Rialtas na hÉireann
Government of Ireland

# Expert Group on Global Value and Supply Chains

## Final report

Prepared by the Department of Enterprise, Trade and Employment

# Contents

# Minister's Foreword

This Report of the Expert Group on Global Value and Supply Chains fulfils one of the key recommendations of our *Trade and Investment Strategy 2022-2026: Value for Ireland, Values for the World*, which recognised the need for an expert assessment of the outlook for Global Value Chains and the specific opportunities and risks for Ireland.

Ireland's success in attracting Foreign Direct Investment (FDI) and exporting to global markets is built upon agility and flexibility to respond to changing global circumstances. FDI has deeply embedded Ireland within Global Value Chains, and supported Irish companies to access them, driving productivity, specialisation and innovation growth.

The current geopolitical environment coupled with the impacts of recent international conflicts, chokepoints in supply routes, COVID-19, and the twin green and digital transitions, has placed an increased focus on the future of global supply and value chains. Following a period of rapid expansion, the pace of globalisation has broadly levelled off since the financial crisis in 2008. The report highlights that emerging industrial policies focused on economic security, derisking, export controls and securing resources for the twin transitions all have the potential to reshape global business connections. Yet, recent crisis events have also demonstrated that global value chains have largely recovered quickly from shocks, remaining resilient and adaptable.

In 2023, Ireland's total trade surpassed one trillion euro, with strong growth in both manufacturing and services. This Expert Report confirms that Ireland's trading base is hardwired to the global economy, with our exports using significant inputs of goods and services from foreign markets, coupled with significant value-added created domestically. In turn, many of our exports also provide important inputs for other trade partners used to produce goods and services.

This openness and connectedness are the foundation of our success, and we are highly aware we need to manage risks to the international trading environment. The Expert Group recommends important policy actions to enable business to build more resilient supply chains with Government support. They include the need for regular monitoring of trade dependencies; partnering with industry and international partners to stress test supply chains; focused advisory supports to assist companies in their risk assessment; regular stakeholder dialogue; continued advocating for open international markets and ensuring world-class trade facilitation systems.

The Expert Group has also made it clear that in order to support effective participation in global value chains, enterprises need continued long-term investment in the innovation system, infrastructure, strategic sectors, leadership and skills, digital capabilities and sustainable production methods in order that companies can remain flexible and agile to the international environment.

I would like to thank the Expert Group for its valuable analysis, expertise, insights and policy recommendations. I look forward to working with the Trade and Investment Council to monitor progress on the implementation of the Expert Group's key recommendations that my Department is now working with colleagues across Government to deliver.

Peter Burke TD
Minister for Enterprise, Trade and Employment

# Executive Summary

This report fulfils one of the actions of the *Trade and Investment Strategy 2022-2026: Value for Ireland, Values for the World,* which recommended the establishment of an Expert Group on Global Value Chains and Supply Chains (the "Expert Group") to identify global supply chain opportunities and threats. The work of the Expert Group has encompassed a number of quantitative and qualitative analyses:

- An orientation paper detailing international developments in Global Value Chains (GVCs) and future outlook.
- A detailed statistical profile of Ireland and our positioning within Global Value Chains.
- Product level import dependency analysis.
- PESTLE analysis identifying the main political, economic, social, technological, legal and environmental factors impacting on the current and future development of value chains in Ireland.
- Analysis at sectoral level, detailing strengths and opportunities that facilitate company participation in GVCs.
- Comparative analysis of international policy practice and presentation from the OECD on resilient supply chains.

Global value chains are the full range of activities (design, production, marketing, distribution and support to the final consumer, etc) that are divided among multiple firms and workers across geographic spaces to bring a product from its conception to its end use and beyond. Modern GVCs can be complex, often involving multiple locations, components, services and stages of production. Furthermore, even within the same sector, companies can have very different supply chain structures depending on factors such as how much a company may outsource or retain in-house within their own production facilities.

Through spreading production across locations, global value and supply chains provide many potential benefits of strategic interest to Ireland as a highly export oriented economy, including greater access to inputs, markets and investment opportunities; access to a wider array of technologies; and opportunities for specialisation and comparative advantage. These features enable productivity gains through more efficient allocation of resources and

facilitate diversification of supply and demand. However, they also may create potential for choke points and subsequent shocks.

## Globalisation at a crossroads

The expansion of GVCs, at a global level, has broadly levelled off since the financial crisis in 2008. There are significant differences on a regional basis. China has seen a steady decline in foreign value added (FVA) content of exports, from a peak of 23.5% in 2004 to 15.8% in 2020. This indicates a greater share of value added in Chinese exports produced domestically and less reliance on foreign inputs for its exports. There has also been a decline in US backward participation in GVCs since 2008, with FVA in US gross exports declining from 12.15% in 2008 to 7.5% in 2020, also indicating a greater use of domestically produced inputs in US exports. On the other hand, the EU has seen a steady increase in FVA as a share of gross exports, since 2003, levelling off at approximately 17% in 2012 and staying relatively stable to 2020. The data also shows that openness to GVC participation is not limited to smaller economies, indicating that trade and investment policy is a significant determinant of GVC integration.

A number of recent crisis events and rising geopolitical tensions have raised questions about the stability and viability of established GVCs. Social support for globalisation is being challenged. COVID-19 and the Russian invasion of Ukraine underlined specific import dependencies by some countries for critical products in areas such as pharmaceuticals, medical equipment, food, energy, and the green and digital transitions. As such, the case for open markets is being challenged and there has been a rising policy argument internationally by some countries for re-shoring or ‘friendshoring’ of supply chains.

With globalisation at a crossroads, the future evolution of GVCs is challenging to predict. On the one hand, factors such as technology, converging wages, the sustainability agenda, economic security concerns, subsidy policies and more interventionist government strategies all have the potential to shorten or at least reshape and reconfigure GVCs and international trade patterns. The frequency of global shocks has been increasing, and the ability of some companies to continuously withstand shocks on a business-as-usual basis is under question.

On the other hand, there are inherent risks to re-shoring, including the concentration of risk and increasing exposure to domestic shocks. There are also potentially high or even prohibitive capital costs to moving production, especially in sectors where specialist knowledge, technologies and skills, and advanced production processes are critical and have developed over many years. Geographically, some critical raw materials essential to facilitating the digital and green transitions are concentrated in certain trading partners, which further impinges on the practicality of re-shoring or near-shoring, and also raises questions for the efficacy of bilateral relationships strategies that are based on friend-shoring.

Globally, economic security and resilience are increasing priorities in industrial strategy. For example, the US Inflation Reduction Act and Chips and Science Act, and the EU European Economic Security Strategy, Critical Raw Materials Act and Net Zero Industry Act are examples of policies specifically aimed at safeguarding and securing supplies of strategic goods and critical technologies. The European Commission has also emphasised de-risking and not de-coupling, for example, in its strategic approach to China.

These policies indicate a more assertive and interventionist approach by some governments in international markets. A major risk from Ireland's perspective is that companies based here get caught in disruption arising from escalating geopolitical tensions. For example, unilateral action favouring domestic industry in the interests of national economic security will distort international trade, having a ripple effect which could impact on supply chains. Additionally, strategic alliances in the interests of securing critical supplies may lead to the formation of competing alliances elsewhere, including on a regional basis but perhaps increasingly also on specific themes and values such as sustainability. In turn, this could possibly lead to retaliatory trade measures such as sanctions and export restrictions, and the escalation of trade tensions.

## Ireland and Global Value Chains

In comparative terms, Ireland is heavily integrated in GVCs with foreign value-added share of exports at 43.8%, almost 6 times higher than the OECD average of 7.4% and reflecting our large export base and presence of multinationals in Ireland. The economic importance of Ireland's internationally trading sectors cannot be understated. Preliminary estimates from

the CSO indicate that in 2023, Ireland exported €564billion worth of goods and services, with imports of €499 billion, amounting to over €1 trillion worth of trade. According to the World Bank, trade as a percentage of Ireland's GDP is 235 percent in 2023, the seventh highest in the world.

Employment in exporting companies supported by Ireland's enterprise agencies reached over 535,000 in 2023. This accounts for 20% of total employment in Ireland and approximately 25% of business employment. In 2022, Enterprise Agency companies created €191bn in value added, and spent €8.2 billion on research and development. Importantly, from a value chain perspective, these companies had €73.9bn in expenditures in the Irish economy on wages, materials and services, creating significant domestic economic value and jobs. The OECD estimates that intermediate goods and services now account for the majority (60%) of Ireland's exports. In other words, most of the value of what Ireland exports are inputs that go into production of other goods and services.

Analysis of Ireland's forward and backward participation in GVCs confirms that between 1995 and 2020, Ireland's trade partnerships have become more diverse and globalised. It shows a significant change in the composition of where Irish companies source inputs for their exports, indicating a much more diverse and globalised picture in line with the developing and growing export and FDI base. In relative terms, there has been a significant decline in the significance of the UK market from 23% (in 1995) of total foreign value added in Ireland's exports to 11% (in 2020) – although in absolute terms, the value of trade to the UK has continued to increase. There have been significant increases in the proportion of inputs from the EU (+6%) and US (+9%) in line with the developing of the EU Single Market and increased FDI by US multinationals in Ireland, during the same time period (1995-2020). Notably some countries which did not feature strongly 25 years ago such as Canada, China, Switzerland and India are now a greater part of Ireland's value chain profile in terms of where inputs come from.

Looking at Ireland's forward linkages, the EU has increased in importance as a user of value added generated in Ireland from a 51% to 57% share of Ireland's total domestic value added embodied in foreign exports, reflecting the deepening integration of the Single Market during this time. The UK's share has declined dramatically from 21% to 6% and has been surpassed by China with a 7% share in 2020 compared to zero in 1995. The US has

remained relatively constant at between 5% and 4%. Although having relatively low share overall, countries that did not feature prominently in 1995 such as Japan, Singapore and Switzerland have increased in significance over time, indicating that a broader pool of economies use Irish-generated value added in their exports.

## Initial Analysis of Trade Dependencies

The Expert Group carried out an initial analysis of Ireland's import dependencies using an established European Commission methodology. A total of 655 products met initial criteria for a trade dependency. The value of these products amounted to €11.1bn in 2022 or 7.9% of total goods imports of €141.3bn in 2022. The products are relatively concentrated in value terms with 170 products accounting for 99% of total value and the top 25 products accounting for 91 percent of or €10.1 billion of the total value. These products include many which are of strategic economic and social interest to Ireland, particularly in the area of energy (gas, petroleum, coal), fertilisers/animal feed (oilcake, diammonium phosphate, maize), semiconductors, solar panels (photovoltaic cells), palm oil, surgical gloves, aluminium, airplane parts etc. The UK and US are the main markets where trade dependency value is concentrated, and to a lesser extent China.

## PESTLE, Sectoral Analysis and International Policy Practice

The Expert Group also undertook qualitative analyses including a PESTLE analysis of the main political, economic, social, technological and environmental factors of relevance to Ireland that likely to shape global value chains into the future. They include commodity market volatility; rising global input costs; regulatory compliance costs; market concentration; critical raw materials availability; staff retention; distribution costs and freight availability; increased energy costs and energy security; increasing complexity of supply chains; Brexit impacts and concerns about cybersecurity. These factors also include more medium to long term challenges which are structural in nature such as innovation capacity, technological change and adoption, infrastructure challenges, skills shortages and retention, shifting demographics and meeting climate change and sustainability challenges.

A further analysis by the Expert Group of the main strengths and opportunities at sectoral level highlights that a conducive business environment, skilled workforce, technological

adoption, and other sector-specific positive attributes are some of the main factors that have supported Irish based companies to successfully participate in GVCs. There are opportunities identified to further strengthen R&D capabilities and collaboration, deploy new and emerging digital technologies across sectors to drive productivity and efficiencies, increased demand for sustainable products and production using renewable energy, opportunities to build domestic sourcing and sub supply capacity, build on existing markets, target emerging markets, and opportunities from the increased tradability of services.

A review of international policy practice identified a variety of policy approaches in efforts to build value and supply chain resilience. Some key features include dedicated new systems or offices to monitor supply chains, improve information, undertake risk assessments; focus on specific sectors (e.g. digital, green, security); top-down strategic approaches with supporting legislative initiatives; focus on improving supply chains efficiencies at the company level; tools to help companies diagnose supply chain vulnerabilities; and collaboration with international partners.

## Policy Actions

The COVID-19 pandemic, the current Ukraine crisis and geopolitical tensions have demonstrated that it is very difficult to anticipate and react to trade shocks. There remains considerable uncertainty in the international environment and, while Ireland's economy has proven resilient to recent external disruptions, it remains sensitive to global changes. As an open and highly trade-oriented economy, Ireland is more exposed than many countries to trade shocks. A continued focus on the openness and resilience of global value chains, supported by a fair and rules-based international trading system therefore remains a key national interest.

Resilient supply chains also means sustainable supply chains. Trade is increasingly intertwined with the sustainability agenda, including the relationship between trade and the environment, labour standards, human rights and responsible business conduct. Notwithstanding current short terms risks, it is arguably more important that we prepare for and help companies in Ireland to navigate the opportunities and challenges that global value chains will inevitably face from the twin transitions of climate change and the digital transformation.

The quantitative analysis confirms the extent of Ireland's deep integration into global value chains along with the importance of certain key international partners for our backward and forward linkages in value chains, and as suppliers of key inputs. The PESTLE and sectoral analysis, along with the review of international policy practice have underlined the breadth of factors that underpin effective participation and resilience in global value chains, ranging from short term concerns about market volatility and availability of raw materials to more structural issues around innovation, skills and infrastructure.

An important principle of the Expert Group is that policy actions should not overly interfere in the smooth commercial operation of global value and supply chains. Even within sectors, different companies will be targeting different customers, different markets and have different raw materials, production processes etc. Resilience first comes from firm strategies. Governments can help by reducing logistics and regulatory frictions, supporting diversification strategies and by not overly intervening in the design of supply chains. Strategies which are based on 'dynamic capabilities' as recommended by the OECD such as flexibility, agility, or co-operation, for example, can work for any type of crisis. This 'dynamic capabilities' principle would appear particularly relevant for Ireland as a relatively small, open, advanced economy that relies heavily on trade as a driver of economic growth.

There is also a strong role for public-private coordination, including maintaining open dialogue, sharing information and facilitating circular information flows. Further analysis of Ireland's key trade dependencies in consultation with industry can form a key part of de-risking. At international level, it is important to continue to promote open, fair and rules-based trade, to support WTO reform, to combat unfair or unnecessary export restrictions and to cooperate on reducing barriers to goods and services trade. Finally, there are many 'no regrets' actions that governments can take to support company participation in GVCs, including supports for innovation, industry-relevant skills, internationalisation, infrastructure, continued support for digital trade, including trade facilitation and customs procedures, and better regulation principles.

On this basis, a range of specific actions to strengthen and support company participation in GVCs are proposed by the Expert Group.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| 1 | **Monitor and Communicate Trade Dependencies**<br>Further develop trade dependency analysis to capture both export and import dependencies and update on annual basis; including policy orientations on improving resilience and de-risking strategies. | DETE in consultation with Govt Depts and Industry Stakeholders |
| 2 | **Stress Test Supply Chain Disruptions**<br>(a) Pilot 1-2 sectoral stress tests of disruptions to supply chains, their impacts and required policy responses.<br>(b) Develop joint stress test scenarios with partner countries including in Europe. | DETE in consultation with Govt Depts, Industry Stakeholders and international partners |
| 3 | **Develop focused advisory supports**<br>Develop costed proposals to support firm-level supply chain assessments, resilience and company sourcing strategies. | DETE and Enterprise Agencies |
| 4 | **Stakeholder Dialogue on GVC issues**<br>Provide regular two-way dialogue between Government and Industry on key GVC issues by consulting with industry on emerging geopolitical developments, regulations and policies impacting on supply chains and ensuring that supply chain issues and bottlenecks are featured on relevant government-industry fora agendas. | DETE, Enterprise Agencies, Industry Stakeholders |

| | | |
|---|---|---|
| 5 | **Advocating open international markets**<br>DETE Trade Division to ensure Ireland's interests are 'GVC proofed' at relevant EU and multilateral fora, including by continuing support for open markets, rules-based trade and scrutinising non-trade measures for trade impacts; and by pressing for removal of barriers within the EU Single Market. | DETE in consultation with Govt Depts, Industry Stakeholders |
| **6** | **Maintaining and Enhancing 'Best In Class' Trade facilitation**<br>DETE to engage with Revenue on a periodic basis to review trade facilitation developments and to prioritise actions for further improvement. | DETE, Revenue |
| **7** | **Proactively support GVC participation and resilience**<br>(a) Pursue the broad spectrum of 'no regrets' measures identified by the Expert Group, including investment in the innovation system, strengthening enterprise capacity and development of strategic sectors.<br>(b) Report annually to the Trade & Investment Council on Ireland's progress in GVC participation and resilience. | DETE in consultation with Govt Depts, Industry Stakeholders |

# 1. Global Value and Supply Chains – international trends

## 1.1 Background and Introduction

Ireland's success in exporting to global markets is built upon agility and flexibility to respond to changing global circumstances. Over the years, we have successfully leveraged and adapted our strengths to take advantage of shifts in the global economy as new business models emerged and existing sectors evolved. FDI has deeply embedded Ireland in global value chains (GVCs), and in turn supported Irish companies to access GVCs, driving productivity and innovation growth.

In April 2022, the Government published a new Trade and Investment (T&I) Strategy 2022-2026, *Value for Ireland, Values for the World*. The strategy highlighted that the current geopolitical environment, coupled with the impacts of COVID-19 and the twin green and digital transitions, has placed an increased focus on the future of global supply and value chains. Supply chain risks are broad in nature and include cybersecurity threats, natural disasters, escalating trade tensions, rising protectionism, changing climate patterns and policy uncertainties.

In order to increase Ireland's resilience, one of the main actions of the new T&I strategy is the establishment of an Expert Group on Global Value Chains and Supply Chains (the "Expert Group") to identify global supply chain opportunities and threats. The Expert Group met on four occasions in 2023. Analysis and outputs by the Expert Group included:

- An orientation paper detailing international developments in GVCs and future outlook.
- Detailed statistical profile of Ireland and GVCs.
- Product level import dependency analysis identifying an initial list of 655 products.
- PESTLE analysis identifying the main political, economic, social, technological, legal and environmental factors impacting on the current and future development of value chains in Ireland.

- Analysis at a sectoral level, detailing strengths and opportunities that facilitate company participation in global value chains.
- Comparative analysis of international policy practice and presentation from the OECD on resilient supply chains.

This report summarises the analysis and findings of the Expert Group along with recommendations made by the Expert Group to support Irish companies to participate in and GVCs and manage risks.

## 1.2 Defining Global Value Chains

**Global value chain**

*The full range of activities (design, production, marketing, distribution and support to the final consumer, etc) that are divided among multiple firms and workers across geographic spaces to bring a product from its conception to its end use and beyond (UNIDO, 2019)*

### What are global value chains?

World trade, investment and production are increasingly organised around global value chains (GVCs). A value chain is the full range of activities that firms engage in to bring a product to the market, from conception to final use. Such activities range from design, production, marketing, logistics and distribution to support to the final customer.[1] They may be performed by the same firm or shared among several firms. As they have spread, value chains have become increasingly global. GVCs draw on some basic characteristics of today's global economy, as set out by the OECD:[2]

- ***The growing interconnectedness of economies***: In GVCs economic activities are fragmented and dispersed across countries. Exports increasingly include value added imported from abroad.

[1] What are global value chains and why do they matter? | Industrial Analytics Platform (unido.org)
[2] OECD (2013), Interconnected Economies: Benefiting from Global Value Chains, OECD Publishing, Paris, https://doi.org/10.1787/9789264189560-en

- ***Specialisation of firms and countries in tasks and business functions*:** Today, most goods and a growing share of services are "made in the world", with different firms and countries specialising in the specific functions and tasks that collectively make up a GVC.
- ***Networks of global buyers and suppliers:*** In GVCs, firms control and co-ordinate activities in networks of buyers and suppliers, and multinational enterprises (MNEs) play a central role. Policy affects how these networks are formed and where their activities are located.
- ***New drivers of economic performance:*** In GVCs, trade and growth rely on the efficient sourcing of inputs from abroad, as well as on access to final producers and consumers abroad. The fragmentation of production in GVCs is a means of increasing productivity and competitiveness. GVCs also affect the labour market, mainly by affecting demand for different skills groups.

According to the OECD, about 70% of international trade today involves GVCs, as services, raw materials, parts, and components cross borders – often numerous times. Once incorporated into final products they are shipped to consumers all over the world. Exports from one country to another often involve complex interactions among a variety of domestic and foreign suppliers. Trade is increasingly determined by strategic decisions of firms to outsource, invest, and carry out activities wherever the necessary skills and materials are available at competitive cost and quality.

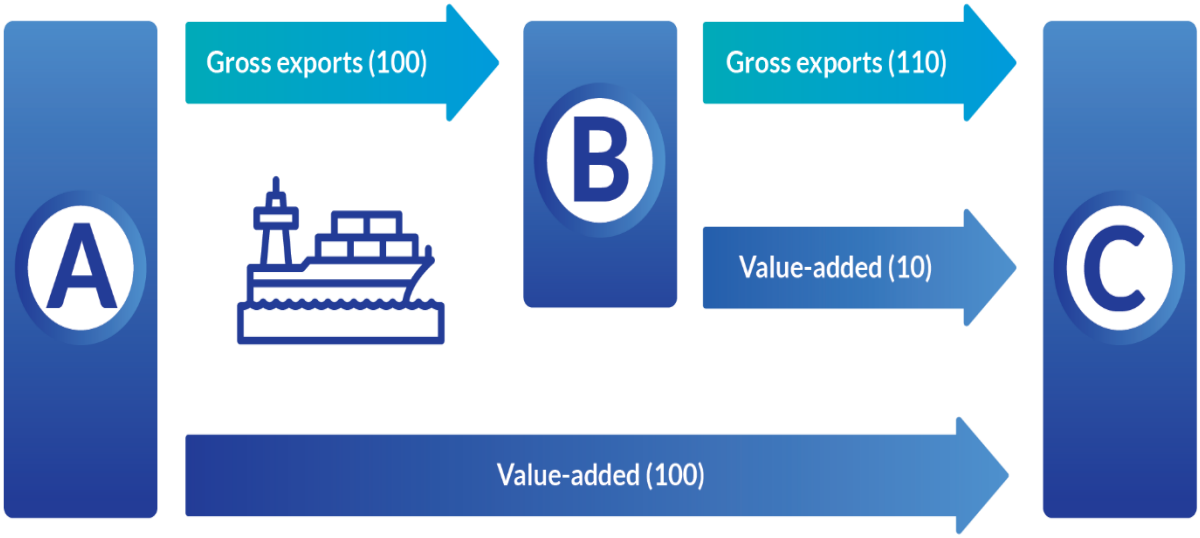
For example, a smart phone assembled in China might include graphic design elements from the United States, computer code from France, silicone chips from Singapore, and precious metals from Bolivia. Throughout this process, all countries involved retain some value and benefit from the export of the final product. But much of this value added throughout the international supply chain is invisible in traditional trade statistics, which attribute the full value of a good or service to the last country in the chain that finalised production.[3]

[3] Trade in value-added | OECD

The OECD measures GVCs using *trade in value added (TiVA)* data. TiVA removes the double counting issue associated with analysing gross exports/imports and instead measures the flows of value that is added (labour, taxes, profits) by a country in the production of any good or service that is exported. In Figure 1, Country A produces exports valued at 100 that are exported to B who further adds 10 in value and exports to Country C. In traditional trade data, exports from B to C are valued at 110 and B has a trade surplus with C of 110.

