).<sup>30</sup> Even allowing for the increase in implicit protection, due to higher trade costs following Brexit, this impact would be similar for all Irish meat categories. This aligns with results from the Copenhagen Economics research, which suggests that outputs for the Irish beef sector would decline by -23% under a WTO agreement.<sup>31</sup>

<sup>28</sup> Ibec, Dairy Industry Ireland case Study, 2017, Cheddar Type Cheeses: A Brexit Case Study.

<sup>29</sup> Irish Agricultural Input Price CAGR 2014-2019 is 0.9%, with animal feed, veterinary and motor fuel costs increasing exponentially over this time period (all over 2% CAGR).

<sup>30</sup> Van Berkum, S., Jongeneel, R., Vrolijk, H., van Leeuwen, M. and Jager, J. (2016). Implications of a UK Exit from the EU for British Agriculture (LEI Wageningen UR: Wageningen).

<sup>31</sup> Copenhagen Economics – Ireland & the impacts of Brexit report (see Fig. 23) Output changes in two scenarios for Brexit in 2030, page 43.

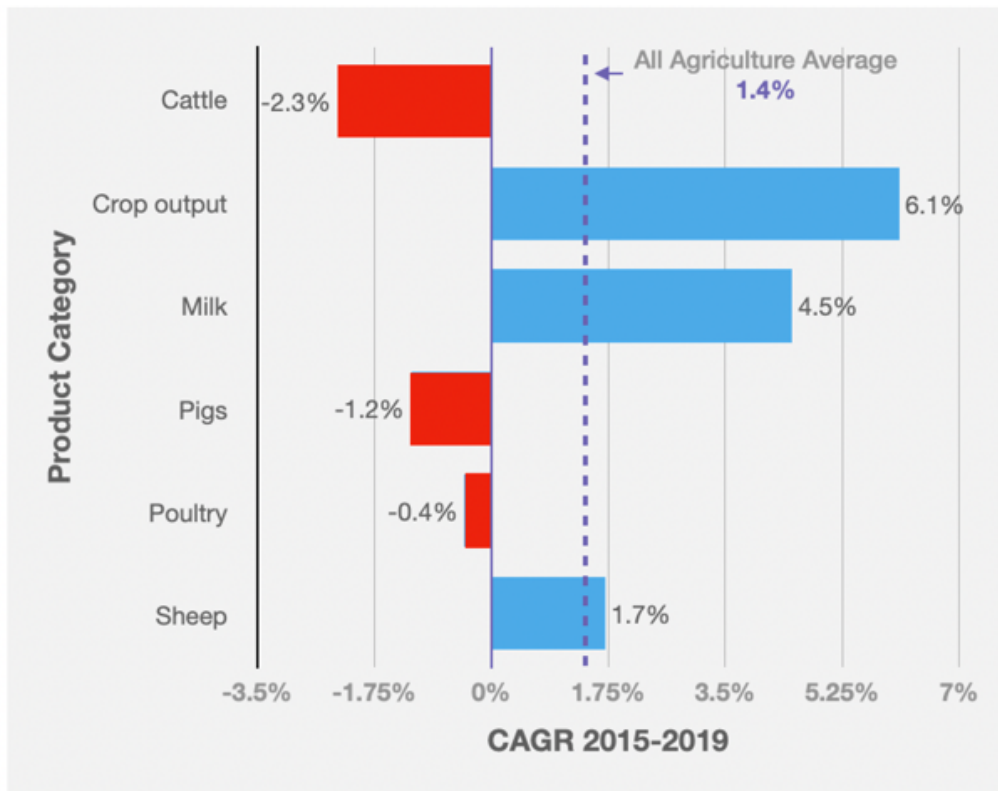


Figure 2-1: Irish Agricultural Output Price Growth 2015-2019<sup>30</sup>

## 2.4 Customs procedures and non-tariff barriers

Membership of the EU provided the UK with freedom of movement for goods and services with other EU27 countries. This ensured the elimination of all trade barriers, including customs duties and restrictions on quantities. However, the reintroduction of customs or border controls is likely, as a consequence of the no trade agreement scenario. The scenario will cause significant level of disruption in trade flow, with ports operations experiencing bottlenecks,

transportation delays, cross-border uncertainties, higher logistical costs, and more complex supply-chain networks.

The cost of implementing customs procedures for agri-food products depends on many factors. These include complex rules of origin; sensitivity of the good to delay, and the distribution network. Even the product category being processed may affect costs. Food Drink Ireland (FDI)<sup>32</sup> (the main trade association for the food and drink industry), recommended that any future trade agreement needs to minimise customs complexity and regulatory checks by:

<sup>32</sup> Food Drink Ireland, 2018, Improving Competitiveness: Policy Priorities for the Food and Drink Sector.

- Simplifying procedures and ensuring they are consistent with the Union Customs Code
- Practising maximum collaboration on SPS, veterinary and product standards
- Mutually recognising standards to expedite trade between approved consignors/consignees

#### 2.4.1 Non-tariff barriers for dairy products

Non-tariff barriers, administration or resource requirements, and sensitivity to delays are all issues linked to the complexity which dairy products experience in the face of ‘rules of origin’. It is generally understood that secondary goods (i.e. processed goods) such as skimmed-milk powder, cheese and butter, have more complex rules of origin than primary goods such as unprocessed milk. Adhering to these rules of origin requirements is a very costly administrative process.

Rules of origin procedures require dairy goods to have at least partly originated within the FTA area. This means exporters would have to limit their use of input goods from outside the EU.<sup>33</sup> The Arla report estimates that the cost of compliance with these checks, when importing into the EU27, are in the range of 8% of the value of the good itself, with a large portion of this cost (85%) being a result of additional paperwork.

<sup>33</sup> Bakker, J and Datta, N (2018), The impact of Brexit on the UK dairy sector: A report for Arla Foods UK, LSE Consulting.

#### 2.4.2 Non-tariff barriers for meat products

Apart from having more primary product categories (i.e. livestock), meat products have very similar rules-of-origin requirements as dairy. Therefore, secondary goods such as processed meat have more complex rules of origin than primary goods such as cattle, lamb and pig livestock. This will influence what challenges the supply chain will face as the result of new non-tariff barriers following the transition period. As noted with dairy rules of origin, the goal here is to ensure that the meat category products exported from one country to the other are originated (or partly originated) in the country of export. They must not be third-country products rerouted to gain more favourable tariff access.

It is important to note that there are differences between rules of origin for FTAs and WTO trade agreements. The requirements discussed in the previous paragraph are FTA rules of origin, also known as preferred rules of origin. These apply to countries which have agreed a preferential trade arrangement with the EU, such as South Korea. WTO rules, known as non-preferential rules of origin, apply to trade under WTO rules in the absence of a preferential trade arrangement; for example, trade between the EU and the United States.<sup>34</sup>

<sup>34</sup> House of Lords (2017). Brexit: Trade in Goods, European Union Committee, 16th Report of Session 2016-17, HL Paper 129, page 44

## 2.5 Divergence in regulations

The UK exiting the EU single market is the factor which will have the greatest impact on trade flow, other than SPS checks on cross-border trade. There will be checks, at EU border entry points, for compliance with a wide range of technical regulations (such as nutrition labelling and organic certification), for all products entering the EU27 from the UK or from other non-EU countries.<sup>35</sup> UK agri-food exports will have to meet EU regulative requirements. These apply to imports from any non-EU country, unless these requirements are modified in a trade agreement. The UK intends to transpose all current EU requirements into its domestic law following Brexit through the Great Repeal Bill 2017. These requirements would also apply to EU26 and Irish exporters who seek access to the UK market following Brexit. The specific regulative requirements for agri-food products can be seen in Table 2-1.

### 2.5.1 Regulation divergence for dairy product

Falling under the ‘Product of Animal Origin’ classification, Table 2-1, dairy product regulations will diverge significantly once the UK leaves the EU single market. All regulative and administrative requirements, except needing a passport or pre-movement tests, will be applicable. Even if the Great Repeal Bill 2017 is honoured and all EU regulations pre-withdrawal will transfer to domestic UK

law, a substantial increase in regulation and administrative activities would increase costs for Irish exporters. The risk of future regulatory divergence in the dairy sector is high, due to the reputation of EU regulations at a global level.

### 2.5.2 Regulation divergence for meat product

The meat category can be split into primary goods such as livestock and secondary goods of animal origin. The meat product category qualifies for all non-plant/seed classifications in Table 2-1. As with dairy, it is assumed that the UK will adhere to the status quo, with the Great Repeal Bill. This may result in a series of mutual-recognition agreements between the UK and EU, if FTA agreement is concluded. However, this would require the UK to adhere to EU regulations in the future, and it would also need to agree to some form of dispute settlement if a request to leave the agreement is made. This would be difficult for the UK to accept, especially in relation to the meat product category. The UK has ambitions to enter FTAs with third country status. Being tied to EU regulations surrounding meat would be a barrier, especially if such FTAs demanded access to products such as hormone-treated beef or chlorinated chicken.

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<sup>35</sup> Matthews, A. (2017). Brexit impacts on Irish Agri-food exports to the UK. *Eurochoices*, 16(2), 26-32.



Table 2-1: Regulative requirement to trade between a third country and EU countries

	Live Animals (not pets)	Germinal Product (semen/ embryos)	Product of Animal Origin (e.g. meat)	Animal By Product (not human food)	Plants	Seeds
EU needs to approve country as an exporter?	Y	Y	Y	Y	*Some	*Some
EU needs to approve the country's residue plan?	N/A	N/A	Y	N/A	N/A	N/A
EU to audit the country, by each trading commodity?	Y – broader scope than within EU	Y – broader scope than within EU	Y – broader scope than within EU	Y – broader scope than within EU	N	N
Each premises/ manufacturer in the country needs to be approved by EU?	**Some	Y	Y	Y	*Some	*Some
Passport required to export to an EU country?	Only horses and cattle	N/A	N/A	N/A	Y (PC)	Y (PC)
Requires official certification?	Y - EHC	Y - EHC	Y	Y	Y (PC)	Y (PC)
Needs pre-movement tests/ checks?	Y	Y	N	Some	Most	Most
Requires official inspection on departure?	Y	Y	Y	Y	Y	Y
Movement is pre-notified on EU's TRACES system?	Y	Y	Y	Y	N	N
Need to enter EU via a Border Inspection Post?	Y	Y	Y	Y	Y, also via postal hubs	Y, also via postal hubs

Notes: \*National Rules apply; \*\*Assembly centres only; N/A: Not applicable; Y: Yes; N: No; EHC: Export Health Certificate; PC: Plant certificate; Postal hubs are centres where letters, parcels, packets and other articles that arrive from overseas by post may be legally examined for customs purposes.

Source: HMRC, Administrative elements of importing and exporting goods, written evidence in House of Lords (2017).

Source: Matthews, 2017<sup>37</sup>

It is important to note that, although mitigating the risk of regulatory divergence is a legal and political responsibility, it has huge implications for the performance of agri-foods supply chains. Each third-country certification requirement, official inspection or pre-movement check, added to an already long logistics order process, increases operational costs exponentially. As mentioned previously, this increases the sensitivity of agri-food products to cross-border checks and delays, adding further barriers to existing route-to-market infrastructures.

## 2.6 Route-to-market Implications

The chapter so far has explained the risks and negative impacts that any future EU-UK trade agreement will have on the Irish agri-foods industry, which include additional tariff and other duty fees; delayed trade flow due to SPS and other security checks, and regulatory divergence administration requirements. Consequently, a range of service sectors will face higher costs and operational disruptions to cross-border service trade, post Brexit. These include air transport, road transport, finance, insurance and professional services, to name a few. These service providers are the strategic route-to-market enablers of the agri-food

industry. Any increased costs and delays will have severe implications for their competitiveness.

Irish maritime transport is also a strategic route-to-market infrastructure for the agri-foods industry, connecting the country to most of its international markets. More than 90% of Ireland's international trade volume moves through its ports.<sup>36</sup> Apart from their close trade relationship, Ireland has historically relied on the UK road and ports network, known as the UK land-bridge,<sup>37</sup> as its primary route-to-market to mainland Europe. The UK land-bridge is favoured by traders in high-value or time-sensitive goods as it is border-free. There is also a high frequency of what are considered to be short-sea crossings. This allows a much faster transit time than alternative direct routes. Ireland is also part of the European TEN-T North Sea–Mediterranean core network corridor, of which UK infrastructure is an integral part.<sup>38</sup> The uncertainty of what customs may be at UK borders has called the attractiveness of this route into question. In fact, the Irish Government's core mission is to mitigate the risk that Brexit will cause, and to maintain as much as possible of the As-Is relationship between the UK and EU27. It also wishes to minimise the regulatory burden for all goods moving along the UK land-bridge.<sup>39</sup>

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<sup>36</sup> Irish Maritime Development Office IMDO, 2019, *The Irish Maritime Transport Economist*.

<sup>37</sup> Vega, A. and N. Evers. 2016. "Implications of the UK HGV Road User Charge for Irish Export Freight Transport Stakeholders – A Qualitative Study". *Case Studies on Transport Policy* 4(3):208–217.

<sup>38</sup> Breen, B., Brewster, P., Tsakiridis, A., O'Driscoll, C. (2018) *The Implications of BREXIT on the Use of the Landbridge*, Dublin.

<sup>39</sup> Irish Government, 2017, *BREXIT Ireland's Priorities*, Dublin.

## CHAPTER 3: SIMULATION-BASED SCENARIO MAPPING MODEL

### 3.1 Scope of study

The objective of the study is to analyse and quantify different scenarios of disruption that may interrupt the trade flow between Ireland, the UK and the EU26 following the transition period, i.e. after 31 December 2020. The research focuses in particular on the Brexit implications for the transportation sector and Irish agri-food supply chains, especially the dairy and meat product categories. A simulation-based scenario mapping model is developed that mimics the traffic flow of the inbound and outbound trucks between Ireland, the UK and the EU26 via the UK land-bridge and direct routes. The consequences of introducing new border controls and non-tariff barriers at the entry points (i.e. ports) in Ireland and the UK will be assessed against various indicators, including product delivery time, product shelf-life and trucks congestion level at the ports. Three main risks of Brexit were analysed in the study: 1) the introduction of new border checks at Irish and UK ports; 2) the challenges in access to the UK and EU27 markets via the UK land-bridge, and 3) the adequacy of checks infrastructure at Irish and UK ports. Practical alternatives to the current strategies of freight forwarding and products delivery are also analysed.

The model scope is the Ro/Ro traffic between Ireland, the UK and Continental

Europe. This traffic goes either via the land-bridge or through direct route services to mainland Europe. Ro/Ro traffic from Ireland and Northern Ireland moves through four main corridors: The Northern, Eastern, Southern and Continental corridors.<sup>40</sup> While the Northern corridor links Northern Ireland with the UK through Scotland, the central and southern corridors connect Ireland to the UK and EU26 through the land-bridge route. On the other hand, direct services connect Ireland directly to Continental Europe through ports in France, the Netherlands and Belgium. This study focuses on the three main corridors as illustrated in Figure 3-1:

- East/West Maritime Corridor: this includes the central and southern corridors via Dublin-Holyhead, Dublin-Liverpool, Dublin-Heysham, Rosslare-Fishguard, and Rosslare-Pembroke.
- Land-bridge: this links Ireland to the EU26 with the UK as a bridge. The route is connected through the East/West maritime corridor, transit routes from the western UK ports to Dover, and

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<sup>40</sup> IMDO, 2017, The implications of Brexit on the use of Landbridge.

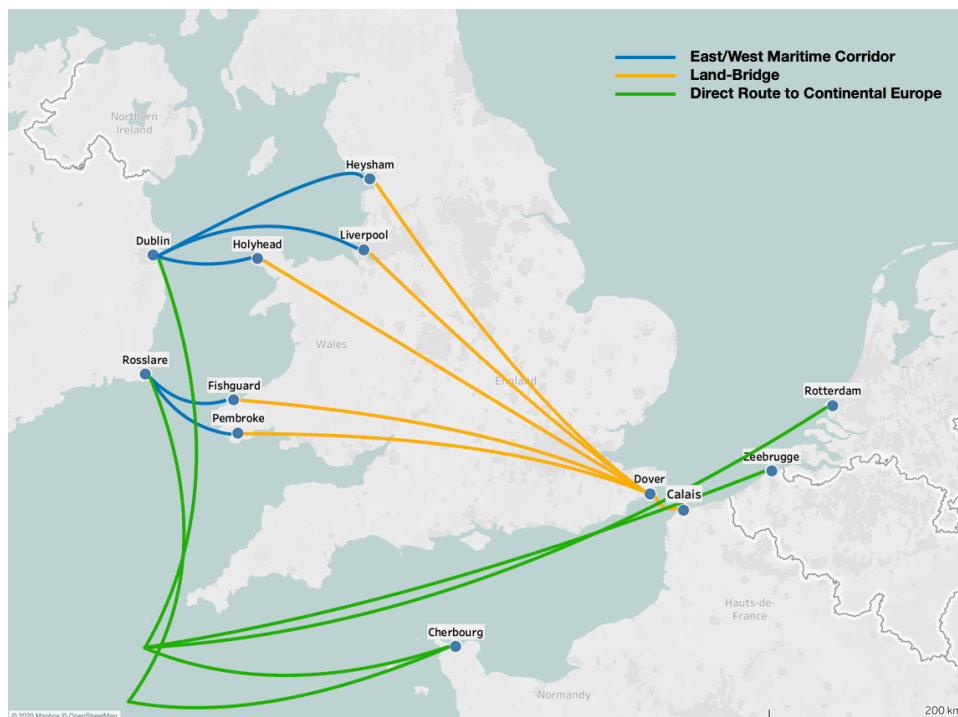


Figure 3-1: Maritime shipping routes between Ireland, the UK and the EU

finally a maritime route, Dover-Calais, to France.

- Direct Route to Continental Europe: this corridor links Ireland directly with the EU26 through four maritime routes: 1) Dublin-Cherbourg, 2) Rosslare-Cherbourg, 3) Dublin-Rotterdam and 4) Dublin-Zeebrugge.

### 3.2 System understanding and problem formulation

To understand the implications of Brexit on the transportation links between Ireland, the UK and the EU26, a wide range of qualitative techniques have been used. These include focus groups, face-to-face interviews, panel discussions and field visits. Since the beginning, the research team has been in continuous contact with various senior

supply-chain professionals. The team has also engaged with agri-food manufacturers, logistic companies and trade associations. Interviews were conducted with participants who have experience in both the strategic and operational aspects of supply-chain design and of transportation links between Ireland and the UK. (A full list of the stakeholders consulted throughout the study is presented in Appendix 2). Preliminary interviews and focus groups were conducted with a freight forwarder, an agri-food processor and a member of a logistics company. These were considered necessary for identifying the initial scope, feasibility and parameters of the study. Two field visits were made to Dublin and Rosslare port, and detailed interviews with experienced port officials were conducted. This was to

understand port operations and the preparation activities for Brexit.

### 3.3 Data collection and model development

The relevant data for the model was collected from various data sources including the Central Statistics Office (CSO), Eurostat, the Irish Maritime Development Office (IMDO), state agency publications and reports (including DAFM, the Revenue, and HSE), the Dublin Port and Rosslare Europort websites, shipping operators' websites, and information acquired from the expert panel and industry stakeholders. Other data, associated with future Brexit arrangements, was hypothesised based on the discussions with the experts and industrial stakeholders involved in the study. Two data categories can be identified based on the data collection methodology and the data availability, as follows:

- ***Post-Brexit scenarios and related information***

This category of data includes post-transition scenarios such as: 1) arrangements for new border checks between the EU27 and UK, 2) possible changes in trade volumes between Ireland, the UK and EU26 as a result of non-tariff barriers, 3) levels of accessibility to the EU27 market through direct shipping services, and 4) the readiness of checks infrastructure in Ireland, the UK and EU26 ports. The data related to these scenarios (i.e. the level of checks interventions, proportion of trucks selected for checks, timing of checks, check resource capacities,

and future demand on the direct route) were not available from any data source. The shape of agreement between the UK and EU and the implementation of the procedures associated with this agreement will provide more practical information and values on these data in the future. Therefore, to identify the nature of the tested scenarios and set the relevant assumptions for this post-Brexit data, the research team conducted a comprehensive review of relevant literature and held in-depth discussions with the project stakeholders and academics. They provided the research team with valuable information that supported many of the determined assumptions, as will be illustrated in the coming sections.

- ***Historical data in relation to trade volumes and shipment flow***

The data in this category was *not* hypothesised as Irish and European statistical databases were comprehensively mined. This was conducted in tandem with their related publications, presentations and case studies in order to validate the data. The data collection was supported by continuous discussions with business stakeholders and relevant colleagues in academia. A wealth of information has been collated and, it has informed an in-depth understanding of trade relations and transportation links between Ireland and the UK. The data in this category includes: 1) Ro/Ro trade volumes between Ireland, the UK and EU26, 2) the traffic flow along the maritime routes of the three corridors, 3)

shipping-line capacities and sailing frequencies, and 4) transportation regulations which control the movement of goods. Appendix 1 outlines the data values, sources and means of calculation.

### 3.3.1 Trade volumes data

The data showed that Ireland’s trade volume worldwide, for both imports and exports in 2018, reached up to 55 million tonnes<sup>41</sup>. The trade volume between Ireland and the UK (i.e. Great Britain & Northern Ireland) was reportedly 40% of the total tonnage, while trade with the remaining EU countries

accounted for 34.1%. Five categories of traffic are employed to carry the traded goods to and from Ireland: Liquid Bulk, Dry Bulk, Lo/Lo, Ro/Ro, and Break Bulk. Ro/Ro was found to be the most popular method to ship the products between Ireland and the UK. It accounts for approximately 63% of the Irish trade within the UK. On the other hand, the dry bulk and Lo/Lo categories dominate the traffic between Ireland and the remaining EU countries, with approximately 75% of the trade, while the Ro/Ro category represents only 11.5%, Table 3-1.

*Table 3-1: Tonnage of goods handled at Irish ports (2018)*

Category of goods	Volume ('000 tonnes)		
	UK	Other EU	Non-EU
<b>Goods Received</b>			
Liquid bulk	4,248	1,364	1,974
Dry bulk	713	5,806	989
Lift-on/lift-off	436	3,586	11
Roll-on/roll-off	7,364	1,343	0
Break bulk and other goods	165	465	188
<b>Total</b>	<b>12,925</b>	<b>12,565</b>	<b>3,172</b>
<b>Goods Forwarded</b>			
Liquid bulk	654	218	123
Dry bulk	1,459	1,838	442
Lift-on/lift-off	302	2,996	1
Roll-on/roll-off	6,482	835	-
Break bulk and other goods	206	343	13
<b>Total</b>	<b>9,103</b>	<b>6,231</b>	<b>579</b>
<b>Total Goods</b>			
Liquid bulk	4,902	1,582	2,097
Dry bulk	2,172	7,644	1,432
Lift-on/lift-off	738	6,583	12
Roll-on/roll-off	13,846	2,178	9
Break bulk and other goods	371	809	201
<b>Total</b>	<b>22,028</b>	<b>18,795</b>	<b>3,751</b>

Source: CSO statistics of port traffic, Tables 5a, b and c.

<sup>41</sup> CSO Statistics, 2018, Port Traffic.

### 3.3.2 Ro/Ro trade-volumes flow along transportation routes

Following an investigation into the databases of the CSO and other statistical resources, no figures for the Ro/Ro traffic volumes, which flow along the identified maritime corridors, could be found. Therefore, this data analysis is based on various assumptions, in conjunction with consultations with importers, exporters, and trade associations. These assumptions are explained below:

- *Ro/Ro trade volumes between Ireland and the UK via the East/West Maritime Corridor:* According to the CSO, the trade along the East/West Corridor involves either Ro/Ro traffic or liquid bulk. Products such as crude oil, oil product, and liquefied gas are mainly using liquid bulk. Therefore, when the oil products volumes are removed, it can be assumed that all products traded along the routes in the East/West maritime Corridor between Ireland and the UK are Ro/Ro traffic.
- *Ro/Ro trade volumes between Ireland and EU26 via the land-bridge:* The Ro/Ro

traffic between Ireland and the EU26 via the land-bridge is estimated at 16% of the total Ro/Ro traffic between Ireland and the UK (excluding Northern Ireland).<sup>40</sup>

Table 3-2 shows the detailed calculations for the Ro/Ro traffic between Ireland and the EU26 via the land-bridge.

- *Ro/Ro trade volumes between Ireland and EU26 via direct routes:* The CSO published an accumulated figure of the Ro/Ro traffic between Ireland and the other EU countries of 1.3 million tonnes, and 835,000 tonnes for the inbound and outbound flow to and from Irish ports, respectively, Table 3-1. However, the CSO did not clarify the proportion of Ro/Ro product volumes which flow along each of the four direct maritime routes specifically (Dublin-Cherbourg, Dublin-Rotterdam, Dublin-Zeebrugge and Rosslare-Cherbourg). Therefore, the Eurostat database was used to calculate these figures, Table 3-2.<sup>42</sup> A narrow gap is observed between the Eurostat and CSO accumulated figures for the direct Ro/Ro traffic to mainland Europe, indicating the accuracy of the identified figures.