The *Trade in Value Added (TiVA)* approach, instead of measuring exports, accounts for the value added from each country to the chain. Country A adds 100 of value to Country C, and B adds 10 of value to Country C. Traditional measures would state that Country C has a trade deficit of €110 with Country B, while the *TiVA* approach would state Country C has a trade deficit of €100 with A and a trade deficit of €10 with B.

**Figure 1: Trade in value added vs trade flows - basic model**




Source: OECD (2013), *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, Paris, https://doi.org/10.1787/9789264189560-en.

### What are the benefits/rationale for Global Value Chains?

Economic literature points to many potential benefits for engaging in GVCs. Firstly, GVCs enable countries to specialise in the areas of production that they have comparative advantage in – this comes with the benefit of increased productivity and the support of incomes in an economy[4] The IMF points out that in developed economies GVCs provide access to more competitively priced inputs, higher variety, and the economies of scale. Meanwhile, for emerging economies GVCs are viewed as a fast track to industrialisation. Baldwin (2011) argues that internationally fragmented production allows emerging economies to join existing supply chains instead of building them. With increased sophistication of goods, joining a supply chain removes the need to gain comparative advantage in a broad range of production stages domestically.[5] The IMF also highlights that studies have shown that productivity gains associated with offshoring and GVCs can arise through multiple channels including: finer division of labour across countries; availability of greater varieties of inputs; increased competition; knowledge and technology spillovers.

Furthermore, GVC participation benefits local firms within the participating economy – namely, it can provide them with better access to information, open new markets to them and providing greater access to new technologies and skills.[6] GVC integration also tends to boost productivity levels within firms. Baldwin and Yan (2014) empirically test if the integration of Canadian manufacturing firms into a GVC improves their productivity, in a micro-level panel analysis. They find that such firms had a productivity advantage over firms that did not enter a GVC in the first year, with this advantage rising over time. In addition, they found firms that had left a GVC suffered productivity losses, with the loss increasing over time.[7] Furthermore, according to the World Bank, GVC integration comes with the benefit of generating growth by moving to higher-value-added tasks and by embedding more technology and know-how in production, with GVCs providing countries the opportunity to leap-frog their development process.[8]

[4] European Central Bank, Cigna et al., (2022)
[5] Global Value Chains: What are the Benefits and Why Do Countries Participate? in: IMF Working Papers Volume 2019 Issue 018 (2019)
[6] Global Value Chains and Economic Globalization (GVC-EGP) Report v.10-02-12 (europa.eu)
[7] Canada Institute for Research on Public Policy: Baldwin and Yan (2014)
[8] Global Value Chains (worldbank.org)

Finally, in an OECD Ministerial paper, it is noted that to benefit from GVCs, governments need to support the process by strengthening the business environment, promoting, and supporting investment in *knowledge assets* such as R&D and design, and promoting the development of skills and management. The paper also notes that engaging in GVCs tends to promote increases in trade and FDI, which improves the business environment and encourages domestic firms to engage in international trade.[9]

In summary, the main benefits of GVCs according to the literature include:

- Increased productivity through greater access to cheaper/higher-quality intermediate inputs;
- Supporting incomes in the economy, through specialisation and comparative advantage;
- Opens new markets, boosts technology and knowledge of participating economy;
- Boosts FDI and promotes domestic firms to engage in more international trade;
- Increases investment toward knowledge assets, such as R&D and design;
- Promotes greater skills and management across the domestic business environment.

Notwithstanding these benefits, the IMF also conclude that the impacts of GVCs have significant heterogeneity, finding that benefits of GVC trade tend to become greater in magnitude as countries themselves have higher incomes. In particular, they point to greater impacts of GVC trade on GDP per-capita for higher and middle-income countries and hypothesise that this is due to GVCs being more complex in nature, and favouring economies with higher skills and technology.[10]

### The role of multinationals in GVCs

Multinationals play a central role in GVCs. Cross-border production has been made possible by the liberalisation of trade and investment, lower transport costs, advances in information and communications technology, and innovations in logistics. This development has largely been driven by multinationals in industrialised economies, which continuously restructure their businesses and reorganise/ relocate their operations for reasons of competition. This

[9] OECD (2013), Interconnected Economies: Benefiting from Global Value Chains, OECD Publishing, Paris, https://doi.org/10.1787/9789264189560-en
[10] Global Value Chains: What are the Benefits and Why Do Countries Participate? in: IMF Working Papers Volume 2019 Issue 018 (2019)

often manifests in offshoring of labour-intensive stages of production from industrialised economies to comparatively lower wage, labour abundant developing countries. However, costs are not the only factor and location decisions are also driven for reasons such as access to regional markets (e.g. the EU Single Market), skills, infrastructure, tax, R&D supports etc. In addition, production activities are also increasingly being undertaken by third parties with no equity links to the MNEs, in other words, outsourced. One estimate suggests that GVCs 'governed' by MNEs account for 80 per cent of world trade each year.[11]

### How do enterprises participate in GVCs?

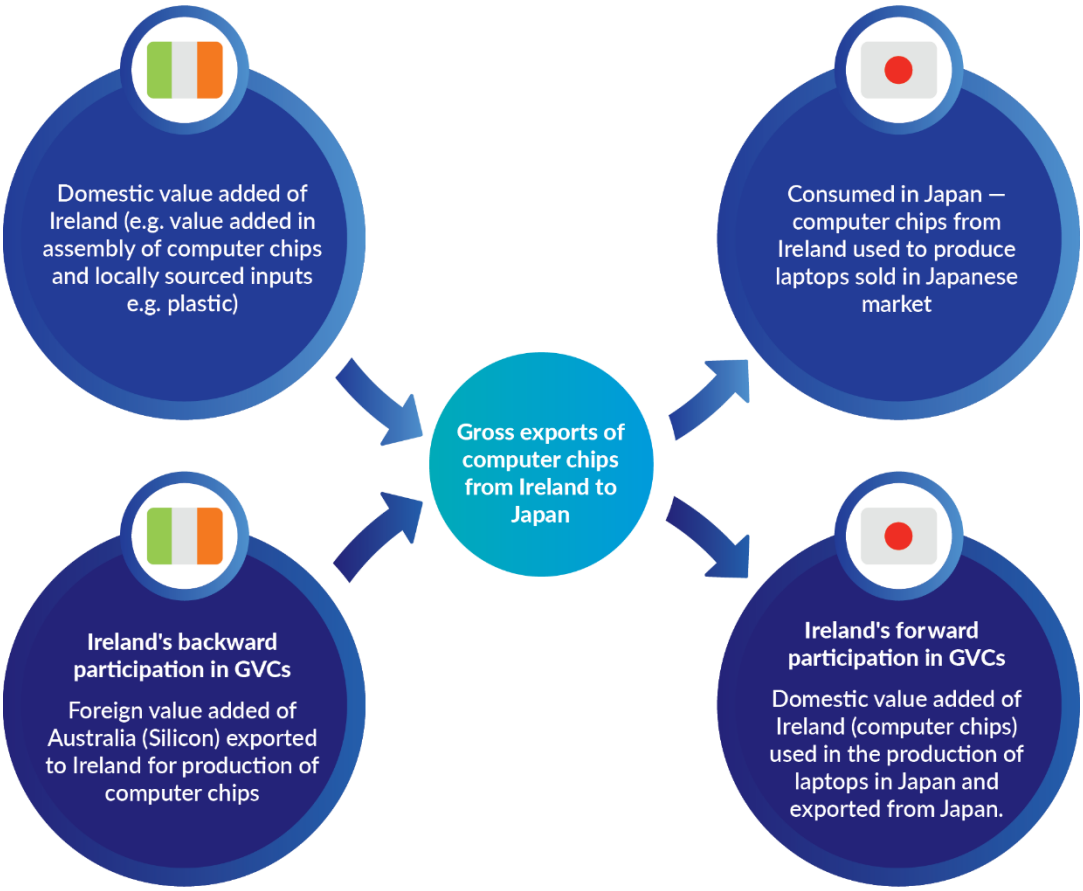
We can conceptualise enterprises participating in GVCs through **backward and forward linkages** or upstream and downstream linkages.

- **Backward linkages** are created when Country A uses inputs from Country B for the production of exports. Backward linkages are useful when certain materials/services needed for production are not available in Country A (or would be comparatively expensive to produce domestically) but are available in Country B. Backward linkages capture the **buyer/sourcing perspective**, where an economy imports intermediate goods to produce its exports. Backward linkages are measured as the "**foreign value added content in exports**". These would commonly be referred to as "**upstream** linkages".[12]
- **Forward linkages** are created when Country A supplies inputs that are used in the exports of Country B. The goods produced in Country B (the foreign country) may be final products or intermediate goods that are exported to other countries. This is considered the **seller/supplier perspective of GVCs**, as Country A is supplying goods down the value chain for further development. Forward linkages can be measured as the "**domestic value added in trade partners' exports**". These products flow **downstream** within the value chain as inputs to other countries' exports.

The figure below summarises these relationships with the green squares identifying the portion of gross exports that represent backward and forward participation in GVCs.

[11] What are global value chains and why do they matter? | Industrial Analytics Platform (unido.org)
[12] WTO Trade in Value Added and Global Value Chains

**Figure 2: Forward and Backward Participation in GVCs**




*In this example, Ireland exports computer chips to Japan. In order to produce its exports to Japan, it can produce and assemble computer chips domestically, relying entirely on its own domestic value added or it can import inputs to production from abroad i.e. embed value added from Australia (by importing silicon) in the form of inputs to production. This represents Ireland's backward participation in the value chain, with Australia providing upstream inputs. Forward participation on the other hand is obtained by measuring the domestic value added (labour and locally sourced inputs) captured in the production of computer chips in Ireland which are exported to Japan. In turn, this value added is embedded in Japan's exports of laptops to other countries. Ireland's participation in value chains in essence is the sum of backward and forward participation.*[13]

[13] Adapted from ECB Global value chains: measurement, trends and drivers (europa.eu)

Of course, modern GVCs are in reality often far more complex than this, involving multiple locations, components, services and stages of production. Furthermore, even within the same sector, companies can have very different supply chain structures depending on factors such as how much a company may outsource or retain in-house within their own production facilities.

For example, McKinsey have mapped out how computer manufacturers Dell and Lenovo, despite having quite different supply chain structures, rely on complex, multitiered and interconnected networks, with the entire supplier ecosystem encompassing thousands of suppliers around the world, across the sectors of semiconductors, electronics manufacturing and service providers, suppliers of displays and advanced optics, chemical manufacturers, and software companies.[14] This shows that large multinationals can have hundreds of tier-one suppliers who in turn rely on hundreds of tier two suppliers.

### Similarities and differences between Value Chains and Supply Chains

Global value chains and supply chains are often used interchangeably, however, there are some subtle but important differences to consider from a policy perspective. Supply chains focus on integrating supplier and producer processes, improving efficiency and reducing waste, while value chains focus on creating value in the eyes of the customer. Value chains can be thought to operate in both directions (upstream and downstream), with suppliers accruing value from the financial resources, payment terms, stability, and future order cover that their customers provide, while customers derive value from the delivered products and services. This is important from a policy perspective, which should consider supply chains as complementary and integral to the functioning of value chains. Supply chains can form part of the value-added, for example, in the form of driving efficiency, logistics or processes along the chain.

In this case, it is helpful to think about value as what the market wants and supply chains as how to optimize the delivery of that value (which itself has an inherent value to the chain).[15]

[14] Risk, resilience, and rebalancing in global value chains | McKinsey
[15] Feller et al. (2006) Value Chains versus Supply Chains.

## 1.3 Drivers of Change

### Long term trends in globalisation

Globalisation is not a recent phenomenon and GVCs have been evolving for decades, although with various stages of acceleration and contraction. Factors contributing to the early rise of trade included falling transport costs in the nineteenth century which facilitated a decoupling between production and consumption. As shipping costs dropped, volumes increased. This period before the First Word World War is characterised by increasing capital flows underpinned by the adoption of the gold standard. It is estimated that world trade as a share of GDP increased from 17.7% in 1870 to 29.1% in 1913. Important drivers behind this wave of globalization were the new technologies of the era, including the steam engine, internal combustion engine, telegraph, electricity. These helped to bridge long geographical distances. Additionally, many countries began to embrace liberal trade policy after years of protectionism.[16]

The second wave of globalisation is approximately from after the Second World War II to the early 1970s. In 1946, world trade as a share of GDP was 15.1% rising to 25.2% in 1972. During this period, the World Bank and the International Monetary Fund (IMF) were created to facilitate the international exchange of goods, services, and assets. In addition, the General Agreement on Tariffs and Trade (GATT) began operation in 1948. GATT set the framework for several important steps toward greater liberalisation of international trade, particularly through reductions in industrial tariffs. The USA became the leading global economy and the dollar became the major currency of the international financial system. Important drivers of the second wave were the technologies which further improved transport and communications, including jet planes, television, communication satellites and container shipping.

[16] Caneralla et al. (2021) Globalization, long memory, and real interest rate convergence: a historical perspective

***Figure 3 – International trade as a share of global output***


Source: World Bank

The third wave of globalisation began in the 1980's reaching a peak in 2008, when world trade reached 61% of global output (see graph above). Foreign direct investment increased twice as fast as trade during this time. Technologies including microprocessors, personal computers, the Internet, and mobile phones drove the third wave of technological change. According to Canerella et al, the ICT revolution drove down the costs of organizing complex activities over long distances, allowing MNEs to diversify production, including to emerging market economies taking advantage of relatively lower labour costs.[17] ICT has had a particular impact on services trade which play a critical role by supporting the functioning of GVCs, including through transport and telecommunications. According to the ECB, services trade has increased twice as fast as goods trade since 2003, and, within services, digital trade flows have tripled.[18]

Other significant features of this era include the decline of tariffs from the 1980's onwards, the establishment of the WTO, the development of the EU Single Market and the

[17] Caneralla et al. (2021) Globalization, long memory, and real interest rate convergence: a historical perspective
[18] ECB (2022) Global value chains: measurement, trends and drivers (europa.eu)

proliferation of preferential trade agreements. FDI is particularly important, especially given that the operations of multinationals are vertically linked, such that an increase in activity in the host country generates increased demand for intermediate products from the parent country.[19]

Since the global financial crisis in 2008, world trade as a share of GDP has declined, from the peak of 61% in 2008 to 52% in 2020, broadly equivalent to its level in 2003. Factors underpinning this include tapering off of tariff reductions, the increased use of regulatory measures and non-tariff barriers such as export subsidies, restrictions on licensing or FDI and domestic clauses in public procurement and technology transfer policies.[20]

### Recent trends and narratives – deglobalisation, nearshoring and "friend-shoring"

The slowdown in world trade relative to output is reflected in GVC trends. The expansion of GVCs has to some extent levelled out in the past decade, with trade flows in intermediate products expressed as a share of global production reducing from almost 17% in 2011 to between around 14% and 15% from 2016 to 2020.[21]

The reasons behind the slowdown in GVCs are multifaceted and nuanced. Before COVID-19, the OECD attributes structural shifts in intermediate trade to factors such as the digitalisation of economies, the 'servitisation' of manufacturing (i.e. manufacturing firms increasingly use and produce services that they combine with the goods they sell e.g. iPhones, games consoles) and consumer preferences for more customisation and sustainable production processes are other important reasons why firms are tending to produce closer to consumers and may rely less on offshoring.

Analysis by the ECB and the International Monetary Fund (IMF) suggests that geographical shifts in economic activity and changes in the composition of aggregate demand (e.g. the sectors with a low GVC intensity, such as construction and services, have accounted for an incrementally larger share of world trade over time) impacted on the relationship between global trade to total economic output. Specifically, it estimated that around half of the

[19] *Ibid*
[20] ECB (2022) Global value chains: measurement, trends and drivers (europa.eu)
[21] OECD (2020), "COVID-19 and global value chains: Policy options to build more resilient production networks" https://doi.org/10.1787/04934ef4-en

slowdown in trade elasticity between the periods 1995-2007 and 2012-16 was due to compositional factors, namely the growing weight in the world economy of emerging market countries, which typically have a lower trade intensity than advanced economies. Furthermore, large economies such as China have progressively moved from being assemblers of foreign inputs to relying increasingly on domestic inputs.[22].

The COVID-19 pandemic brought questions about the resilience of GVCs into sharp focus. However, concerns were increasing about rising global trade tensions and protectionism before the pandemic. The ECB points to the rise of protectionist regulatory measures and non-tariff barriers such as export subsidies, restrictions on licensing or foreign direct investment, and domestic clauses in public procurement, leading to an overall surge in trade distortions. The number of new discriminatory actions announced by G20 economies has risen steadily since 2012 and surged further in 2018. Anti-dumping measures and import tariffs were the two most widely used instruments, together accounting for around 30% of all of measures imposed.[23]

Some significant 'Black Swan' type of events have added to complexity. The US America First policy under President Trump placed increased tariffs on products such as solar panels, washing machines, steel and aluminium. Notably, the US trade war with China cited factors such as forced technology transfer and national security concerns as rationale for increasing tariffs on Chinese goods. Under the Biden administration, the Inflation Reduction Act raises concerns about international market distortions from an EU perspective as it intends to

[22] ECB (2019) The economic implications of rising protectionism: a euro area and global perspective (europa.eu)
[23] *Ibid*

provide incentives to 'buy American' in sectors such as electric goods vehicles. In addition, the UK's exit from the Single Market and the Customs Union means that many goods now face regulatory and customs requirements, adding to the costs of trade. Even comparatively short-lived crises such as the grounding of the Ever Given container tanker in the Suez Canal in 2021 underscored the importance of this route to supply chains. It is estimated that approximately 12% of global trade and 30% of global container traffic traverse the Suez, transporting over USD $1 trillion worth of goods per annum, and for each single day the Suez remained blocked global annual trade growth would decrease by 0.2-0.4% and cost USD $6-10 billion.[24] More recently, in early 2024, security concerns about safe passage through the Red Sea to the Suez Canal has resulted in many firms deciding to avoid one of the world's busiest shipping lanes and take longer routes adding to freight costs and increasing delivery times by at least two weeks. For example, the typical Singapore to Rotterdam sea voyage is 40 precent longer via the Cape of Good Hope compared to the Suez Canal. [25]

**Deglobalization/Reshoring**

Deglobalization refers to a scenario *"in which economic agents are increasingly severing their international economic links and are reshoring economic activity toward their domestic economies."* (Antras, (2020)

**Nearshoring**

Nearshoring is about bringing production back, to an area nearer to the domestic economy, which in theory allows for greater management control and reduces time-zone and cultural differences due to production being geographically close in proximity. https://tallyfy.com/what-is-nearshoring/.

**Friend-shoring**

US Treasury Secretary Janet Yellen coined the term "friend-shoring." This implies deepening relationships and diversifying suppliers with trusted partners ("friends") to reduce risk facing the domestic economy and the friend's economy (Condon and Kim, (2022)). This is a form of nearshoring, but specifically, nearer economies must be "trusted" by the domestic

The large volume of trade underpinning these types of events and policies has significant implications for GVCs, which have to absorb any increases in associated trade costs as inputs cross borders. With COVID-19, GVCs are argued by some to create economic vulnerabilities during a pandemic or other crisis where international trade is disrupted. The closure of factories in China drew

[24] The Importance of the Suez Canal to Global Trade - 18 April 2021 | New Zealand Ministry of Foreign Affairs and Trade (mfat.govt.nz)
[25] FACTBOX: Seaborne trade reroutes away from Red Sea over Houthi attacks | S&P Global Commodity Insights (spglobal.com)

attention to the reliance of many manufacturing value chains on inputs produced in the Chinese economy. The subsequent lockdowns implemented all over the world resulted in a GVC 'concussion' and re-ignited a debate on the risks associated with international production.[26]

Following these events some discourse has suggested that there is a need to rethink GVCs and make them more resilient, for example by diversifying their supplier base or by reshoring some activities. It is also evident that this also comes at a considerable cost in the form of substantial flows of FDI and can take many years.[27] Some assert that re-nationalising GVCs could to some extent insulate countries from the economic consequences of the pandemic. However, according to the OECD, analytical work indicates that the contraction of GDP would have been worse during the pandemic with re-nationalised GVCs, as government lockdowns also affected the supply of domestic inputs.[28]

Analysis from the IMF would appear to back up this narrative. In their study of GVCs during the pandemic, they find that pandemic specific factors had an important determinant on trade – goods imports increased excessively while services imports decreased significantly. Excessive goods imports and services declines were higher where the pandemic and lockdown policies were more severe. Furthermore, while GVC intensive industries were initially more negatively affected by lockdowns, negative spillover effects diminished over time, indicating that GVCs were able to adjust. The ability to work from home further mitigated negative spillovers. According to the IMF, this should sound a cautionary note regarding policies seeking to effect permanent changes in the structure of global production and trade.[29]

Indeed, there may be significant challenges involved in reorganising some value chains due to 'choke points' such as geographic concentration. Deloitte, for example, point to the difficulties that could arise from reshoring policies, using the example of the semiconductor industry. Semiconductors are a critical input to many products and particularly important in

[26] OECD (2020), "COVID-19 and global value chains: Policy options to build more resilient production networks" https://doi.org/10.1787/04934ef4-en
[27] Javorcik (2020) Reshaping of global supply chains will take place, but it will not happen fast
[28] OECD, Arriola, C., et al. (2020), "Efficiency and risks in global value chains in the context of COVID-19", OECD Economics Department Working Papers, No. 1637 https://doi.org/10.1787/3e4b7ecf-en
[29] IMF (2022) Global Trade and Value Chains during the Pandemic in: World Economic Outlook, April 2022 (imf.org)

the manufacture of new electric cars. The manufacture of semiconductors, therefore, has the capability to impact on a wide range of sectors. The design and manufacture of semiconductors requires specialist knowledge and capital-intensive manufacturing equipment that is difficult to acquire or reproduce. These factors have led to geographic consolidation of the supply chain for semiconductors in three locations —the United States, China, and Taiwan—which together have roughly 70% of market share in semiconductor assembly, testing, and packaging. Taiwan and South Korea together manufacture all of the most advanced semiconductors. According to Deloitte, such specialisation inevitably creates choke points and supply chain vulnerabilities. Few nations possess the natural resources or knowledge base needed for independent semiconductor production. By one recent industry estimate, establishing fully domestic semiconductor manufacturing supply chains in the United States could cost up to US$1 trillion—more than double the value of the entire global semiconductor market.[30]

### Impact of Russian invasion of Ukraine on GVCs

The crisis caused by the Russian invasion of Ukraine has further intensified the debate about resilience of GVCs and their ability to withstand shocks and has particularly focused the debate about reconfiguring GVCs on the grounds of economic security. Consequently, this has given more prominence to the concept of 'friend-shoring' whereby trade relationships are deepened and diversified with 'trusted' trade partners to reduce the risk of reliance on potentially unfriendly partners. This strategy creates distinct trading alliances aligned by shared geopolitical goals. In turn, this has significant implications for GVCs as it also implies a less diversified and less networked global economy, with political interests superseding trade interests.  Relatedly, concern is also growing about the potential for economic coercion whereby economies are over reliant on one or a small number of trading partners for critical inputs and raw materials, and trade partners then use this as leverage to try to extract policy concessions.