<sup>42</sup> Eurostat, transport, maritime transport, [https://ec.europa.eu/eurostat/data/database?p\\_p\\_id=NavTreportletprod\\_WAR\\_NavTreportletprod\\_INSTANCE\\_nPgeVbPXRmWQ&p\\_p\\_lifecycle=0&p\\_p\\_state=normal&p\\_p\\_mo](https://ec.europa.eu/eurostat/data/database?p_p_id=NavTreportletprod_WAR_NavTreportletprod_INSTANCE_nPgeVbPXRmWQ&p_p_lifecycle=0&p_p_state=normal&p_p_mo)

[de=view&p\\_p\\_col\\_id=column-2&p\\_p\\_col\\_pos=1&p\\_p\\_col\\_count=2](de=view&p_p_col_id=column-2&p_p_col_pos=1&p_p_col_count=2)

Table 3-2: Ro/Ro trade volume for each studied maritime route

Maritime Route		Volume (tonnes)
<b>Goods Received</b>		
East/West Maritime Corridor	Heysham – Dublin	356,000
	Holyhead – Dublin	3,470,000
	Liverpool – Dublin	2,982,000
	Fishguard – Rosslare	247,000
	Pembroke – Rosslare	481,000
	<b>Volume between Ireland, THE UK and EU</b>	<b>7,536,000</b>
Land-bridge route*	<b>Volumes between Ireland and EU (land-bridge)</b>	<b>1,205,760</b>
East/West Route	<b>Volume between Ireland and THE UK</b>	<b>6,330,240</b>
Direct route	Cherbourg – Dublin	41,000
	Cherbourg – Rosslare	182,000
	Rotterdam – Dublin	417,000
	Zeebrugge – Dublin	588,000
Ro/Ro Direct Route	<b>Total Volume between Ireland and EU (Direct)</b>	<b>1228,000</b>
<b>Goods Forwarded</b>		
East/West Maritime Corridor	Dublin – Heysham	273,000
	Dublin – Holyhead	2,846,000
	Dublin – Liverpool	2,496,000
	Rosslare – Fishguard	330,000
	Rosslare – Pembroke	667,000
	<b>Volume between Ireland, THE UK and EU</b>	<b>6,612,000</b>
Land-bridge route*	<b>Volumes between Ireland and EU (land-bridge)</b>	<b>1,057,000</b>
East/West Route	<b>Volume between Ireland and THE UK</b>	<b>555,4080</b>
Direct route	Dublin – Cherbourg	56,000
	Rosslare – Cherbourg	202,000
	Dublin – Rotterdam	256,000
	Dublin – Zeebrugge	287,000
RO/RO Direct Route	<b>Total Volume between Ireland and EU (Direct)</b>	<b>801,000</b>

Source: Adapted from the CSO & EuroStat.

\* According to the IMDO report, 16% of the trade volumes between Ireland and the UK are shipped to the EU markets via the UK land-bridge<sup>43</sup>.

### 3.3.3 Ro/Ro trade volumes of agri products along the three corridors

The research provided particular attention to the impact that new, non-tariff barriers would have on the agri-food trade flow

through Irish and UK ports, following the end of the transition period. Non-tariff barriers may include SPS measures, conformity assessment, and pre-shipment inspections related to rules of origin. These can be



applied to live animals and animal products, as well as plant products entering the EU single market. The DAFM<sup>43</sup> specified seven product categories that would incur these checks:

- Animals & Animal Product
- Plants & Plant Products
- Timber & Timber Products
- Fishery Products
- Animal Feed
- Fertilisers
- Food of non-animal origin subject to increased pesticide residue control

According to the CSO, 14 distinct product divisions can be assumed, in each of the seven categories, Table 3-3. These would be subject to the types of checks for agri-food products including documentary and sealed identity checks, SPS inspections and sampling tests. The Ro/Ro trade volumes of these categories are calculated and presented in Table 3-3. (Appendix 1 shows detailed calculations for the Ro/Ro trade volumes of non-agri and agri-food products that flow along the East/West corridor to the UK and via the land-bridge and direct routes to mainland Europe).

### 3.3.4 Number of freight units handled by Irish ports

Identifying the number of vehicles which flow along the three corridors was crucial for understanding the shipping operations in Irish and UK ports. The CSO provides figures on the number of Ro/Ro freight vehicles that cross the Irish Sea between Ireland and the UK. However, there is no breakdown of these figures for the individual maritime routes that link the two countries. Similarly, it is not clear what number of vehicles move on to mainland Europe, via the land-bridge or the direct route. Pinpointing these numbers is imperative for understanding the dynamics of the transportation network along these corridors, and also for understanding the impact that the introduction of non-tariff barriers would have on waiting times for trucks and on projected congestion at these ports. The product trade volumes, expressed by tonnes, can be converted into number of vehicles by using the Average Unit Weight metric (AUW), Table 3-4. AUW is estimated by the IMDO to be 21 tonnes per truck for Ro/Ro heavy-goods vehicles (HGVs.)<sup>40</sup>.

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<sup>43</sup> Department of Agricultural, Food, and the Marine: Brexit Preparations, Borders Control, <https://www.agriculture.gov.ie/importofanimalsandanimalproducts/>

### 3.3.5 Sailing frequency and freight capacity of ferries

Irish Ferries, Seatruck Ferries, P&O and Stena Line provide Ro/Ro shipping services across

the East/West Corridor. They call at Holyhead, Liverpool and Heysham from Dublin, and at Fishguard and Pembroke from Rosslare. These services grew by 4% in 2018

Table 3-3: Agri products division and volumes via Ro/Ro traffic

Product Category	Product Division	Trade Volume with UK – 2018		Trade Volume with 2018		Other-EU –
		Export Volume (tonnes)	Import Volume (tonnes)	Export Volume (tonnes)	Import Volume (tonnes)	Import Volume (tonnes)
Animal & Animal Products	00 – Live Animal	9,277	1,973	20,206		542
	01 – Meat & Meat Preparation	454,859	122,903	319,510		143,001
	02 – Dairy Products	16,872	46,125	90,088		19,244
	29 – Crude Animal & vegetable material	16,872	46,125	90,088		19,244
	41 – Animal oils & fats	20,718	2,941	69,503		2,764
Plant & Plant Product	05 – Vegetable & Fruit	140,129	365,938	8,261		471,542
	43 – Animal or vegetable materials	1,417	20,101	7		6,940
Timber & Timber Products	24 – Cork & Wood	373,358	234,173	2,537		184,748
	63 – Cork & wood manufactures (excl. furniture)	360,771	67,845	131,080		137,901
Fishery Product	03 – Fish & molluscs Preparation	16,872	46,125	90,088		19,244
Animal Feed	08 – Feeding Stuff for Animal	181,664	397,873	81,645		946,351
	21 – Hides, skins & fur-skins	101,479	153,388	140,363		115,581
Fertiliser	27 – Crude fertilizer & minerals	135,831	388,552	50,605		921,773
	56 – Fertilizers	3,424	142,571	474		985,999
Other Agri-food	04 – Cereals & Cereal Preparations	185,889	807,462	12,152		740,010
	07 – Coffee, tea cocoa, spices & Manufacturers thereof	49,340	67,506	3,352		36,786
	09 – Miscellaneous edible products & preparations	101,479	153,388	140,363		115,518
	11 – Beverages	421,181	404,475	141,032		269,063
Ro/Ro Agri product trade volume between Ireland, UK and EU via land-bridge*		<b>2,591,432</b>	<b>3,469,464</b>			
Ro/Ro Agri product trade volume between Ireland and EU (land-bridge)**		<b>414,629</b>	<b>555,114</b>			
Ro/Ro Agri product trade volume between Ireland and UK		<b>2,176,803</b>	<b>2,914,350</b>			
Total Agri product trade volume between Ireland and EU (Direct Route)					<b>1,391,354</b>	<b>5,136,251</b>
Ro/Ro Agri product trade volume between Ireland and EU (Direct Route)***					<b>153,049</b>	<b>667,713</b>

Source: the CSO.

\*All trade via the East/West maritime corridor to UK ports is assumed to be transported using the Ro/Ro traffic mode. The figure includes the trade volume to the EU through the land-bridge

\*\*According to the IMDO report, 16% of the trade volumes between Ireland and the UK are shipped to the EU via the UK Land-bridge.

\*\* According to the CSO, the percentages of inbound and outbound Ro/Ro traffic between Ireland and the EU are 11% and 13% respectively of the total trade volume.

Table 3-4: Number of Ro/Ro freight trucks for each studied maritime route

Maritime Route		Products Volume (tonnes)	Number of Freight Units AUW (21 tonnes/truck)
<b>Goods Received</b>			
East/West Maritime Corridor	Heysham – Dublin	356,000	17,000
	Holyhead – Dublin	3,470,000	165,238
	Liverpool – Dublin	2,982,000	142,000
	Fishguard – Rosslare	247,000	11,762
	Pembroke – Rosslare	481,000	22,905
	<b>Total RO/RO trade volumes and freight units received from THE UK</b>	<b>7,536,000</b>	<b>358,905</b>
Direct route	Cherbourg – Dublin	41,000	1,952
	Cherbourg – Rosslare	182,000	8,667
	Rotterdam – Dublin	417,000	19,857
	Zeebrugge – Dublin	588,000	28,000
<b>Goods Forwarded</b>			
East/West Maritime Corridor	Dublin – Heysham	273,000	13,000
	Dublin – Holyhead	2,846,000	135,524
	Dublin – Liverpool	2,496,000	118,857
	Rosslare – Fishguard	330,000	15,714
	Rosslare – Pembroke	667,000	31,762
	<b>Total Ro/Ro trade volumes and freight units forwarded to UK</b>	<b>6,6120,000</b>	<b>314,857</b>
Direct route	Dublin – Cherbourg	56,000	2,667
	Rosslare – Cherbourg	202,000	9,619
	Dublin – Rotterdam	256,000	12,190
	Dublin – Zeebrugge	287,000	13,667

Source: Adapted from the CSO/IMDO.

and now account for 45% of all Ireland’s Ro/Ro traffic.<sup>44</sup> Irish Ferries and Stena Line also provide direct shipping services to Continental Europe, to Cherbourg Port in France from Dublin and Rosslare ports, respectively. Also, on these direct routes, CLdN links Dublin Port to Rotterdam and Zeebrugge ports in the Netherlands and

Belgium, respectively. Recently, substantial capacity has been added to the direct service to the Continent by the arrival of a new operator, Cobelfret. It has launched direct Ro/Ro services from Dublin to Zeebrugge, and more recently to Rotterdam. Direct Continental services to France, Belgium and the Netherlands have increased by 15% in

<sup>44</sup> IMDO, 2018, Irish Maritime Transport Economist, 16<sup>th</sup> edition.

total. Detailed ferry routes, shipping times and ferry capacities, along with the frequencies in the East/West and direct Continental corridors for 2018 are presented in Table 3-5.<sup>45</sup>

### 3.4 Model input parameters and measurement indicators

#### 3.4.1 Input parameters in model control screen

To map the entire transportation flow, a comprehensive list of input parameters (158 in total), was identified and programmed

into the model’s control screen. All related aspects of the Ro/Ro transportation dynamics between Ireland, the UK and mainland Europe has been presented. Input parameters were based on consultations with the experts, coupled with an extensive literature review. This large number of parameters provided the analysts with the ability to map a wide range of post-Brexit scenarios and assess their implications on the overall performance of the system. The identified parameters are divided into six categories, as illustrated in Table 3-6.

*Table 3-5: Data collected on ferries and vessels on relevant maritime routes*

Maritime Route		Shipping company	Weekly Sailing Frequency (both ways)	Transit Time (hours)	Avg. Vessel Capacity (Freight Unit)
East/West Maritime Corridor	Dublin – Holyhead	Irish Ferries	56	3.5	209
	Rosslare – Pembroke		28	4	122
	Dublin – Holyhead	Stena Line	56	3.5	209
	Rosslare – Fishguard		28	4	75
	Dublin – Liverpool	P&O	24	8	123
	Dublin – Liverpool	Seatruck	42	8	123
	Dublin – Heysham		12	9	122
Direct route	Dublin – Rotterdam	CldN	6	41	530
	Dublin – Zeebrugge		4	40	530
	Dublin – Cherbourg	Irish Ferries	6	19	170
	Rosslare – Cherbourg	Stena Line	6	17	150

Source: Shipping company websites.

<sup>45</sup> Irish Ferries: <https://www.irishferries.com/ie-en/routes-and-times/dublin-holyhead/>  
 Stena Line: <https://www.stenalinefreight.com/routes/>  
 Seatruck: <https://www.seatruckferries.com/>

P&O: [https://www.poferriesfreight.com/freight/content/pages/template/ports\\_and\\_routes\\_ports\\_and\\_routes.htm](https://www.poferriesfreight.com/freight/content/pages/template/ports_and_routes_ports_and_routes.htm)  
 CLDN: [http://www.cldn.com/ro-ro\\_cldn\\_ro-ro.html](http://www.cldn.com/ro-ro_cldn_ro-ro.html)

*Ro/Ro Trade Volumes* category provides users with the ability to identify the Ro/Ro trade volumes that flow between Ireland, the UK and the EU26 in both inbound and outbound directions. Analysts can investigate the implications of Brexit on the products’ demand and supply in specific regions (represented by the volume of imports and exports), by altering the values of the parameters in this category. The model dynamics change the number of generated vehicles on any of the modelled routes by altering this category of

parameters on the particular route. This in turn affects the volumes of traffic flow throughout the respective ports and the freight transportation performance accordingly. Users can also examine various scenarios in relation to border check delays. Their implications for trade flow can be analysed by changing the parameters included in the *Check Delays of Non-Tariff Barriers* category. The category provides a wide range of check delays for both the outbound and inbound trucks that flow through the ports. This includes all 11 Irish,

*Table 3-6: Input parameters and performance indicators*

Model Input Categories	
<b>Ro/Ro Trade Volumes between Ireland, UK and EU</b>	Inbound/outbound Ro/Ro trade volumes between Ireland and the UK (tonnes)
	Inbound/outbound Ro/Ro trade volumes between Ireland and the EU (land-bridge) (tonnes)
	Inbound/outbound Ro/Ro trade volumes between Ireland and the EU (direct route) (tonnes)
<b>Check Delays of Non-Tariff Barriers at Irish, UK and EU Ports</b>	Checks on inbound/outbound trucks at Irish ports (Dublin and Rosslare)
	Checks on inbound/outbound trucks at western UK ports (Heysham, Liverpool, Holyhead, Fishguard, and Pembroke)
	Checks on inbound/outbound trucks at eastern UK port (Dover)
	Checks on inbound/outbound trucks at EU ports
<b>Capacity of Border Check Facilities</b>	Number of customs, SPS, and security check facilities at Irish ports
	Number of customs, SPS, and security check facilities at western UK ports
	Number of customs, SPS, and security check facilities at eastern Irish ports
	Number of customs, SPS, and security check facilities at EU ports
<b>Traffic Flow and Vessel Capacity</b>	Proportions of trucks exported from Irish ports (%)
	Ferries capacities for outbound trucks (freight units)
	Proportions of trucks imported to Ireland from western UK ports (%)
	Ferries capacities that carry inbound/outbound trucks through direct route (freight units)
<b>Transportation Modes</b>	Percentage of accompanied/unaccompanied trucks at Irish ports

UK and EU ports mentioned in the research. The level of check intervention and check delays can also be entered. This helps to model a variety of check interventions, as well as the check intensity for different types of border checks, including customs checks, documentary and sealed identity checks, and physical inspections checks for both agri and non-agri products.

Moreover, the capacities of border check facilities can also be altered through the category *Capacity of Border Check Facilities*. This can help decision-makers to investigate the adequacy of checks infrastructure under different border check scenarios. Also, the model provides separate controls over the number of check facilities at the ports on an individual basis (i.e. Dublin, Rosslare, Holyhead, Liverpool and Dover). Analysts can use this ability to investigate the sensitivity of the trade flow to the lack of checks infrastructure in each single port along the studied corridors.

The categories *Traffic Flow and Vessels Capacity* and *Transportation Modes* consist of many parameters to adjust the size of trucks traffic within each maritime route and ferries capacities. These parameters are vital to understand the dynamics relating to the transportation routes. It is also important to understand the viability of existing shipping

capacities and transportation modes to maintain the flow between the UK and the EU27. The parameters in these categories can also be used to mimic scenarios of changes in shipping services demand and then investigate alternatives to the busy and uncertain routes.

### 3.4.2 Measurement indicators

The outcomes from the interviews with the key stakeholders, especially those in the Irish freight transport sector has provided the basis for adopting five groups of indicators, Table 3-7. Since the main objective of the study is to investigate how border check delays will affect the flow of goods and their shelf-life, the *Inbound/Outbound Transportation Time* of trucks and products' *Remaining Shelf-life* are major indicators. Truck transportation time encompasses the total time it takes for a truck to go from the point of origin to the point of destination, for both inbound and outbound directions (i.e. door-to-door). This time includes driving time from the point of origin to the ports, the waiting time at the origin ports (if relevant), the maritime shipping duration, the waiting time at the inbound checkpoint in the destination ports, and finally the time it takes to drive from the ports to the point of destination.

Table 3-7: Identified measurement indicators of the scenario mapping model

Measurement Indicators	
Inbound/Outbound Transportation Time	Inbound/outbound transportation time for trucks between Ireland and UK (hours)
	Inbound/outbound transportation time for trucks flow between Ireland and EU (land-bridge) (hours)
	Inbound/outbound transportation time for trucks flow between Ireland and EU (direct route) (hours)
Remaining Shelf-life	Remaining shelf-life time for inbound/outbound products between Ireland and UK (%)
	Remaining shelf-life time for inbound/outbound products between Ireland and EU (land-bridge) (%)
	Remaining shelf-life time for inbound/outbound products between Ireland and EU (direct route) (%)
Trucks Waiting Time at Checkpoints	Inbound/outbound trucks waiting time at checkpoint in Irish ports (hrs)
	Inbound/outbound trucks waiting time at checkpoint in UK ports (eastern and western) (hrs)
	Inbound/outbound trucks waiting time at checkpoint in EU ports (hrs)
Check Facilities Usage	Customs facilities occupation rate (%)
	SPS facilities occupation rate (%)
	Immigration checkpoints occupation rate (%)
Trucks Queue Length	Trucks queue length for rolling on vessels at Irish ports
	Trucks queue length for rolling on vessels at UK ports
	Trucks queue length for rolling on vessels at EU ports

This study does not limit the analysis to truck delay at ports, as other aspects of transportation time have a direct impact on the shelf-life of products. The *Remaining Shelf-life* indicator contributed to understanding how check delays could affect a product’s value, competitive advantage and quality.

Also, the model measures the occupation rate for the check facilities at the selected Irish and UK ports; the *Check Facilities Usage* group of indicators evaluates the adequacy of the proposed check infrastructure at the

ports. It is directly linked to the available check capacities and their adequacy to carry out the required checks to the inbound traffic at the port. Levels of checks intervention and check delays have a strong correlation with the *Check Facilities Usage* and *Trucks Waiting Time at Checkpoints* indicators.

Furthermore, the model introduces *Trucks Queue Length* to measure the number of trucks waiting to roll on to the ferries. The indicator is sensitive to the low sailing frequency or limited shipping capacity of the

ferries. Therefore, the indicator was used in conjunction with the scenarios where changes in shipping service demand and freight diversion to ports with adequate border check infrastructure are observed.

### 3.5 Model Assumptions

The assumptions of the model are divided into 1) common assumptions, applied for all scenarios, and 2) scenario-specific assumptions, applied according to the dynamic of each scenario. This section introduces the nature of the common assumptions and their rationale, while scenario-specific assumptions are presented in Chapter 4, before the analysis of each scenario.

The model's transportation flow is based on the door-to-door dynamics for both directions (i.e. inbound and outbound flow). The time of movement from the point of origin to an Irish port and the reverse movement (from Irish ports to point of destination) range between one and three hours. This assumption is based on the relatively small distances between points of origin/destinations and the ports in Ireland. The range is increased by 1–6 hours and 1–9 hours where the trucks are moving in UK or EU26 territories, respectively. Haulier and logistic experts provided estimations for truck movement times between their premises and the ports in Ireland, the UK, and finally the EU26, which were the basis of these assumptions.

The second assumption focused on the trucks shipping model. Various freight

forwarders have referred to the popularity of the consolidation shipping model (i.e. groupage load). When carriers use consolidation shipping, they combine individual 'Less than truckload' (LTL) shipments from various suppliers into one 'Full truckload' (FTL) shipment. This is an effective solution in terms of cost, reduced chances of damages, and speed to market. However, this solution will considerably increase the complexity of the model. Therefore, the assumption is that trucks operate under the full truckload in the models.

Trucks are also assumed to carry only one type of product. Products are divided into two types: (1) Non-agri products (including all products except agri-food), and (2) Agri-products. The model is designed so that carriers cannot consolidate agri-food with non-agri products on the same truck. The rationale is that agri-products will pass through entirely different procedures of inspections and border controls, compared to non-agri products.

The final assumption concerns the capacity of checks facilities at Irish, UK and EU26 ports. In the case of a no-deal Brexit, or with an agreement that does not involve close alignment with EU inspection regulations, imports will be subject to additional controls at the ports. Irish Government has taken important steps to ensure adequate staffing and check infrastructure to minimise this expected disruption. The Office of Public Works (OPW) has made arrangements for new custom and SPS infrastructure at both



Dublin and Rosslare ports, which will operate in two phases. An emergency phase, based on temporary facilities, was developed to ensure sufficient check infrastructure was in place before the previous October 2019 deadline for Brexit. This infrastructure provided the foundations for incremental development of permanent and long-term infrastructure which will be in place before 31 December 2020<sup>46</sup>, Table 3-8. The Irish Government has also recruited 400 additional Revenue staff and trained 249 staff from the DAFM and the HSE who can conduct import controls. The model also considers the capacity of check officers at Irish ports, based on Irish Government announcements on recruitment figures. Therefore, the model assumes that the check facilities at Dublin and Rosslare ports will have sufficient permanent capacities,

equivalent to the number as planned by the Government.

The readiness of UK ports is still uncertain. Concerns have been raised by a number of stakeholders that important ports such as Holyhead and Dover do not have sufficient space to carry out border inspections, especially given the large volume of trade which flows through them.<sup>47</sup> The UK government has referred to a pre-lodgement model (where imported goods are required to submit a custom declaration in advance of boarding at UK ports) as an alternative to border control process. These can be applied by the ports which may not have the space or infrastructure to operate temporary storage. However, no further details about this model have been published to date. Therefore, the numbers of these facilities at UK ports are assumed to be similar to the

*Table 3-8: Irish Government plans for developing checks infrastructure at ports*

Type of Infrastructure	Temporary facilities (for end-October 2019 Brexit Deadline)	Planned permanent facilities (for end-December 2020 Deadline)
<b>Dublin Port</b>		
Inspection bays for SPS and food safety checks and Revenue turnout sheds	13 + 1 Revenue turnout shed	25 + 4 Revenue turnout sheds
Seal checks booths for documentary and identity checks facilities	Have not been indicated	8
Parking spaces for heavy good vehicles (HGVs)	128 truck + 100 truck overflow parking	270 trucks
Border control posts (BCP) for live animals	1	1
<b>Rosslare Port</b>		
Inspection bays for SPS and food safety checks and Revenue turnout sheds	4	13 + 2 Revenue turnout sheds
Seal checks booths for documentary and identity checks facilities	2	2
Parking spaces for heavy good vehicles (HGVs)	35	35
Border control posts (BCP) for live animals	1	1

<sup>46</sup> Government of Ireland, July 2019, Preparing for the withdrawal of the United Kingdom from the European Union: Contingency Action Plan.

<sup>47</sup> Financial Times, June 2020, Dover-Calais post-Brexit trade plagued by uncertainty.

capacity of permanent check facilities as planned in Irish ports, Table 3-8. Checks infrastructure at Liverpool Port is assumed to be identical to that at Dublin Port (25 SPS inspection bays, 4 Revenue turnout sheds, and 8 seal checks booths). Both are large ports with space to accommodate more checks facilities and storage areas. Heysham, Holyhead, Fishguard, Pembroke and Dover, on the other hand, are taken to be small ports with limited space to allow the building of a large number of check facilities. Therefore, the capacity of check facilities at these ports is assumed to match the permanent capacity of check facilities at Rosslare Port (13 SPS inspection bays, 2 Revenue turnout sheds, and 2 seal checks booths) as illustrated in Table 3-8.

### 3.6 Development of simulation model

Discrete-event simulation, along with agent-based methods, was used to build the simulation-based scenario mapping model, using the simulation platform AnyLogic. In total, 19 agents were used to mimic the flow of imports and exports between Ireland, the UK and the EU26. The agents include suppliers (the origin point generating the trucks), distributors (the destination point receiving the trucks), and port agents. The main agents were developed to manage the overall dynamics of the model and the interrelationships between the agents. The simulation software can simulate road and maritime traffic routes. Figure 3-2 shows a detailed GIS map of various routes, along with the specific locations of suppliers, distributors and ports, used in the simulation

model. The software is flexible enough to incorporate different trip times for different road and maritime routes.

#### 3.6.1 Model logic and process mapping

During the simulation development, the research team proposed a set of conceptual models. The aim here was to understand the processes of the transportation system between Ireland and the UK. This includes customs and SPS checks processes, rolling-on and rolling-off the trucks, to/from the vessels and port operation systems. An understanding of the decisions and operating rules of the transportation flow between Ireland, the UK and EU26 was also necessary.

The related information was acquired through extensive review of publications, regulations and guidelines from both Irish and the EU26 state agencies. Various meetings with practitioners and experts involved with Irish ports and logistics and sector associations, such as the Freight Transport Association (FTA Ireland), were also conducted. These interactions added coherence to the modelled processes. The state agencies' feedback on the model also provided valuable clarifications for some aspects of process logic and structure.

These models mapped the complete journey for inbound and outbound trucks along the studied transportation routes, from points of origin to points of destination. Two main agents, suppliers and distributors, were created in the model to mimic the origin and destination points respectively. In the case of

outbound flow from Ireland to the UK and Continental Europe, trucks originated with an Irish-based supplier, passed through varying maritime routes, and finished their

journey either at a UK-based distributor or an EU26-based distribution centre, Figure 3-3.

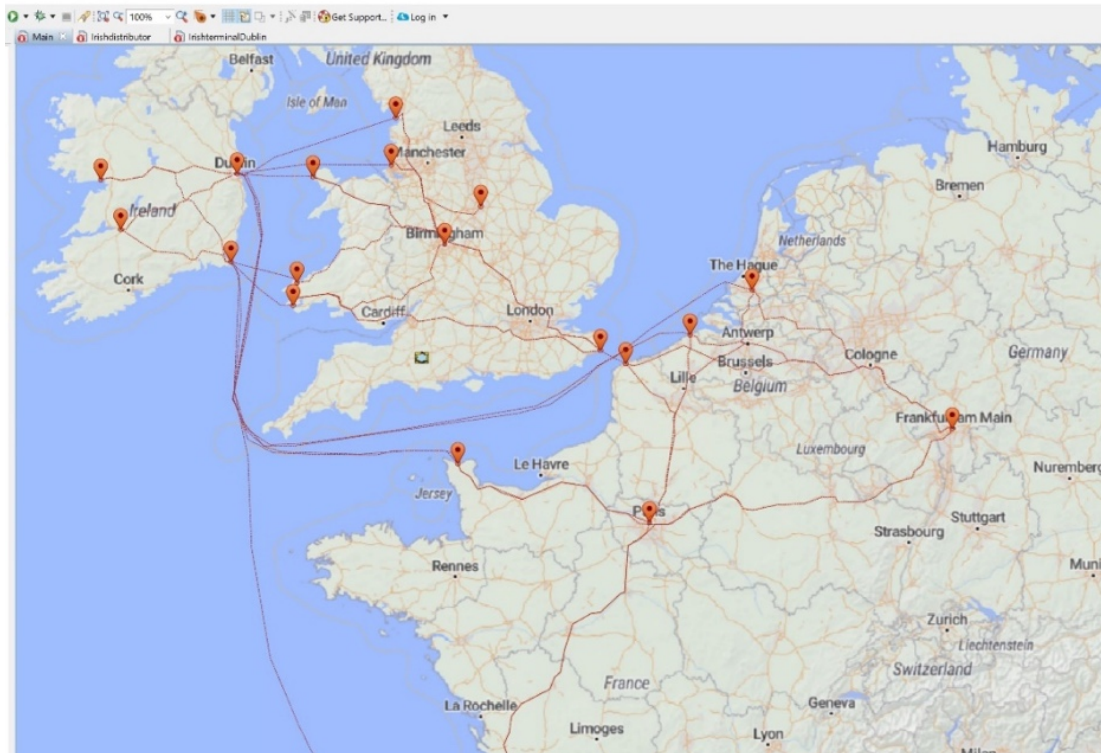


Figure 3-2: Transportation Flow Simulation-based Model

Similarly, in the inbound flow from the EU26 or UK to Ireland, trucks which originate from either a UK-based or EU26-based supplier will pass through different ports. They will then finish their journey at an Irish-based distributor, Figure 3-4. To map the proposed border checks intervention following the transition period, detailed conceptual models were prepared. The mapped processes were based on information collected from Irish state agencies and departments, including the Revenue and DFAM. Qualitative data analysis from expert interviews was also used in forming the process maps. According to the state

agencies, non-tariff barriers are inevitable at Irish, UK and EU ports. Exports from Ireland will undergo a minimal level of intervention by customs officials in Irish ports, Figure 3-5. On the other hand, checks on agri-food imports to Ireland will comprise documentary and sealed identity checks (i.e. import declarations and security documents) for all trucks, along with SPS inspections on a specific percentage of trucks carrying agri-food products. For non-agri imports, non-physical checks will take place before the ferry docks.

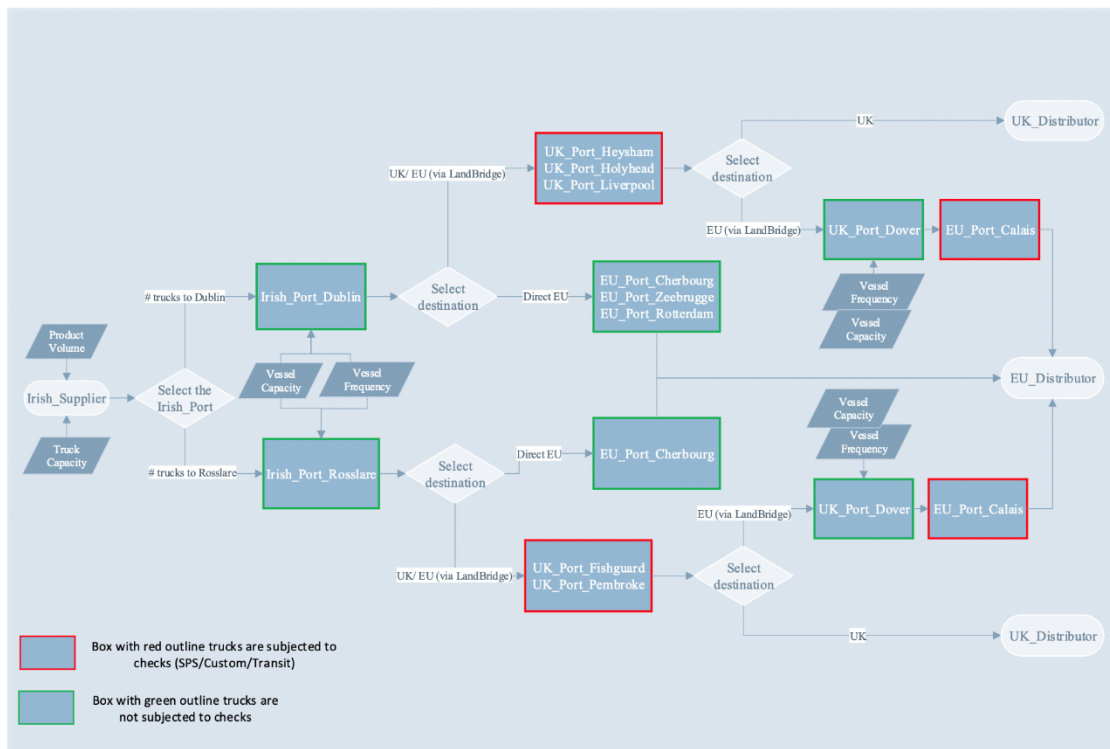


Figure 3-3: Outbound trucks flow from Ireland to UK or EU (via land-bridge or direct route)

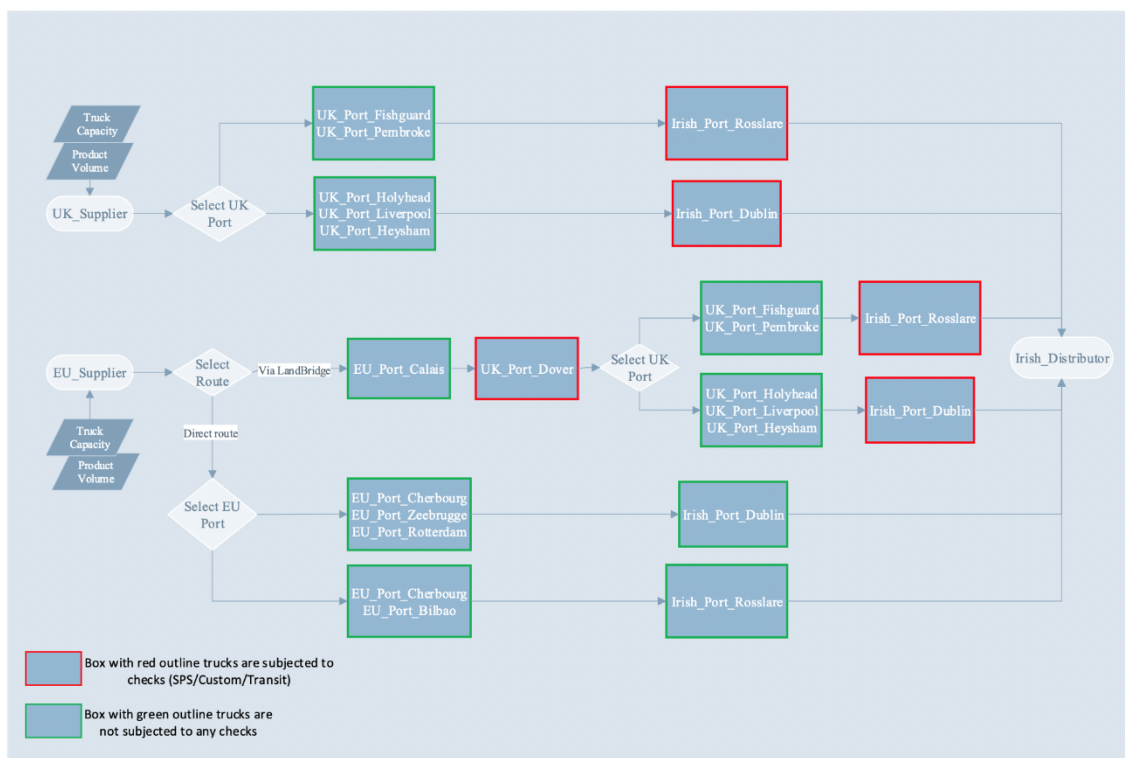


Figure 3-4: Inbound trucks flow from UK or EU (via land-bridge or direct route) to Ireland

The process mapping for import checks is depicted in Figure 3-6 and Figure 3-7. A similar process logic was used to model border checks procedures at the UK ports.<sup>48</sup>

### 3.7 Scenario mapping and analysis

To design the scenarios of border disruptions after Brexit, Irish exporters and importers, freight forwarders and 3PL logistics professionals, supply-chain managers, and directors of trade associations were selected for interview (Appendix 2). A total of 23 representatives from logistics and supply-chain departments, operation managers, and sales directors were selected. The participants are all involved in trade activities between Ireland and the rest of the world. They play a key role in facilitating the supply-

chain connections between Ireland, the UK and the EU26, specifically.

Each interview lasted for approximately 40 minutes. The questions were divided into two sections. First, questions surrounding which uncertainties would significantly affect Irish supply chains and their connectivity following Brexit were posed. Four major uncertainties emerged from the responses: 1) The introduction of new borders, 2) The unclear requirements for transit checks at the UK land-bridge, 3) The demand levels for direct shipping services to mainland Europe, and 4) How prepared the UK ports are, and whether they have adequate check facilities and infrastructure to carry out the required checks following the transition period.

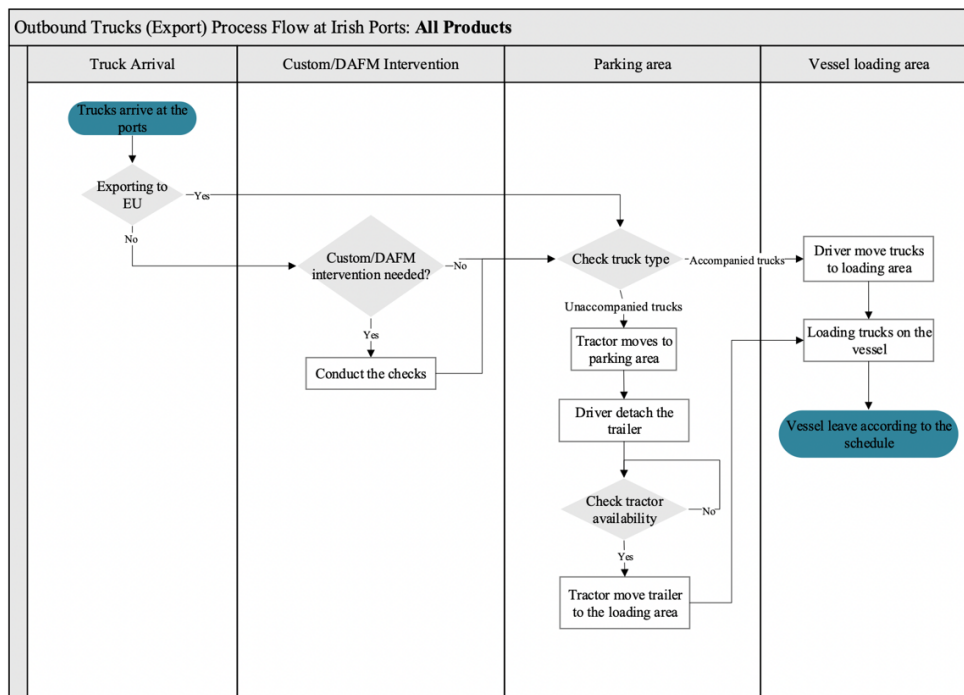


Figure 3-5: Border interventions for trucks outbound from Ireland

<sup>48</sup> UK government, July 2020, Border Operating Model.

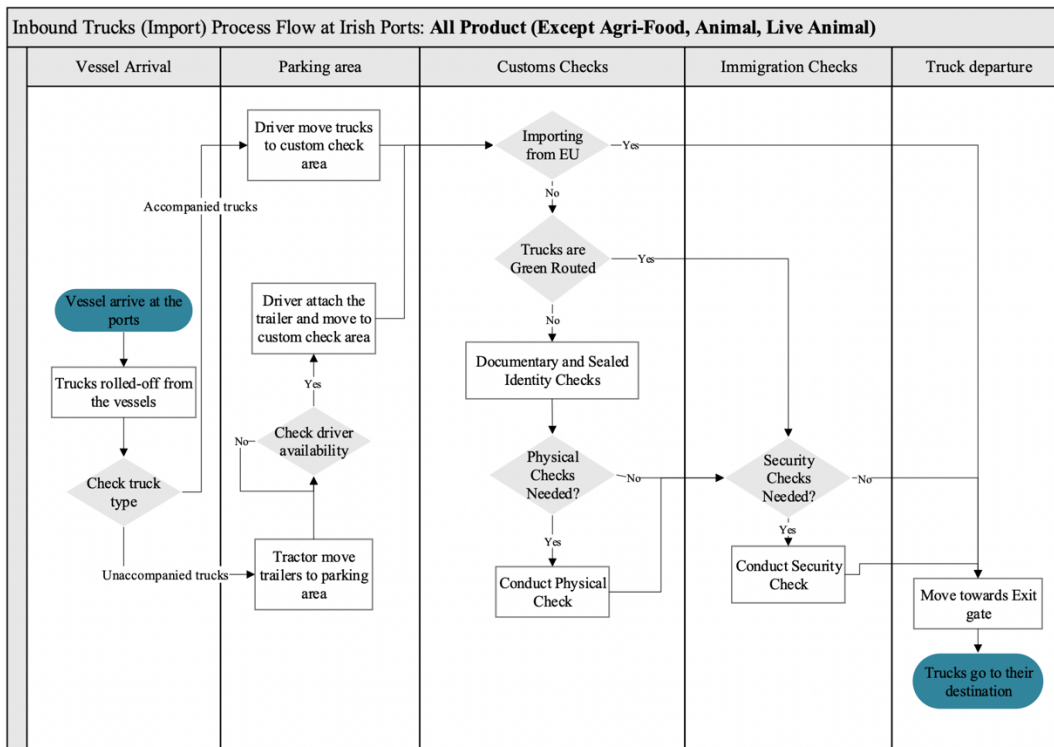


Figure 3-6: Border interventions for inbound non-agri food trucks

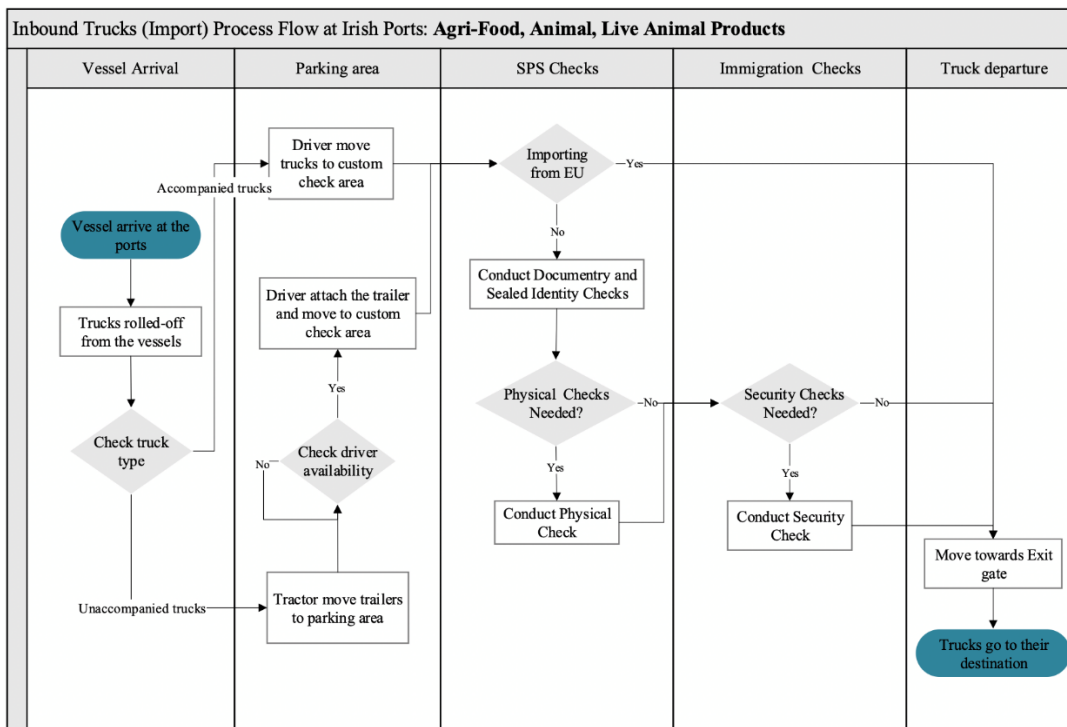


Figure 3-7: Border interventions for agri-food trucks inbound to Ireland

The research team has determined a set of alternatives to how the transportation links between Ireland, the UK and the EU26 can evolve, given these four uncertainties, Table 3-9. These are based on the responses, coupled with a review of the literature. Consultations with academic experts also informed the dynamics of each alternative (i.e. scenarios), and the respective input parameters in the model. (More details on the scenarios dynamics and impacts are presented in Chapter 4).

The second part of the questionnaire aimed to quantify the effects these scenarios would have, and to test their dynamics using the simulation model. The interviewees were asked to reflect on the scenario outcomes from the simulation. This allowed for the

development of what strategies and policies would be required to mitigate the identified risks. A multi-disciplinary expert panel, consisting of specialists from various management and economic disciplines, was also formed (see Appendix 2). These professionals provided their opinions and a more in-depth analysis on the model outcomes and analysed scenarios. Five focus groups and four in-depth interviews have taken place with the specialists. In these interactions, the model outcomes were presented and discussed from an economic, food safety, retail management, and food manufacturing perspective. Chapter 5 presents the views of the expert panel.

*Table 3-9: Identified alternatives of studied Brexit uncertainties*

Brexit Uncertainties	Relevant Alternatives
New Border Checks Procedures	Limited Checks Intervention and Delays
	Moderate Checks Intervention and Delays
	High Checks Intervention and Delays
Transit Checks Delays	Short Transit Checks Delays
	Moderate Transit Checks Delays
	Long Transit Checks Delays
Demand Level on Direct Shipping Service to Mainland Europe	Demand on direct shipping service increases by 15%
	Demand on direct shipping service increases by 25%
	Demand on direct shipping service increases by 35%
Preparedness of Check Facilities at western UK ports	Lack of checks infrastructure at Heysham
	Lack of checks infrastructure at Holyhead
	Lack of checks infrastructure at Fishguard
	Lack of checks infrastructure at Pembroke

## CHAPTER 4: BARRIERS AND ACCESSIBILITY OF IRISH TRADE & SUPPLY CHAINS – SCENARIO IDENTIFICATION & ANALYSIS

### 4.1. Overview

Agri-food supply chains in Ireland have been refined into high-quality operations in order to avoid delays. This strategy is vital in supporting just-in-time deliveries for time-sensitive products. The just-in-time model enables Irish exporters to minimise product transportation times and maximise the shelf-life of products. This in turn allows the industry to provide high-value products to the market and increase their competitive advantage. Irish agri-food supply chains have pan-European operations, with manufacturing, warehouses, wholesalers and retailers often distributed across the EU. This strategy minimises cost and maximises the service level.

Brexit is projected to affect the already complex dynamics of Irish agri-food supply chains. The reintroduction of border controls, customs and rules of origin (which are designated as non-tariff barriers throughout this report) will directly affect the delivery time of products, the service levels of companies, and their profit margins. Non-tariff barriers will also complicate access to the UK and Continental Europe, via the UK land-bridge. This in turn adds extra administrative burdens to companies along with cash-flow issues in Irish supply chains. The analysis in this chapter is from the perspective of Brexit risks that were highlighted in Chapter 1. The main focus of

the study is understanding how to minimise the level of non-tariff barriers, to maintain reasonable access to the UK and EU27 markets, and to ensure that the ports (i.e. border entry points) are prepared to accommodate new checks. Therefore, three main determinants will be analysed:

- Border check timings, along with level of check intervention
- Accessibility to the UK and EU27 markets, via the land-bridge, along with direct shipping services
- Adequacy of checking infrastructure at border entry points (i.e. ports)

### 4.2. Border checks timing and level of intervention

Border checks ensure that imported goods comply with all customs regulations, documentary requirements, and other controls required by the point of origin, point of destination, and any countries the goods may transit through. According to EU regulations, all animal products of non-EU origin must be imported via a border entry point (e.g. port or airport). These include border control post (BCP) facilities where official veterinarians (OVs) can inspect products. Under the EU's Veterinary Checks Directive 97/78 EC, all imported products of animal origin from outside the EU must undergo a documentary, sealed identity, and physical check at all EU ports. While 100% of



imported consignments are subject to documentary and sealed identity checks, the level of physical checks for each product is determined by EU Commission Decision 94/360/EC. Figure 4-1 illustrates the procedures of the customs and SPS inspections that take place at EU ports for imports from non-EU countries.<sup>49</sup>

According to Revenue, the arrangements are taken to minimise the customs intervention on imported goods at the Irish points of entry after the transition period. They will instead take place at an approved authorised premise, in the case of an authorised consignee. Moreover, it is intended that most of the non-physical interventions will be completed on the ship before the arrival of the product.

While the EU27's border inspection regulations are well established and regularly practised by traders in the EU27, it is still not clear what regulation checks the UK may apply, following Brexit. Britain is keen to 'take back control', so many rules and regulations which are set within the EU single market may be adapted or disregarded completely. This position will lead to more regulatory divergence between the UK and EU27. This of course causes ambiguity for Irish traders and the logistics sector. Failure to sign an agreement which minimises regulatory divergence may cause wide disruption to the trade between the EU27 and UK. Changes in these regulations

will directly lead to fluctuations in the level of check interventions at borders. According to a recent announcement by the UK government,<sup>50</sup> an increase in physical checks and samples from products of animal origin, along with plants and their products, are to be expected following July 2021. The nature of these changes depends on the outcomes of the trade negotiations between the EU and UK. In the end, the degree to which UK regulations will be aligned with the EU will have the biggest impact on trade.

Irish exporters and supply-chain professionals, particularly those who trade in time-sensitive or limited shelf-life markets in the UK, wish to understand the magnitude of these potential disruptions. Therefore, three border checking scenarios were tested and compared against the As-Is scenario (no border checks between Ireland and UK):

- 1) Limited checks intervention and delay
- 2) Moderate checks intervention and delay
- 3) High checks intervention and delay

Border check types vary according to type of products (i.e. agri-food or non-agri products), trade direction (inbound or outbound trade), and country of origin/destination, Table 4-1.

<sup>49</sup> Andrew Grainger, 2013, Trade and Customs Procedures: The Compliance Costs for UK Meat Imports

<sup>50</sup> GOV.UK, 2020, Government accelerates border planning for the end of the transition period.

Exports from Ireland take various routes based on their destination. In the case of products exported to Britain, there are five maritime routes available. These routes can be categorised as short-sea and long-sea, based on sailing times. While the sailing time between Dublin-Holyhead, Rosslare-Fishguard, and Rosslare-Pembroke is between 3.5 and 4 hours (i.e. short-sea routes), Dublin-Liverpool and Dublin-Heysham take between 7.5 and 9 hours (i.e. long-sea routes). The levels of check interventions at the UK ports are quantified by the proportions of trucks which pass through each check route (green, orange or red routes).

The level of checks intervention is closely related to the results of the ongoing EU-UK trade agreement negotiations. The intensity of border checks will also depend on various factors that are currently uncertain. These factors include the extent of SPS inspections of agri-food products, the level of regulatory divergence between the UK and EU, and how all this will affect the new check procedures. Issues surrounding the mutual recognition of driver licences and operators' permissions on both sides will also be a factor, along with the constraints on road haulage permits, and immigration checks on EU26 drivers (i.e. non-Irish or non-UK citizens).

*Table 4-1: Studied maritime corridors and types of checks*

Trade Activity	Countries of Trade	Trade Routes	Type of Product	Type of Checks
Outbound	Ireland-UK	East/West Maritime Corridor	Non-Agri product	Customs Checks at western UK ports*
			Agri-food products	SPS Checks at western UK ports
	Ireland-EU	UK Land-bridge	All product types (Agri-food & non-Agri food)	Internal Transit Check at UK ports and Offices of Transit at EU ports
	Ireland-EU	Direct Route to Continental Europe	All product types	No Checks at EU ports
Inbound	UK-Ireland	East/West Maritime Corridor	Non-Agri products	Customs Checks at Irish ports**
			Agri-food products	SPS Checks at Irish ports
	EU-Ireland	UK Land-bridge	All product types	Internal Transit Check at Dover and Offices of Transit at Irish ports
	EU-Ireland	Direct Route to Continental Europe	All product types	No Checks at Irish ports

\* Western UK ports include Holyhead, Liverpool, Heysham, Fishguard, Pembroke.