[30] Deloitte (2022) Global Supply Chain Solutions | Deloitte Insights

Disruptions to trade caused by the Russian invasion, the subsequent economic sanctions on Russia and its retaliation have severely affected global markets. Prices of oil, gas and certain agricultural products have risen, intensifying inflation pressures and threatening food security, particularly in some developing economies. There is also uncertainty regarding some metals that are produced in Russia, and which are indispensable to supply chains of modern manufacturing production such as aluminium, nickel, palladium and vanadium. Furthermore, trade in potash – an essential input in fertiliser production – has also been affected.[31]

Simply switching supply to trade partners other than Russia is not straightforward, with many large suppliers of these raw materials also applying export restrictions.[32] According to the OECD's export restriction inventory, South Africa applies non-automatic licensing to palladium exports. Major suppliers of vanadium oxides (South Africa and China) apply non-automatic licensing to their exports. Belarus, the second largest exporter of potash, applies export taxes, as does China on aluminium and nickel. China's incomplete rebate of value added tax (VAT) on exports of primary aluminium effectively taxes exports from China to about 25-30%. The Philippines, a major producer of nickel, applies non-automatic licensing and Indonesia imposes a total export ban on nickel. In addition to imposed sanctions and export restrictions, the availability of critical raw materials is affected by significant disruptions in transportation due to the suspension of shipping services to and from Russian ports, impacting on Russia's supplies to many countries.

Agricultural markets are another major area that have been impacted by the Russian invasion of Ukraine, particularly on Ukraine's capacity to harvest and export crops. According to the OECD, Ukraine is the world's largest producer of sunflower seed, as well as a key exporter of wheat, rapeseed, barley, vegetable oil, and maize. These commodities are major inputs to a range of foodstuffs. Russia is the world's largest exporter of wheat, and an important exporter of barley and sunflower seed. Russia is also a leading exporter of energy and fertilisers. The OECD estimates that the full loss of Ukraine's capacity to export together

[31] OECD (2022), "The supply of critical raw materials endangered by Russia's war on Ukraine", OECD Policy Responses on the Impacts of the War in Ukraine, https://doi.org/10.1787/e01ac7be-en

[32] See OECD Inventory of Export Restrictions on Industrial Raw Materials 2024 | OECD

with a 50% reduction in Russian wheat exports could lead to a 34% increase in international wheat prices in 2022/23.[33] A UN and Turkey brokered pact, allowing Ukraine exports of grain through the Black Sea, was reached in July and extended for a further 120 days in November 2022, however, the deal remains fragile.

Assessing the GVC implications of the war and associated sanctions is complex, not least because some of the measures are targeted to specific products, for example bans on exports of certain products from the EU to Russia, or are working through restrictions on finance, and, more recently, impacting transport costs through restricting access to ship cargo insurance. Some of the sanctions might also be circumvented, for example via transhipments. Added to this is the difficulty of assessing the trade impact of the war on the Ukrainian economy, including its exports and imports.[34] Overall, the European Commission DG Trade Chief Economist estimates the impacts of its sanctions on Russia will be in the region of $55bn (3.7% reduction in GDP) compared to $13bn for the EU (0.1% reduction in of GDP). This amounts to a "welfare destruction rate" of 46/1 in the EU's favour. However, the EU also estimates slightly positive impacts accrue to economies such as China, India and Turkey as Russia rediverts trade to non-sanctioning countries.[35]

In summary, the current geopolitical situation creates a considerable degree of uncertainty and volatility from a value chain perspective. Notably, the Russian invasion of Ukraine has created some significant issues for specific agricultural and raw materials products, which provide inputs to many products, in addition to the general impact that the energy crisis has had on production costs.

### Global Value Chains and Sustainable Development

The trade and sustainable development (TSD) agenda has been increasing in importance in recent years. This is driven by increased focus by citizens, NGOs, governments, unions and enterprises on the relationship between trade and the environment, impacts on climate change, human rights, labour standards and responsible business conduct. The importance

[33] OECD (2022), "The impacts and policy implications of Russia's aggression against Ukraine on agricultural markets", https://doi.org/10.1787/0030a4cd-en
[34] OECD Working Party to the Trade Committee (June 2022) Updates on Trade Developments
[35] DG Trade Chief Economist (2022)THE ECONOMIC IMPACT OF SANCTIONS AND RUSSIAN COUNTERMEASURES FOLLOWING THE RUSSIAN INVASION OF UKRAINE

of sustainability in the trade agenda is reflected in Ireland's new trade and investment strategy *Value for Ireland: Values for the World*. The strategy emphasises trade as a powerful driver of prosperity, well-being and improved living standards while recognising in parallel that civil society demands an increased focus on environmental, social and governance dimensions of trade. At EU level, the Commission's recent Trade Policy Review (2021) pointed to the European Green Deal as the Commission's top priority and that every policy area needs to contribute to its objectives, including trade. From an Ireland and EU trade perspective, the TSD agenda is broadly developing in three ways.

**1) Autonomous EU measures** such as the Commission's Carbon Border Adjustment Mechanism (CBAM); the proposal to ban products made from forced labour being placed on the single market; the proposed regulation to minimise EU driven deforestation and forest degradation; and the directive for Corporate Sustainability Due Diligence, which will provide for mandatory due diligence by large companies to identify and prevent, end or mitigate adverse impacts of their activities on human rights, workers' rights and the environment.

**2) Modern EU Free Trade Agreements (FTAs)** have contained steadily more comprehensive provisions on TSD, notably in relation to commitments to climate change and labour standards. Recently, the EU undertook a review of its approach to negotiations with bilateral partners on TSD provisions. The review provides actions that the Commission will take to develop a more assertive and practical approach to TSD chapters, including implementation roadmaps, enhanced role for civil society, and, for the first time, the possibility of sanctions as a last resort for breaches of the Paris Agreement and core ILO principles. This more assertive approach to TSD is evident in the EU's recent trade agreement with New Zealand.

**3) At the multilateral level**¸ at the WTO, there is enhanced focus on areas such as trade and environmental sustainability and trade and gender. Notably, discussions are underway (with varying levels of plurilateral participation) to develop roadmaps for actions in areas such as liberalising trade in environmental goods and services, the circular economy, plastics trade and fossil fuel subsidies. In addition, there are soft law international standards that are increasingly being used by governments and by companies, including the OECD Guidelines for Multinational Enterprises and their associated guidance to companies on sectoral and supply-chain due diligence.

Trade can contribute positively to solving global sustainability challenges and creating a better future for the next generations. This includes:

- Promoting the circular economy;
- Liberalising trade and investment in environmental goods and services;
- Promoting green standards in FTA procurement chapters;
- Cooperating with trade partners on environmental and labour standards, carbon pricing and reducing fossil fuel subsidies;
- Cooperating on sustainable food systems and improving food security;
- Providing a central role in delivering the UN SDGs such as Poverty Reduction, Zero Hunger, Good Health and Well Being, Gender Equality, Decent Work, Industry and Innovation, Reduced Inequalities and Life Below Water;
- Cooperating with trade partners regarding differing capacities to implement TSD provisions e.g. developing and Least Developed Countries.

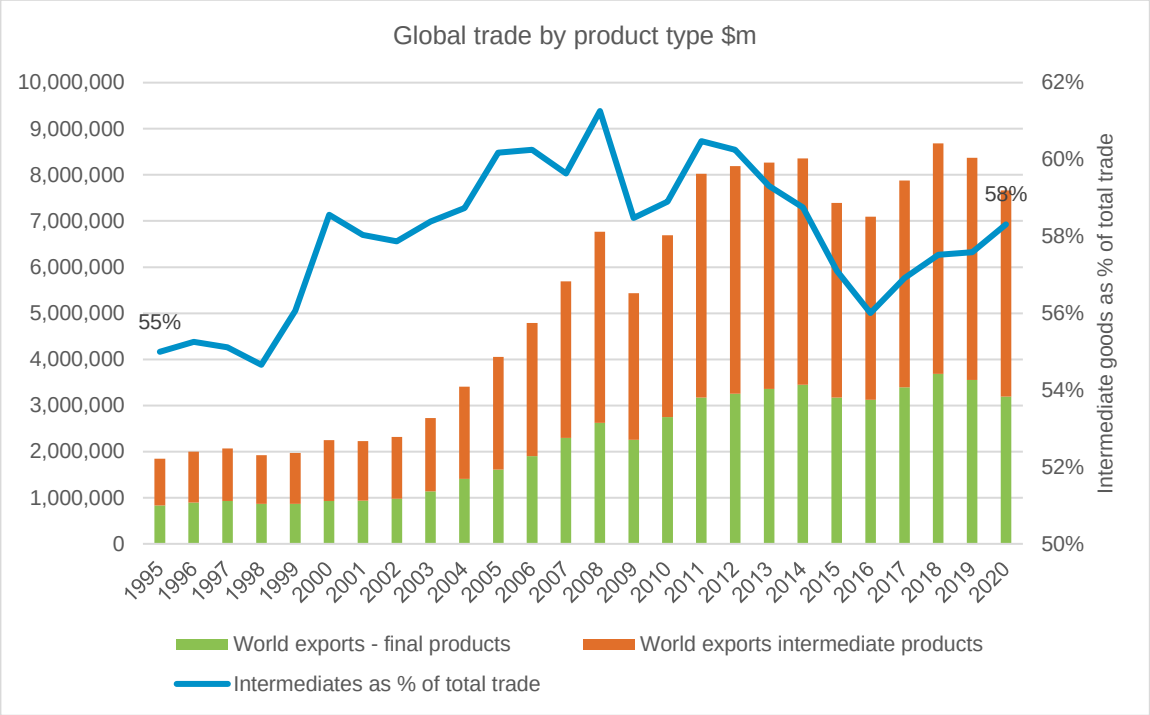
In summary, there is increased scrutiny on companies and their due diligence policies to ensure that their activities are sustainable, backed up by soft and hard law measures. Notably, responsible business conduct and due diligence today extends beyond the direct operations of the company to their supply chains. In a world where GVCs may need to rely on multiple supply points, this creates added complexity regarding monitoring value chains for sustainability impacts.

Additional trade costs may be imposed by measures, either directly in the form of the Carbon Border Adjustment Mechanism, or indirectly in areas such as administration requirements to comply with proposed legal measures such as due diligence or the ban on products from forced labour.

## 1.4 Global Trends – Statistical Overview and Outlook

Taking the various drivers of change into consideration, this section assesses the current status of GVCs using latest available data. One of the main indicators of the growth in GVCs in world trade is with regard to trade of intermediate goods and services, which are inputs to final goods and services. Figure 4 below shows global trade from 1995-2020 split between final goods and services and intermediate goods and services.

***Figure 4 – Global trade in final and intermediate Goods***




Source: OECD TiVa database

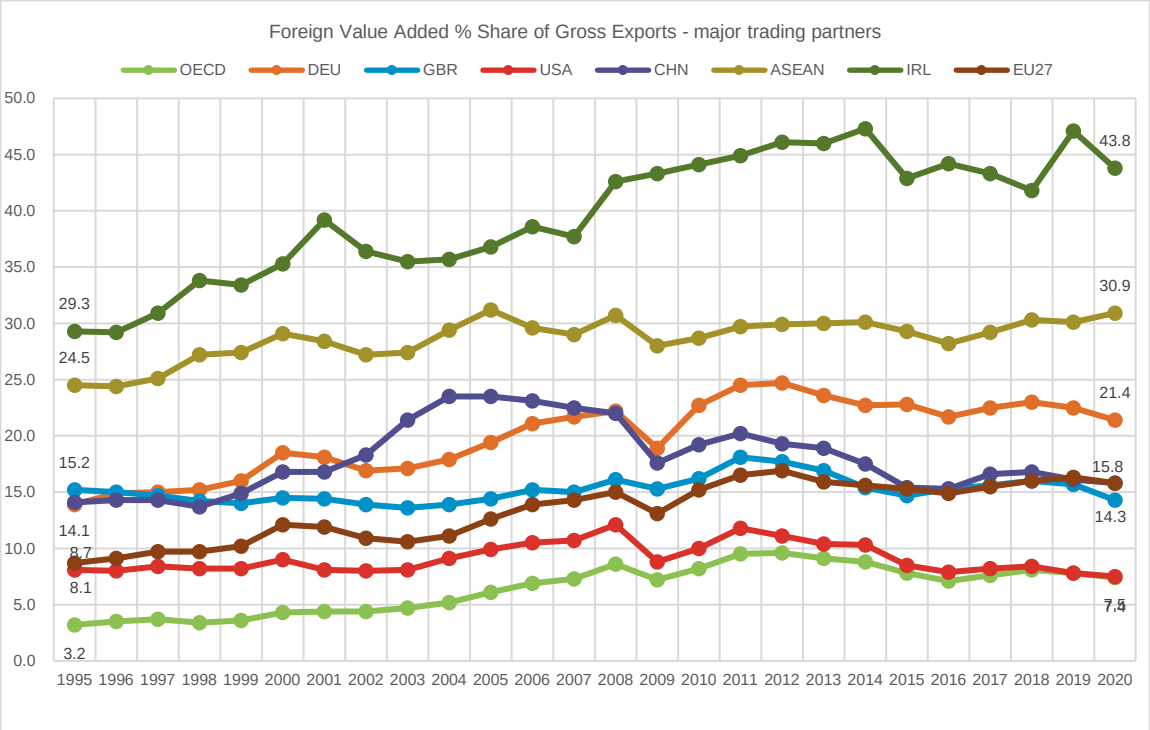
The line graph shows that intermediate goods and services accounted for 55% of total trade in 1995, accelerating significantly through the 2000's, rising to a high of 61% in 2008 and recovering to 60% in 2012 post the global financial crash. Since 2012 the proportion of trade in intermediates has generally levelled out at between 56% to 58% of world trade.

Of course, this picture represents a high-level view of global trade, not taking into account factors such as sectoral and regional shifts or structural factors such as the digital transition and other technological advances within the 23-year period. The data also predates the subsequent economic shocks of the COVID-19 pandemic and the Russian invasion of Ukraine. Nonetheless it provides a picture that since 2012, there has been a levelling off in the overall proportion of intermediates in world trade to 2020. Supplementing the OECD data, WTO data shows that trade in intermediate goods continues to display some volatility. After at 21% increase in world exports of intermediates in 2021, exports decreased by 8 per cent year-on-year in the second quarter of 2023, at a time of stagnant commodity prices and a marked contraction in global consumer demand due to high inflation and high interest

rates. Despite this fall, intermediate goods exports remained relatively stable from the end of 2022 and were worth US$ 2.3 trillion in Q2 2023.[36]

Foreign value-added (FVA) content of exports is another primary indicator of the integration of GVCs and is a key measure of openness to trade. In effect it measures how much of a country's exports uses imported inputs (in other words backward linkages).

***Figure 5 – Foreign value-added share of gross exports***




Source: OECD TiVa database

The chart above shows that:

- In broad terms, the data indicates a slowdown in the growth of GVCs since the financial crisis in 2008. However, the OECD surmise that this slowdown did not persist beyond 2016. In most exporting economies the FVA in trade increased slightly between 2016

[36] WTO | Global Value Chains - Information notes on trade in intermediate goods

and 2020, indicating that the apparent 'GVC trade shrinkage' was temporary. Again, more recent global impacts are not reflected in the data (full impacts of COVID-19, Russia's invasion of Ukraine).

- In comparative terms, Ireland is heavily integrated in GVCs relative to large trading blocks, with FVA share of exports at 43.8%, almost 6 times higher than the OECD average of 7.4%, and reflecting our large export base and presence of multinationals in Ireland. The OECD attributes Ireland's declining share since 2015 in part due to a significant revision of national accounts in that year (for example, regarding the treatment of intellectual property, aircraft leasing and contract manufacturing).[37]
- China has seen a steady decline in FVA content of exports, from a peak of 23.5% in 2004 to 15.8% in 2020. This indicates a greater share of value added in Chinese exports produced domestically and less reliance on foreign inputs for its exports. This is a major concern for economies such as the EU and US in terms of the balance of global trade as it indicates increasing Chinese self-sufficiency and autonomy from a technological perspective.
- There has also been a decline in US backward participation in GVCs since the global financial crisis in 2008, with FVA in US gross exports declining from 12.15% in 2008 to 7.5% in 2020, also indicating a greater use of domestically produced inputs in exports.
- On the other hand, the EU has seen a steady increase in FVA as a share of gross exports, since 2003, levelling off at approximately 17% in 2012 and staying relatively stable to 2020. It is also notable that in 1995 the shares of the EU and US were almost identical, however, their paths have diverged significantly over time with the EU increasing and the US declining in terms of share of FVA in gross exports.
- Notably, the share of FVA in the OECD has increased from 3.2% in 1995 to between 8%-10% from 2008 to 2018. This indicates an almost three-fold increase in the proportion of FVA within OECD exports (i.e. inputs sourced from outside the OECD). This reflects the increasing participation of non-OECD countries in GVCs, driven by large economies like the BRICs.

[37] OECD (Feb 2022) Trade in Value Added: Ireland link

At country level, there are significant differences regarding participation in value chains. The following chart shows the top 50 countries according to share of FVA in their respective gross exports. The data shows Ireland in seventh position. While many of the economies are relatively small, open economies similar to Ireland, there are notably some large countries and regions included in the mix, such as Mexico, Canada, Germany and India. This confirms that GVC participation is not just limited to smaller economies and depends on factors such as the level of openness to trade and investment.

***Figure 6 – Top 50 countries by share of foreign value added 2020***


Source: OECD TiVa database

As value chains show signs of becoming slightly less fragmented in global terms, one question is whether they are becoming more regional. According to the OECD, in all regions, the share of intra-regional VA has remained relatively stable since 2011 while the change observed in the foreign VA in trade is almost fully explained by the extra-regional VA, with a decrease after 2011. Although there is no overall trend towards more regional value chains, GVC links within regions seem more stable. Changes in foreign sourcing seem to primarily

affect suppliers located outside the region. This trend could also reflect the fact that adjustments are more on primary inputs than on first tier suppliers of processed inputs, which are generally located in the same region as final producers.[38]

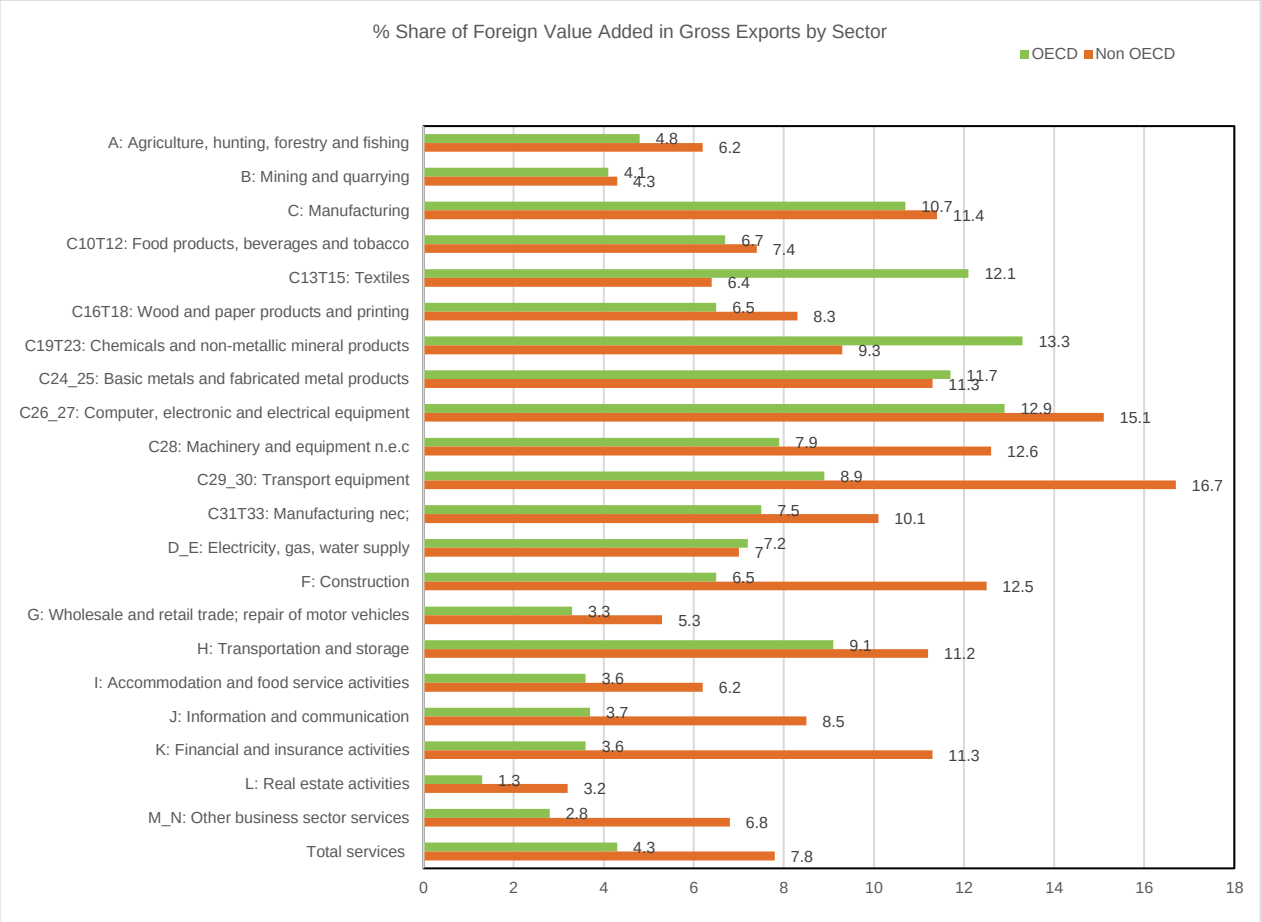
Over the last decade, the ECB estimates that for countries in Europe and Asia, and to a lesser extent in North America, GVC participation has risen largely on the back of stronger supply linkages within the region itself, while countries in Latin America have become integrated in GVCs by strengthening linkages with partners from outside their region. Overall, value chains mostly remain clustered at regional level, particularly in Europe and Asia where the majority of supply linkages occur within the region itself (over 70 percent for Europe). For countries in the USMCA area, almost half of the imported intermediates embodied in gross exports originate within the area. By contrast, extra-regional linkages are more pervasive in Latin America, with approximately 90 percent of inputs coming from outside the region.[39]

### Sectoral variations in GVCs

Global trends mask significant sectoral differences in GVCs, with some sectors having a much higher share of FVA in gross exports than others.