\*\* Irish ports include Dublin and Rosslare.

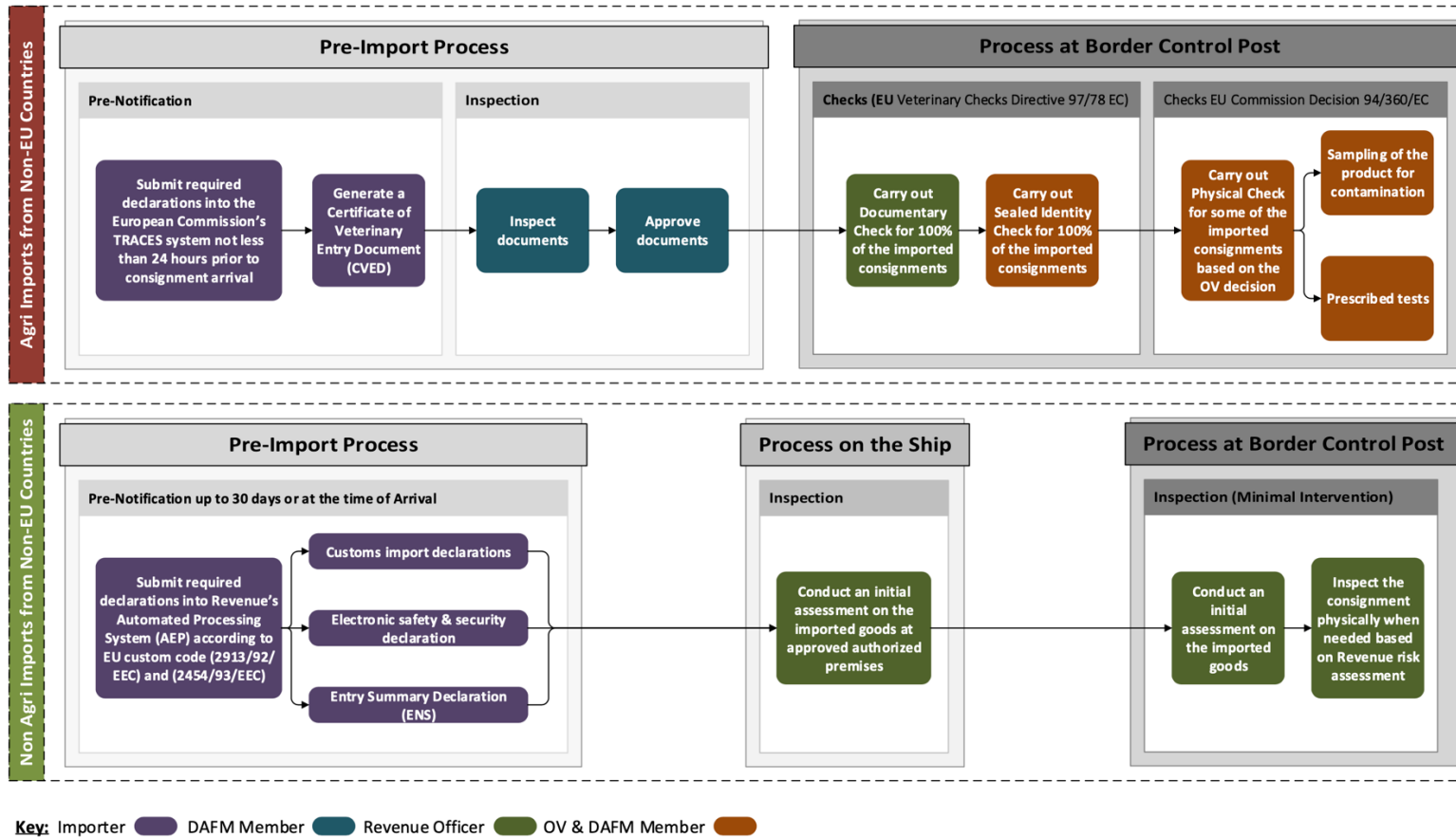


Figure 4-1: Customs and SPS inspection procedures at EU27 points of entry<sup>51</sup>

<sup>51</sup> Andrew Grainger, 2013, Trade and Customs Procedures: The Compliance Cost for UK Meat Imports.

Border checking delays will also diverge based on whether drivers and freight forwarders will satisfy the required paperwork and declarations at the border checkpoints between the EU27 and UK. Drivers and operators will need time after the transition period to become familiar with

the new check procedures in order to avoid administrative errors. It is expected that incomplete declarations and missing documents following the transition period will increase. This in turn will cause delays at the ports.

Table 4-2: Checks intervention and delays at Irish and UK ports: scenario settings

Examined scenarios	Check type	Proportion of trucks (%)	Timing of checks (min)	Comments
<b>As-Is Situation</b>	Non-Agri trucks are green-routed on arrival at ports (no checks intervention).	100%	0	No trucks are directed to any checks at UK ports (i.e. Agri and non-Agri trucks).
	Non-Agri trucks are red-routed on arrival at ports (physical checks intervention).	0%	0	
	Agri-food trucks are directed to checks (physical checks intervention).	0%	0	
	Trucks selected for immigration and security checks	0%	0	
<b>Limited Check Delay</b>	Non-Agri trucks are green-routed on arrival at ports (no checks intervention).	90%	20	10% of the non-Agri trucks get documentary checks.
	Non-Agri trucks are red-routed on arrival at ports (physical checks intervention).	10%	60	10% of the non-Agri trucks selected for physical checks.
	Agri-food trucks are directed to SPS checks (physical checks intervention).	10%	60	10% of the Agri-food trucks selected for SPS checks.
	Trucks selected for immigration and security checks	10%	20	10% of all trucks selected for security and immigration scan.
<b>Moderate Check Delay</b>	Non-Agri trucks are green-routed on arrival at ports (no checks intervention).	80%	30	20% of the non-Agri trucks get documentary checks.
	Non-Agri trucks are red-routed on arrival at ports (physical checks intervention).	20%	90	20% of the non-Agri trucks selected for physical checks.
	Agri-food trucks are directed to SPS checks (physical checks intervention).	20%	90	20% of the Agri-food trucks selected for SPS checks.
	Trucks selected for immigration and security checks	20%	30	20% of all trucks selected for security and immigration scan.
<b>High Check Delay</b>	Non-Agri trucks are green-routed on arrival at ports (no checks intervention).	70%	45	30% of the non-Agri trucks get documentary checks.
	Non-Agri trucks are red-routed on arrival at ports (physical checks intervention).	30%	135	30% of the non-Agri trucks selected for physical checks.
	Agri-food trucks are directed to SPS checks (physical checks intervention).	30%	135	30% of the Agri-food trucks selected for SPS checks.
	Trucks selected for immigration and security checks	30%	45	30% of all trucks selected for security and immigration scan.

Three scenarios are defined in order to quantify the sensitivity of Irish exports to different levels of checks at UK ports, Table 4-2. The percentage of trucks selected at checking phases and the time of these checks are assumed by the research team. The rate of trucks selected at each checking stage is increased by 10% and time of checks is increased by 50% in each scenario.

The lack of information on the UK's plans for building new check facilities and infrastructure for their ports meant that the number of inspection spaces and facilities at the UK ports have been hypothesised. The assumptions are based on the Irish Government's contingency plan regarding port and airport preparations. As outlined in Chapter 3, it is assumed that the capacity of check facilities in Liverpool port is: 25 SPS inspection bays, 4 Revenue turnout sheds, and 8 Sealed checks booths. On the other hand, Holyhead, Fishguard and Pembroke ports are assumed to have: 13 SPS inspection bays, 2 Revenue turnout sheds, and 2 seal check booths. The number of immigration checkpoints is assumed to be equal to the number of Revenue turnout sheds in all ports. The four check delay scenarios are tested against trucks' average transportation time, products remaining shelf-life, check facilities usage and trucks waiting time indicators (For more details about measurement indicators, see Table 3-7). The system dynamics under each scenario is replicated for three months, in the simulation model.

Under the *As-Is scenario*, no border checks are applied. This scenario suggests that all trucks would take around 13 hours to make it to the British market, using the East-West maritime corridor. The average transportation time for non-agri vehicles rises by 1.5% and 18% under the *Limited and Moderate Check Delay scenarios* respectively, Figure 4-2. The results for agri-food vehicles under the same scenarios (i.e. *Limited and Moderate check*) show an increase of 4% and 13% respectively. However, in the case of the *High-Check-Delay scenario*, a sharper increase in the average transportation time for non-agri and agri-food trucks is shown as **459%** and **252%**, respectively, Figure 4-2. This is when compared to the truck's transportation time under the *As-Is scenario*. The results show that minimising checks interventions and check delays at UK ports are a high priority for the Irish authorities and freight forwarders alike if the fluidity of traffic flow and product shelf-life are to be maintained.

As these percentages deviate hugely from the *As-Is* situation, more understanding into the reasons for the delay was required. It can be noticed that the limited capacity of Revenue sheds and SPS inspection bays at Holyhead Port contributed significantly to the waiting times for both types of trucks (i.e. non-agri and agri food trucks). This in turn increased the overall transportation

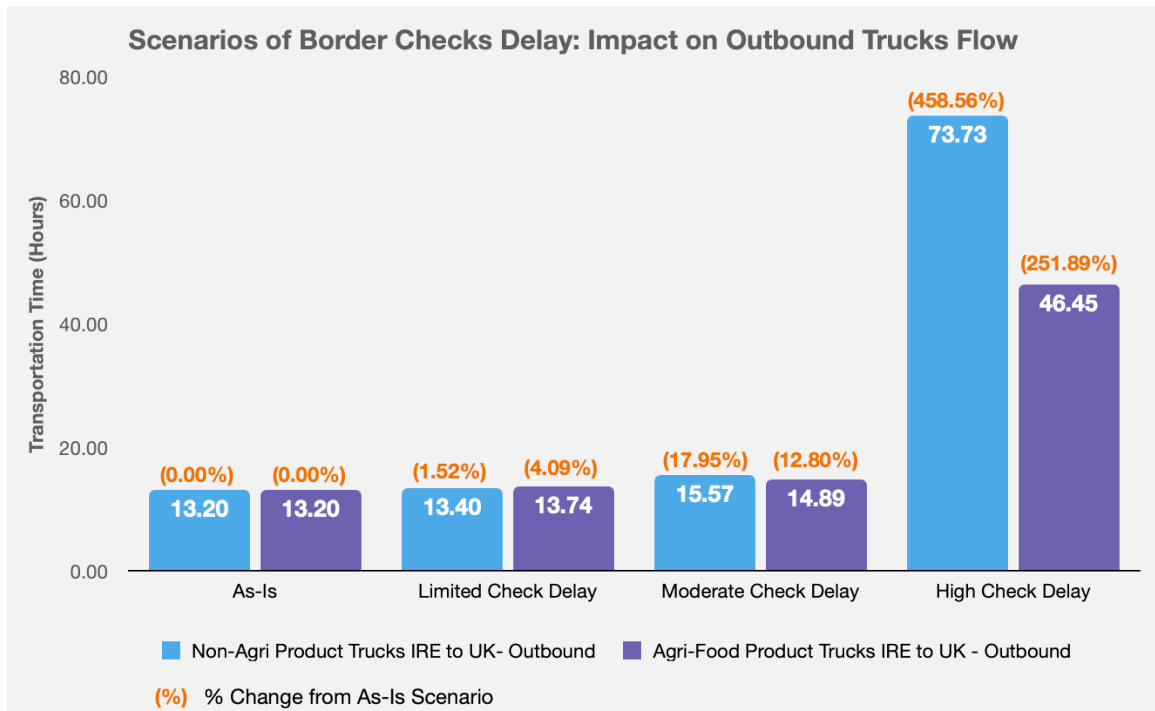


Figure 4-2: Impact of checks intervention scenarios on export trucks' transportation time

time of trucks. The large trade volumes which flow along the Dublin-Holyhead route is the reason for the exponential increase in truck waiting times at Holyhead, especially when compared to the other UK ports. The Revenue sheds and SPS inspection bays at Holyhead Port were occupied by **99%** and **68%** respectively under *High-Check-Delay* scenario. This is in comparison to 41% and 10% occupation rates at Liverpool Port, and 15% and 5% occupation rates at Heysham Port, under the same scenario, Figure 4-3. Although *High-Check-Delay* assumes the worst-case scenario in terms of the level of check interventions, longer check delays, and the low number of check facilities at the UK ports, it highlights the devastating consequences to the Irish export sector if

this scenario is realised following the transition period.

Two case studies, on the cheese and beef export sectors, were used as real-world examples of how these scenarios could affect those in the industry. These case studies show the impact that check delays in UK ports could have on Ireland's agri-food exporters. For those involved in Irish cheese and beef supply chains, the *High-Check-Delay* scenario presents a major problem for the shelf-life of products from both sectors. The remaining shelf life is reduced by **6% and 9%** for cheese and beef respectively, according to Figure 4-4 and Figure 4-5. UK-based retailers and consumers have strict rules surrounding acceptable minimal life (AML) criteria on their food suppliers. This simply means that food products have a

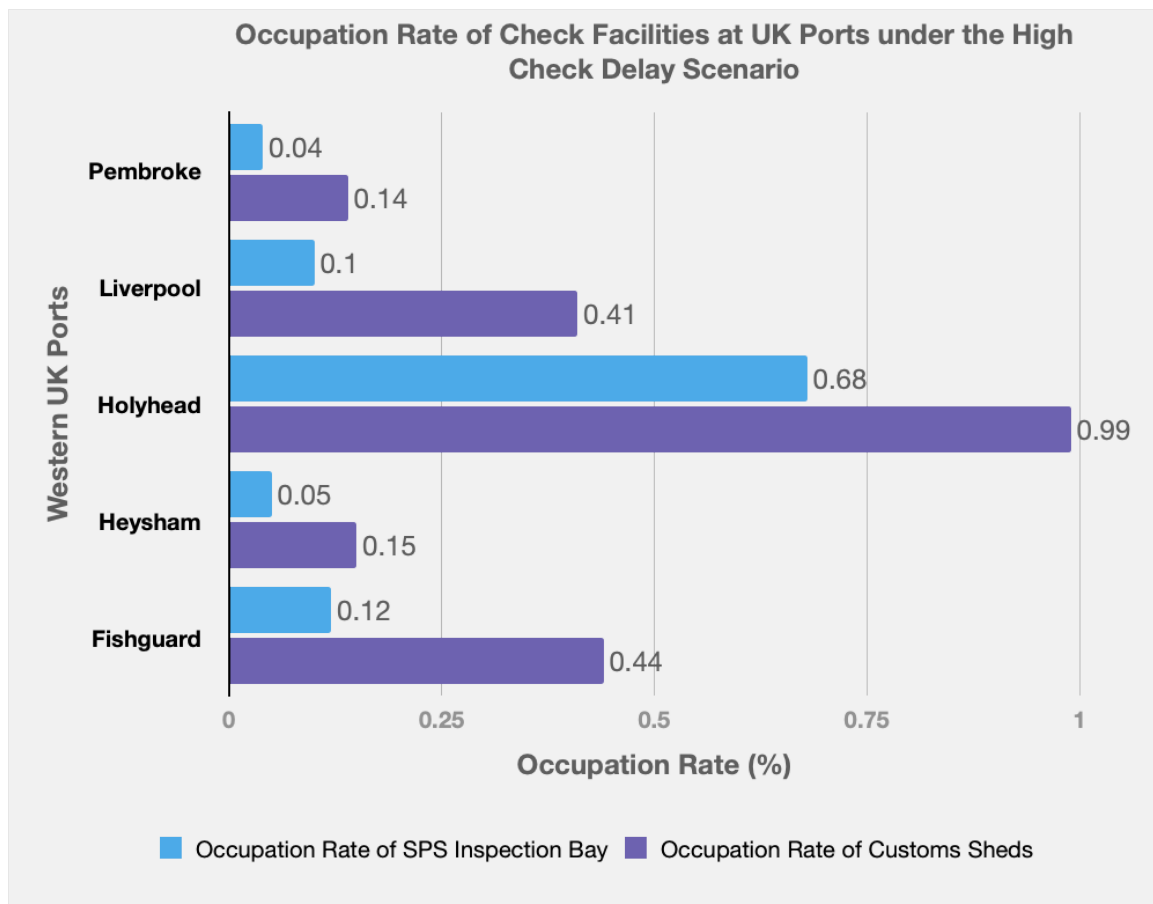


Figure 4-3: Occupation rate of check facilities at UK ports under High-Check-Delay scenario

certain shelf-life still available when they reach their destination, or they are not accepted. This puts Irish exporters under pressure in the case of the *High-Check-Delay* scenario, as they must meet these AML criteria in order to avoid their deliveries being rejected.

Although cheese exporters expect that cheese products could lose between 20% and 25% of their value if these shorter shelf-life scenarios occur, they expect that their products will still be resilient. The cheese supply chain is insulated from most of the impacts of transportation delays, mainly due to the longer than average shelf-life of most

of the products (six months for some hard cheese). However, short-shelf-life cheese (e.g. soft cheese) would be severely affected by long delays under the *High-Check-Delay* scenario.

Concerning beef exports, the beef supply chain is sensitive to longer lead times for delivery. The shelf-life of beef products ranges from one day (for fresh ready meals, which must be delivered in the next day) and six weeks (fresh beef in vacuumed packages). Mince beef, for instance, must be processed within six days of slaughtering, to avoid product spoilage. Moreover, beef exporters could face challenges in meeting service-

level-agreement commitments with UK consumers if the *High-Check-Delay* scenario occurs. It is a high priority for them to avoid any disruptions in trade with the UK, since the Irish beef supply chain is extremely dependent on exports to the UK, as their main market. The beef supply chain is inflexible and cannot be easily redesigned to find new markets that might replace the UK.

There is agreement in the agri-food export sector that the Just-in-Time nature of food supply chains will inevitably have to change in response to delays at border checkpoints. This of course would be particular the case in the event of the *High-Check-Delay* scenario or under any further delays. Beef supply-chain partners, for instance (e.g. retailers, freight forwarders, suppliers, and logistics), are currently building buffers against the

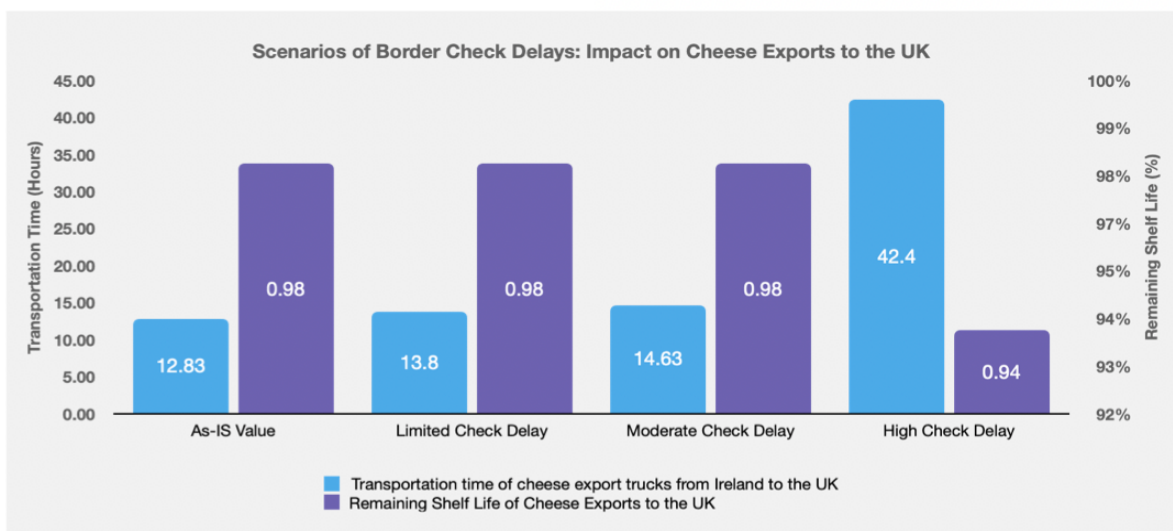


Figure 4-4: Impact of border check delays on Irish cheese exports

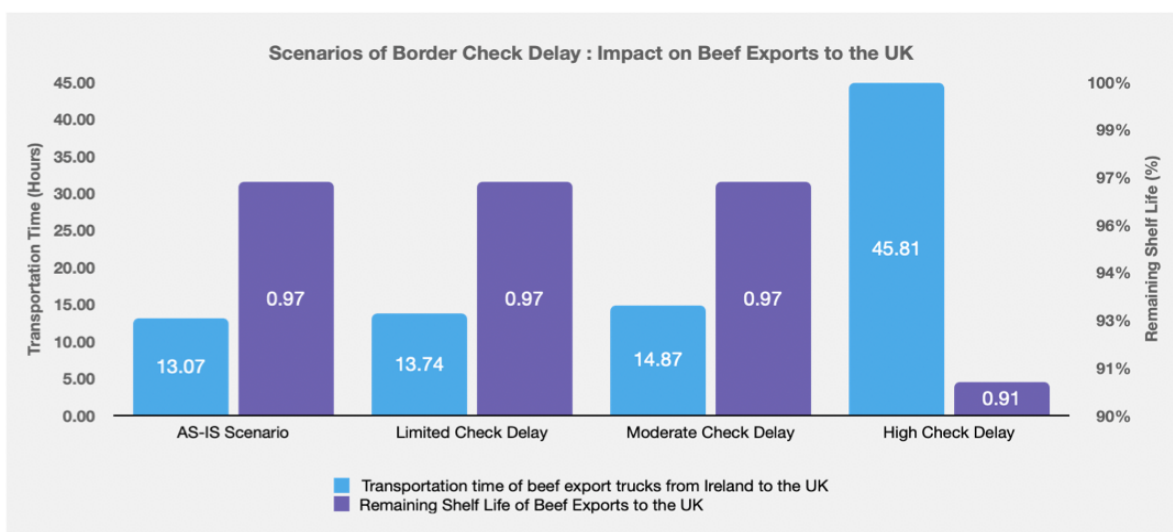


Figure 4-5: Impact of border check delays on Irish beef exports



uncertainties surrounding product delivery times. The main effort has been to change demand quantities, inventory strategies, and investment in refrigerated warehouses and trucks (i.e. reefers). In the beef case study, it became clear that retailers will plan their demand in advance. They are expected to order larger quantities to build stocks for longer-shelf-life fresh beef (i.e. vacuum-packed beef).

Demand for refrigerated trucks has increased in the last two years, and further demand is expected in the future. Using refrigerated warehouses and trucks is an important method to maintain the shelf-life of products and avoid spoilage. However, these solutions are not feasible in mitigating border check delays in the short term. The shortage of reefer trucks and refrigerated warehouses, along with their expense and maintenance, were also highlighted as challenges for this strategy. In addition, a delayed driver with a refrigerated truck could cost exporters more than €550, approximately, per day<sup>52</sup>. Moreover, delays at UK ports will impose further costs on hauliers and exporters. Port operators charge the ships that go beyond their allocated time in loading and unloading their cargos (i.e. demurrage). Daily demurrage costs at the UK ports are estimated at £110 per day. In addition, further charges of between £60 and £110 after three to five days of delay at the port are also applied.<sup>52</sup>

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<sup>52</sup> The European Livestock and Meat Trade Union (UECBV), 2020, The EU Meat Industry in a Hard Brexit Scenario

The importance of hiring customs agents, third-party logistics (3PL) or dedicated staff to manage the administrative burden of customs declarations was also highlighted as important measure to minimise checks delay at the borders. Providing the right declarations and certificates at the checkpoints is seen as critical effort to smooth flow of trucks across borders. Although this strategy may be an expense additional to overall operational costs, exporters explained that these can be absorbed by the regular employment and operational costs.

Increasing the number of green-routed trucks and minimising the level of SPS checks at UK ports, in particular at Holyhead, is also seen as crucial in minimising waiting times, and would improve the shelf-life of products. The agreement New Zealand has with the EU, which provides an exemption for most identity checks, with only around 2% of imports incurring physical inspections, was highlighted as a valid example to be followed with the UK.<sup>49</sup> The existing trade relations between Ireland and the UK, in particular in the agri-food sector, must encourage politicians to reach an agreement that minimises check and non-tariff barriers.

The limited spaces at some UK ports were described as another risk to the exporters of limited-shelf-life products. The Dublin-Holyhead route, for instance, is an important maritime route for exporters, hauliers and

logistics companies alike.<sup>53</sup> The traffic volume through this route is much higher compared with the other routes in the east/west maritime corridor. It is the shortest transportation link between Ireland and the UK, and enjoys the highest sailing frequencies, with eight shipping ferries per day compared to only two per other routes. The model results showed how important it is to maintain the efficiency of such important routes in order to maximise the shelf-life of Irish products and maintain their high-quality standards.

With regard to imports from the UK to Ireland, they take two main routes: Holyhead-Dublin and Liverpool-Dublin. According to the CSO, 40% of imports come through Liverpool-Dublin, while 47% use Holyhead-Dublin. This means that around 90% of imports from the UK flows through Dublin Port. Ireland plans to apply minimal customs intervention at the point of entry for non-agri imports. Custom interventions can also be carried out at approved trader premises, if these traders are Authorised Economic Operators (AEOs). The Government has also planned to provide plenty of SPS inspection bays at Dublin Port to facilitate the flow of imported agri-food products from the UK (i.e. 33 SPS inspection bays and seal check booths).<sup>54</sup>

The model shows that this policy is effective, as there is virtually no increase in the average transportation time for trucks in the

*Limited-Check-Delay* and *Moderate-Check-Delays* scenarios compared to the *As-Is* scenario, Figure 4-6. The proposed capacity of check facilities at Dublin and Rosslare ports, as illustrated in the Government contingency plan of Brexit<sup>54</sup>, was found adequate to alleviate the risk of increased check delays and interventions in both scenarios. However, a rise in trucks waiting time is observed, particularly at Dublin Port, in the *High-Check-Delay* scenario, which results in an extensive increase in the average transportation time for the inbound trucks, Figure 4-6.

A more in-depth analysis shows that the proposed Revenue sheds at Dublin port, (i.e. 4 Revenue turnout sheds **Error! Bookmark not defined.**), would be over capacity under the *High-Check-Delay* scenario, with a **99%** occupation rate. On the other hand, the large number of SPS inspection bays and seal check booths (i.e. 35 SPS and sealed inspection points **Error! Bookmark not defined.**) play a key role in reducing the occupation rates of SPS inspection bays, by **43%**, and in turn reducing truck average transportation times for agri-food products in comparison to non-agri products truck, Figure 4-6. These results indicate that, if more customs and physical checks take place following the transition period, an increase in the capacity of Revenue checkpoints would be crucial for avoiding congestion at Dublin Port. Also, strategies such as the

<sup>53</sup> Welsh Government, 2019, Holyhead Port Plans for a No Deal Brexit – FAQs.

<sup>54</sup> Government of Ireland, July 2019, Preparing for the withdrawal of the United Kingdom from the European Union: Contingency Action Plan.

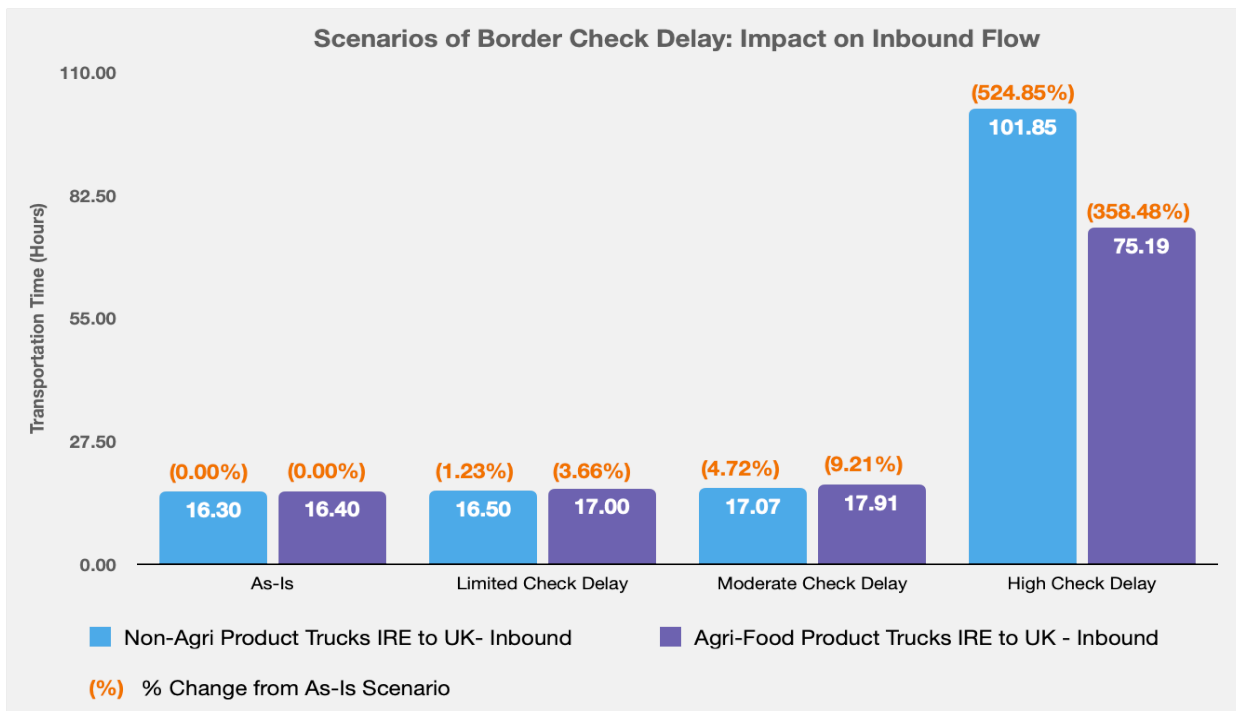


Figure 4-6: Impact of checks intervention scenarios on import trucks transportation time

submission of custom declarations in advance of boarding at the UK ports, and the completion of customs processes at authorised premises of the traders with AEO status, would help avoid bottlenecks at Dublin port.

#### 4.3. Level of transit check delays via the UK land-bridge

The UK has recently joined the Common Transit Convention (CTC), whereby the movement of goods and services between Ireland and the EU26, using the UK as a land-bridge, enjoys no restrictions by the UK authorities. This convention prevents the doubling of declarations to Irish, EU26 and UK customs authorities<sup>55</sup>.

If a consignor/consignee is not authorised by the Irish or EU26 custom authorities, they cannot start and terminate the transit movement at their premises. Therefore, initial presentation to the customs authorities at ports is required at both the outset and end of the transit.

The procedures for transit checks at UK ports still depend on the nature of the UK-EU agreement and the subsequent required checks at UK transit offices. Where goods are exported from Ireland to the EU26, via the land-bridge, the UK customs authorities (HMRC) check the Transit Accompanying Documents (TADs) and the goods at an office of transit at the first entry point to the UK. The Good Vehicle Movement Service (GVMS)

<sup>55</sup> UK Government, 2020, The Border with the EU Importing and Exporting Goods

is a digital solution, established by the UK, which accelerates the office-of-transit processes.<sup>55</sup> Irish hauliers and exporters should submit Transit Movement Reference Numbers (MRNs) and vehicle registration via the GVMS, prior to checking in at the Irish point of departure. The UK authorities then assess the information and inform the hauliers if they are clear to proceed, to terminate the transit, or if they must present the goods and TADs to customs officials at the ports.

Some UK ports, however, may still choose to operate on a paper-based method in their office of transit. If this is the case, it is expected to cause considerable transit delays, in particular if documentation or declarations are incorrect or missing. Moreover, according to Irish haulage companies and traders, it is not clear to what level checks will take place at UK offices of transit. The FTA Ireland warned that it is unknown if Irish hauliers will be subjected to unnecessary delays at the office of transits in the UK ports.<sup>56</sup> Or they may need special

permits to have an unlimited number of journeys in UK territory. Furthermore, additional immigration delays are anticipated at offices of transit if EU26 drivers (i.e. not Irish nor UK citizens) are not permitted to cross UK borders without additional immigration checks. Therefore, to investigate the consequences of the disruptions to movements via the UK land-bridge, four scenarios of transit checks were analysed, as illustrated in Table 4-3.

The ports of Heysham, Liverpool, Holyhead, Fishguard and Pembroke are assumed to have two offices of transit. Due to the lack of information on the type of offices of transit at UK ports (i.e. either paper-based or digital-based using GVMS), all ports are assumed to operate on a paper-based system, where drivers will present the goods and accompanying documents upon arrival at the UK entry points. No check delays are assumed at the office of transit in the EU27 ports. The reverse procedure applies to the inbound movement of goods from

*Table 4-3: Scenarios of transit checks at Ireland/EU and UK ports*

Examined scenarios	Timing of transit checks (min)	Comments
As-Is	0	No transit checks.
Low level of transit check	5	Regular checks on TAD and goods.
Moderate level of transit check	15	More checks are required for the operator in order to be permitted to transit via UK territory.
High level of transit check	25	All previous checks in addition to immigration checks of drivers who are EU26 nationals. Submission of incomplete documentation or wrong declarations is factored into this scenario.

<sup>56</sup> FTA Ireland, 2019, Brexit FTAI Position Paper

Continental Europe to Ireland. The office of transits, in this case, will be at Dover.

The model outcomes show that the outbound flow from Ireland is not disrupted in the *Limited-Transit-Check-Delay* and *Moderate-Transit-Check-Delay* scenarios. There are slight interruptions in the *High-Transit-Check-Delay* scenario, where the

truck average transportation time increases by 18%, Figure 4-7. The large number of offices of transit at the western UK ports, which is assumed by two offices at each port, plays a key role in facilitating the flow of outbound traffic to the EU26 in the model. It is anticipated that they will provide suitable

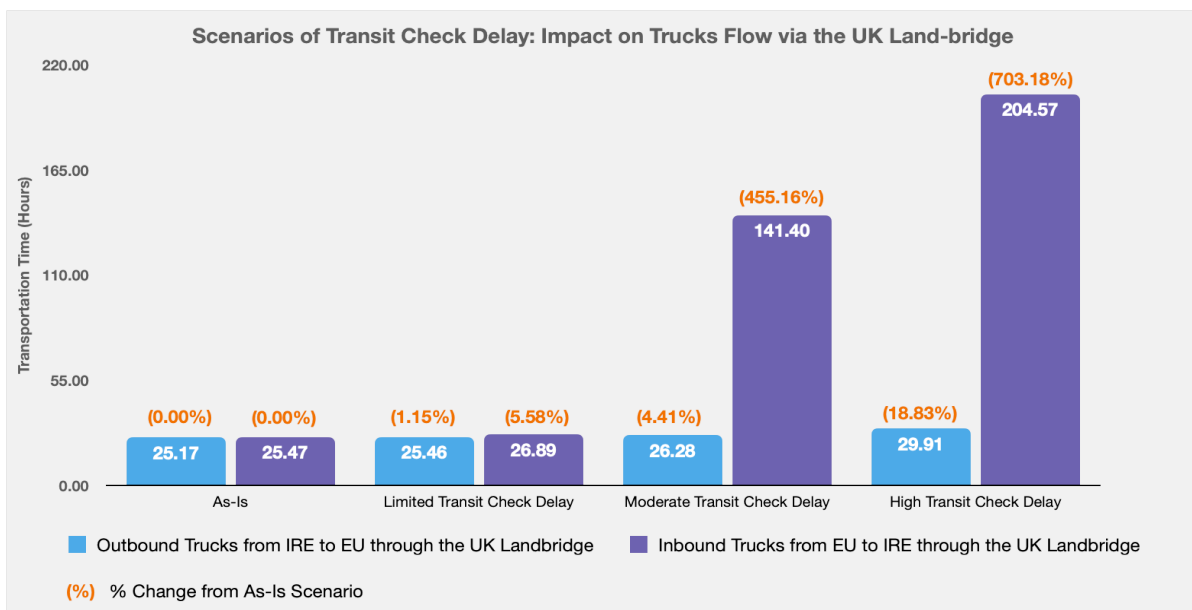


Figure 4-7: Transit check implications on inbound/outbound flow between Ireland and the EU

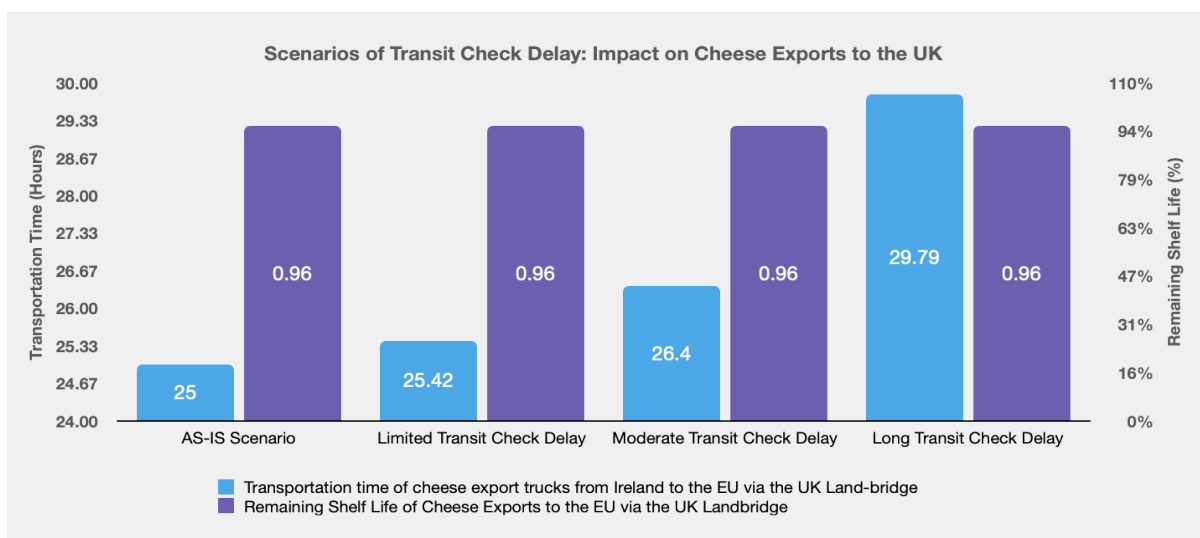


Figure 4-8: Transit check delay impact on cheese exports to EU

capacity for transit checks, which help avoid congestion or increased waiting times.

An efficient land-bridge route through the UK is seen as a crucial advantage in maintaining strong supply-chain connectivity with non-UK markets. Cheese exporters expressed their interest in these results and emphasised that securing minimum transit time via the UK Land-bridge would significantly support the sector’s activities at EU26 markets, Figure 4-8. Maintaining the fluidity of transit traffic via the UK land-bridge would also boost the competitiveness of Irish cheese in terms of product prices and short delivery time.

Considering the large number of beef exporters who use the UK land-bridge to reach mainland Europe, the predictions of shorter truck transit times are welcomed, Figure 4-9. The land-bridge provides beef exporters with better control over how long it takes for them to reach their destination. Also, the implementation of (GVMS) digital

solutions at UK ports will play a crucial role in the facilitation of traffic flow through offices of transit even more. However, it is recommended that all exporters (including beef and cheese exporters) make themselves familiar with the GVMS system and ensure they submit the correct TADs and MRNs to the ports in order to avoid any delays.

In contrast to the exports from Ireland, imports from the EU26 to Ireland witnessed significant delay in transit times under the *Moderate-Transit-Check-Delay* and *High-Transit-Check-Delay* scenarios, Figure 4-7. After in-depth analysis of these figures, it was concluded that a bottleneck at Dover is the cause of these delays. Even during the earlier peak of the Covid-19 crisis, Dover received tremendous traffic volumes, which flowed continuously from the French coast. The port handled around 7,000 trucks per day, which can easily reach 10,000 in peak periods. In the As-Is scenario (where no checks are applied), a truck takes less than

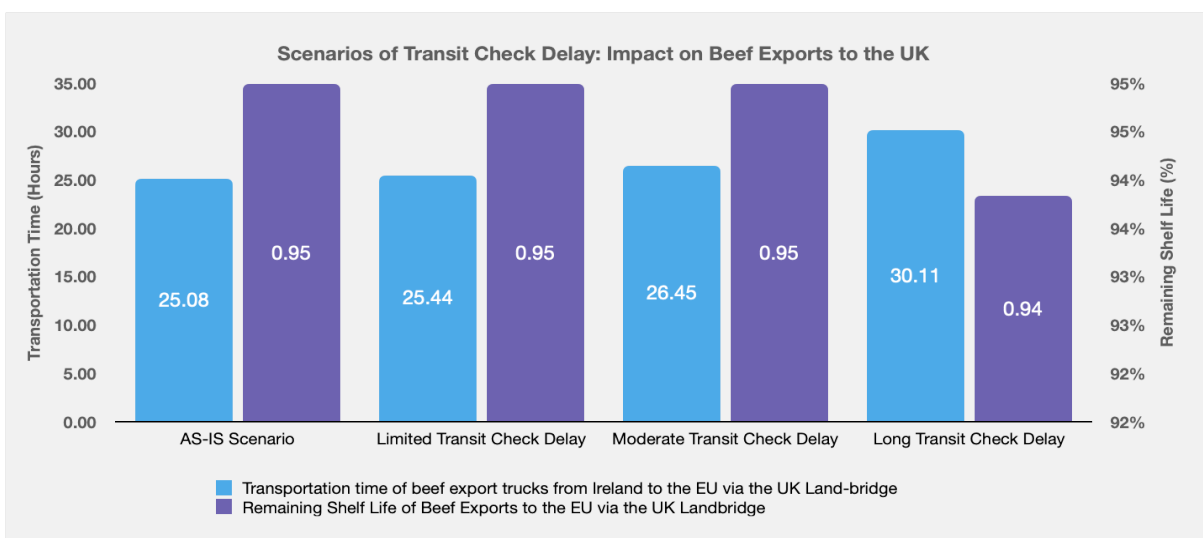


Figure 4-9: Transit check delay for beef exports to EU via land-bridge

four minutes to reach the port exit from the moment it drives off the cargo deck of the ferry. However, the model estimated the delay at Dover under the *Moderate-Transit-Check-Delay* and *High-Transit-Check-Delay* scenarios to be between **five** and **eight** days per truck, respectively. Working with the UK to set strategies at paper-based offices of transit is vital to keep the transit traffic flowing smoothly. Strategies such as green routes for EU transit trucks are particularly crucial for the Calais-Dover route. However, the limited space at Dover presents a challenge for such a strategy. If the UK could not dedicate special lanes to prioritise transit and green-routed trucks at Dover, these trucks could directly contribute to bottlenecks around the ports.

Increasing the number of authorised consignees, or AEOs, is an alternative to the fast transit-lane strategy. It reduces the demand on the offices of transit at UK ports and, in turn, eliminates bottlenecks at busy ports like Dover and Holyhead. This strategy has been endorsed by importers in Ireland, particularly if the information surrounding transit checks via the UK land-bridge remains uncertain. Although an increasing number of companies are applying for AEO status in Ireland, the time it takes to go through the process (an average of four to six months, according to the interviewed stakeholders) is a challenge.

#### 4.4. Using direct routes to mainland Europe as an alternative to UK land-bridge

Most of the trade between Ireland and mainland Europe moves via the UK land-bridge (more than 3m tonnes recorded each year).<sup>57</sup> With the potential that the UK exits the EU customs union without an agreement, or with a deal that largely deviates from current EU regulations, the demand for direct shipping services to mainland Europe will greatly increase. The UK land-bridge offers Irish traders and hauliers a competitive and efficient service, in terms of shipping frequency and transit times. It has a higher level of reliability and security. This is even with the route being a more expensive option compared with the alternative direct routes to Continental Europe.

The direct shipping services to Europe are viable alternatives to the UK land-bridge. They provide traders with more consistent delivery performance and better control over time, when uncertainty regarding the land-bridge is considered. This may result in unprecedented shifts from the current Ro/Ro traffic flow along the UK land-bridge to more Continental routes. However, further analysis will be required to compare both paths.

Therefore, three demand scenarios for direct shipping services to mainland Europe are defined: 1) Increasing demand on the direct

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<sup>57</sup> IMDO, 2019, The Implications of Brexit on the Use of Land-bridge

route services by 15%, 2) Increasing demand by 25% and 3) Increasing demand by 35%. The transportation flow for both inbound and outbound trucks under the three scenarios is examined against the As-Is scenario (represents the current demand for the direct shipping services to Europe). The CSO and Eurostat databases were used to identify the Ro/Ro volumes which flow directly from Dublin and Rosslare to Cherbourg, Rotterdam and Zeebrugge.<sup>58 59</sup> The four demand scenarios were tested in regard to freight capacities and sailing frequencies of the shipping lines, as illustrated in Chapter 3. In the four scenarios, it is assumed that transit trucks using the UK land-bridge pass through paper-based offices

of transit, with a moderate transit check delay (15 minutes/truck) at the UK ports, Table 4-3. The trucks move via the UK land-bridge in the four scenarios, and follow the assumptions introduced in section 4.3.

The model results show how effective the land-bridge is compared to the direct shipping services to mainland Europe, under the moderate transit check delay. Selecting the UK land-bridge in this case guarantees a shorter transportation time for Irish exporters. The transportation time is reduced by 32% compared to the direct shipping service to Cherbourg and reduced by 110% compared to direct shipping

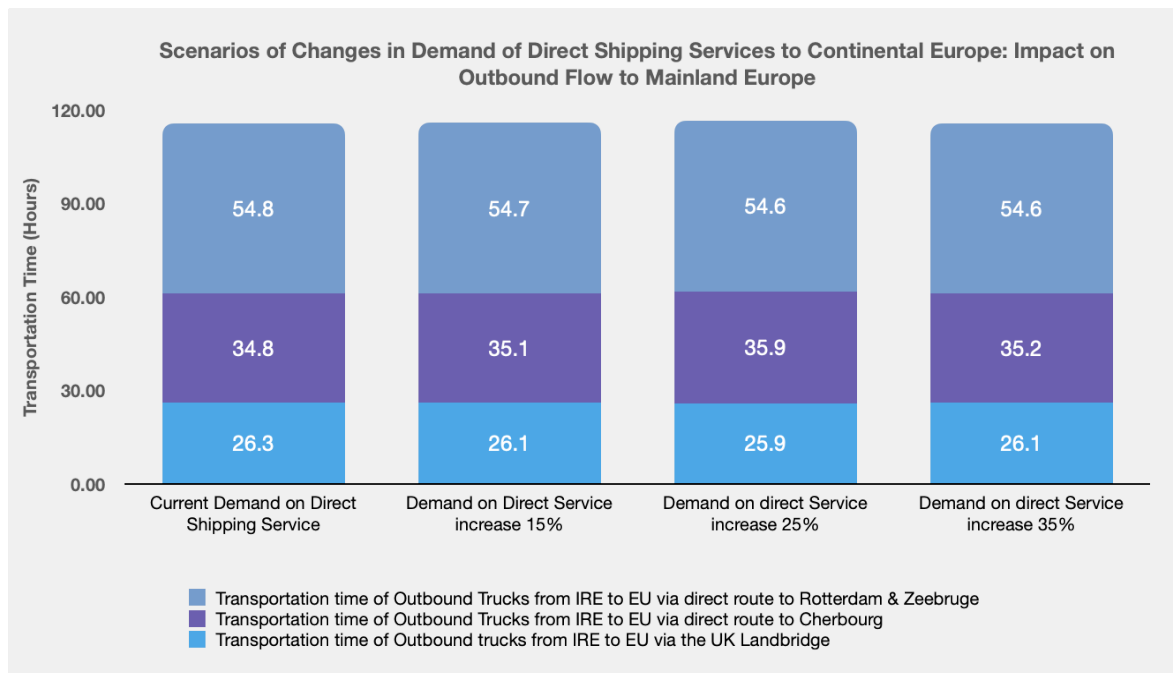


Figure 4-10: Transportation time for export trucks from Ireland to the EU

<sup>58</sup> Eurostat, transport, maritime transport, [https://ec.europa.eu/eurostat/data/database?p\\_p\\_id=NavTreeportletprod\\_WAR\\_NavTreeportletprod\\_INSTANCE\\_nPgeVbPXRmWQ&p\\_p\\_lifecycle=0&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_col\\_id=column-2&p\\_p\\_col\\_pos=1&p\\_p\\_col\\_count=2](https://ec.europa.eu/eurostat/data/database?p_p_id=NavTreeportletprod_WAR_NavTreeportletprod_INSTANCE_nPgeVbPXRmWQ&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view&p_p_col_id=column-2&p_p_col_pos=1&p_p_col_count=2)

<sup>59</sup> CSO, Maritime Statistics, TBA03, [https://statbank.cso.ie/px/pxeirestat/Database/eirestat/Maritime%20Statistics/Maritime%20Statistics\\_statbank.asp?sp=Maritime%20Statistics&Planguage=0&ProductID=DB\\_TB](https://statbank.cso.ie/px/pxeirestat/Database/eirestat/Maritime%20Statistics/Maritime%20Statistics_statbank.asp?sp=Maritime%20Statistics&Planguage=0&ProductID=DB_TB)



services to Rotterdam and Zeebrugge, Figure 4-10.

However, the efficiency of the land-bridge can only be fully assessed once information on the potential transit check types and level of interventions at the UK ports is provided. Figure 4-7 shows how efficient the land-bridge is currently for outbound traffic from Ireland to Continental Europe. This is conditional, in the sense that all five western UK ports (Heysham, Holyhead, Liverpool, Fishguard and Pembroke), are assumed to have the appropriate space to carry out transit checks for a high volume of traffic.

These results were shared with beef and cheese exporters. Although using the land-bridge guarantees the maximum remaining shelf-life on their products, Figure 4-11, they expressed concerns regarding Holyhead Port

and whether or not it has the space to host transit checks without causing congestion. The limited space at the port adds to their scepticism regarding the continued efficiency of the land-bridge, following the transition period.