[38] OECD (2021) TiVA Trade Policy Brief
[39] ECB (2022) Global value chains: measurement, trends and drivers (europa.eu)

***Figure 7 – Share of Foreign Value Added by Sector (OECD and Non-OECD) 2020***




Source: OECD TiVa database

The graph above shows that:

- Manufacturing (10.7% for OECD countries) has a higher proportion of FVA in gross exports compared to services (4.3%). This indicates higher tradability of goods relative to services.
- However, it is also worth highlighting that over time, the figure for services has increased in the OECD from 2% in 1995, more than doubling the share of FVA in business services in 2020.
- This reflects the increased global trade in services and 'servitisation' of manufacturing over time, along with higher levels of integration between OECD and non-OECD countries.

- Within manufacturing, in the OECD, there is relatively high levels of FVA in sectors such as textiles, chemicals and non-metallic minerals (which includes energy and pharma), metals and computers. Within non-OECD countries, there is relatively high FVA in sectors such as machinery, computers, and transport equipment.
- For the OECD, there is relatively low FVA in services, with only transport and storage having a higher-than-average share of FVA than for services overall. This indicates a lot of remaining GVC activity takes place within the OECD (i.e. between OECD countries).
- Within non-OECD countries, the share of FVA in services is higher in transport and storage and financial and insurance services, and other business services, indicating a slightly higher reliance in these sectors for services produced in OECD countries. The very low levels of FVA within real estate indicates a high level of domestic value added (localisation) in this sector.

In summary:

- From the available data, it would appear that the level of GVC integration, at a global level, has broadly levelled off since the financial crisis in 2008. Further data is required to assess the trade shocks caused by, for example, COVID-19 and the invasion by Russia of Ukraine.
- Some major economies such as the US and China have seen a relative decline in GVA integration, indicating greater reliance on domestic inputs in their gross exports. The data also shows that openness to GVC participation is not limited to smaller economies, indicating that trade and investment policy is a significant determinant of GVC participation.
- There are significant variations, both across countries and across sectors regarding the prevalence of GVCs (as measured by the FVA share of gross exports). This points to both substantial opportunities for participation and specialisation in GVCs and potentially considerable exposures to upstream or downstream shocks for countries with high levels of GVC integration.

## 1.5 Outlook for Global Value Chains

This section considers what the future evolution of GVCs may entail, considering the current international trading environment can be described by the risk categorisation of VUCA (volatile, uncertain, complex, ambiguous) and longer drivers of transition, including the green and digital transition, and elaborates on earlier discussion on reshoring, nearshoring and localisation. Much of the policy debate on GVCs is now around how to ensure their future resilience and their role in supporting economic security.

Even before the recent crises of the COVID-19 pandemic and the Russian invasion of Ukraine, the OECD (2017) pointed to the following factors which increasingly challenge the 'business as usual' organisation of production in long and complex GVCs and may shape the evolution of GVCs differently in the future. These include old and new factors, those which are known to negatively impact GVCs but also emerging factors of which the possible effects on GVCs are less understood.[40] In summary, these are:

- **Wage convergence** between developing and developed countries will gradually erode the cost advantage of some emerging economies in labour intensive activities;
- **Hidden costs** and risks of offshoring, including costs of protecting intellectual property;
- The increasing occurrence of major global effects on one part of a supply chain, including natural disasters, prompting companies to move from 'just in time' to 'just in case' production processes, factoring in some redundancy to supply chains;
- **ICT** can both support and shorten value chains, with communications technologies enabling their further proliferation whereas robotics, automation, computerised manufacturing, artificial intelligence, etc. all could reduce the advantages of production in low-labour-cost emerging economies;
- From **mass production to mass customisation**: digital technologies like additive manufacturing and 3D printing, autonomous robots, big data, etc. will increasingly allow for customised products manufactured at the cost of a standardised product (some even

[40] De Backer, K. and D. Flaig (2017), "The future of global value chains: Business as usual or "a new normal"?", *OECD Science, Technology and Industry Policy Papers*, No. 41, https://doi.org/10.1787/d8da8760-en.

go as far as “manufacturing on-demand”), with manufacturing becoming more localised as a result;

- The **green and sustainability imperative**: the continuous expansion of GVCs and their related transport flows of intermediate and final products have resulted in major environmental impacts like emissions, waste generation, etc. Government regulation and consumer demands for sustainable products may drive companies’ strategies of corporate social responsibility by sourcing less products while at the same time more inputs from closer to home.

Making the case for continued diversification of GVCs, particularly with regard to developing countries, the World Bank has undertaken modelling on possible economic impacts of reshoring or nearshoring of GVCs in the wake of COVID-19 (out to 2030).[41] The key findings are:

- Overall, the World Bank finds that, during a crisis, countries more deeply integrated into GVCs recovered more quickly than others.
- Reshoring GVCs would be counterproductive and could lead to a significant rise in global poverty. Greater economic integration and strengthening of supply chains can spur resilient economic growth.
- Although participation in GVCs increases exporters’ vulnerability to foreign shocks, it also reduces their exposure to domestic shocks. GVCs act as both a propagator and as an absorber of shocks. GVCs ensure that, in a global recession, a recovery in any part of the world is transmitted to other regions through the value chain.
- Economic modelling projects that a shift toward global reshoring in high income countries and China could drive an additional 52 million people into extreme poverty, most of them in Sub-Saharan Africa.
- On the other hand, deepening trade by removing barriers to movement of goods and services across borders, could lift almost 22 million people out of poverty by 2030, and improve the incomes of the bottom 40 percent.

[41] World Bank (March 2022) Reshaping Global Value Chains in Light of COVID-19: Trade, Development & Climate Change

- Another lesson is that resilience comes from diversification. Developing countries should seek new opportunities and integrate into GVCs that support a low-carbon future.

Regarding the potential scale of localisation or production, the World Bank surmises that there may be significant costs associated with reshoring or nearshoring, as traditional supply chains have transformed over time into supply networks. Where networks are highly interconnected, the time and costs of relocating could be substantial. Even if production facilities can be relocated, it would require a whole ecosystem of talent pool, supporting infrastructure, and nearby upstream/downstream industries to scale up production in a new location.

McKinsey (2020) observe that the frequency of trade shocks has been increasing in recent years and makes the following conclusions from its assessment of risk, resilience and rebalancing of GVCs.[42]

- **Shocks that affect global production are growing more frequent and more severe.** Companies face an array of hazards, from natural disasters to geopolitical uncertainties and cyberattacks on their digital systems. Global flows and networks offer more "surface area" for shocks to penetrate and damage to spread. Disruptions lasting a month or longer now occur every 3.7 years on average, and the financial toll associated with the most extreme events has been climbing.
- **Value chains are exposed to different types of shocks based on their geographic footprint, factors of production, and other variables.** Those with the highest trade intensity and export concentration are most exposed, including some of the highest-value sectors, such as communication equipment, computers and electronics, and semiconductors and components. Many labour-intensive value chains, such as apparel, are highly exposed to pandemics, heat stress, and flood risk. In contrast, food and beverage and fabricated metals have lower average exposure to shocks because they are among the least traded and most regionally oriented value chains.
- **The interconnected nature of value chains limits the economic case for making large-scale changes in their physical location.** Primarily labour-intensive value chains (such as apparel and furniture) have a strong economic rationale for shifting to new

[42] McKinsey August 2020 Risk, resilience, and rebalancing in global value chains | McKinsey

locations. Non-economic pressures may prompt movement in others, such as pharmaceuticals. Considering both industry economics and national policy priorities, McKinsey estimate that 16 to 26 percent of global goods exports, worth $2.9 trillion to $4.6 trillion, could conceivably move to new countries over the next five years if companies restructure their supplier networks.

- **Operational choices can heighten or lessen vulnerability to shocks.** Practices such as just-in-time production, sourcing from a single supplier, and relying on customized inputs with few substitutes amplify the disruption of external shocks and lengthen companies' recovery times. Geographic concentration in supply networks can also be a vulnerability. Globally, McKinsey find 180 traded products (worth $134 billion in 2018) for which a single country accounts for the vast majority of exports.
- **Building supply chain resilience can take many forms beyond relocating production.** This includes strengthening risk management capabilities and improving transparency; building redundancy in supplier and transportation networks; holding more inventory; reducing product complexity; creating the capacity to flex production across sites; and improving the financial and operational capacity to respond to shocks and recover quickly from them.

What's notable from the McKinsey analysis is that how companies are structured, along with factors such as sector, will impact to a greater or lesser extent on GVC participation. The reality is that some GVCs will be more vulnerable to reshoring or nearshoring than others, depending on factors such as the existing availability of tier one and secondary suppliers, and the complexity and depth of existing supply networks will have a bearing. Some GVCs cannot be fully reshored because critical resources may exist in only one or two locations in the world. Even within sectors, large multinationals will have highly different structures (for example how much they produce in-house as opposed to contracting out) and geographical spread, so it does not necessarily follow that all companies would be affected similarly by the same global or regional level trade shock. Furthermore, without substantial market intervention and trade restrictions, governments have limited direct control on where companies source their inputs, and so the incentives to reshore or nearshore would have to far outweigh the costs of doing so.

The Centre for Economic Policy Research (CEPR) assesses that the decade to 2030 is likely to prove a decade of transformation for international production. In particular it

suggests that the future of GVCs will be characterized by a combination of technology, policy and sustainability factors:

- Technology includes factors such as advanced robotics, artificial intelligence, further digitalisation of the supply chain, and additive manufacturing (3D printing).
- Policy factors include more interventionism and protectionism by Governments in trade and investment policy, along with more regional and bilateral economic cooperation.
- Sustainability factors will be underpinned by policies and regulation, but also market and consumer driven products and processes.

Overall, the CEPR estimates that, although not unidirectional, the overall direction of travel points towards is shorter and less fragmented value chain, with more concentrated value added. There will be downward pressure on global trade in intermediate goods and less on trade in final products. Manufacturing will see some shifts from large scale to smaller investments. There will be continued growth and fragmentation of services value chains, facilitated by advances in communications technology. The sustainability imperative will drive the green economy, and resilience and national security concerns will act as key drivers of GVC diversification.[43]

Regarding technology, the ECB estimates new technologies related to Industry 4.0 have the power to transform and reshape the global organisation of production going forward. While they could lead to further shortening and regionalisation, the overall direction and size of their impact remain ambiguous at this stage.

With globalisation at a crossroads, the future evolution of GVCs is challenging to predict. On the one hand, factors such as technology, converging wages, the sustainability agenda, economic security concerns, more interventionist government strategies all have the potential to shorten or at least reshape and reconfigure global value chains and international trade patterns. As McKinsey points out, the frequency of global shocks has been increasing, and the ability of some companies to continuously withstand shocks on a business-as-usual basis is under question. On the other hand, there are inherent risks to reshoring, including the concentration of risk and increasing exposure to domestic shocks. There are also

[43] Centre for Economic Policy Research (August 2020) Global value chain transformation to 2030: Overall direction and policy implications | CEPR

potentially high or even prohibitive capital costs to moving production, especially in sectors where specialist knowledge and skills, and advanced production processes are critical. Geographically, some critical raw materials essential to facilitating the digital and green transitions are concentrated in certain trading partners, which further impinges on the practicality of reshoring or nearshoring, and also raises questions for the efficacy of bilateral relation strategies that are based on friend-shoring.

### Global policy measures impacting value chains

Policy and economic governance will perhaps ultimately have the most determining impact on GVCs over the next decade by impacting on incentives (and disincentives) for companies in their location decisions, where they source their inputs and how they plug into value chains. Globally, there is clear evidence that economic security and resilience is an increasing priority in industrial strategy. With this are some policies which aim to reduce reliance on international trade for critical industries or to build strategic trade partnerships in order to secure supplies of inputs in strategic sectors.

- In the **United States**, the Inflation Reduction Act establishes ‘Make it in America’ provisions for the use of American-made equipment for clean energy production. The law provides expanded clean energy tax credits for wind, solar, nuclear, clean hydrogen, clean fuels, and carbon capture. The Chips and Science Act aims to revitalise and incentivise semiconductor manufacturing in the US.
- In May 2022, the Japanese Diet passed the **Economic Security Bill** focusing on four areas of economic security — supply chains, basic infrastructure, leading technology and patent publication for sensitive technologies. The law enables the national government to intervene in Japanese companies’ dealings with foreign companies and encourages Japanese companies to diversify supply chains with critical materials, while the government provides funds for diversification if companies meet certain conditions.
- The Economist assesses that **China’s** current trade policies and practices are driven by four overarching priorities: pushing for indigenous innovation, driving self-sufficiency, enhancing national security, and market reform and opening. As China’s relations with the US and its allies deteriorate, links between national security and economic and

industrial policy will grow. As a result, the focus on national security will overshadow the likelihood of radical market reform.[44]

- Within the **European Union**, in June 2023, the Commission launched its European Economic Security Strategy focused on minimising risks arising from certain economic flows in the context of increased geopolitical tensions and accelerated technological shifts, while preserving maximum levels of economic openness and dynamism. In addition, two proposals for regulations in 2022 – the European Chips Act and the European Critical Raw Materials Act – aim to enhance security of supply (both regarding production within the EU and through strategic partnerships) in these sectors which are critical to support the digital and green transitions.
- In addition, in its most recent Trade Policy Review, the European Commission has adapted EU trade policy as reflected in the concept of 'Open Strategic Autonomy'. This essentially encompasses being:
    - Open to trade and investment for the EU economy to recover from the crisis and remain competitive and connected to the world;
    - Sustainable and responsible to lead internationally to shape a greener and fairer world, reinforcing existing alliances and engaging with a range of partners;
    - Assertive against unfair and coercive practices and ready to enforce its rights, while always favouring international cooperation to solve global problems.

These examples of policies, to varying extents, suggest a more assertive and interventionist approach by some governments in international markets are intended. A major risk from Ireland's perspective is that companies based here get caught in the crossfire of escalating tensions. For example unilateral action favouring domestic industry in the interests of national economic security will distort international trade, having a ripple effect which could impact on the supply chains. Strategic alliances in the interests of securing critical supplies may lead to the formation of competing alliances elsewhere, including on a regional basis but perhaps increasingly also on specific issues such as a 'values' basis with regard to issues such as sustainability. In turn, this could possibly lead to a retaliatory trade measure such as sanctions and export restrictions, and escalation of trade tensions.

[44] The Economist (2021): Economic Power Play - Assessing China's Trade Policies

# 2 Profiling Ireland and Global Value Chains

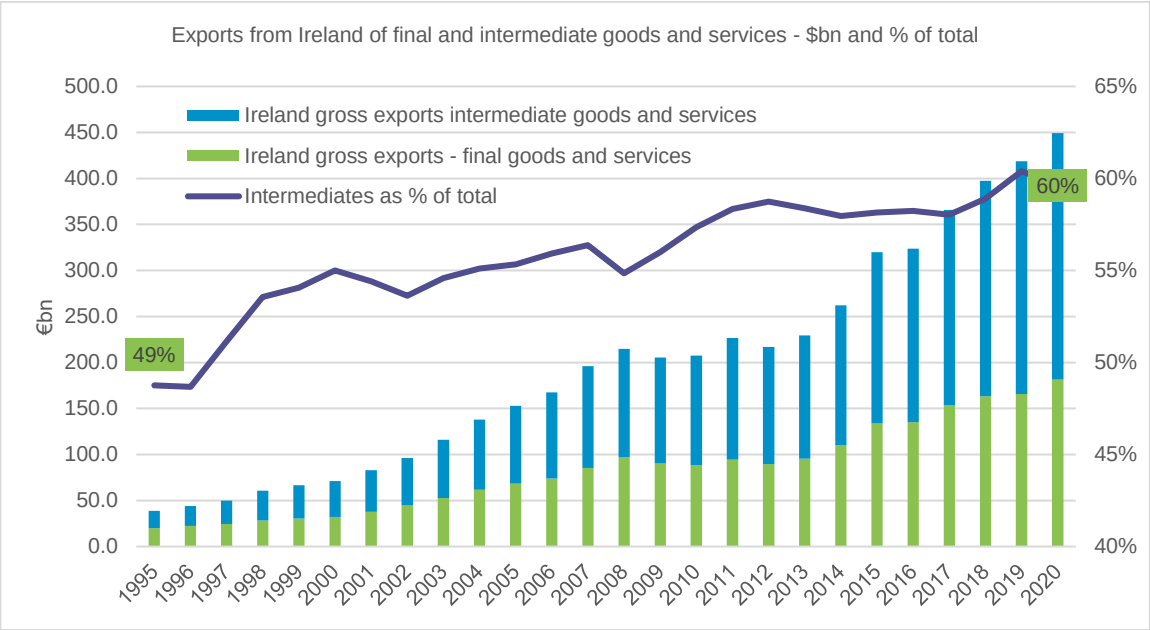
## 2.1 Profile and Trends

This section examines Ireland's participation in GVCs through a number of indicators, including forward and backward linkages.

The economic importance of Ireland's internationally trading sectors cannot be understated. Preliminary estimates from the CSO indicate that in 2023, Ireland exported €564 billion worth of goods and services, with imports of €499 billion, amounting to over €1 trillion euro worth of trade. According to the World Bank, trade as a percentage of Ireland's GDP is 235 percent in 2023, the seventh highest in the world. Employment in exporting companies supported by Ireland's enterprise agencies reached over 535,000 in 2023. This accounts for 20% of total employment in Ireland and approximately 25% of business employment. In 2022, Enterprise Agency companies created €191bn in value added, and spent €8.2 billion on research and development. Importantly, from a value chain perspective, these companies had €73.9bn in expenditures in the Irish economy on wages, materials and services, creating significant domestic economic value and jobs.

In broad terms, it is clear that the nature of trade that Ireland is engaged in has evolved and that Ireland has become more embedded in GVCs over time. The graph below shows that exports have grown significantly in value over time but also that intermediate goods and services now account for the majority (60%) of our exports. In other words, most of the value of what Ireland exports are inputs that go into production of other goods and services.

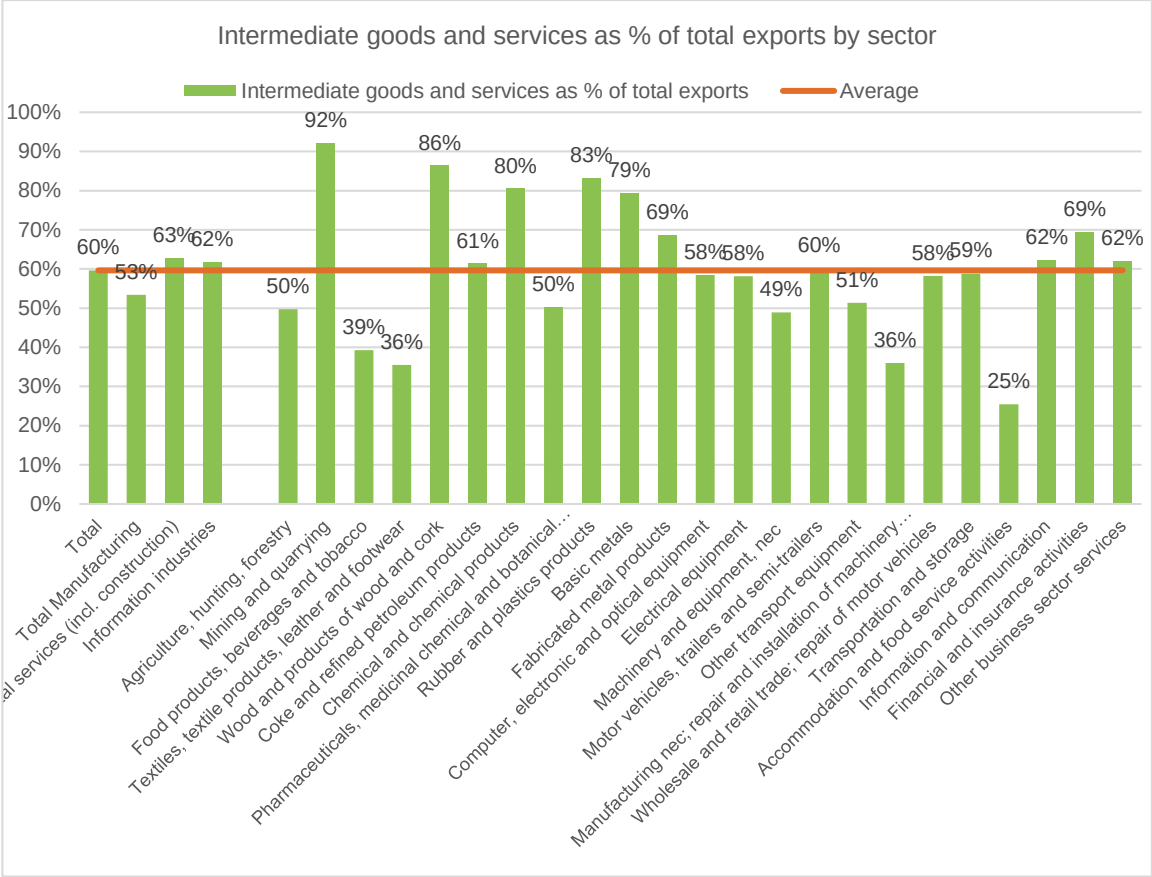
***Figure 8 – Exports from Ireland of final and intermediate goods and services***




Source: OECD TiVa database

Looking across sectors, it is clear that trade in intermediate goods and services varies considerably. Within manufacturing, intermediates account for very high shares of total exports in areas such as mining and quarrying; wood and wood products; chemicals; rubber and plastics; metals. By contrast, intermediates account for a relatively low share of exports in sectors such as food and beverages, textiles and pharmaceuticals indicating a much higher level of finished goods in these sectors. Overall, services sectors tend to be around the average of 60% share or below, reflecting that services are relatively 'stickier' than goods in terms of their mobility, however, sectors such as information and communication and financial and insurance services have above average shares of intermediate exports, reflecting high levels of internationalisation and business-to-business activities in these sectors.