Many agri-food supply chains are organised based on just-in-time consumer demands and consistent delivery dynamics. The direct service to Cherbourg, therefore, is seen as a viable alternative to the UK land-bridge, in particular for limited-shelf-life exports (e.g. mince beef and soft cheese). It offers a more economic, consistent and reliable delivery service. The control over their delivery time is essential, and this is the current advantage of the land-bridge compared to the direct shipping service to the mainland Europe. If the land-bridge route cannot provide this

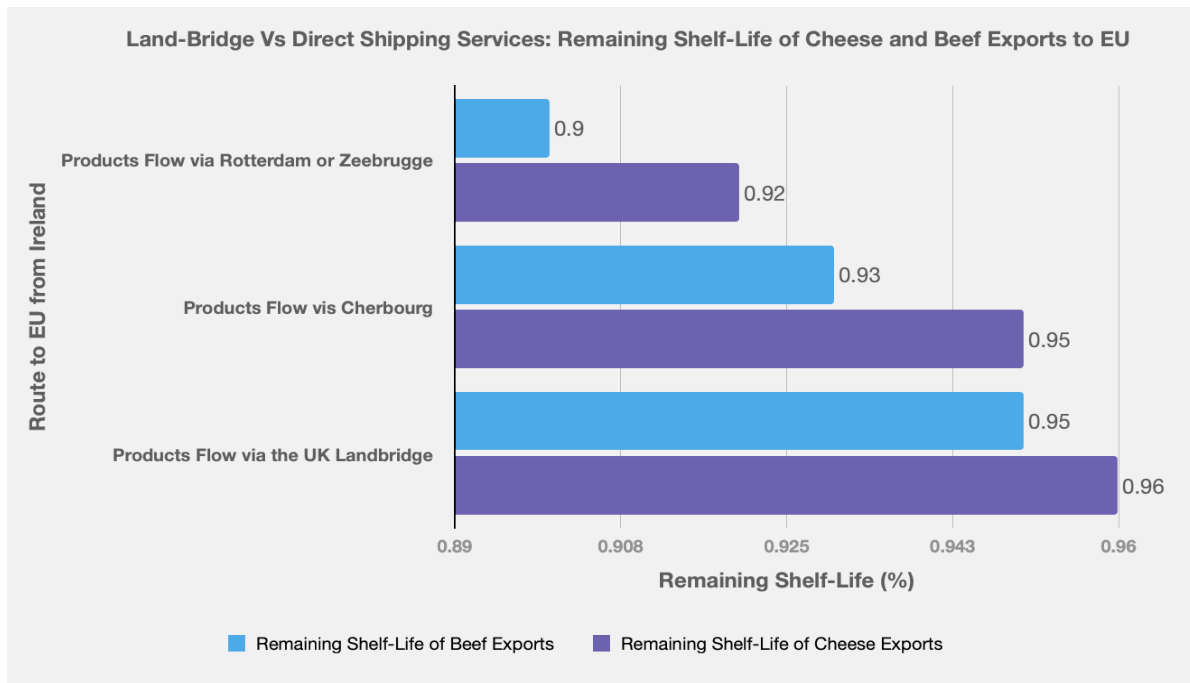


Figure 4-11: Remaining shelf-life of cheese and beef exports to the EU

control over transit delay and product delivery time, traders will shift their demand to direct shipping services.

Recently, many traders have developed route strategies to cut out the land-bridge entirely. They describe this as an essential measure in mitigating the risk. Haulage companies and exporters are encouraged to only use the land-bridge for products with a limited lifespan. The direct route to Continental Europe can be dedicated to the transport of products with a longer shelf-life, mainly using the Dublin or Rosslare to Cherbourg route. The rationale for this strategy is to reduce the volumes of goods that use the UK land-bridge. This would contribute in preventing bottlenecks at UK ports that have limited space (e.g. Holyhead). The Dublin-Rotterdam or Dublin-Zeebrugge routes are also viable alternatives to the UK land-bridge, in particular for products with longer shelf-life (e.g. hard cheddar cheese and fresh meat in vacuumed packages).

This strategic trend has seen shipping companies working to increase their direct shipping service capacities to Continental Europe over the last two years. CLdN Ro/Ro SA has added more shipping capacity (5,400 lane meters) from Dublin Port to Rotterdam and Zeebrugge.<sup>60</sup> These decisions were made to satisfy the increasing demands on the service.

Direct services to Continental Europe could also allow some businesses to change their

transportation model from accompanied to unaccompanied. The high cost of direct routes to Europe, using accompanied transportation, presents a challenge given the higher driver cost, asset cost, and maintenance fees. From both an economic and health & safety perspective, it is no longer viable to use accompanied trucks, due to the long direct journeys from Dublin to mainland Europe. Changing the mode of transportation requires companies to make fundamental alterations to their operational model, including providing inland depots at the destination ports and drivers to collect the trailers upon ship's arrival.

#### 4.5. Adequacy of border checks infrastructure

The absence of adequate checking infrastructure or appropriate inspection spaces at UK ports may break many of the existing transportation links between Ireland and the UK. As aforementioned, stakeholders have widely acknowledged that many of the UK's ports (barring Liverpool), have neither the space nor the capacity to carry out the necessary border checks following the end of the transition period. Many maritime routes could be suspended, and freights may be diverted through the few UK ports which are actually equipped with adequate inspection spaces and checking facilities. In this case Irish exporters must understand the impact this scenario will have on their trade flow and supply chains, in particular for limited-shelf-life

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<sup>60</sup> CLdN, [http://www.cldn.com/ro-ro\\_cldn\\_ro-ro.html](http://www.cldn.com/ro-ro_cldn_ro-ro.html)

supply chains. In addition, Irish and EU26 traders must find alternatives to the land-bridge to maintain their supply-chain connectivity.

Three scenarios were designed to investigate this risk, Table 4-4. All scenarios are tested under the assumption that a *limited check delay* will take place for exports from Ireland to the UK market, Table 4-2. Similarly, *limited transit check delay* is assumed to take place at the UK’s offices of transit for Irish exports to EU26 via the UK land-bridge, Table 4-3. The scenarios also run under the same sailing frequencies and freight capacities of the shipping lines as presented in Table 3-5, Chapter 3.

As illustrated in previous sections, Dublin-Holyhead is the preferable route for Irish businesses that link Ireland with the UK and EU26 markets. It has the shortest transit times and the highest sailing frequencies compared with other services along the east/west maritime corridor. Moreover, the ferries on this route provide the highest

shipping capacities for trucks among the shipping services of other routes, taking about 209 freight units per vessel, Table 3-5. However, this route is extremely sensitive to any and all types of delays or interruptions to traffic flow. Figure 4-12 endorses this fact, showing the negative implications for trade flow if the Dublin-Holyhead route is suspended. This suspension may occur due to lack of infrastructure at Holyhead port for transit checks. The transportation time of goods to the UK and mainland Europe, via the land-bridge, increases by **49%** and **21%** respectively under this scenario. Dublin-Liverpool and Dublin-Heysham are long sea routes, with at least eight hours’ sailing time. If freight is diverted to these routes, truck transportation time will increase substantially. In addition, diverting freight to Heysham and Liverpool, if Holyhead does suffer from a lack of space and check facilities, will cause congestion for trucks at Dublin Port, Figure 4-13. This would be due to the limited departure frequencies to

*Table 4-4: Scenarios of port border check infrastructure unpreparedness in UK*

Scenario	Scenario Mapping
<b>As-Is status</b>	All maritime routes between Ireland and the UK are used. Traffic flows normally from Dublin to Heysham, Liverpool and Holyhead ports and from Rosslare to Fishguard and Pembroke ports.
<b>Lack of check infrastructure at Heysham</b>	Traffic flow on the Dublin-Heysham route would be diverted to Dublin-Liverpool and Dublin-Holyhead.
<b>Lack of check infrastructure at Holyhead</b>	Traffic flow on the Dublin-Holyhead route would be diverted to Dublin-Liverpool and Dublin-Heysham.
<b>Lack of check infrastructure at Fishguard</b>	Traffic flow on the Rosslare-Fishguard route would be diverted to Rosslare-Pembroke.
<b>Lack of check infrastructure at Pembroke</b>	Traffic flow on the Rosslare-Pembroke route would be diverted to Rosslare-Fishguard.

Heysham and Liverpool from Dublin; one and five departures per day, respectively. Trucks would therefore wait for a longer time to roll on to the ferries.

Exporters have started to explore the options of diverting freight to Rosslare-Fishguard and Rosslare-Pembroke as well. Both routes provide a short shipping time to the UK market and are viable alternatives to the Dublin-Holyhead route. However, the limited sailing frequencies of the ferries for both routes present a challenge for this strategy. While the Dublin-Holyhead route has eight departure slots per day, Rosslare-Fishguard and Rosslare-Pembroke have only two for each route.<sup>61 62</sup> Ferry companies

have confirmed that, if demand for current services changes for any of the current routes, the capacity and frequency of the services will be updated accordingly.

Businesses are therefore urged to consider using alternative routes to Dublin-Holyhead; at the same time commercial operators must respond rapidly to this change.

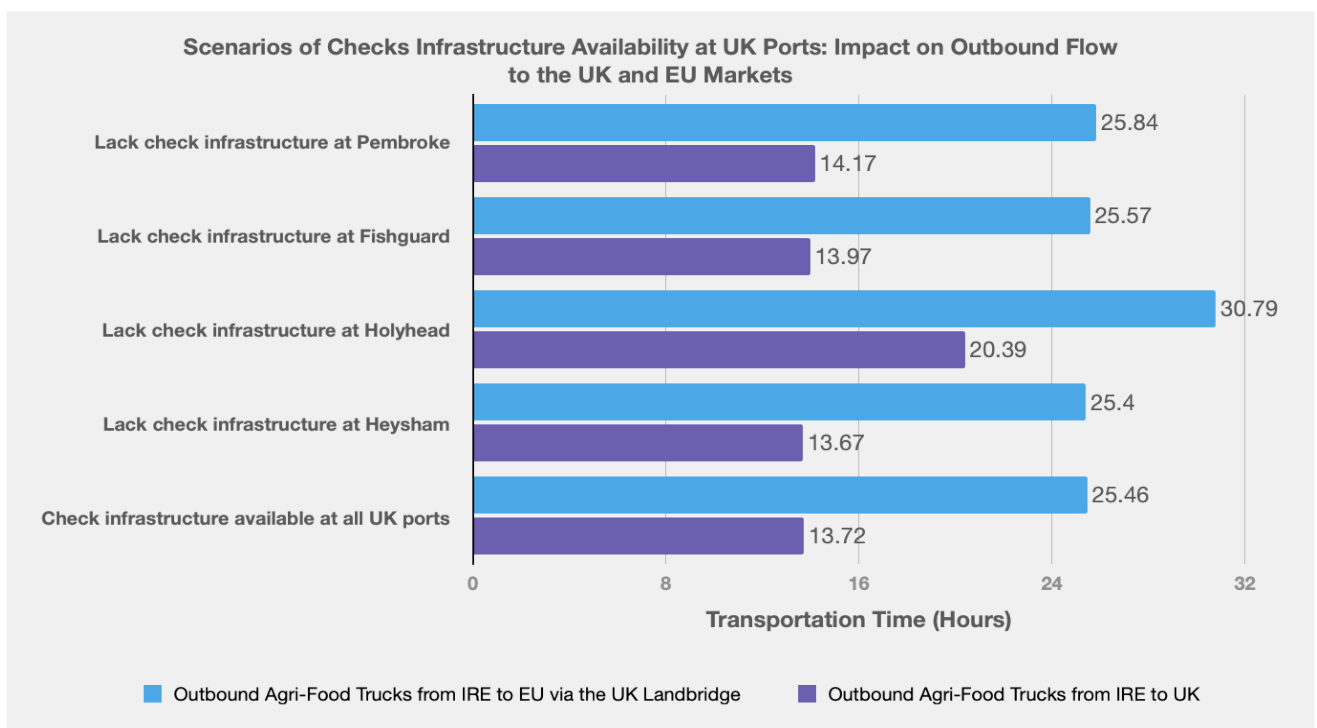


Figure 4-12: Effect of lack of checking infrastructure on transportation flow to UK and EU

<sup>61</sup> Stena  
 Line: <https://www.stenalinefreight.com/routes/>

<sup>62</sup> Irish Ferries: <https://www.irishferries.com/ie-en/routes-and-times/dublin-holyhead/>

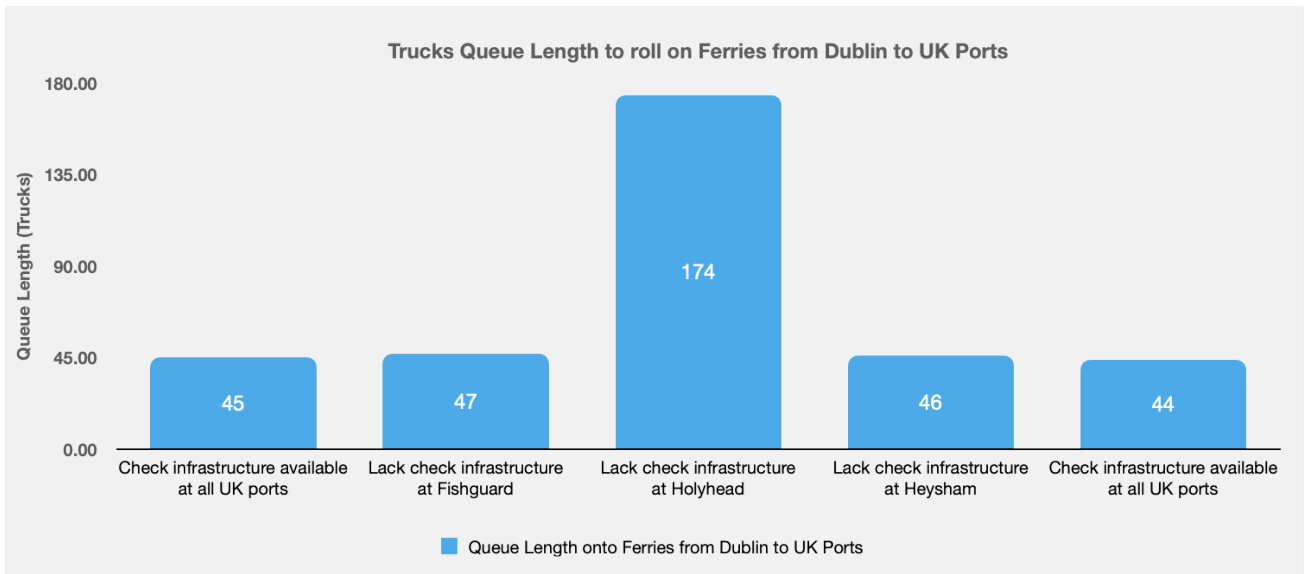


Figure 4-13: Trucks queue length to roll on to ferries sailing to UK

## CHAPTER 5: POST-BREXIT IMPLICATIONS: A CROSS-SECTORIAL OUTLOOK

### 5.1. Introduction

As explained in Chapter 2, all potential trade agreement scenarios would cause some level of disruption in Irish trade flow. This research study has focused on understanding the severity of trade-flow disruption and the resulting impacts in port operations, such as process bottlenecks, transportation delays, cross-border uncertainties, and more complex supply-chain networks. Although Chapter 4 has analysed and discussed in detail the operational impact that non-tariff barrier disruptions would have on agri-food supply chains, validated through the cheese and beef sector case studies, a higher-level, cross-sectorial discussion is still needed.

Therefore, to put added perspective on the findings and to provide consultation during the modelling and analysis, a panel of experts, consisting of academic specialists in the fields of economics, food safety, the environment, retail management and food manufacturing, was formed (see Appendix 2). Given the negotiation stance of the Irish Government, the panel was engaged to provide reflective perspective on the model results from wider perspectives, based on the following overarching themes of the research project:

1. The agri-food sector's dependence on the UK market is considerably greater than that of the economy as a whole. This is acknowledged by the Government in the Brexit trade and economic contingency planning<sup>63</sup>.
2. Since Ireland is an island nation with an open economy on the periphery of Europe, interconnectivity and transport are essential and strategic enablers of economic sustainability.

### 5.2. The UK market – a vital trade partnership for the agri-food sector

The importance of the UK market to the Irish agri-food sector has been highlighted throughout this study. There was consensus in the expert panel that, as Ireland's largest agri-food trade partner, the UK market is of critical importance and that the relationship with the UK needs to be guarded as much as possible. The UK is typically the first route to market for many agri-food products, including groceries, raw-material supply, new-product development launches and collaboration in product concepts, as well as being a major source of most Irish grocery sector products and ingredients for the food service sector. The emphasis on the Irish economy's dependence on the UK market reflects the critical nature of trade with the

<sup>63</sup> Irish Government Publication 2017 - Ireland and the negotiations on the UK's withdrawal from the

European Union: The Government's Approach, Section 7

UK for the dairy and meat sectors, outlined in previous chapters.

Reflecting on the model results, coupled with the overall research undertaken during this study, the panel was relatively optimistic about the Irish economy's resilience in dealing with any possible impacts on trade with UK. Although the flow of goods might suffer disruption if the 'cliff-edge' or a similar scenario played out (e.g. *High-Check-Delay* scenario), there is a high likelihood that this would be temporary. As seen with the Covid-19 crisis, supply chains have adapted to new ways of doing business and managing spikes in demand driven by panic buying. However, to ease the concerns about the potential post-Brexit problems with trade, in terms of policy from an economic perspective, a number of measures should be taken, several of which are probably happening already<sup>64</sup>.

Under any new trade agreement with the UK, there will be a negative impact on trade flow and that the development of relationships with other markets will be inevitable. Although this is commonly known, the interesting point was made that these new market decisions are most often political in nature,<sup>65</sup> with the arrival of more trade-orientated, research-driven policy decisions to the table in later phases of the EU/UK negotiations. Also, creating alternative markets to the UK for some

sectors, such as beef, is seen challenging given the complexity and inflexibility of beef supply chains. There is an agreement between stakeholders that this research will be very valuable in supporting policy decisions in the later phases of trade negotiations. Particular emphasis was put on section 4.4 and the analysis on using direct routes to mainland Europe as an alternative to the UK land-bridge. The results for the Ireland-Cherbourg direct route, illustrated in Figure 4-10, are of interest here; the fact that this route has minimal variation in transportation times when demand for the route increases by 35% is valuable information for agri-food organisations and vessel operators alike. This proves that direct routes to mainland Europe should be invested in and are a viable alternative to the UK land-bridge, even for time-sensitive, short-shelf- life products.

Uncertainty surrounding the types of checks at Offices of Transit at UK ports and their levels of intervention and delay compounds the attractiveness of direct routes to the UK. If the UK authorities are unable to provide solutions and adequate facilities to minimise delay in transit checks at UK ports, bottlenecks will develop, hindering the transit flow between Ireland and the EU26. Figure 4-7 presented an example of the influence of such bottlenecks on truck transit time, which increased considerably in both

<sup>64</sup> Government of Ireland, 2020, Budget 2020 and No Deal Brexit

<sup>65</sup> The Brexit withdrawal negotiation process itself has been highly political, with more detailed trade

negotiations taking place in later phases of the process timeline.

the *Moderate and High transit-check delay* scenarios.

Interestingly, a member of the panel with expertise in econometric analysis stated that a lot of focus on trade flow between Ireland and the UK involved medium-term solutions, and that other uses of time and resources was needed for more long-term strategic economic initiatives. Describing the Stigler’s survivor technique,<sup>66</sup> the panel member suggested that this basically means that strong firms will survive, and the rest will disappear. This is based on the argument alluded to in Chapter 2; Figure 2-1 showed that some agri-food producers, such as beef farmers, are on the margin in terms of financial sustainability. Therefore, some of these individuals would be better off financially by either diversifying or using their land or resources for other activities. This may meet with resistance, but it is an economic reality that some may experience post-Brexit.

Again, this will require educating those involved on the options available to them, but a good example can be seen in the cheese case study, where diversification from cheddar to mozzarella production was successful and can open new markets in both the UK and the EU26.

### 5.3. Route-to-market interconnectivity – an essential economic enabler

Route to market interconnectivity is a critical infrastructure for Irish trade flow. As explained in Chapter 2, Ireland, connected through the UK land-bridge, is part of the North Sea–Mediterranean Core Network Corridor, as illustrated in Table 4-1. The uncertainty regarding border-free crossings has put the attractiveness of this route under huge scrutiny, and this research has investigated the viability of Ireland’s network infrastructure in various post-Brexit scenarios, focusing on three main determinants: border check times, accessibility to the UK and EU26 markets, and the adequacy of checking infrastructure and resources, see section 4.1. For the purpose of this discussion, the end result of each determinant is possible time-delay disruptions, and therefore they do not need to be discussed individually. Hence the discussion in this section focuses on time delays and is not determinant-specific.

The expert panel presented a retail and consumer-orientated focus on the effects of non-tariff barriers on trade flow. Key concerns centred on the implications of disruptive delays at ports due to the burden that SPS and other checks would have on port traffic, as illustrated in Figure 4-2 to Figure 4-6. A common thread of discussion between all panel members was not limited to the impact on operational issues at ports,

<sup>66</sup> For further information on Stigler’s survivor technique see: Shepherd, W. (1967). What Does the

Survivor Technique Show about Economies of Scale? Southern Economic Journal, 34(1), 113-122



such as increased queuing times/numbers or capacity constraints, but on the direct time-delay consequences caused by these issues.

Risks directly associated with the shelf-life of short life-cycle products such as, increased lead-times, the risk of late delivery times, and reduced on-shelf availability were the topics of concern, especially in high-intervention check scenarios for both inbound and outbound trucks. The near **252%** increase in outbound transportation times and **358%** increase in inbound transportation times, Figure 4-2 and Figure 4-6 respectively, in *high check-delay scenarios*, predictably was the main focus for the panel. As lead-time is the most important metric to consider and is a driver of costs, these transportation increases would have a severe impact on the sector's competitiveness. Negative impacts included costs for lost sales (empty shelves), consumer panic-buying due to delayed supply, and disposal costs for perishable products. Similar to what we are seeing currently with the effects of Covid-19 disruptions, to mitigate against the risk of lead-time delays, retail outlets will reduce the variation of products available and stick to core brands and product categories.

From a food manufacturing perspective, the high traffic of food ingredients and raw-material supply flowing between the Irish and UK markets was considered. With respect to exports to the UK, any delays close to those modelled in Figure 4-2 and Figure 4-6 would be catastrophic. As the majority of food distribution networks in the

UK are centralised, getting to distribution centres is time-critical. Delays of up to 60 hours, on average, in a no-deal scenario would have huge knock-on implications for the scheduling of entire centralised networks.

Other concerns focused on the perishability and quality standards of short life-cycle and temperature-controlled agri-food products that might be delayed at ports. Many agri-food product categories, such as soft cheeses and fresh minced beef, are time-sensitive, meaning that delays at ports can decrease the quality of the product, whether in taste, colour or depletion in nutritional value. The limited impact on shelf-life highlighted in Figure 4-4 and Figure 4-5, in the *limited and moderate check delay scenarios*, reduced these concerns.

#### 5.4. The cost implications of expected delays

Although cost implications are not within the scope of this research, it is important to acknowledge the link between future disruptive patterns and their associated costs for agri-food supply chains. Under all future trade agreements, time-delay disruptions would mean significant cost implications for Irish businesses. It was succinctly put that any extra associated costs would make Irish businesses less competitive internationally, due to the expected increase in prices. The viability of many agri-food SMEs would be at risk under WTO terms, and therefore, financial interventions could be essential to save many businesses. The

government has assigned around €1 billion in Budget 2020 to be spent on no deal Brexit preparedness. €650m is dedicated to support greatest risk sectors from Brexit including Agriculture, Enterprise, and Tourism. Of this €650m, €220m will be activated for immediate deployment if a no deal Brexit is confirmed to assist firms and enterprises across the economy. Agriculture sector will receive €110m, where the provision of immediate support to the beef sector will be an initial priority with €85m aid for beef farmers. Fisheries, livestock farmers and mushrooms sector and food and drinks processing industry will receive €25m to improve competitiveness, support products and market innovation, and increase environmental efficiency of these sectors<sup>64</sup>.

Hidden environmental costs due to increased levels of waste and CO<sub>2</sub> levels should also be considered. Ireland would be at risk of incurring larger penalties for increased carbon emissions due to any future congestion and rerouting of supply chains.

From a food manufacturing and distribution perspective, increased logistics costs is a major concern under any new trade agreement. Reflecting on the fact that there is limited inventory of retail products held on the island of Ireland, Irish food and grocery logistics networks are anticipated to be redesigned, moving away from a lean, just-in-time, cross-docking network structure to a more traditional warehousing and last-mile-delivery design.

Further elasticity studies should be conducted for policy perspective, to see how elastic products are and how much of the extra cost would be borne by producer or consumer.

## Appendix 1: Data Manipulation and Assumptions

### Input parameters

The list of input parameters is divided into three sub-sections, as shown below.

### Section 1: Ro/Ro Annual Trade Volumes between Ireland (IR), UK and the EU26

Ro/Ro Trade Vol between IR-UK

Data Source

<p>1. Import Volumes of Non-Agri products from the UK to IRE (tonnes)</p>	<p>6,330,240</p>	<ul style="list-style-type: none"> <li>Total Ro/Ro inbound traffic from the UK to Ireland is <b>7,536,000</b> (<a href="https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraff/c2018/">https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraff/c2018/</a>)</li> <li>According to IMDO, 16% of the total inbound Ro/Ro trade volume from UK is imported from the EU26 via UK land-bridge. (<a href="https://www.imdo.ie/Home/sites/default/files/IMDOFiles/A143219%20IMDO%20landbridge%20Report-digital-draft1.pdf">https://www.imdo.ie/Home/sites/default/files/IMDOFiles/A143219%20IMDO%20landbridge%20Report-digital-draft1.pdf</a>)</li> <li>Hence the net volume of the inbound Ro/Ro trade from the UK to Ireland is calculated as follows: <math>(7,536,000 - (7,536,000 * 0.16)) = \mathbf{6,330,240}</math> tonnes)</li> </ul>
<p>2. Export Volumes of Non-Agri products from IRE to the UK (tonnes)</p>	<p>5,554,080</p>	<ul style="list-style-type: none"> <li>Total Ro/Ro outbound traffic from Ireland to UK is <b>6,612,000</b>. (<a href="https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraff/c2018/">https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraff/c2018/</a>)</li> <li>According to IMDO, 16% of the total outbound Ro/Ro trade volume from Ireland to UK is exported to EU26 via land-bridge. (<a href="https://www.imdo.ie/Home/sites/default/files/IMDOFiles/A143219%20IMDO%20landbridge%20Report-digital-draft1.pdf">https://www.imdo.ie/Home/sites/default/files/IMDOFiles/A143219%20IMDO%20landbridge%20Report-digital-draft1.pdf</a>)</li> <li>Hence the net volume of the outbound Ro/Ro trade from Ireland to the UK is calculated as follows: <math>(6,612,000 - (6,612,000 * 0.16)) = \mathbf{5,554,080}</math> tonnes)</li> </ul>
<p>3. Import Volumes of Agri-food products from the UK to IRE (tonnes)</p>	<p>2,914,350</p>	<ul style="list-style-type: none"> <li>Data of the trade between Ireland and UK, of all product categories, is provided by CSO (<a href="https://www.cso.ie/en/statistics/agriculture/">https://www.cso.ie/en/statistics/agriculture/</a>).</li> <li>The Agri-food categories are identified based on DAFM's list of product categories that need SPS checks at Irish ports, according to EU regulations. (<a href="https://www.agriculture.gov.ie/brexit/preparingforbrexit/faqsforcommodities/">https://www.agriculture.gov.ie/brexit/preparingforbrexit/faqsforcommodities/</a>)</li> <li>Accordingly, the following product divisions were selected to present the Agri-food products that need SPS checks upon arrival to Irish ports: (00, 01, 02, 03, 04, 05, 07, 08, 09, 11, 21, 24, 27, 29, 41, 43, 56, 63). Please see full description of products divisions in <b>Table 1</b>.</li> <li>The trade of these products is assumed via Ro/Ro shipping.</li> <li>By summing up the import volumes of these product, according to CSO, the gross volume of inbound Ro/Ro Agri-food product from UK to Ireland is estimated at <b>3,469,464</b>.</li> <li>As illustrated above, 16% of total inbound Ro/Ro trade volume from UK to Ireland is imported from EU26 via land-bridge.</li> <li>Hence, the net volume of inbound Ro/Ro Agri-food products from UK to Ireland: <math>(3,469,464 - (3,469,464 * 0.16)) = \mathbf{2,914,350}</math> tonnes).</li> </ul>
<p>4. Export Volumes of Agri-food products from IRE to the UK (tonnes)</p>	<p>2,176,803</p>	<ul style="list-style-type: none"> <li>Data of the trade between Ireland and UK, of all product categories, is provided by CSO (<a href="https://www.cso.ie/en/statistics/agriculture/">https://www.cso.ie/en/statistics/agriculture/</a>).</li> <li>The Agri-food categories are identified based on DAFM's list of product categories that need SPS checks at Irish ports, according to EU regulations. (<a href="https://www.agriculture.gov.ie/brexit/preparingforbrexit/faqsforcommodities/">https://www.agriculture.gov.ie/brexit/preparingforbrexit/faqsforcommodities/</a>)</li> <li>Accordingly, the following product divisions were selected to present the Agri-food products and need SPS checks upon arrival at Irish ports: (00, 01, 02, 03, 04, 05, 07, 08, 09, 11, 21, 24, 27, 29, 41, 43, 56, 63). Please see full description of product divisions at <b>Table 1</b>.</li> <li>The trade of these products is assumed via Ro/Ro shipping.</li> <li>By summing up export volumes of these product, the gross volume of outbound Ro/Ro Agri-food product from Ireland to UK is estimated at <b>2,591,432</b>.</li> <li>As illustrated above, 16% of outbound Ro/Ro trade volume from UK to Ireland is exported to EU26 via UK land-bridge.</li> </ul>

		<ul style="list-style-type: none"> <li>Hence, the net volume of outbound Ro/Ro Agri-food products from Ireland to UK: <math>(2,591,432 - (2,591,432 * 0.16) = 414,629) = \mathbf{2,176,803}</math> tonnes.</li> </ul>
5. Import Volumes of Beef product from the UK to IRE (tonnes)	25,672	<ul style="list-style-type: none"> <li>Jim Power Economics, in their report 'An independent assessment of the Irish beef industry', 2020, presented the beef imports to Ireland by geographical market at 2018, <b>Table 2</b>.</li> <li>Total beef imports from the UK: <b>30,562</b>.</li> <li>16% of beef imports from the UK is assumed to be shipped to EU26 via land-bridge.</li> <li>Hence the net value of beef imports from the UK to Ireland is estimated as follows: <math>(30,562 - (30,562 * 0.16) = \mathbf{25,672}</math>.</li> </ul>
6. Export Volumes of Beef product from Ireland to the UK (tonnes)	226,515	<ul style="list-style-type: none"> <li>The calculation of beef export volume from Ireland to the UK is based on the Jim Power Economics data.</li> <li>Total beef exports to the UK: <b>269,661</b>.</li> <li>16% of beef exports to the UK is assumed to be shipped to EU26 via land-bridge.</li> <li>Hence, the net value of beef exports from Ireland to the UK is estimated as follows: <math>(269,661 - (269,661 * 0.16) = \mathbf{226,515}</math></li> </ul>
7. Import Volumes of Cheese products from the UK to IRE (tonnes)	36,217	<ul style="list-style-type: none"> <li>The volume of cheese imports from the UK is derived from the CSO database.</li> <li>Total cheese imports from the UK: <b>43,115</b>.</li> <li>16% of cheese imports from the UK is assumed to be shipped from EU26 via land-bridge.</li> <li>Hence, the net value of cheese import from the UK to Ireland is estimated as follows: <math>(43,115 - (43,115 * 0.16) = \mathbf{36,217}</math></li> </ul>
8. Export Volumes of Cheese product from Ireland to the UK (tonnes)	96,981	<ul style="list-style-type: none"> <li>The volume of cheese exports to the UK is derived from the CSO database.</li> <li>Total cheese exports to the UK: <b>115,454</b>.</li> <li>16% of cheese exports to the UK is assumed to be shipped to EU26 via land-bridge.</li> <li>Hence the net value of cheese exports to the UK is estimated as follows: <math>(115,454 - (115,454 * 0.16) = \mathbf{96,981}</math></li> </ul>

*Ro/Ro Trade Vol between IR-EU26 (via land-bridge)*

9. Import Volumes of Non-Agri products from EU26 to IRE via land-bridge (tonnes)	1,205,760	<ul style="list-style-type: none"> <li>16% of Ro/Ro trade volumes between Ireland and the UK flow to/from EU26 via land-bridge, according to IMDO report.</li> <li>Total inbound Ro/Ro volume for Non-Agri food products from the UK to Ireland is <b>7,536,000 (i.e. Check first row)</b>.</li> <li>Hence, inbound Ro/Ro volume of Non-Agri products from EU26 to Ireland via land-bridge is: <math>(7,536,000 * 0.16 = \mathbf{1,205,760}</math> tonnes)</li> </ul>
10. Export Volumes of Non-Agri products from IRE to EU26 via land-bridge (tonnes)	1,057,920	<ul style="list-style-type: none"> <li>Total outbound Ro/Ro volume for Non-Agri food products from Ireland to the UK is <b>6,612,000 (i.e. Check 2<sup>nd</sup> row)</b></li> <li>Outbound Ro/Ro volume of Non-Agri products from Ireland to EU26 via land-bridge is: <math>(6,612,000 * 0.16 = \mathbf{1,057,920}</math> tonnes)</li> </ul>
11. Import Volumes of Agri-food products from EU26 to IRE via land-bridge (tonnes)	555,114	<ul style="list-style-type: none"> <li>Total inbound Ro/Ro volume for Agri food products from the UK to Ireland is <b>4,469,464 (i.e. Check 3<sup>rd</sup> row)</b></li> <li>Hence, inbound Ro/Ro volume of Agri products from EU26 to Ireland via land-bridge is: <math>(4,469,464 * 0.16 = \mathbf{555,114}</math> tonnes)</li> </ul>
12. Export Volumes of Agri-food products from IRE to EU26 via land-bridge (tonnes)	414,629	<ul style="list-style-type: none"> <li>Total outbound Ro/Ro volume for Agri food products from Ireland to the UK is <b>2,591,432 (i.e. Check 4<sup>th</sup> row)</b></li> <li>Outbound Ro/Ro volume of Non-Agri products from Ireland to EU26 via land-bridge is: <math>(2,591,432 * 0.16 = \mathbf{414,629}</math> tonnes)</li> </ul>
13. Import Volumes of Beef products from EU26 to IRE via land-bridge (tonnes)	4,890	<ul style="list-style-type: none"> <li>Total inbound Ro/Ro volume of beef products from the UK to Ireland is <b>30,562 (i.e. Check 5<sup>th</sup> row)</b></li> <li>Hence, inbound Ro/Ro volume of beef products from EU26 to Ireland via land-bridge is: <math>(30,562 * 0.16 = \mathbf{4,890}</math> tonnes)</li> </ul>
14. Export Volumes of Beef products from IRE to EU26 via land-bridge (tonnes)	43,146	<ul style="list-style-type: none"> <li>Total outbound Ro/Ro volume of beef products from Ireland to the UK is <b>269,661 (i.e. Check 6<sup>th</sup> row)</b></li> <li>Outbound Ro/Ro volume of beef products from Ireland to EU26 via land-bridge is: <math>(269,661 * 0.16 = \mathbf{43,146}</math> tonnes)</li> </ul>

15. Import Volumes of Cheese products from EU26 to IRE via land-bridge (tonnes)	6,898	<ul style="list-style-type: none"> <li>Total inbound Ro/Ro volume of cheese products from the UK to Ireland is <b>43,115 (i.e. Check 7<sup>th</sup> data row)</b></li> <li>Hence, inbound Ro/Ro volume of cheese products from EU26 to Ireland via land-bridge is: <math>(43,115 * 0.16 = \mathbf{6,898}</math> tonnes)</li> </ul>
16. Export Volumes of Cheese products from IRE to EU26 via land-bridge (tonnes)	18,473	<ul style="list-style-type: none"> <li>Total outbound Ro/Ro volume of cheese products from Ireland to the UK is <b>115,454 (i.e. Check 8<sup>th</sup> data row)</b></li> <li>Outbound Ro/Ro volume of cheese products from Ireland to EU26 via land-bridge is: <math>(115,454 * 0.16 = \mathbf{18,473}</math> tonnes)</li> </ul>

*Ro/Ro Trade Vol between IR-EU26 (via Cherbourg)*

17. Import Volumes of Non-Agri products from EU26 (Cherbourg) to IRE via Direct Route (tonnes)	223,000	<ul style="list-style-type: none"> <li>The inbound/outbound Ro/Ro volume between Ireland and Cherbourg (EU26) via direct routes is derived from EuroStat (Maritime Transport Statistics). <a href="https://ec.europa.eu/eurostat/web/transport/data/database">https://ec.europa.eu/eurostat/web/transport/data/database</a></li> </ul>
18. Export Volumes of Non-Agri products from IRE to EU26 (Cherbourg) via Direct Route (tonnes)	258,000	
19. Import Volumes of Agri-food products from EU26 (Cherbourg) to IRE via Direct Route (tonnes)	173,605	<ul style="list-style-type: none"> <li>Data of inbound Agri-food trade volume between Ireland and EU26 is derived from CSO (<a href="https://www.cso.ie/en/statistics/agriculture/">https://www.cso.ie/en/statistics/agriculture/</a>).</li> <li>Similar to the assumption in the 3<sup>rd</sup> data row, Agri-food categories are assumed based on DAFM's list of product categories that need SPS checks on arrival at Irish ports, which are (00, 01, 02, 03, 04, 05, 07, 08, 09, 11, 21, 24, 27, 29, 41, 43, 56, 63), <b>Table 1</b>. (<a href="https://www.agriculture.gov.ie/brexit/preparingforbrexit/fagsforcommodities/">https://www.agriculture.gov.ie/brexit/preparingforbrexit/fagsforcommodities/</a>)</li> <li>By summing up inbound volume of Agri product categories, the total inbound Agri product from EU26 to Ireland is estimated at <b>5,136,251</b>.</li> <li>This volume is shipped through different shipping modes including Ro/Ro, Lo/Lo, Dry bulk, Liquid Bulk and others.</li> <li>According to CSO (port traffic data), 13% of imports from EU26 to Ireland are shipped by Ro/Ro shipping mode.</li> <li>Hence, the Ro/Ro volume of inbound Agri product from EU26 to Ireland is calculated as: <math>(5,136,251 * 0.13 = \mathbf{667,713})</math></li> <li>According to EuroStat, <b>26%</b> of Ro/Ro inbound volume from EU26 to Ireland via direct route is shipped from Cherbourg to Ireland.</li> <li>Hence, the Ro/Ro volume of inbound Agri-food products from Cherbourg to Ireland via direct route is calculated as: <math>(667,713 * 0.26 = \mathbf{173,605})</math>.</li> </ul>
20. Export Volumes of Agri-food products from IRE to EU26 (Cherbourg) via Direct Route (tonnes)	48,975	<ul style="list-style-type: none"> <li>Similar calculations have been conducted for the outbound flow from Ireland to mainland Europe via direct route.</li> <li>By summing up the outbound volume of Agri-food product from Ireland to EU26, the total volume of Agri-food product from Ireland to EU26 is <b>1,391,354</b>.</li> <li>According to CSO (port traffic data), 11% of exports from Ireland to EU26 moves via Ro/Ro traffic.</li> <li>Hence, Ro/Ro volume of outbound Agri-food product from Ireland to EU26 is calculated as: <math>(1,391,354 * 0.11 = \mathbf{153,049})</math></li> <li>According to EuroStat, <b>32%</b> of Ro/Ro outbound volume from Ireland to EU26 (via direct route) is shipped from Ireland to Cherbourg.</li> <li>Hence, the Ro/Ro volume of outbound Agri-food products from Ireland to Cherbourg via direct route is calculated as: <math>(153,049 * 0.32 = \mathbf{48,975})</math>.</li> </ul>
21. Import Volumes of Beef products from EU26 (Cherbourg) to IRE via Direct Route (tonnes)	145.5	<ul style="list-style-type: none"> <li>Volume of Ro/Ro inbound beef from Cherbourg to Ireland is calculated based on the inbound beef volume from EU26 to Ireland.</li> <li>The total inbound beef volume from EU26 to Ireland is <b>3,350 tonnes, Table 2</b>.</li> <li>Most of inbound beef volume is based on 10 EU countries.</li> <li>It is assumed that the entire inbound volume of beef from EU26 will be shipped from Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of inbound beef from the other 7 EU countries (excluding France, Netherlands and Belgium), see Table 2, to Ireland will be equally divided between the three ports.</li> <li>Hence, the inbound beef volume from Cherbourg to Ireland will be calculated as: <math>(308 \text{ (inbound beef flow from France to Ireland)} + 811.67 \text{ (the</math></li> </ul>

		<p>equal division of the inbound beef from the other 7 EU countries to Ireland) = <b>1,120</b>)</p> <ul style="list-style-type: none"> <li>The calculated outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence to calculate the Ro/Ro inbound beef from Cherbourg to Ireland: (1,120 * 0.13 (percentage of Ro/Ro inbound traffic between EU26 and Ireland) = <b>145.5</b>).</li> </ul>
22. <i>Export Volumes of Beef products from IRE to EU26 (Cherbourg) via Direct Route (tonnes)</i>	8,257	<ul style="list-style-type: none"> <li>Volume of Ro/Ro outbound beef from Ireland to Cherbourg is calculated based on the outbound beef volume from Ireland to EU26.</li> <li>The total outbound volume of beef from Ireland to EU26 is <b>172,002 tonnes, Table 3</b>.</li> <li>Most of outbound beef volume from Ireland is exported to 8 EU countries.</li> <li>It is assumed that the entire outbound beef volume from Ireland to EU26 is shipped to Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of outbound beef from Ireland to the other 5 EU countries (excluding France, Netherlands and Belgium) will be equally divided between the three ports.</li> <li>The outbound beef volume from Ireland to Cherbourg will then be calculated as: (49,597 (outbound beef volume from Ireland to France) + 25,466 (the equal division of the outbound beef from Ireland to the other 5 EU countries) = <b>75,063</b>).</li> <li>The calculated outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence to calculate the Ro/Ro outbound beef from Ireland to Cherbourg: (75,063 * 0.11 (percentage of Ro/Ro outbound traffic between Ireland and EU26) = <b>8,257</b>)</li> </ul>
23. <i>Import Volumes of Cheese products from EU26 (Cherbourg) to IRE via Direct Route (tonnes)</i>	1,329	<ul style="list-style-type: none"> <li>Volume of Ro/Ro inbound cheese from Cherbourg to Ireland is calculated based on the volumes of inbound cheese from EU26 to Ireland.</li> <li>The total inbound cheese from EU26 to Ireland is <b>20,834 tonnes, Table 5</b>.</li> <li>Most of inbound cheese volume is based on the imports from 10 EU countries.</li> <li>It is assumed that the entire inbound cheese from EU26 will be shipped from Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of inbound cheese from the other 7 EU countries (excluding France, Netherlands and Belgium) to Ireland will be equally divided between the three ports.</li> <li>Hence, the inbound cheese volume from Cherbourg to Ireland will be calculated as: (5,589 (inbound cheese volume from France to Ireland) + 4637 (the equal division of the inbound Cheese from the other 7 EU countries to Ireland) = <b>10,226</b>).</li> <li>The calculated outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence to calculate the Ro/Ro inbound cheese from Cherbourg to Ireland: (10,226 * 0.13 (percentage of Ro/Ro inbound traffic between EU26 and Ireland) = <b>1329.4</b>).</li> </ul>
24. <i>Export Volumes of Cheese products from IRE to EU26 (Cherbourg) via Direct Route (tonnes)</i>	1,420	<ul style="list-style-type: none"> <li>Volume of Ro/Ro outbound cheese from Ireland to Cherbourg is calculated based on the outbound cheese volume from Ireland to EU26.</li> <li>The total outbound cheese volume from Ireland to EU26 is <b>45,414 tonnes, Table 5</b>.</li> <li>Most of outbound cheese volume from Ireland is exported to 4 EU countries.</li> <li>It is assumed that the entire outbound cheese from Ireland to EU26 is shipped to Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of outbound cheese from Ireland to Germany (excluding France, Netherlands and Belgium) will be equally divided between the three ports.</li> <li>The outbound cheese volume from Ireland to Cherbourg will then be calculated as: (7,964 (outbound cheese volume from Ireland to France) + 4,945 (the equal division of the outbound cheese from Ireland to Germany) = <b>12,909</b>).</li> <li>The calculated volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence, to calculate the Ro/Ro outbound cheese from Ireland to Cherbourg: (12,909 * 0.11 (percentage of Ro/Ro outbound traffic between Ireland and EU26) = <b>1,420</b>)</li> </ul>

*Ro/Ro Trade Vol between IR-EU26 (via Rotterdam)*

25. <i>Import Volumes of Non-Agri products from EU26 (Rotterdam) to IRE through Direct Route (tonnes)</i>	417,000	<ul style="list-style-type: none"> <li>The inbound/outbound Ro/Ro volume between Ireland and Rotterdam (EU) via direct routes is collected from EuroStat (Maritime Transport Statistics). <a href="https://ec.europa.eu/eurostat/web/transport/data/database">https://ec.europa.eu/eurostat/web/transport/data/database</a></li> </ul>
26. <i>Export Volumes of Non-Agri products from IRE to EU (Rotterdam) via Direct Route (tonnes)</i>	256,000	
27. <i>Import Volumes of Agri-food products from EU26 (Rotterdam) to IRE via Direct Route (tonnes)</i>	206,991	<ul style="list-style-type: none"> <li>Data of inbound Agri-food trade volume between Ireland and EU26 is collected from CSO data (<a href="https://www.cso.ie/en/statistics/agriculture/">https://www.cso.ie/en/statistics/agriculture/</a>).</li> <li>Similar to the assumption in the 3<sup>rd</sup> data row, Agri-food categories are assumed based on DAFM's list of categories that need SPS checks on arrival at Irish ports, which are (00, 01, 02, 03, 04, 05, 07, 08, 09, 11, 21, 24, 27, 29, 41, 43, 56, 63), <b>Table 1</b>. (<a href="https://www.agriculture.gov.ie/brexit/preparingforbrexit/faqsforcommodities/">https://www.agriculture.gov.ie/brexit/preparingforbrexit/faqsforcommodities/</a>)</li> <li>By summing up the inbound volume of Agri product categories, the total inbound Agri product volume from EU26 to Ireland is estimated by <b>5,136,251</b>.</li> <li>This volume is shipped through different shipping modes including Ro/Ro, Lo/Lo, Dry bulk, Liquid Bulk and others.</li> <li>According to CSO (port traffic data), 13% of imports from EU26 to Ireland is shipped via Ro/Ro shipping mode.</li> <li>Hence, the Ro/Ro volume of inbound Agri product from EU26 to Ireland is calculated as: <math>(5,136,251 * 0.13 = 667,713)</math></li> <li>According to EuroStat, <b>31%</b> of Ro/Ro inbound volume from EU26 to Ireland (via direct route) is shipped from Netherland to Ireland (via Rotterdam port).</li> <li>Hence, the Ro/Ro volume of inbound Agri-food products from Rotterdam to Ireland is calculated as: <math>(667,713 * 0.31 = 206,991)</math>.</li> </ul>
28. <i>Export Volumes of Agri-food products from IRE to EU26 (Rotterdam) via Direct Route (tonnes)</i>	48,975	<ul style="list-style-type: none"> <li>Similar calculations have been conducted for the outbound flow from Ireland to mainland Europe via direct route.</li> <li>By summing up the outbound volume of Agri-food products from Ireland to EU26, the total volume of Agri-food products from Ireland to EU26 is <b>1,391,354</b>.</li> <li>According to CSO (port traffic data), 11% of exports from Ireland to EU26 moves via Ro/Ro traffic.</li> <li>Hence, the Ro/Ro volume of outbound Agri-food products from Ireland to EU26 is calculated as <math>(1,391,354 * 0.11 = 153,049)</math>.</li> <li>According to EuroStat, <b>32%</b> of Ro/Ro outbound volume from Ireland to EU26 via direct route is shipped from Ireland to Netherland (via Rotterdam).</li> <li>Hence, the Ro/Ro volume of outbound Agri-food products from Ireland to Rotterdam is calculated as: <math>(153,049 * 0.32 = 48,975)</math>.</li> </ul>
29. <i>Import Volumes of Beef products from EU26 (Rotterdam) to IRE via Direct Route (tonnes)</i>	180	<ul style="list-style-type: none"> <li>Volume of Ro/Ro inbound beef from Rotterdam to Ireland is calculated based on the inbound beef volume from EU26 to Ireland.</li> <li>The total inbound beef volume from EU26 to Ireland is <b>3,350 tonnes, Table 2</b>.</li> <li>Most of inbound beef volume is imported from 10 Eu countries.</li> <li>It is assumed that the entire inbound beef volume from EU26 will be shipped from Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of inbound beef from the other 7 EU countries (excluding France, Netherlands and Belgium) will be equally divided between the three ports.</li> <li>Hence, the inbound beef volume from Rotterdam to Ireland will be calculated as: <math>(569 \text{ (inbound beef flow from Netherland to Ireland)} + 811.67 \text{ (the equal division of the inbound beef from the other 7 EU countries to Ireland)}) = 1,381</math></li> <li>This outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> </ul>

		<ul style="list-style-type: none"> <li>Hence to calculate the Ro/Ro inbound beef volume from Rotterdam to Ireland: <math>(1,381 * 0.13</math> (percentage of Ro/Ro inbound traffic between EU26 and Ireland) = <b>180</b>).</li> </ul>
30. <i>Export Volumes of Beef products from IRE to EU26 (Rotterdam) via Direct Route (tonnes)</i>	7223	<ul style="list-style-type: none"> <li>Volume of Ro/Ro outbound beef from Ireland to Rotterdam is calculated based on the outbound beef volume from Ireland to EU26.</li> <li>The total outbound beef from Ireland to EU26 is <b>172,002 tonnes, Table 3</b>.</li> <li>Most of outbound beef from Ireland is exported to 8 EU countries.</li> <li>It is assumed that the entire outbound beef volume from Ireland to EU26 is shipped to Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of outbound beef from Ireland to the other 5 EU countries (excluding France, Netherlands and Belgium) will be equally divided between the three ports.</li> <li>The outbound beef volume from Ireland to Rotterdam will then be calculated: <math>(40,201</math> (outbound beef volume from Ireland to Rotterdam) + <math>25,466</math> (the equal division of the outbound beef from Ireland to the other 5 EU countries) = <b>65,667</b>)</li> <li>This outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence to calculate the Ro/Ro outbound beef from Ireland to Rotterdam: <math>(65,667 * 0.11</math> (percentage of Ro/Ro outbound traffic between Ireland and EU26) = <b>7223</b>).</li> </ul>
31. <i>Import Volumes of Cheese products from EU26 (Rotterdam) to IRE via Direct Route (tonnes)</i>	770	<ul style="list-style-type: none"> <li>Volume of Ro/Ro inbound cheese from Rotterdam to Ireland is calculated based on the inbound cheese volumes from EU26 to Ireland.</li> <li>The total inbound cheese volume from EU26 to Ireland is <b>20,834 tonnes, Table 5</b>.</li> <li>Most of inbound cheese is imported from 10 EU countries.</li> <li>It is assumed that the entire inbound cheese from EU26 will be shipped from Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of inbound cheese from the other 7 EU countries (excluding France, Netherlands and Belgium) to Ireland will be equally divided between the three ports.</li> <li>Hence, the inbound cheese from Rotterdam to Ireland will be calculated as: <math>(1,286</math> (inbound cheese volume from Rotterdam to Ireland) + <math>4637</math> (the equal division of the inbound beef from the other 7 EU countries to Ireland) = <b>5,923</b>).</li> <li>The calculated outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence to calculate the Ro/Ro inbound cheese volume from Rotterdam to Ireland: <math>(5,923 * 0.13</math> (percentage of Ro/Ro inbound traffic between EU26 and Ireland) = <b>770</b>)</li> </ul>
32. <i>Export Volumes of Cheese products from IRE to EU26 (Rotterdam) via Direct Route (tonnes)</i>	2487	<ul style="list-style-type: none"> <li>Volume of Ro/Ro outbound cheese from Ireland to Rotterdam is calculated based on the outbound cheese volume from Ireland to EU26.</li> <li>The total outbound cheese volume from Ireland to EU26 is <b>45,414 tonnes, Table 5</b>.</li> <li>Most of outbound cheese from Ireland is exported to 4 EU countries.</li> <li>It is assumed that the entire outbound cheese from Ireland to EU26 is shipped to Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of outbound cheese from Ireland to Germany (excluding France, Netherlands and Belgium) will be equally divided between the three ports.</li> <li>The outbound cheese volume from Ireland to Rotterdam will then be calculated as: <math>(17,695</math> (outbound cheese volume from Ireland to Netherlands) + <math>4,945</math> (the equal division of the outbound cheese from Ireland to Germany) = <b>22,604</b>).</li> <li>The calculated volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence, to calculate the Ro/Ro outbound cheese volume from Ireland to Rotterdam: <math>(22,604 * 0.11</math> (percentage of Ro/Ro outbound traffic between Ireland and EU26) = <b>2487</b>).</li> </ul>