***Figure 9 – Intermediate goods and services as % of exports by sector***



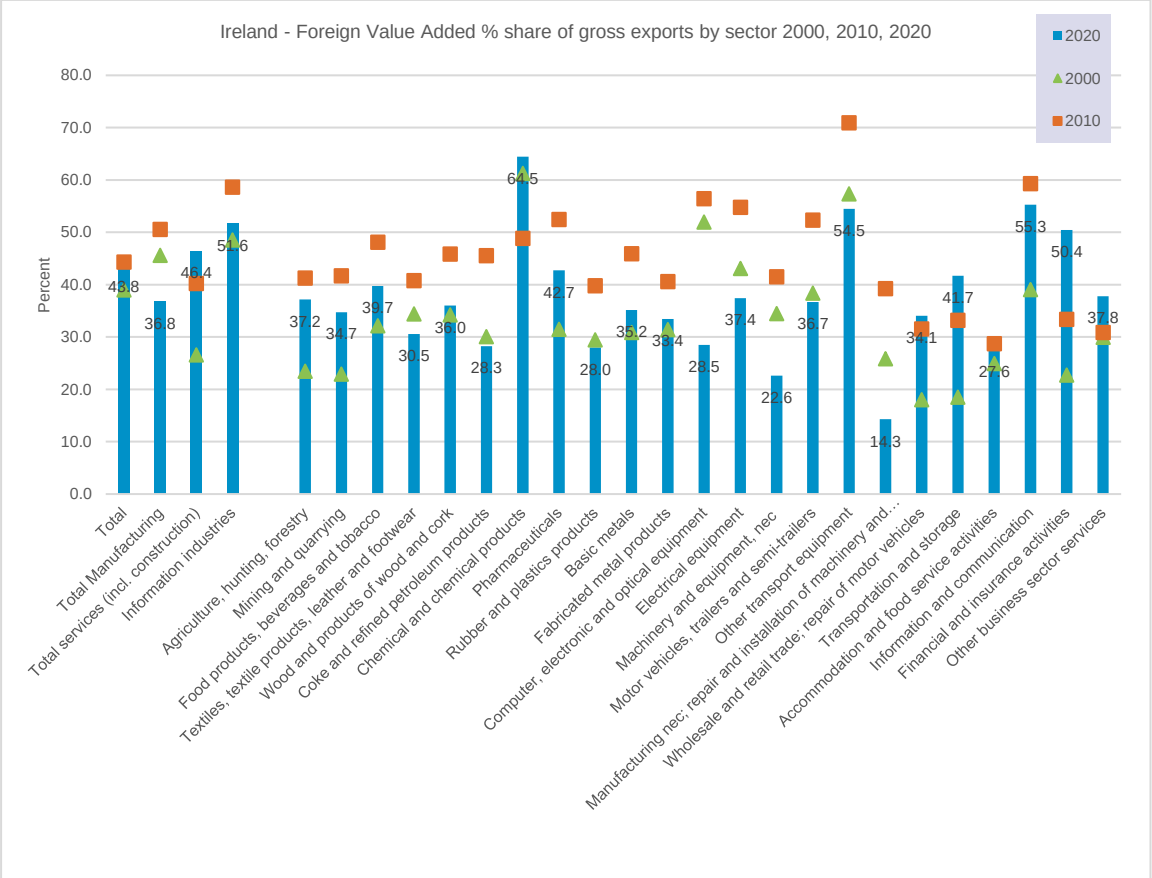

Source: OECD TiVa database

## 2.2 Backward linkages in Global Value Chains

As set out above, in comparative terms, Ireland is heavily integrated in GVCs relative with the FVA share of exports at 43%, almost six times higher than the OECD average and our openness to exporting and foreign direct investment, and is a key indicator of the importance of our backward value chain linkages in Irish exports. There are some interesting developments in the share of FVA in Ireland by sector and over time. In broad terms, the share of FVA in manufacturing has decreased since 2010 across most manufacturing sectors apart from Chemicals, indicating that a greater share of value-added is being generated domestically, indicating the manufacturing base has transitioned to higher value-added activities. In contrast, the share of FVA has grown in services sectors from 2010 to 2020, driven by increases in FVA in transportation and storage and financial and insurance

services, reflecting increased tradability of services, while the share of FVA in exports of Information and Communication services has remained high at over 50 percent of gross exports. This reflects the importance, for example, of our imports of IP and R&D services which support exports in our technology and life sciences sectors.

***Figure 10 – share of foreign value added by sector***



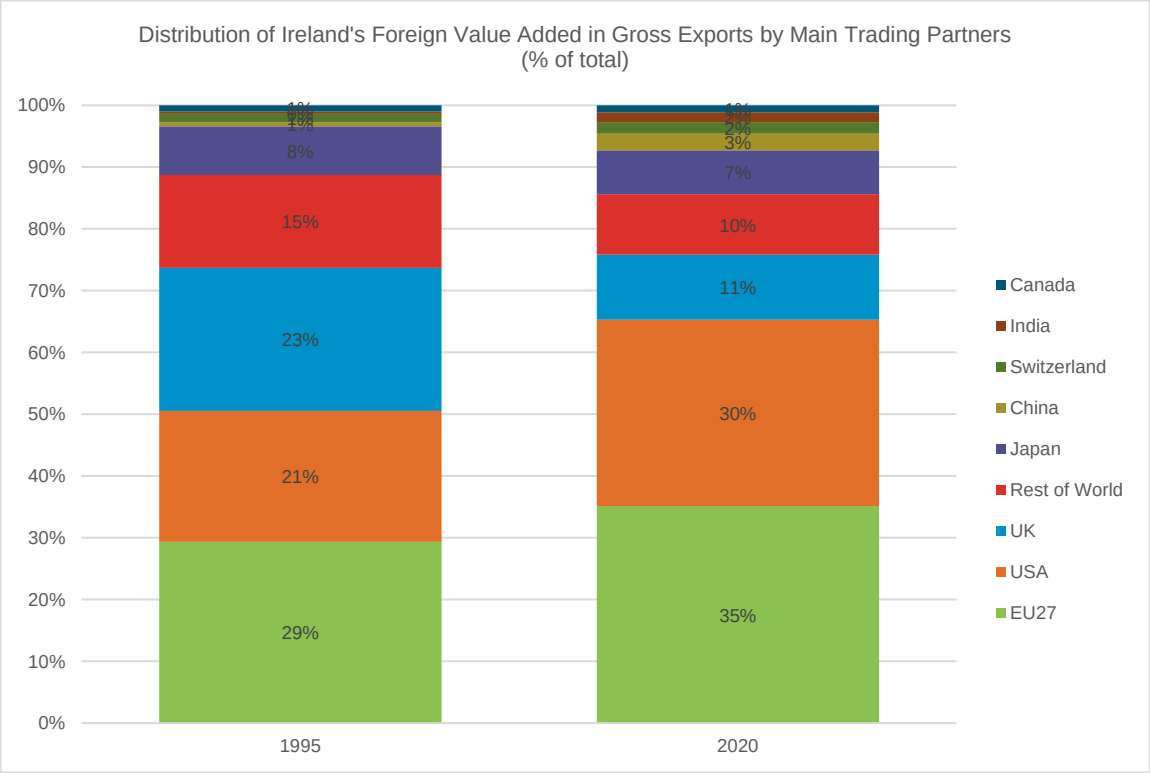

Source: OECD TiVa database

Turning now to look at the main countries that dominate our forward and backward linkages to GVCs, the graph below shows the distribution of our FVA in gross exports by key export partners in 2020 compared to 1995. In other words, it shows the main trade partners that Ireland depends on for inputs to its exports.

It shows a signification change in the composition of where we source inputs for our exports, indicating a much more diverse and globalised picture in line with the developing export and FDI base. There has been a significant decline in the UK in terms of its relative importance

from 23% of total FVA to 11% of FVA. There have been significant increases in the proportion of inputs from the EU (+6%) and US (+9%) in line with the developing of the EU Single Market and increased FDI by US multinational in Ireland. Notably some countries which did not feature strongly in 1995 such as Canada, China, Switzerland and India are now a greater part of our value chain profile in terms of where our inputs come from.

***Figure 11 – Distribution of Foreign Value Added in Ireland exports by Country***

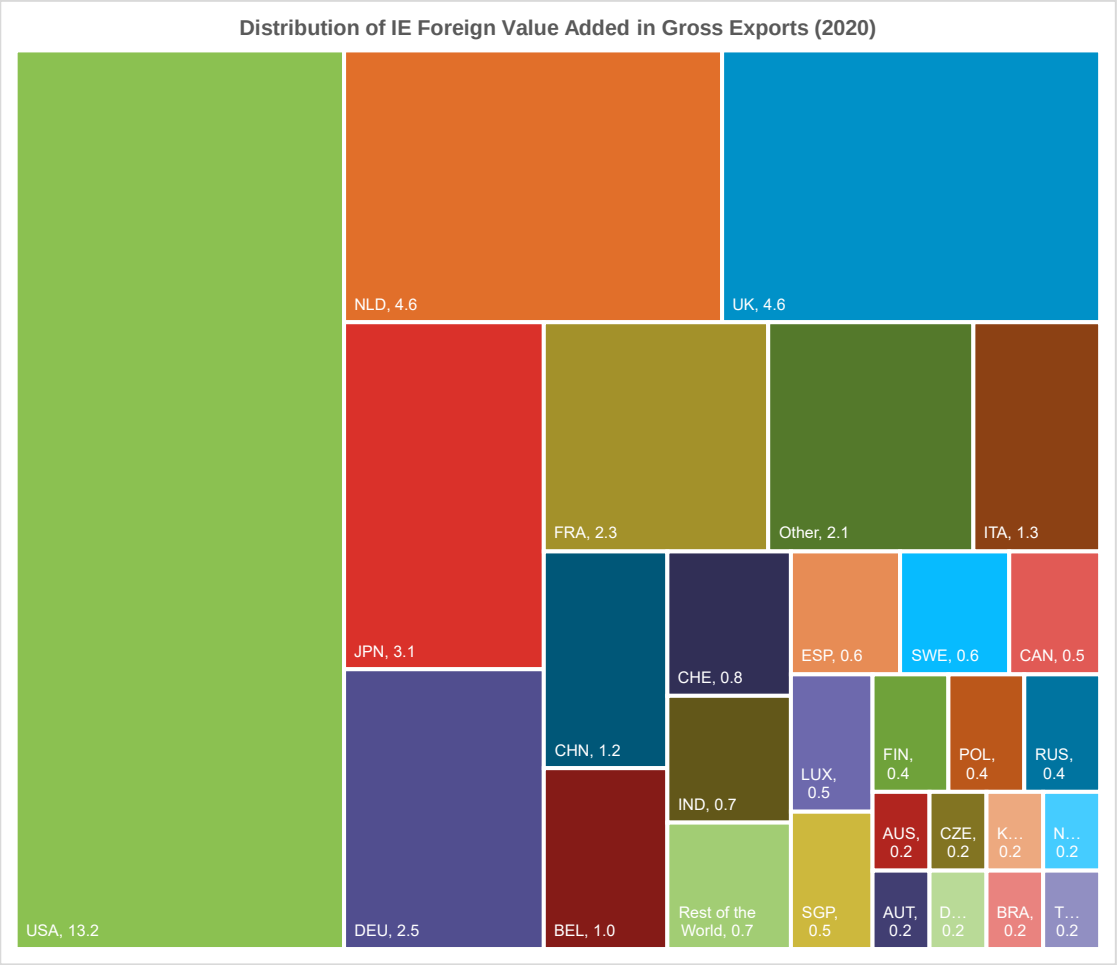



Source: OECD TiVa database

Looking more closely at individual economies on a tree-map shows that the most important country by some distance is the United States, followed by the Netherlands and the UK. Although the UK has declined in relative terms as a source of FVA in our export base, it is still the third highest share of FVA in our exports, indicating it remains a very important source of inputs to our export base. This is an important consideration in the context of Brexit and the potential for trade frictions to arise through divergence between the EU and UK on trade rules. Other important suppliers include Japan, Germany, Italy, France, Belgium, China, Switzerland and India. Although relatively small in share, countries such as Korea, Taiwan, Norway, Russia, and Brazil also feature on Ireland's backward value chain.

In this context, Ireland's export base relies on a highly globalised profile of trade partners for foreign inputs used in exports.

***Figure 12 – Distribution of IE Foreign Value Added in Gross Exports by Country***



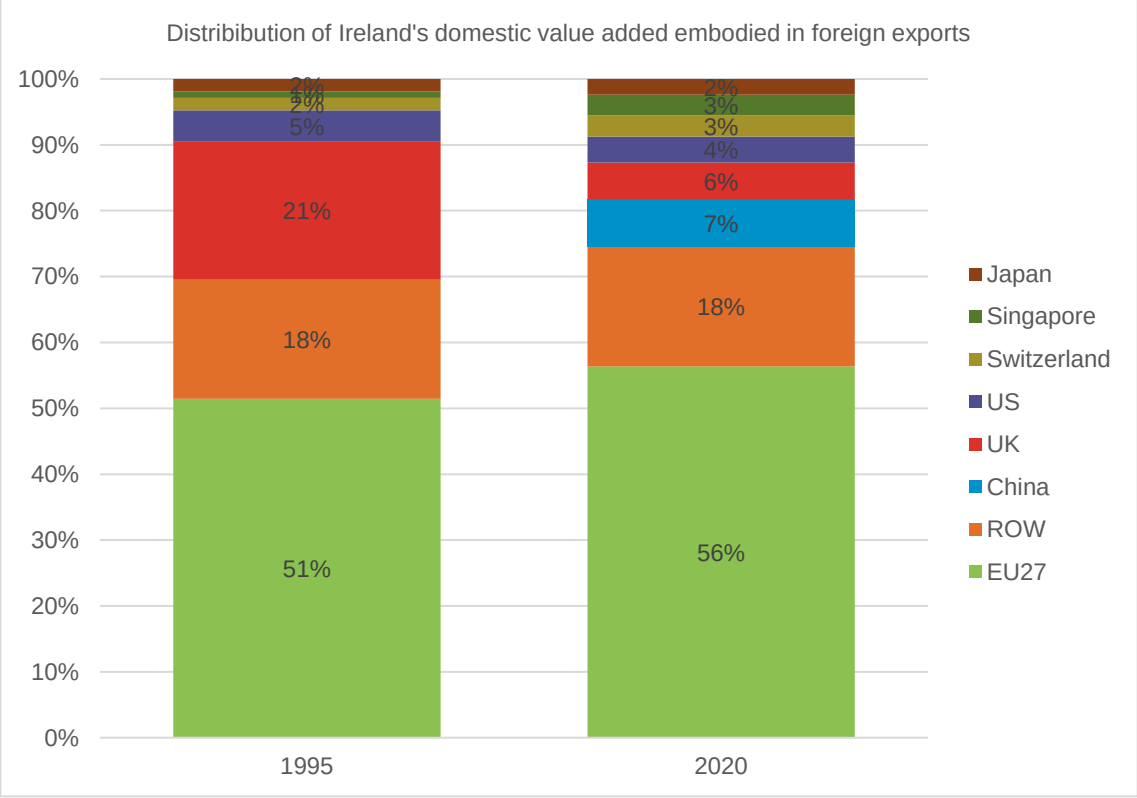

Source: OECD TiVa database

## 2.3 Forward linkages in Global Value Chains

The graph below shows the distribution of Ireland's domestic value added that is embodied in foreign exports. In other words, trade partners that use Irish inputs in their exports. It is a key measure of our forward linkages in GVCs. Overall, the OECD estimates that 12.6% of Ireland's gross exports is value added that is further used by other countries in their exports. The distribution of this value added is shown in the graph below.

As for backward linkages, it shows a significant evolution in the nature of our forward linkages over time. The EU has increased in importance as a user of value added generated in Ireland from 51% to 57% share, reflecting the deepening integration of the Single Market during this time. The UK's share has declined dramatically from 21% to 6% and has been surpassed by China with a 7% share in 2020 compared to zero in 1995. The US has remained relatively constant at between 5% and 4%. Although having relatively low share overall, countries that did not feature prominently in 1995 such as Japan, Singapore and Switzerland have increased in importance over time, indicating that a broader pool of economies use Irish generated value added in their exports.

***Figure 13 – Distribution of Ireland's domestic value added in foreign exports by country***

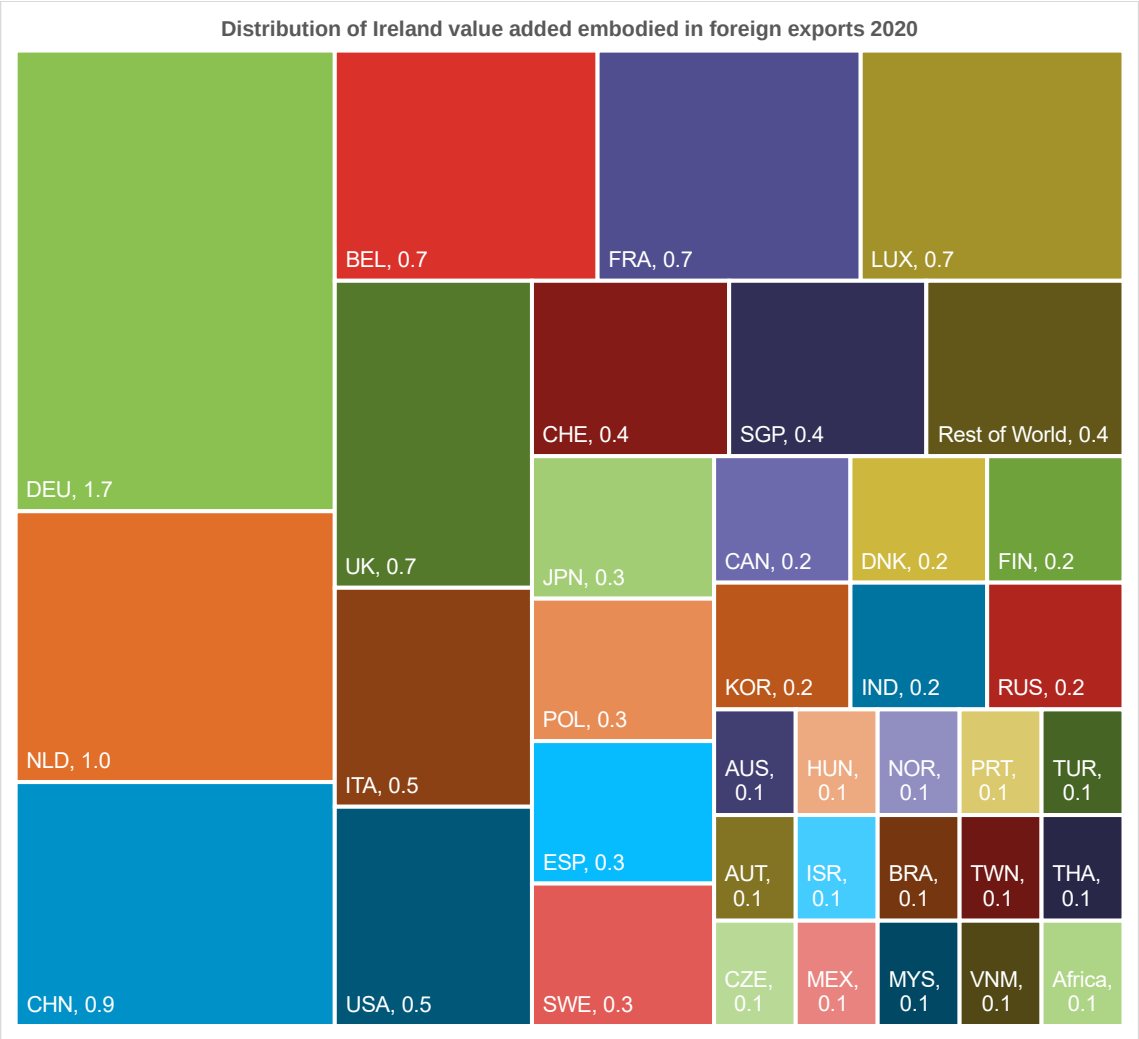



Source: OECD TiVa database

Looking more closely at individual economies that are the main users of value added generated in Ireland in their exports, Germany is the lead country, with roughly equal shares accounted for by China, Netherlands, Belgium, France and Luxembourg. The next tier

includes the USA, Italy, Switzerland, China, Singapore. Overall, at a country level, Ireland's forward linkages are more diverse and less concentrated than our backward linkages. To some extent this reflects both the prominence of different EU member states as export markets and the US as a supplier and source of FDI, however, there are also some non-EU countries such as China, Singapore and Japan that are important for Ireland as destinations which use inputs generated in Ireland in their exports.