*Ro/Ro Trade Vol between IR-EU26 (via Zeebrugge)*



33. <i>Import Volumes of Non-Agri products from EU26 (Zeebrugge) to IRE via Direct Route (tonnes)</i>	588,000	<ul style="list-style-type: none"> <li>The inbound/outbound Ro/Ro volume between Ireland and Zeebrugge (EU) via direct routes, is collected from EuroStat (Maritime Transport Statistics). <a href="https://ec.europa.eu/eurostat/web/transport/data/database">https://ec.europa.eu/eurostat/web/transport/data/database</a></li> </ul>
34. <i>Export Volumes of Non-Agri products from IRE to EU26 (Zeebrugge) via Direct Route (tonnes)</i>	287,000	
35. <i>Import Volumes of Agri-food products from EU26 (Zeebrugge) to IRE via Direct Route (tonnes)</i>	293,793	<ul style="list-style-type: none"> <li>Data of inbound Agri-food trade volume between Ireland and EU26 is collected from CSO data (<a href="https://www.cso.ie/en/statistics/agriculture/">https://www.cso.ie/en/statistics/agriculture/</a>).</li> <li>Similar to the assumption in the 3<sup>rd</sup> data row, Agri-food categories are assumed based on DAFM’s list of product categories that require SPS checks on arrival at Irish ports, which are (00, 01, 02, 03, 04, 05, 07, 08, 09, 11, 21, 24, 27, 29, 41, 43, 56, 63), <b>Table 1</b>. (<a href="https://www.agriculture.gov.ie/brexit/preparingforbrexit/fagsforcommodities/">https://www.agriculture.gov.ie/brexit/preparingforbrexit/fagsforcommodities/</a>)</li> <li>By summing up the inbound volumes of Agri products categories, the total inbound Agri product volume from EU26 to Ireland is estimated at <b>5,136,251</b>.</li> <li>This volume is shipped via different shipping modes including Ro/Ro, Lo/Lo, Dry bulk, Liquid Bulk and others.</li> <li>According to CSO (port traffic data), 13% of imports from EU26 to Ireland is shipped via Ro/Ro shipping mode.</li> <li>Hence, the Ro/Ro volume of inbound Agri products from EU26 to Ireland is calculated as: <math>(5,136,251 * 0.13 = 667,713)</math></li> <li>According to EuroStat, <b>44%</b> of Ro/Ro inbound volume from EU26 to Ireland via direct route is shipped from Zeebrugge to Ireland.</li> <li>Hence, the Ro/Ro volume of inbound Agri-food products from Zeebrugge to Ireland via direct route is calculated as: <math>(667,713 * 0.44 = 293,793)</math>.</li> </ul>
36. <i>Export Volumes of Agri-food products from IRE to EU26 (Zeebrugge) via Direct Route (tonnes)</i>	55,097	<ul style="list-style-type: none"> <li>Similar calculations have been conducted for the outbound flow from Ireland to mainland Europe via direct route.</li> <li>By summing up the outbound volume of the identified Agri-food product categories, the total volume of Agri-food product from Ireland to EU26 is <b>1,391,354</b>.</li> <li>According to CSO (port traffic data), 11% of exports from Ireland to EU26 moves via Ro/Ro traffic.</li> <li>Hence, the Ro/Ro volume of outbound Agri-food products from Ireland to EU26 is calculated as <math>(1,391,354 * 0.11 = 153,049)</math></li> <li>According to EuroStat, <b>36%</b> of Ro/Ro outbound volume from Ireland to EU26 via direct route is shipped from Ireland to Zeebrugge.</li> <li>Hence, the Ro/Ro volume of outbound Agri-food products from Ireland to Zeebrugge via direct route is calculated as: <math>(153,049 * 0.36 = 55,097)</math>.</li> </ul>
37. <i>Import Volumes of Beef products from EU26 (Zeebrugge) to IRE via Direct Route (tonnes)</i>	111	<ul style="list-style-type: none"> <li>Volume of Ro/Ro inbound beef from Zeebrugge to Ireland is calculated based on the inbound volume from EU26 to Ireland.</li> <li>The total volume of inbound beef from EU26 to Ireland is <b>3,350 tonnes</b>, <b>Table 2</b>.</li> <li>Most of inbound beef is imported on 10 EU countries.</li> <li>It is assumed that the entire inbound beef volume from EU26 will be shipped from Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>Hence the amount of inbound beef from the other 7 EU countries (excluding France, Netherlands and Belgium) to Ireland will be equally divided between the three ports.</li> <li>Hence, the inbound beef volume from Zeebrugge to Ireland will be calculated as: <math>(38 \text{ (inbound beef flow from Belgium (via Zeebrugge) to Ireland)} + 811.67 \text{ (the equal division of the inbound beef from the other 7 EU countries to Ireland)}) = 850</math>.</li> <li>This outbound volume of Beef can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>Hence to calculate the Ro/Ro inbound beef volume from Zeebrugge to Ireland: <math>(850 * 0.13 \text{ (percentage of Ro/Ro inbound traffic between EU26 and Ireland)}) = 111</math>.</li> </ul>

<p>38. <i>Export Volumes of Beef products from IRE to EU26 (Zeebrugge) via Direct Route (tonnes)</i></p>	<p>3440</p>	<ul style="list-style-type: none"> <li>• Volume of Ro/Ro outbound beef from Ireland to Zeebrugge is calculated based on the outbound beef volume from Ireland to EU26.</li> <li>• The total outbound beef volume from Ireland to EU26 is <b>172,002 tonnes, Table 3.</b></li> <li>• Most of outbound beef from Ireland is exported to 8 EU countries.</li> <li>• It is assumed that the entire outbound beef volume from Ireland to EU26 is shipped to Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>• Hence the amount of outbound beef from Ireland to the other 5 EU countries (excluding France, Netherlands and Belgium) is equally divided between the three ports.</li> <li>• The outbound beef volume from Ireland to Zeebrugge will then be calculated: (5807 (outbound beef volume from Ireland to Belgium (via Zeebrugge) + 25,466 (the equal division of the outbound beef from Ireland to the other 5 EU countries) = <b>31,273</b>).</li> <li>• This outbound volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>• Hence to calculate the Ro/Ro outbound beef volume from Ireland to Zeebrugge: (31,273 * 0.11 (percentage of Ro/Ro outbound traffic between Ireland and EU26) = <b>3440</b>).</li> </ul>
<p>39. <i>Import Volumes of Cheese products from EU26 (Zeebrugge) to IRE via Direct Route (tonnes)</i></p>	<p>609</p>	<ul style="list-style-type: none"> <li>• Volume of Ro/Ro inbound cheese from Zeebrugge to Ireland is calculated based on the inbound cheese volume from EU26 to Ireland.</li> <li>• The total inbound cheese volume from EU26 to Ireland is <b>20,834 tonnes, Table 5.</b></li> <li>• Most of inbound cheese is imported from 10 EU countries.</li> <li>• It is assumed that the entire inbound cheese volume from EU26 will be shipped from Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>• Hence the amount of inbound cheese from the other 7 EU countries (excluding France, Netherlands and Belgium) to Ireland is equally divided between the three ports.</li> <li>• Hence, the inbound cheese volume from Zeebrugge to Ireland is calculated as: (47 (inbound cheese volume from Belgium (via Zeebrugge) to Ireland) + 4637 (the equal division of the inbound cheese from the other 7 EU countries to Ireland) = <b>4,684</b>).</li> <li>• This volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>• Hence to calculate the Ro/Ro inbound cheese volume from Zeebrugge to Ireland: (4,684 * 0.13 (percentage of Ro/Ro inbound traffic between EU26 and Ireland) = <b>609</b>).</li> </ul>
<p>40. <i>Export Volumes of Cheese products from IRE to EU26 (Zeebrugge) via Direct Route (tonnes)</i></p>	<p>1089</p>	<ul style="list-style-type: none"> <li>• Volume of Ro/Ro outbound cheese from Ireland to Zeebrugge is calculated based on the outbound cheese volume from Ireland to EU26.</li> <li>• The total outbound cheese volume from Ireland to EU26 is <b>45,414 tonnes, Table 5.</b></li> <li>• Most of outbound cheese from Ireland is exported to 4 EU countries.</li> <li>• It is assumed that the entire outbound cheese volume from Ireland to EU26 is shipped to Cherbourg, Rotterdam and Zeebrugge ports.</li> <li>• Hence the amount of outbound cheese from Ireland to Germany (excluding France, Netherlands and Belgium) is equally divided between the three ports.</li> <li>• The outbound cheese volume from Ireland to Zeebrugge is then calculated: (4,955 (outbound cheese volume from Ireland to Belgium (via Zeebrugge) + 4,945 (the equal division of the outbound cheese from Ireland to Germany) = <b>9,900</b>).</li> <li>• This volume can be delivered by different shipping modes including Ro/Ro, Lo/Lo and others.</li> <li>• Hence, to calculate the Ro/Ro outbound cheese volume from Ireland to Zeebrugge: (9,900 * 0.11 (percentage of Ro/Ro outbound traffic between Ireland and EU26) = <b>1089</b>).</li> </ul>
<p><i>Ro/Ro Trade Vol between UK-EU26</i></p>		
<p>41. <i>Import Volumes of all products from the EU26 to the UK (tonnes)</i></p>	<p>7551000</p>	<ul style="list-style-type: none"> <li>• The inbound/outbound volume between UK and EU26 is collected from EuroStat <a href="https://ec.europa.eu/eurostat/web/transport/data/database">https://ec.europa.eu/eurostat/web/transport/data/database</a></li> </ul>

42. <i>Export Volumes of the UK to the EU26 (tonnes)</i>	10853000	
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## *Section 2: Resources Capacity for Checkpoints at IR, UK and EU26 Ports*

### *Capacity of Check Facilities at Dublin Port*

43. <i>Number of Revenue turnout sheds at Dublin port</i>	4	The number of Revenue turnout sheds at Dublin port is determined by the government of Ireland based on "Preparing for the withdrawal of the United Kingdom from the European Union: Contingency Action Plan".
44. <i>Number of SPS inspection bays at Dublin port</i>	33	SPS inspection facilities are proposed to consists of 25 SPS inspection bays and 8 documentary and sealed checks booths according to government of Ireland based on "Preparing for the withdrawal of the United Kingdom from the European Union: Contingency Action Plan"
45. <i>Number of immigration checkpoints at Dublin port</i>	4	Research team assumed the number of immigration checkpoints to be equivalent to the number of Revenue turnout sheds.

### *Capacity of Check Facilities at Rosslare Port*

46. <i>Number of Revenue turnout sheds at Rosslare port</i>	2	Number of Revenue turnout sheds at Rosslare port is determined by the government of Ireland based on "Preparing for the withdrawal of the United Kingdom from the European Union: Contingency Action Plan".
47. <i>Number of SPS inspection bays at Rosslare port</i>	15	SPS inspection facilities are proposed to consist of 13 SPS inspection bay and 2 Documentary and Sealed checks booths according to government of Ireland based on "Preparing for the withdrawal of the United Kingdom from the European Union: Contingency Action Plan".
48. <i>Number of immigration checkpoints at Rosslare port</i>	2	Research team assumed the number of immigration checkpoints to be equivalent to the number of Revenue turnout sheds.

### *Capacity of Check Facilities at Holyhead Port*

49. <i>Number of Revenue turnout sheds at Holyhead port</i>	2	Since there is no clear information of the capacity of checks facilities at the UK ports, the research team used the proposed number of check facilities at Irish ports as a basis of the assumptions of check facilities at UK ports. The research team categorised Holyhead port as a small port considering the limited space of the port and its small size. Hence, the number of check facilities at Holyhead port is assumed to be equivalent to the number of check facilities at Rosslare port.
50. <i>Number of SPS inspection bays at Holyhead port</i>	15	
51. <i>Number of immigration checkpoints at Holyhead port</i>	2	

### *Capacity of Check Facilities at Liverpool Port*

52. <i>Number of Revenue turnout sheds at Liverpool port</i>	4	Similar to the assumptions on Holyhead port, the number of check facilities at Liverpool port is assumed similar to the number of facilities at Dublin port. Liverpool is a large port that enjoys wide space to develop more checks infrastructure and facilities. The port is also equipped with checks infrastructure that is currently used to conduct the required border checks on imports from non-EU countries.
53. <i>Number of SPS inspection bays at Liverpool port</i>	33	
54. <i>Number of immigration checkpoints at Liverpool port</i>	4	

### *Capacity of Check Facilities at UK-West Ports (Heysham, Fishguard, and Pembroke)*

55. <i>Number of custom sheds at the UK-West ports</i>	2	The assumptions on the three ports are determined similar to that in the case of Holyhead port. The three ports are categorised as small ports with limited space that cannot host a large number of check facilities and infrastructure.
56. <i>Number of inspection bay at the UK-West ports</i>	15	

57. Number of security post at the UK-West ports	2	
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#### Capacity of Check Facilities at UK-East Port (Dover)

58. Number of custom sheds at Dover	2	The assumption on Dover is determined similar to that in the case of Holyhead port. Dover is categorised as a small port with limited space that cannot host a large number of check facilities and infrastructure.
59. Number of inspection bay at Dover	15	
60. Number of security post at Dover	2	

### Section3: Capacities of Vessels and Traffic Volumes of the Maritime Routes between IR, UK and the EU26.

#### Maritime Routes (Exports to UK)

61. Percentage of outbound trucks from Dublin port to the UK market (%).	90%	According to CSO (port traffic data) 90% of outbound trucks from Ireland move through Dublin port, and remaining 10% from Rosslare. <a href="https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraffic2018/">https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraffic2018/</a>
62. Average ferry capacity between Dublin and Heysham ports (trailer).	122	<p>The capacities of ferries that sail across the Irish Sea are collected from the shipping lines' websites, as follows:</p> <ul style="list-style-type: none"> <li>Irish Ferries: <a href="https://www.irishferries.com/ie-en/routes-and-times/dublin-holyhead/">https://www.irishferries.com/ie-en/routes-and-times/dublin-holyhead/</a></li> <li>Stena Line: <a href="https://www.stenalinereight.com/routes/">https://www.stenalinereight.com/routes/</a></li> <li>SeaTruck: <a href="https://www.seatruckferries.com/">https://www.seatruckferries.com/</a></li> <li>P&amp;O Ferries: <a href="https://www.poferriesfreight.com/freight/content/pages/template/ports_and_routes_ports_and_routes.htm">https://www.poferriesfreight.com/freight/content/pages/template/ports_and_routes_ports_and_routes.htm</a></li> <li>CLdN: <a href="http://www.cldn.com/ro-ro_cldn_ro-ro.html">http://www.cldn.com/ro-ro_cldn_ro-ro.html</a></li> <li>DFDS Ferries: <a href="https://www.dfds.com/en/passenger-ferries/ferry-crossings/ferries-to-france/dover-calais">https://www.dfds.com/en/passenger-ferries/ferry-crossings/ferries-to-france/dover-calais</a></li> <li>Brittany Ferries: <a href="https://www.brittany-ferries.ie/ferry-routes/ireland-spain-ferries/roslare-bilbao">https://www.brittany-ferries.ie/ferry-routes/ireland-spain-ferries/roslare-bilbao</a></li> </ul>
63. Average ferry capacity between Dublin and Liverpool (trailer).	123	
64. Average ferry capacity between Dublin and Holyhead (Trailer).	209	
65. Average ferry capacity between Rosslare and Fishguard (Trailer).	75	
66. Average ferry capacity between Rosslare and Pembroke (Trailer).	122	

#### Maritime Routes (Imports from UK)

67. Percentage of outbound trucks from Heysham to Dublin ports (%).	3%	According to CSO (port traffic data), <a href="https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraffic2018/">https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttraffic2018/</a>
68. Percentage of outbound trucks from Liverpool to Dublin ports (%).	40%	
69. Percentage of outbound trucks from Holyhead to Dublin ports (%).	47%	
70. Percentage of outbound trucks from Fishguard to Rosslare ports (%).	4%	
71. Percentage of outbound trucks from Pembroke to Rosslare ports (%).	6%	

#### Maritime Direct Routes (IRE to EU26) (EU26 to IRE)

72. Average ferry capacity between Dublin and Cherbourg ports (trailer).	170	The capacities of ferries that sail across the Irish Sea are collected from shipping lines' websites, as follows:
73. Average ferry capacity between Dublin and Rotterdam (trailer).	530	

74. Average ferry capacity between Dublin and Zeebrugge (trailer).	530	<ul style="list-style-type: none"> <li>• Stena Line: <a href="https://www.stenalinefreight.com/routes/">https://www.stenalinefreight.com/routes/</a></li> <li>• SeaTruck: <a href="https://www.seatruckferries.com/">https://www.seatruckferries.com/</a></li> </ul>
75. Average ferry capacity between Rosslare and Cherbourg (trailer).	150	<ul style="list-style-type: none"> <li>• P&amp;OFerries: <a href="https://www.poferriesfreight.com/freight/content/pages/template/ports_and_routes_ports_and_routes.htm">https://www.poferriesfreight.com/freight/content/pages/template/ports_and_routes_ports_and_routes.htm</a></li> <li>• CLdN: <a href="http://www.cldn.com/ro-ro_cldn_ro-ro.html">http://www.cldn.com/ro-ro_cldn_ro-ro.html</a></li> <li>• DFDS Ferries: <a href="https://www.dfds.com/en/passenger-ferries/ferry-crossings/ferries-to-france/dover-calais">https://www.dfds.com/en/passenger-ferries/ferry-crossings/ferries-to-france/dover-calais</a></li> <li>• Brittany Ferries: <a href="https://www.brittany-ferries.ie/ferry-routes/ireland-spain-ferries/roslare-bilbao">https://www.brittany-ferries.ie/ferry-routes/ireland-spain-ferries/roslare-bilbao</a></li> </ul>

Table 1: Products Division Codes (source: CSO Database)

Division	Descriptions	Division	Description
00	Live animals other than animals of Division 03	61	Leather; leather manufactures nes; dressed furskins
01	Meat & meat preparations	62	Rubber manufactures nes
02	Dairy products & birds' eggs	63	Cork & wood manufactures (excl. furniture)
03	Fish, crustaceans, molluscs and preparations thereof	64	Paper, paperboard & articles thereof
04	Cereals & cereal preparations	65	Textile yarn, fabrics, made-up articles & related products
05	Vegetables & fruit	66	Non-metallic mineral manufactures nes
06	Sugar, sugar preparation & honey	67	Iron & steel
07	Coffee, tea cocoa, spices & manufactures thereof	68	Non-ferrous metals
08	Feeding stuff for animals (excl. unmilled cereals)	69	Manufactures of metals nes
09	Miscellaneous edible products & preparations	71	Power generating machinery & equipment
11	Beverages	72	Machinery specialised for particular industries
12	Tobacco & tobacco manufactures	73	Metalworking machinery
21	Hides, skins & furskins, raw	74	General industrial machinery & equipment nes & parts nes
22	Oil seeds & oleaginous fruits	75	Office machines & automatic data processing machines
23	Crude rubber (include synthetic & reclaimed)	76	Telecommunications & sound equipment
24	Cork & wood	77	Electrical machinery, apparatus & appliances nes & parts
25	Pulp & waste paper	78	Road vehicles (include. air-cushion vehicles)
26	Textile fibres & their wastes	79	Other transport equipment
27	Crude fertilisers & minerals, excl. coal, petroleum etc.	81	Prefab buildings; plumbing & electrical fixtures & fittings
28	Metalliferous ores & metal scrap	82	Furniture & parts thereof; bedding, cushions etc
29	Crude animal & vegetable materials nes	83	Travel goods, handbags & similar containers
32	Coal, coke & briquettes	84	Articles of apparel; clothing accessories
33	Petroleum, petroleum products & related materials	85	Footwear
34	Gas, natural & manufactured	87	Professional, scientific & controlling apparatus nes
35	Electric current	88	Photographic apparatus; optical goods; watches clocks
41	Animal oils & fats	89	Miscellaneous manufactured articles nes
42	Fixed vegetable fats & oils	93	Special transactions and commodities not classified according to kind
43	Animal or vegetable materials nes	96	Coin (other than gold coin), not being legal tender
51	Organic chemicals	97	Gold, non-monetary (excluding gold ores and concentrates)
52	Inorganic chemicals	99	All other commodities and transactions
53	Dyeing, tanning & colouring materials		
54	Medical & pharmaceutical products		
55	Essential oils, perfume materials; toilet & cleansing preps		
56	Fertilisers (other than those of Division 27)		
57	Plastics in primary forms		
58	Plastics in non-primary forms		
59	Chemical materials & products nes		

Table 2: Beef Imports to Ireland by Geographical Market (2018)<sup>67</sup>

Country	Tonnes	% Total
United Kingdom	30,562	89.1%
Poland	1,311	3.8%
Netherlands	569	1.7%
Spain	493	1.4%
Germany	404	1.2%
France	308	0.9%
Sweden	107	0.3%
Italy	36	0.1%
Belgium	38	0.1%
Denmark	32	0.1%
Austria	52	0.2%
Total UK	<b>30,562</b>	
Total EU26	<b>3,350</b>	

Table 3: Beef Exports by Geographical Market (2018)<sup>68</sup>

Country	Tonnes	% Total
United Kingdom	269,661	50.5%
France	49,597	9.3%
Netherlands	40,201	7.5%
Italy	26,661	5%
Germany	17,671	3.3%
Sweden	19,555	3.7%
Spain	10,407	1.9%
Belgium	5,807	1.1%
Switzerland	2,103	0.4
Total UK	<b>269,661</b>	
Total EU26	<b>172,002</b>	

Table 4: Cheese Exports/Import Volumes – UK (2018)<sup>69</sup>

Country	SITC	Description	Import	Export
United Kingdom	02410	Grated or powdered cheese, of all kinds	2,246	6,254
	02420	Processed cheese, not grated or powdered	2,617	9,000
	02430	Blue-veined cheese and other cheese containing veins produced by <i>Penicillium roqueforti</i>	127	83
	02491	Fresh (unripened or uncured) cheese, including whey cheese, and curd	12,755	3,066
	02499	Cheese nes	25,370	97,051
Total			<b>43,115</b>	<b>115,454</b>

<sup>67</sup> Jim Power Economics, 2020, An Independent Assessment of the Irish Beef Industry, p32.

<sup>68</sup> Jim Power Economics, 2020, An Independent Assessment of the Irish Beef Industry, p31.

<sup>69</sup> CSO data.

Table 5: Import and Export Volumes of Cheese Products – Ireland and EU26 (2018)<sup>70</sup>

Country	Import	Export
Germany	9,052	14,836
France	5,589	7,964
Netherlands	1,286	17,659
Italy	1,901	
Denmark	109	
Poland	1,331	
Belgium	47	4,995
Lithuania	612	
Greece	353	
Austria	554	
<b>Total EU26</b>	<b>20,834</b>	<b>45,414</b>

<sup>70</sup> CLAL.it, Ireland: Dairy Sector, Cheese Export and Import Statistics, [https://www.clal.it/en/?section=stat\\_irlanda](https://www.clal.it/en/?section=stat_irlanda)



## Appendix 2: List of study stakeholders

### *Industry Stakeholders*

ATC Logistics

Baku GLS Limited

BWG Foods

Dairygold

Department of Transport, Tourism & Sport (DTTAS)

Department of Agriculture, Food & the Marine (DAFM)

DHL

Dublin Port

Freight Transport Association Ireland (FTA)

Iarnród Éireann - Irish Rail

Ibec

Irish Maritime Development Office (IMDO)

Jenkinson Logistics

Moyvalley Meats

Revenue Commissioners

Rosslare Europort

Teagasc

Virginia International Logistics

### *Expert Panel*

Mr Aidan Flynn – *Freight Policy*

Dr Anushree Priyadarshini – *Food Innovation and Costing Strategy*

Dr Damien Cassells – *Economics*

Dr Darren Harris – *Food Technology & Processing*

Mr Tom Farriers – *Consultant Economist*

Dr Edmund O’Callaghan - *Retail & Services Operations*