***Figure 14 – Distribution of Ireland value added in foreign exports by country***



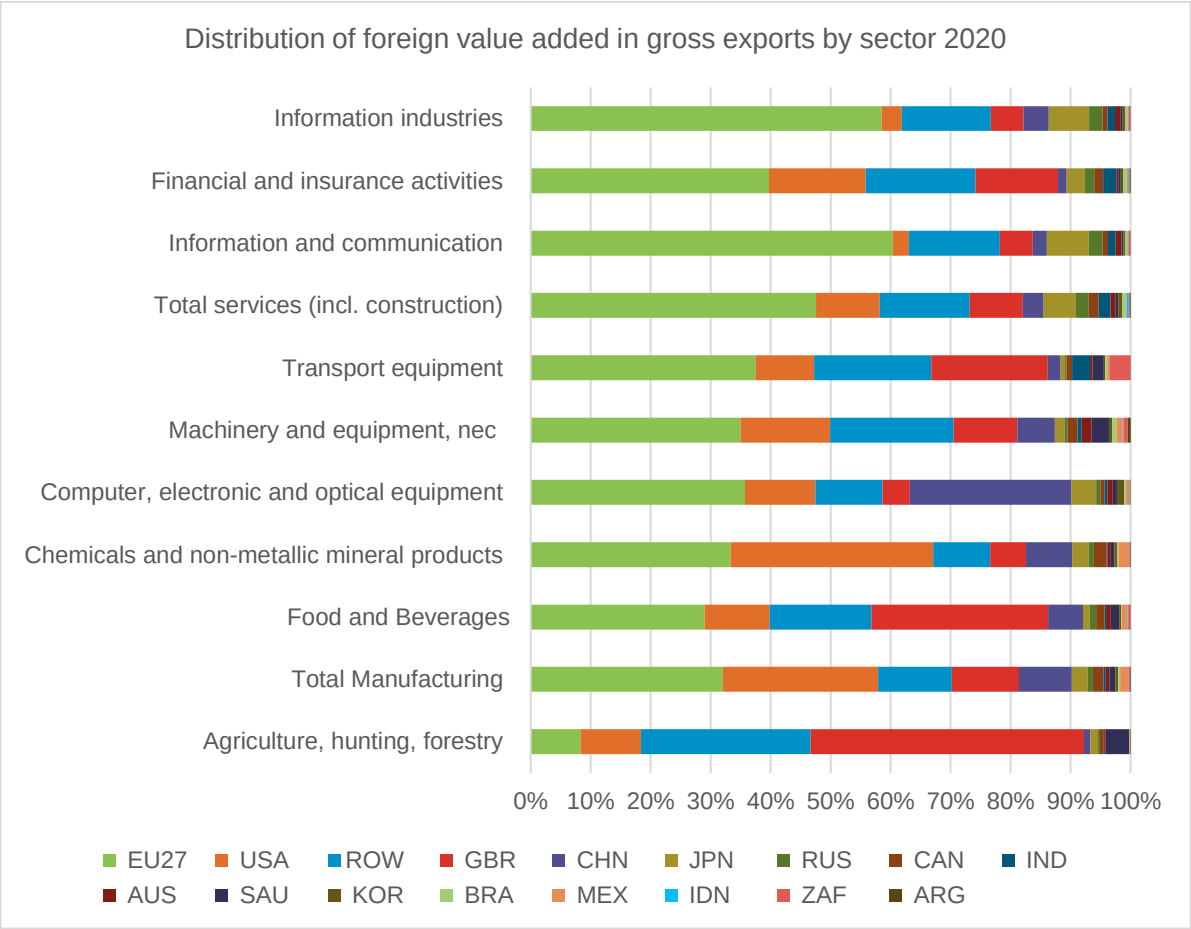

Source: OECD TiVa database

## 2.4 Sector level – backward and forward linkages

To examine backward value chain linkages in specific sectors, we again look at FVA content of gross exports, in other words, the sources of imported intermediate goods and services that are embodied in Ireland's exports.

Looking at the data below for G20 economies, in most sectors the EU, US and UK combined account for the majority of FVA in Ireland's gross exports across almost all sectors. Within agriculture in particular, there is a significant backward linkage with the UK accounting for the majority of FVA in gross exports from this sector. The UK also has a relatively significant share of FVA in the transport equipment sector. Within computer, electronic and optical equipment China represents a significant share of the total FVA in gross exports, indicating a strong reliance on inputs from China in this sector. Within chemicals and non-metallic minerals, the US and EU are the main sources of FVA in gross exports, combining to represent almost 70% of total FVA in exports from this sector. Japan also has a notable presence as a source of FVA in the exports from information industries.

***Figure 15 – Distribution of foreign value added in gross exports by sector***




Source: OECD TiVa database

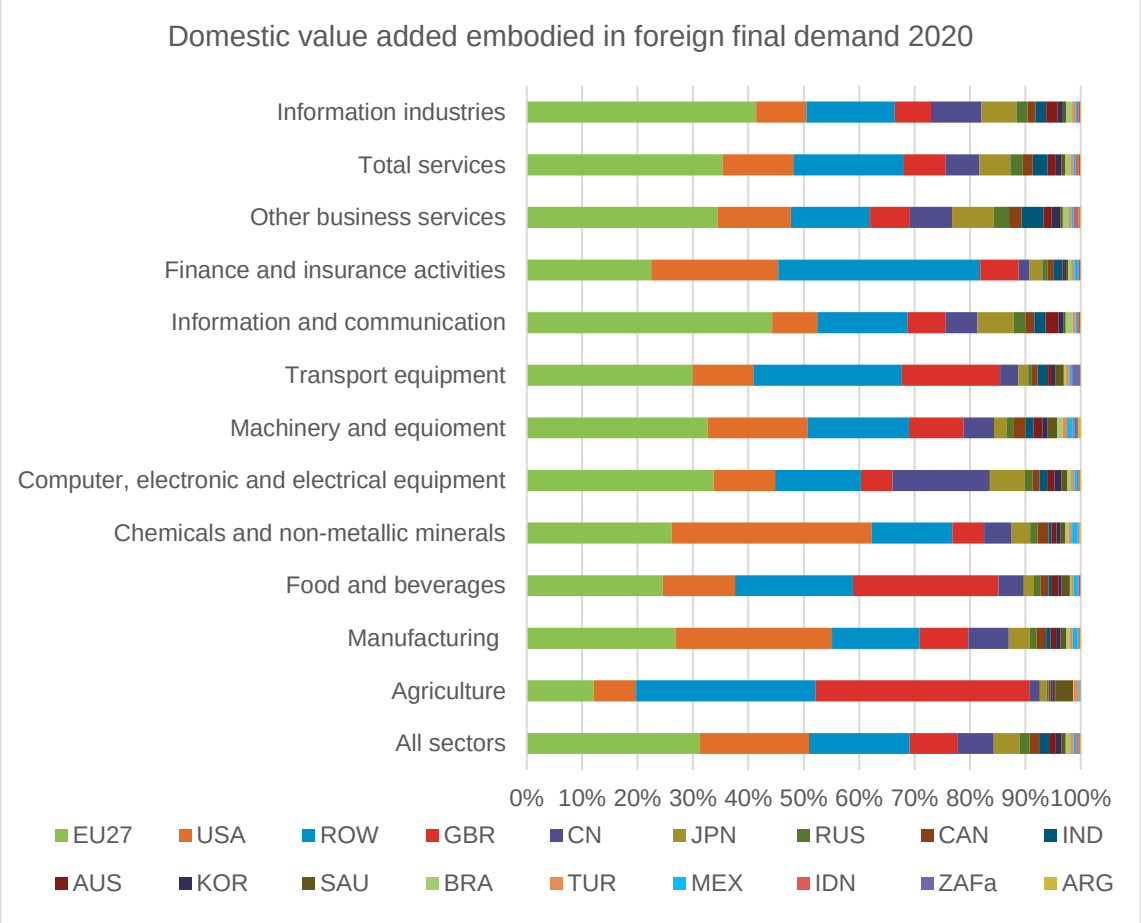
Turning now to look at forward linkages, the main indicator for which sectoral data is available is domestic value added embodied in foreign final demand. This indicator captures the value added that industries export both directly, through exports of final goods or services and, indirectly via exports of intermediates that reach foreign final consumers (households, government, and as investment) through other countries.

The measure reflects how domestic industries (upstream in a value-chain) are connected to consumers in other countries, even where no direct trade relationship exists. The indicator illustrates therefore the full upstream impact of final demand in foreign markets to domestic output. It can be interpreted as 'exports of value added'. In other words, it shows where the

value added that is generated by Ireland's exports is finally consumed regardless of the initial export destination.

Again, the data for G20 economies shows a very strong relationship with the EU and US across both manufacturing and services sectors. In particular, within the chemicals sector, there is a very strong forward linkage to the US, reflecting the importance of this market as the ultimate consumer of value added generated in Ireland. Similarly, in the agriculture and food and beverages sectors, the UK is the single largest consumer of value added generated in Ireland and combined with the previous indicator shows a depth of both forward and backward linkages with this market. China is relatively important for the computer, electronic and electrical equipment, which likely reflects Ireland's supply of ICT goods such as semiconductors to electrical products manufactured in China. The EU is a particularly important market for ICT services, consuming more than 40 percent of value added generated in Ireland, reflecting Ireland's place as a European hub and headquarters for many ICT companies.

***Figure 16 – Distribution of Ireland's domestic value added in foreign final demand by sector***

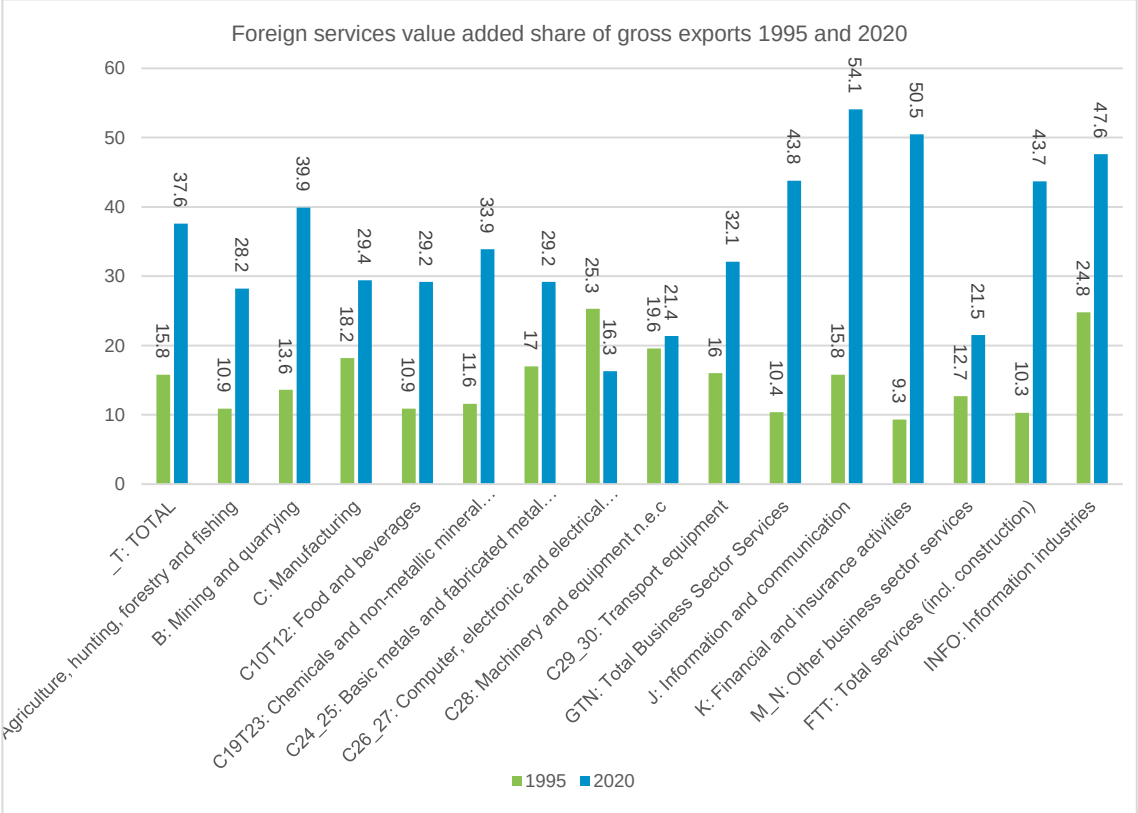



Source: OECD TiVa database

Another notable feature of Ireland's participation in GVCs is the growing role of services. The graph below shows the share of foreign services value added as a share of Ireland's gross exports in 1995 compared to 2020. Across all sectors, the share of foreign services value added in gross exports has more than doubled over 25 years from 15.8 percent in 1995 to 37.6 percent in 2020. As would be expected, services sectors tend to have higher shares of foreign services value added in gross exports, particularly Information and Communication services and Financial and Insurance services having over 50 percent share of foreign services value added in Ireland's gross exports. This reflects the significant presence of multinationals in these sectors and their use of services produced in other countries (for example IP, R&D) as inputs to exports in Ireland. However, it is also clear that services have

become more important over time in the manufacturing sector, in 2020 accounting for an estimated 29.2 percent of share of value added in Ireland's gross exports overall, with foreign services value added in sectors such as chemicals accounting for 34 percent of gross exports from Ireland, reflecting the need for significant services inputs such as R&D in this sector for production and exports. Overall, the trend shows an increased tradability of services over time across both manufacturing and services sectors, which greatly broadens the possibilities for the types of activities that can be targeted by Irish based companies in GVCs.

***Figure 17 – Foreign services value-added share of gross exports 1995/2020***



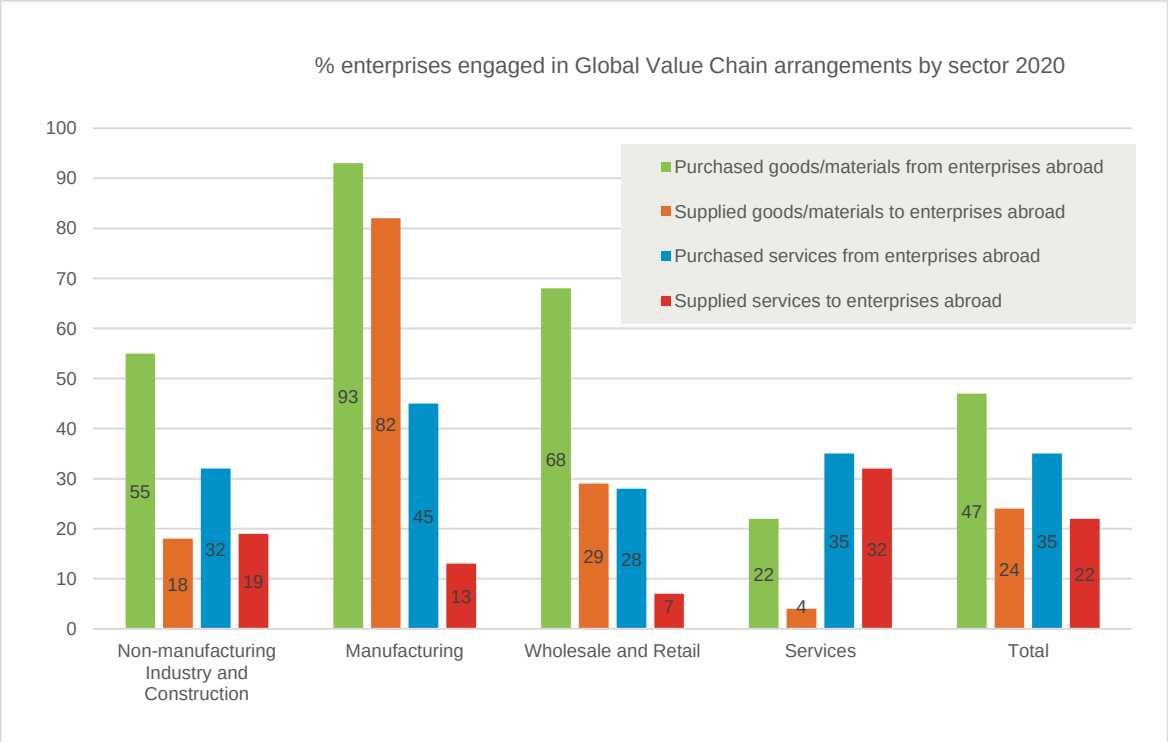

Source: OECD TiVa database

## 2.5 Company level data

Focusing now at the company level, a CSO survey published in 2022 measured the level of participation by companies based in Ireland in GVCs. The headline results show that almost

half (47%) of enterprises purchased goods/materials from abroad in 2020 while 24% supplied goods/materials. More than a third (35%) purchased services while 22% supplied services.

***Figure 18 – percentage of Irish enterprises engaged in global value chains***




Source: CSO

The key results of the survey include:[45]

- More than nine in ten (93%) **Manufacturing** enterprises purchased goods/materials from abroad while 82% supplied goods/materials. Manufacturing also had the highest proportion of firms (45%) purchasing services from abroad. Almost a third (32%) of enterprises in the **Services** sector supplied services abroad in 2020.
- Almost four in ten (37%) enterprises indicated that they purchased goods/materials from the **United Kingdom**, while 35% purchased from the **European Union**. Almost one in

[45] Global Value Chains 2021 - CSO - Central Statistics Office

ten (9%) enterprises purchased from a European country outside the EU and UK, while 21% purchased from the **rest of the world**.

- **Raw materials** used in the firm's own production process (21%) and machinery & other technical equipment used by the business (20%) were the most common purchases. Products designed by another company for resale on domestic or foreign markets (7%) was the least reported type of purchase.
- A quarter (25%) of enterprises indicated that they **purchased services** from the United Kingdom, while 24% purchased from the European Union (EU27, excluding Ireland). ICT services (16%) and distribution & logistics (12%) were the most common purchased services from enterprises abroad. Research and Development (4%) was the least reported type of purchase.
- Almost a quarter of enterprises in Ireland indicated that they **supplied goods/materials to enterprises abroad**, of which 13% said they supplied final goods designed by the company for resale, followed by final goods designed by another company for resale (6%). Machinery & other technical equipment used by own customers abroad was the lowest proportion of goods/materials supplied abroad (2%). The UK (19%) had the highest proportion of suppliers followed by the EU (17%). Less than one in ten enterprises (7%) supplied to other European countries while 13% supplied to the rest of the world.
- More enterprises indicated that they **supplied services** to the United Kingdom (16%) and the European Union (EU27, excluding Ireland) (15%). Other support functions (7%), ICT services (6%) and administrative & management functions (5%) were the most common services supplied abroad. Research and Development (2%) was the least reported service supplied to enterprises overseas.
- Almost half (47%) of enterprises said cancellation of orders/decline in incoming orders from domestic customers due to **COVID-19** has impacted them. A decline in orders from customers abroad impacted 34% of enterprises.
- COVID-19 impacted GVC arrangements both home and abroad. Due to COVID-19, more than two in five (44%) enterprises had difficulty acquiring raw materials or intermediate products from suppliers domestically, while 40% said they had difficulty with suppliers from abroad.
- Over half (54%) of enterprises have been impacted by an increased regulatory burden due to **Brexit**. More than two in five (43%) enterprises reported that Brexit made it

difficult to acquire raw materials or intermediate products from suppliers in the UK, while 30% had difficulty transporting goods produced in the UK back to the enterprise or transporting goods to final customers.

## 2.6 Product level data – trade dependencies

The Expert Group also made an initial assessment of Ireland's trade dependencies using CSO product level data. Trade dependency analysis is of growing interest to many countries as a means of assessing potential risks and vulnerabilities to the supply of critical factors of production. It has been driven by various concerns such as rising geopolitical tensions and overreliance by some countries on China as a source of sensitive inputs or goods; energy and food inflation caused by the Russian invasion of Ukraine; and product shortages and disruptions to supply chains due to COVID-19. Strategies to reduce trade dependencies and foster security of supply include, for example, the US Inflation Reduction Act which has the stated aim to "build more resilient, secure and trusted supply chains"[46] and the European Economic Security Strategy which focuses on "minimising risks arising from certain economic flows in the context of increased geopolitical tensions and accelerated technological shifts, while preserving maximum levels of economic openness and dynamism".[47] Longer term concerns around critical materials to support the digital and green transitions are also of interest. Recent EU legislation such as the Chips Act, the Critical Raw Materials Act and Net Zero Industry Act also reflect the priority that the EU has attached to mitigating risks associated with the supply of certain strategically sensitive or critical products.

Since 2021, spurred by the COVID-19 pandemic, the European Commission has undertaken a number of analyses on strategic dependencies and capacities. The initial analysis included a bottom-up quantitative mapping using external trade flows for more than 5,000 products.[48] This analysis identifies 137 products where the EU can be considered highly dependent on imports from third countries (representing about 6% of the extra-EU import value of goods). The three main foreign sources of EU import value for these dependent products are China

[46] US Inflation Reduction Act One Year In Fact Sheet
[47] An EU approach to enhance economic security (europa.eu)
[48] Staff working document - Strategic dependencies and capacities | European Commission (europa.eu)

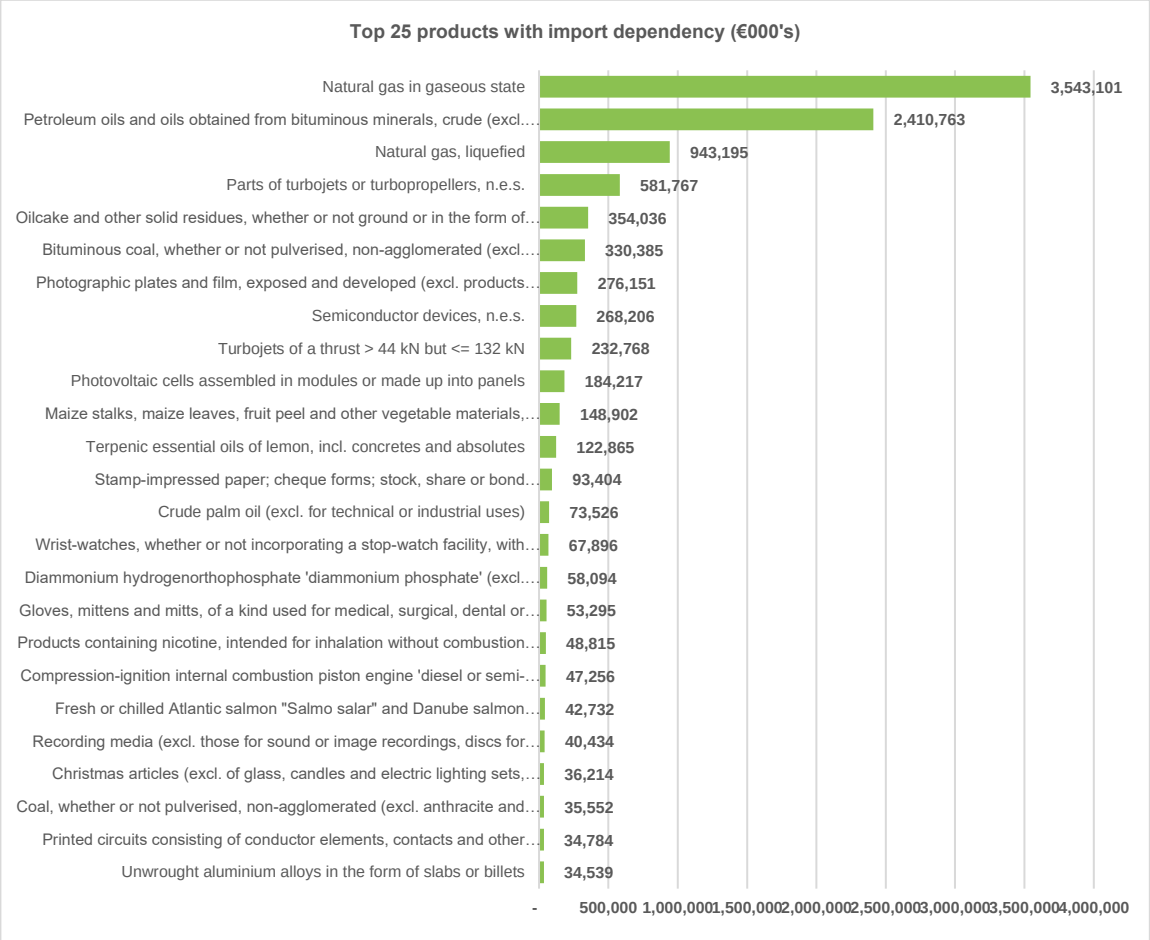
(representing about half of import value), Vietnam and Brazil. The dependent products are situated mainly in the energy intensive industries ecosystem (with 99 dependent products identified, including raw/processed materials and chemicals), as well as in the health ecosystem (including active pharmaceutical ingredients and other health related products) and other inputs and products that are relevant to support the green and digital transformation. Out of the 137 products identified as dependencies in the most sensitive ecosystems, 34 (representing 0.6% of extra-EU import value of goods) could be considered as potentially more vulnerable given their possibly low potential for further diversification as well as substitution with EU production.

Analysis undertaken to inform the work of this Expert Group, the initial analysis by the European Commission which identified the 137 products was mirrored for Ireland, applying the Commission methodology to CSO trade data for 2022. The methodology involves the application of three steps to determine market concentration, market share and substitutability of product imports.

1 Concentration of Ireland's imports from extra EU sources. This is measured using a Herfindahl Hirschman Index with a threshold >0.4, or on average, the product comes from 2.5 or less countries.
2 The market share indicator measures the importance of extra EU imports in total demand (Extra Ireland Imports / Total Irish Imports). Threshold >0.5, or more than 50% of imports are from outside the EU.
3 The substitutability indicator looks at extra EU imports vis-a-vis EU production (Extra EU Import Value / Total EU export value). Threshold >1, or the EU exports more of the same than is imported. This is an indicator of whether or not Ireland can substitute from within the Single Market.

This methodology was applied initially to the list of 8,900 products (CN-8 level) from CSO. A total of 655 products met initial criteria for a trade dependency. The value of these products amounted to €11.1bn in 2022 or 7.9% of total goods imports of €141.3bn. The products are relatively concentrated in value terms with 170 products being greater than one million euro in value and accounting for 99% of total value. Furthermore, the top 25 products account for 91 percent of or €10.06 billion of the total value. These products are graphed below.

***Figure 19 – Top 25 products with import dependencies 2022***



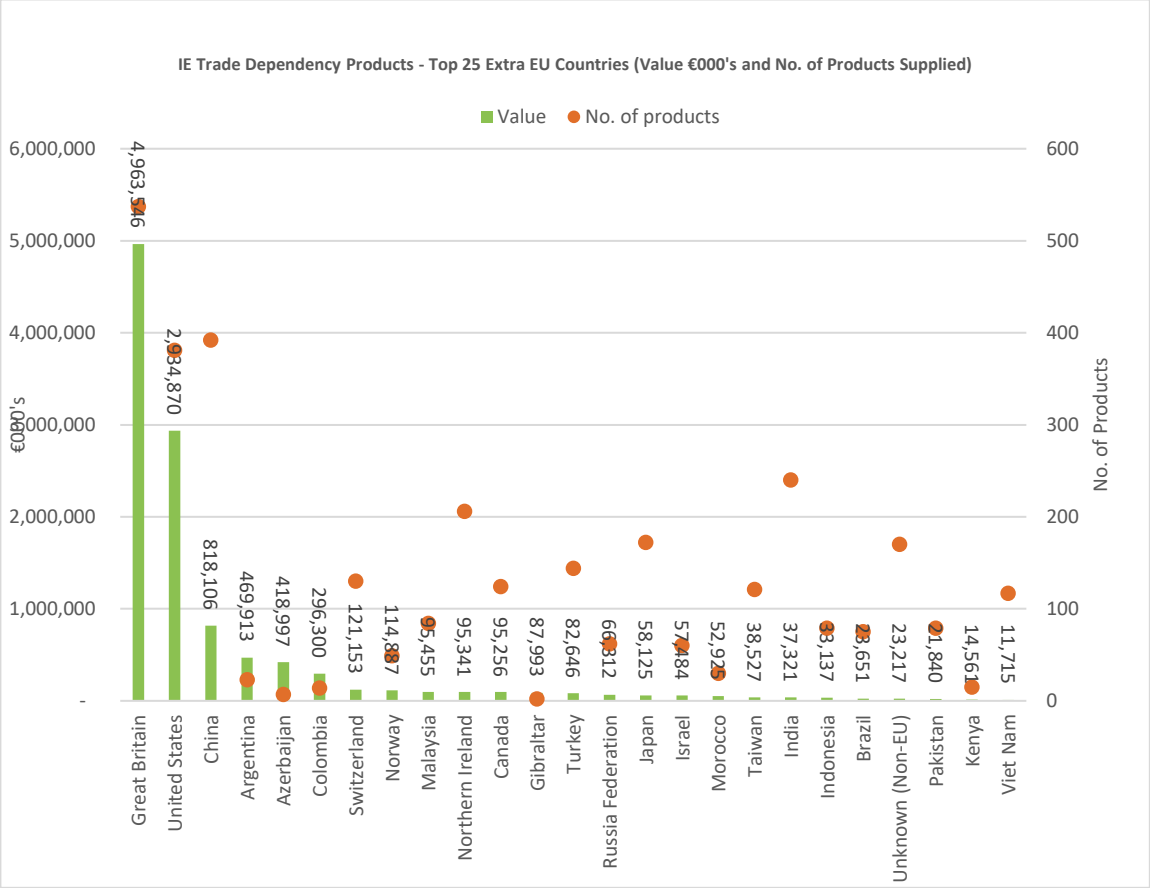

Analysis based on CSO data

The top 25 products include many which are of strategic economic and social interest to Ireland, particularly in the area of energy (gas, petroleum, coal), fertilisers/animal feed (oilcake, diammonium phosphate, maize), semiconductors, solar panels (photovoltaic cells), palm oil, surgical gloves, aluminium, airplane parts etc. There are also arguably other less important products included such as wristwatches, nicotine products and Christmas articles.

Turning to look at the top 25 markets where these products come from, it is clear that it is the UK (€4.94bn) and the US (€2.93bn) which account for the most significant trade dependencies with a significant gap to China (€818m); Argentina (€470m) and Azerbaijan (€418m). From the UK, the largest value products are in gas and petroleum, which reflects Ireland's dependency on the UK for fossil fuel energy. The main trade dependencies on the

US include petroleum, airplane parts and semiconductors. From China, the main products include solar panels, surgical gloves, recording media and Christmas articles.

***Figure 20 – Trade dependencies by value and no. of products (2022)***



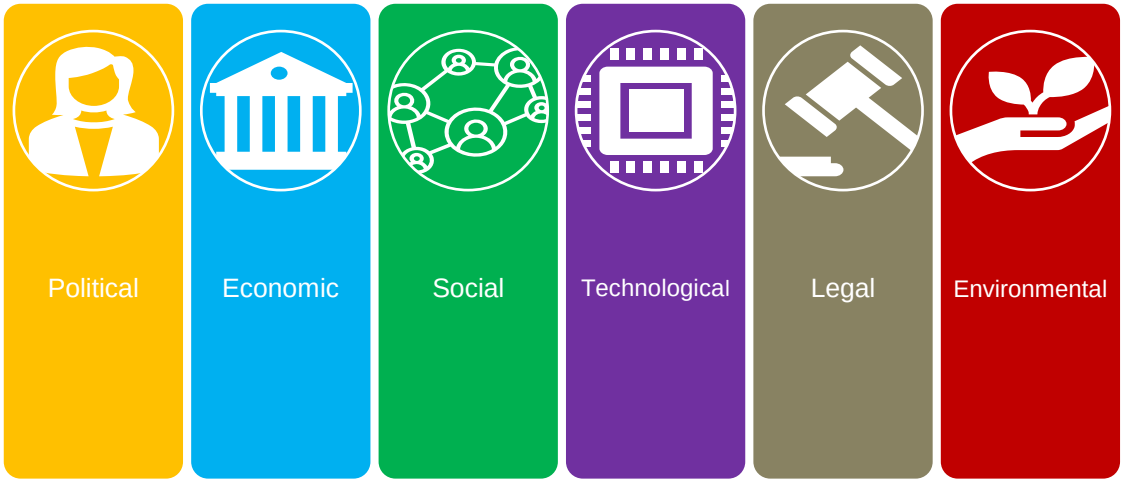

Source: Analysis based on CSO data

Overall, the analysis indicates that Ireland's import dependencies are relatively concentrated on relatively few products and markets. However, there are a number of important caveats to the analysis. First, it represents a snapshot in time. Some products may have significant variability, for example, the demand for surgical gloves could change dramatically in response to another pandemic. Secondly, the products that may be of concern today will not necessarily be the same as those increasingly needed in the future, for example, critical raw materials to support the green transition. For example, Ireland has very high ambitions in wind energy and will have to rely on secure supply of the relevant materials to build and maintain this infrastructure. Third, the analysis is only based on extra-EU trade and has

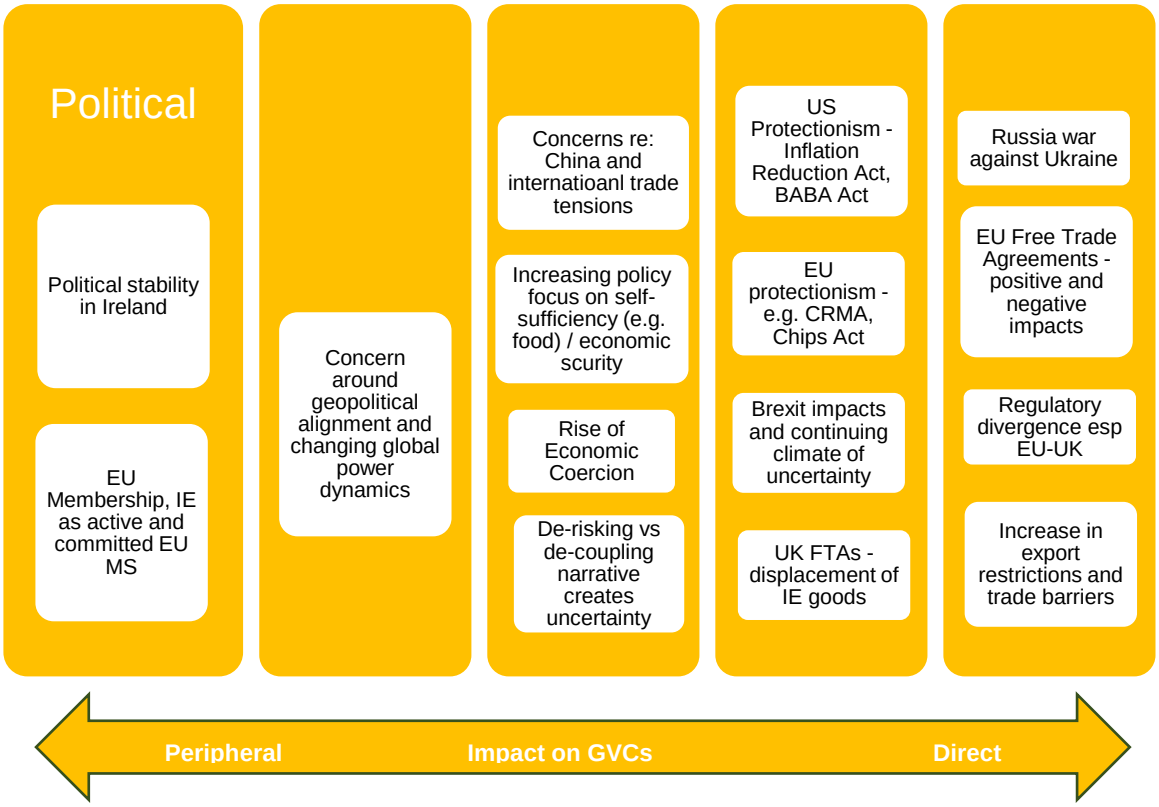
assumed that Ireland can substitute from within the Single Market. In reality, Ireland will also be competing with many EU member states for many of the same products (for example, car batteries, semiconductors, solar panels). Given these concerns, a more in-depth assessment including qualitative assessments with industry to identify the most sensitive products may be worth undertaking and should include both import and export dependencies. This is explored further in the recommendations.

# 3 PESTLE Analysis of Ireland and Global Value Chains

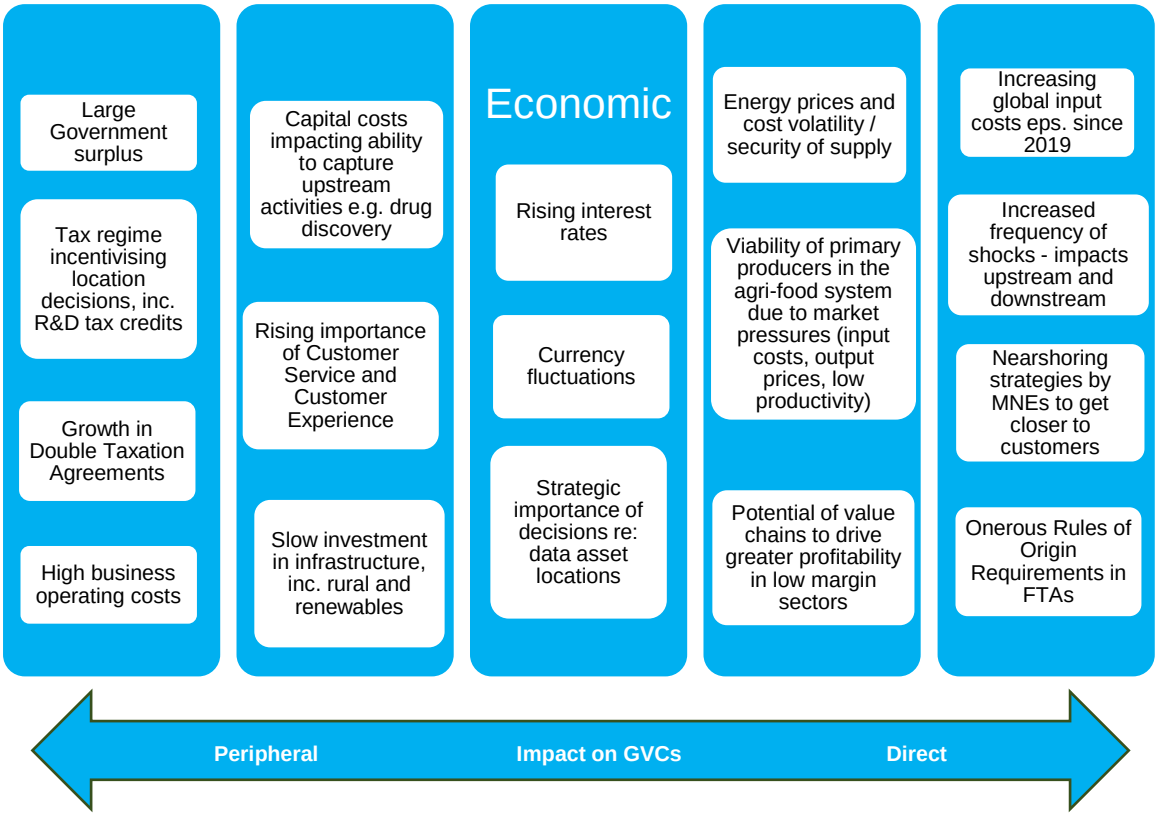
As part of its qualitative work, the Expert Group undertook a 'PESTLE' analysis to consider the major Political, Economic, Social, Technological, Legal and Environmental issues likely to influence the shape of GVCs into the future and which have most importance for Ireland. The issues were further placed on a scale in terms of their direct or peripheral impact on GVCs. The purpose of this analysis was to identify the major strategic issues impacting on GVCs from the perspective of industry stakeholders. Section 4 examines specific sector strengths and opportunities in global value chains.



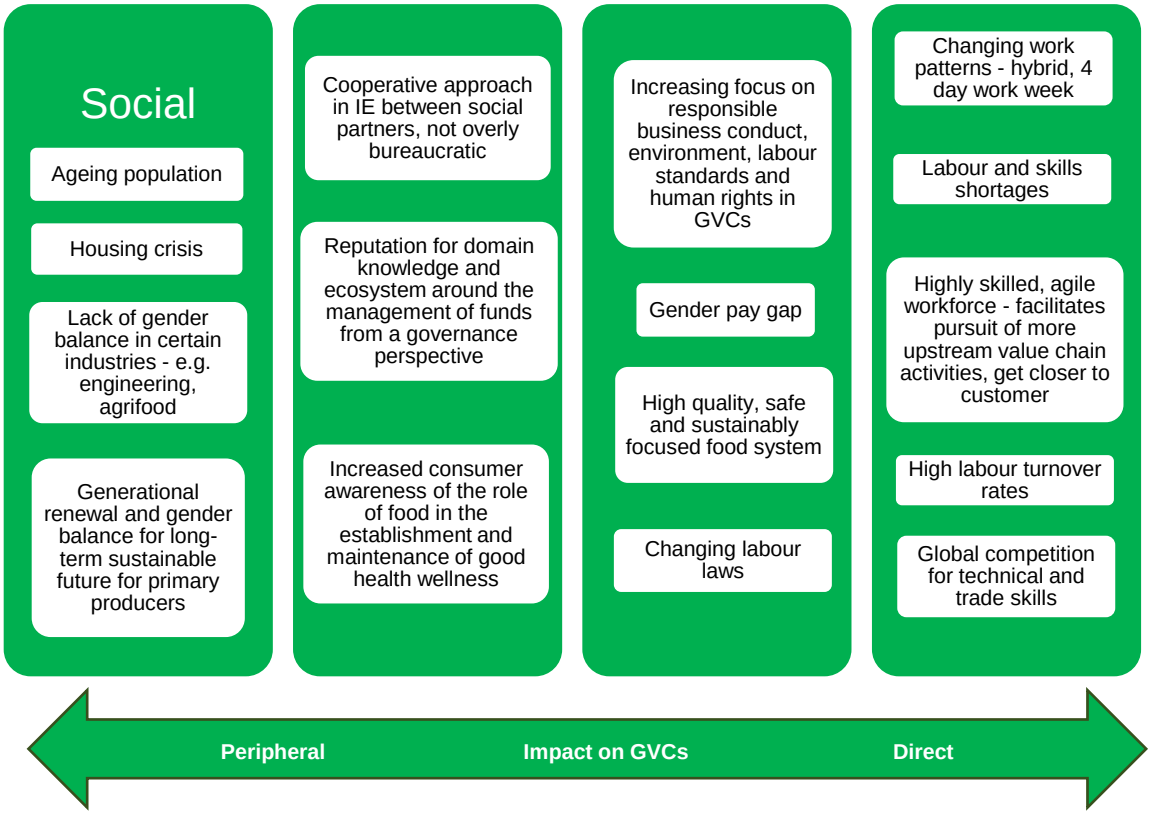

The most salient **political** issues identified included the Russian invasion of Ukraine; the opportunities and impacts of EU Free Trade Agreements; regulatory divergence with the UK post Brexit; the global increase in export restrictions and other trade barriers; the US Inflation Reduction and Build America, Buy America Acts; the threat of increasing protectionism, especially within the EU; along with general concerns around increasing focus on economic security; economic coercion policies; and general geopolitical uncertainty. Political stability in Ireland along with EU membership were highlighted as important factors which support Irish companies to participate in GVCs.



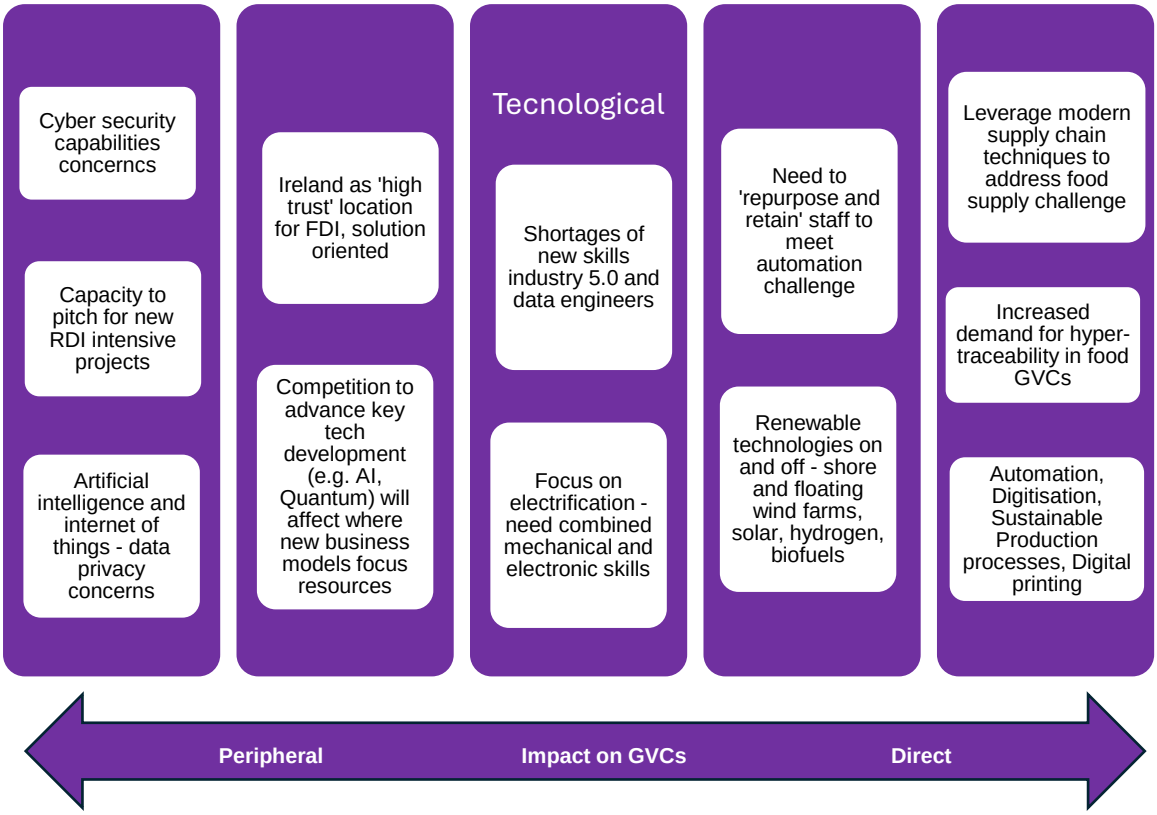

**Economic** issues identified include increasing input costs; price and market volatility; low productivity in some sectors; increased frequency of shocks; nearshoring strategies; rules of origin requirements in FTAs; energy prices; rising interest rates; asset location decisions; impact of increasing capital costs on upstream activities (e.g. R&D); and the need to address infrastructure deficits as a matter of priority. Positive economic factors supporting value chain participation include the potential of value chains to drive profitability in low margin sectors, an attractive and predictable corporate tax regime and recognition of the increasing importance of the customer experience.



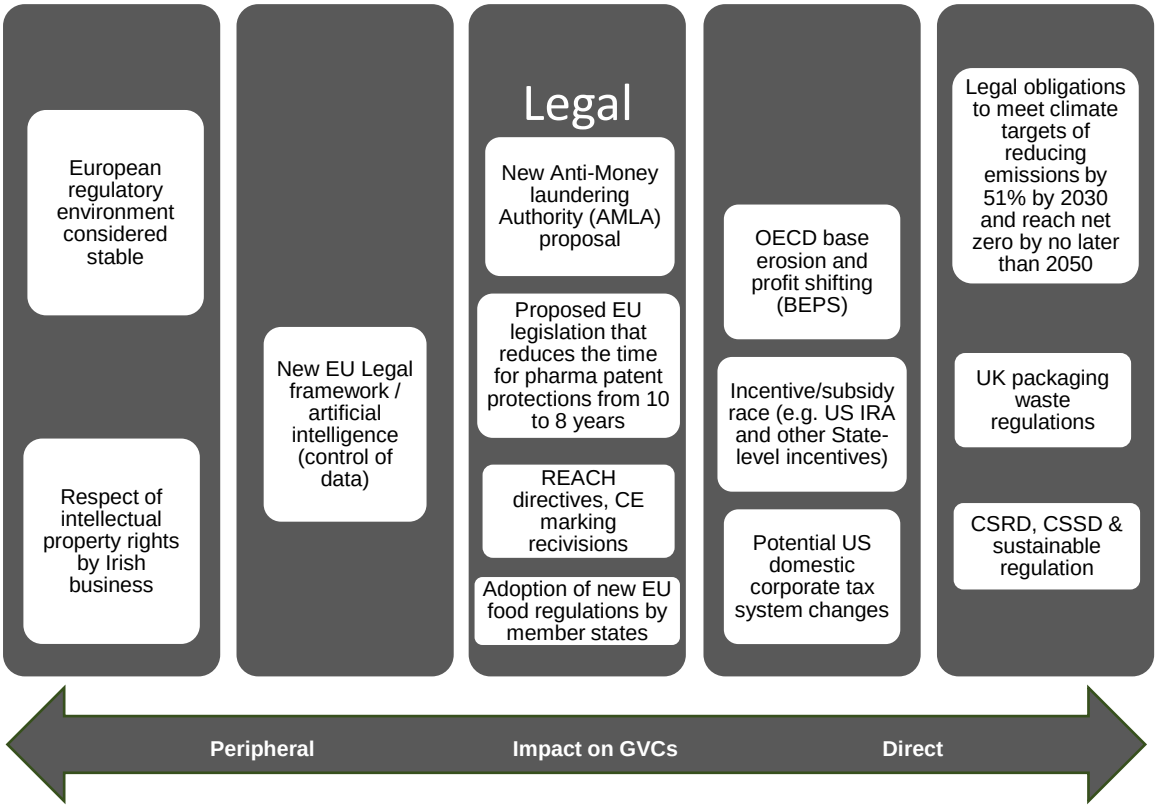

A range of **social** challenges were also identified by stakeholders influencing GVCs, including global competition for technical and trade skills; skills shortages; high labour turnover rates in some sectors; changing work patterns; increasing compliance requirements for companies regarding responsible business conduct and sustainable development; the gender pay gap; changing labour laws; lack of gender balance in certain industries (e.g. engineering, agrifood); ageing populations and housing supply. Social factors which facilitate value chain participation include the highly skilled and agile workforce which enables pursuit of higher value added and upstream activities; proximity to the customer base; cooperative approach between social partners; reputation for domain knowledge; and increased consumer awareness regarding health and wellness.



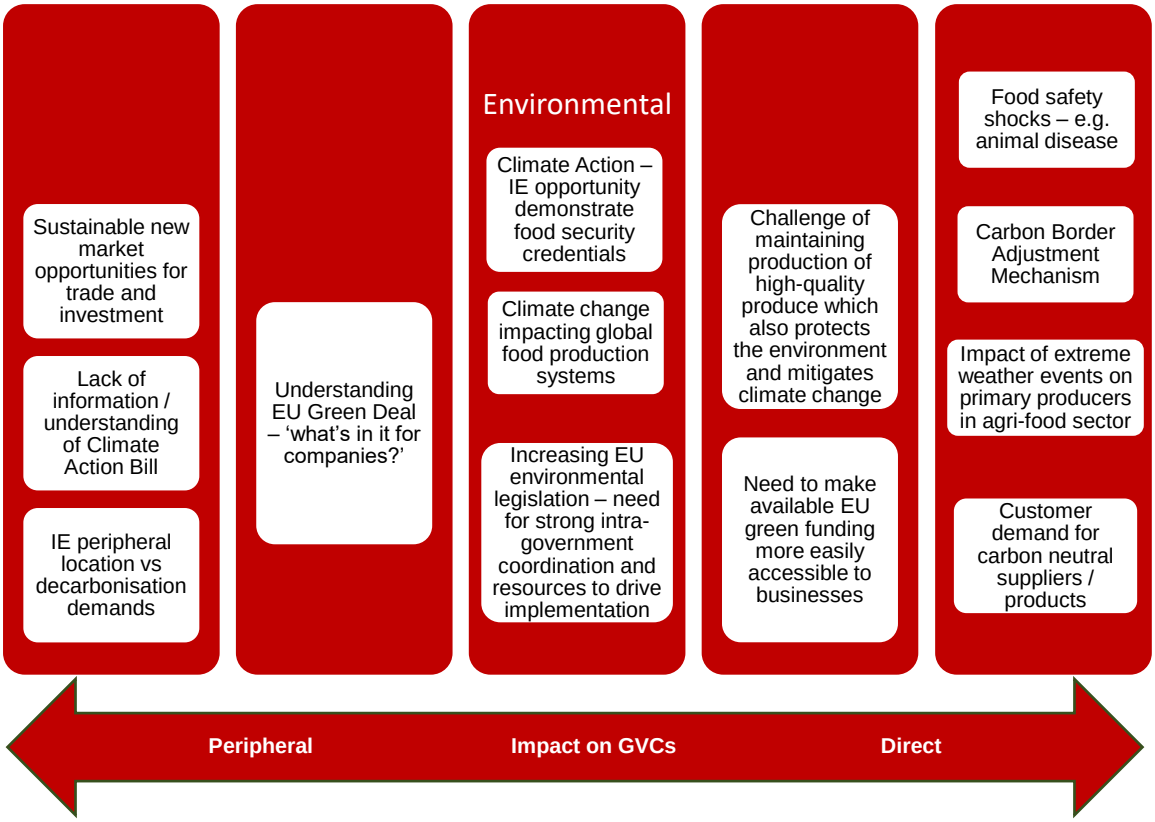

**Technological** factors highlighted by stakeholders shaping value chains include automation and digitisation; digital printing; sustainable production process; demand for food traceability; renewable technologies and biofuels; shortages of skills in areas such as industry 5.0/data engineering; proliferation of AI and Internet of Things; data privacy and cyber security concerns and RDI capacity. Developments in AI and Quantum technologies will affect where new business models focus resources. Other technological factors supporting value chains include Ireland as a high trust and solution-oriented location for FDI.




In the **legal** arena, issues likely to impact on participation by Irish companies in GVCs include legal obligations to meet climate targets; UK packaging and waste regulations; new compliance requirements in responsible business legislation such as the Corporate Sustainability Reporting Directive, the Corporate Sustainability Due Diligence Directive and the Anti Money Laundering Act; OECD Base Erosion Profit Shifting (BEPS) rules; potential subsidy races in key sectors (for example, the impact of the US Inflation Reduction Act on other countries); potential changes to the corporate tax system in the US; impacts of reduced time limits on pharma patent protection; the REACH regulation and changes to CE marking requirements; EU regulatory developments in areas such as food, the environment, and artificial intelligence. A relatively stable EU regulatory regime along with respect by Irish businesses for intellectual property rights are seen as important supporting factors.




**Environmental** factors include future potential food safety shocks (e.g. animal diseases); the EU Carbon Border Adjustment Mechanism; balancing high quality production with climate mitigation requirements; the impact of extreme weather events on production, especially for agrifood; increasing customer demands for carbon neutral suppliers and products; the impact of climate change on global food production systems; increasing environmental regulation (e.g. the via the EU Green Deal); and the need for deeper understanding of important initiatives such as the Climate Action Bill and the EU Green Deal. The need to make available EU funding more easily accessible for businesses was also highlighted. The environmental dimension also brings with it opportunities for sustainable new market opportunities for trade and investment and the opportunity to demonstrate Ireland's food safety credentials.




In summary, the PESTLE identifies a range of challenges impacting on GVCs. These issues are especially relevant for SME's. They include commodity market volatility; rising global input costs; new regulatory compliance costs; market concentration; critical raw materials availability; staff retention; distribution costs and freight availability; increased energy costs and energy security; increasing complexity of supply chains; Brexit impacts and concerns about cybersecurity. They also include more medium to long term challenges which are structural in nature in some sectors such as R&D capacity, technological change and adoption, infrastructure challenges, skills shortages and retention, shifting demographics and meeting climate change and sustainability challenges.

# 4 Sectoral Strengths and Opportunities Analysis

A further analytical exercise undertaken by the Expert Group was to assess some of Ireland's key strategic export sectors and identify strengths and opportunities from a GVC perspective. The purpose is to delve deeper into specific issues and also to identify any commonalities across sectors. A summary of the analysis is provided below, focusing in on the main strengths and opportunities across sectors. It is important to note that the points raised represent the views of a diverse range of stakeholders and should not be interpreted as an exhaustive list or order of priority.

## 4.1 Agri-food including Meat and Dairy

The agri-food sector includes primary production in farming, fishing and forestry, and the processing and manufacture of food, beverages and wood products. It is Ireland's largest and most important indigenous exporting sector and critically important to the overall national economy. The Irish agri-food sector continues to adapt and evolve, operating more efficiently and sustainably year-on-year despite the numerous global headwinds including Brexit and inflation. At almost €19 billion, Agri-food exports accounted for 9% of all the goods exported from Ireland in 2022. The sector is globally orientated, with approximately 90% of Irish beef, sheep meat and dairy produce exported each year. In 2022 the sector exported more than one billion euros in value of each of the following: fresh or chilled Irish beef, natural butter, cheese and Irish whiskey. It is estimated that 165,000 people were employed in the sector in 2022.[49]

A range of existing strengths are noted by stakeholders which support GVC participation including strong R&D capacity and IP protection; knowledge and information systems; high skills levels; risk management systems; temperate climate which supports production; family farm prevalence; animal health and disease controls; industry and policy focus on viability,

[49] Annual Review and Outlook for Agriculture, Food and the Marine 2023

productivity and sustainability; increased deployment of technology, automation and lean methods; established routes to market; quality assurance systems; and key skills in account management, customer relationship and strategy.

### Strengths

- Relatively strong RDI capacity at farm level / strong IP / EU investment in RDI
- Range of innovation supports available
- Adoption of global technologies
- Agriculture Knowledge and Info Systems (AKIS) well established
- High levels of educational attainment / industry relevant education and training
- Risk mitigation / management systems for critical inputs
- Temperate climate / grass-based production system
- Resilience, agility and prevalence of family farms
- Strong animal health and disease control standards
- National strategy focused on competitiveness / increasing productivity / non monopolised / sustainability credentials / Origin Green sustainability programme
- Increasing role of digital tools / modern manufacturing methods / LEAN management techniques
- Strong routes to markets / experienced in third country logistics/ network of transport providers/ sufficient storage capacity
- Quality Assurance Schemes
- EU regulation ensures transparency / expertise in regulatory prerequisites
- Skilled account management/CRM/strategy skills

### Opportunities

- New technologies to drive efficiencies; Diversification inc. circular economy and bioeconomy
- Enhance capabilities re: brand identity; Strengthen collaboration and responsiveness in AKIS; Promote greater research into automation and AI in processing
- Enhance knowledge transfer / peer to peer learning; Improve technology training supports
- Encourage use of new digital technologies;
- Focus on dairy calf to beef enterprise;
- Reduce reliance on imported inputs / shorten supply chains
- Build on supports for young farmers
- Leverage modern technologies to meet challenges of food supply chain; derive greater value from co-products; Increase demand for high quality, safe and sustainable food
- Drive synergies between beef and dairy
- Develop contractual arrangements within supply chains; Leverage diaspora in route to market
- Maximise IE green/social/sustainability/animal welfare credentials internationally; promote grass based production system / local sourcing / high quality safe and sustainable foods;
- Respond to changing consumer dietary demands;
- Fuel efficient/electric transport vehicles;
- Capitalise on decreased costs of transport containers for frozen meat
- Invest in account management skills; Further increase education and training opportunities

A wide range of opportunities are possible, including in the circular and bio-economy; brand identity; AI and automation; knowledge transfer and peer to peer learning; increased domestic sourcing of inputs; targeted supports for young farmers; drive synergies between beef and dairy sectors; develop contractual arrangements with supply chains; leverage diaspora in overseas markets; maximise sustainability credentials; and further invest in skills.

## 4.2 Prepared Consumer Foods and Beverages

The Irish prepared consumer food (PCF) and drink sector exports a broad range of products including confectionary and food ingredients to value-added meat and seafood to whiskey, beer and other liqueurs. The sector is integral to maximising all of the outputs of the Irish food and drink industry and adding value across the full supply chain. Agency data show that the sector exports amounted to €3 billion in the PCF sector and €2 billion in the drinks sector in 2022 with notably a year-on-year increase across a range of products including meal solutions, bakery, drinks and confectionery (chocolate and sugar) and whiskey and the reopening of the foodservice channel in most markets[50]. In 2023, 58,172 people were employed in the sector[51].

Key strengths noted by stakeholders for the food and drink manufacturing sector include strong research and innovation infrastructure and supports; high quality ingredients; world class food safety and traceability; processing capabilities; flexible and dynamic supply chains; access to EU supply chains; Free Trade Agreements; relationship with UK retailers; industry responsiveness and flexibility.

Opportunities include potential to strengthen industry/academia links (especially opportunities from sustainability and digital); target emerging sectors and new technologies; increased collaboration on sourcing and contract manufacturing; greater use of automation

[50] 2022---2023-export-performance-and-prospects.pdf (bordbia.ie)
[51] Annual Employment Survey 2023 - DETE (enterprise.gov.ie)

and AI; market opportunities in key sectors (US, UK, Asia, China); deepen interconnections with continental Europe; and streamline distribution processes.

## Strengths

- Numerous innovation centres; attractive tax incentives for research; infrastructure support for RDI; combined support (EI, Teagasc, Bord Bia);
- High quality food ingredients; farm to fork positioning;
- Water resources;
- Island status protects against disease;
- World class primary sector and food safety/traceability regime;
- Internationally recognised processing capabilities (meat/dairy);
- Economies of scale for large players;
- Clear sustainability goals in place; Food Vision 2030;
- Flexible and dynamic supply chains; short supply chains for indigenous raw materials; access to EU supply chains;
- Ports connectivity and road network;
- Investment in shelf life retention;
- Preferential/Duty free access to EU and FTA partners; continued importance of UK post Brexit; established relationships with EU and UK retailers;
- Responsiveness and flexibility to crises and consumer tastes etc

## Opportunities

- Strengthen industry/academia links; Exploit advantages from green and digital; develop strategic collaborative zones (e.g. research/manufacturing);
- Position Ireland globally in emerging sectors (gut health; plant based foods; food for health); new technologies (e.g. precision fermentation); new crops for IE (e.g. fava);
- Build account management skills; stronger Customer Relationship Management to inform RDI
- Drive ambition to be world leaders in sustainable food production;
- Increased collaboration between cos re: sourcing/contract manufacturing;
- Greater use of automation; AI;
- In-market collaboration;
- Sustainability as a source of competitive advantage;
- Nearshoring in animal nutrition;
- Opportunities in N. America and Asia in VA sectors; PCF growing in UK; China (PCF, infant formula, meat);
- Avail of EU funding to develop interconnectedness with continent (FR, ES etc);
- Streamline distribution processes and reduce congestion;
- Expand rail freight and reduce rail track charges;
- Trade shows;
- Collaboration re: digitisation to manage sales.

## 4.3 Semiconductors

The semiconductor sector provides a range of opportunities for participating in GVCs – both from a vertical perspective in terms of targeting specific company activities such as RDI, manufacturing, logistics, sales etc. but also huge opportunities arising from the use of chips throughout other sectors. The semiconductor industry is the driving force behind such technological innovations as artificial intelligence, electric vehicles, and factory automation, playing a crucial role in trade and national security. Global competition is fierce with the US (CHIPS and Science Act, $52.7bn) and the EU (Chips Act, €43bn) committing major resources to ramping up domestic R&D and production to build security of supply. At the same time, semiconductors are a major source of trade and technology tension between China and the US, with the US imposing restrictions on the sale of chip technologies to China, particularly in the areas of supercomputing and artificial intelligence. Advanced semiconductors have been identified by the European Commission in its Economic Security Strategy (2023) as one of the initial four critical technologies that are considered highly likely to present the most sensitive and immediate risks related to technology security and technology leakage. Ireland has a longstanding semiconductor industry that directly employs 20,000 people and an estimated revenue of €15.5bn in 2023.[52] In this context, it is a major strategic sector for Ireland.

Clear strengths have been identified for the semiconductor sector in Ireland, particularly regarding R&D capacity, the existing cluster of companies, the manufacturing footprint, phototonics packaging capability and the importance of the single market. Opportunities have been identified such as the potential of the EU Chips Fund and Important Projects of Common European Interest; Ireland as an EU HQ to support European Fabs; semiconductors for cyber security; and deployment of wind energy to power fabs.

[52] Semiconductor Technologies | Ireland's role in the Global Semiconductor Industry (tyndall.ie)

### Strengths

- Internationally recognised R&D (e.g. Tyndall);
- 3 of top 5 EDA companies;
- Established cluster of design Centres of Excellence;
- Significant presence of key Equipment Providers;
- Ease of import of materials via Single Market;
- Manufacturing footprint most advanced in Europe;
- Phototonics packaging line in Tyndall Institute;
- Presence of Data Centres and MedTech industries.

### Opportunities

- Ensure easy access to Chips for Europe / Chips Fund;
- Relatively good availability of engineering / managerial talent pool;
- Low capital requirements, utility/building needs facilitate ramp up of operations;
- Leverage EU Chips Act / Important Projects of Common European Interest to develop specialised pilot lines; attract investment in R&D and production facilities to serve EU;
- Position IE as EU HQ for cos seeking to support European Fabs;
- Advance semiconductor research competence through quantum computing;
- Attract FDI of Open EU Foundry / Integrated Design Manufacturers;
- Explore use of wind energy to power first-of-kind semiconductor ops;
- Attract research and FDO in Heterogenous Integration / Advanced Packaging;
- Semi-conductors for next gen low energy network and cyber security.

## 4.4 Biopharmachem

The Biopharmachem sector encompasses the discovery, development, production and sale of pharmaceutical products, both pharmaceuticals and biopharmaceuticals or biologics. Ireland has an established mix of large multinationals, start-ups, and high growth SMEs specialising in Active Pharmaceutical Ingredients, veterinary and human finished product manufacturing, drug discovery, development and delivery, also, service, regulation, engineering, construction and clinical trial management. There is a strong culture of collaboration and cooperation between the large multinationals and indigenous Irish companies which include over 100 Enterprise Ireland supported companies.[53]

The global top 10 Biopharmaceutical companies have a manufacturing presence in Ireland. The Irish life sciences manufacturing sector has grown exponentially in recent years with

[53] focus-on-biopharmachem-2020.pdf (enterprise.gov.ie)

major investments from companies like Pfizer, Eli Lilly, WuXi, Janssen, MSD, Sanofi, BMS, Alexion, and Allergan who have made significant investments in Ireland which have facilitated the rapid growth of the industry. The indigenous sector is highly innovative with companies competing successfully in global markets throughout the world e.g. Alimentary Health, ICON, Chanelle, TopChem, APC. Ireland's strong international reputation in pharmaceutical manufacturing is largely due to: excellence in manufacturing and regulatory compliance; a highly qualified workforce operating in manufacturing sites that are globally recognised as manufacturing 'process/product' development specialists; competitive corporate taxation rates with competitive R&D tax credits and supports; and a world-class research landscape. It is Ireland's single largest manufacturing sector, with exports of chemical products amounting to €127bn in 2023, according to CSO data including €77.8bn in medical and pharmaceutical products and a further €29.7bn in organic chemicals. Agency supported companies employed over 43,000 people in 2023.[54]

### Strengths

- Strong manufacturing cluster presence in Ireland;
- Process development capability in Ireland;
- Emergence of Contract Development and Manufacturing Organisations (CDMOs) in Ireland;
- Established Global Supply Chains managed out of Ireland, significant sectoral expertise;
- Well established / well regarded manufacturing infrastructure and history in Ireland;
- Critical mass of key industry players present in Ireland;
- Established export logistics network for product delivery and supply;
- Good track record of delivery and product supply from sector;
- High level of regulatory compliance/customer centric approach to critical product (medicines) delivery (patient centric approach);
- Educated and experienced workforce;
- Geographic location facilitates forward access to markets.

### Opportunities

- Potential for more process and product development in IE;
- Links with academia to drive hires and innovation;
- Continual drive to develop local sources of raw materials;
- 5.0 - sustainable manufacture - advanced therapeutics capability;
- Increase focus on home grown sustainable/green logistic solutions;
- Opportunity to enhance service with adoption and scale up of new technologies (e.g. AI);
- Increase funding of innovation to support digitalisation/automation along the supply chain.

[54] Annual Employment Survey 2023 - DETE (enterprise.gov.ie)

There are many clear strengths for the sector in Ireland from a value chain perspective, including a critical mass of the key industry players and that some global supply chains are managed out of Ireland. Ireland's track record and skilled workforce are also noted as key strengths of the sector in Ireland. Stakeholders see significant future potential opportunities in areas such as more process and product development, developing more local sources of raw materials, and further digitalisation along the supply chain.

## 4.5 Engineering

Engineered products and sub-supply includes a broad range of manufacturing, engineering and supply chain activities that serve a broad range of markets, including: Automotive, Aerospace, ICT, Medical Technologies, Plastics, Energy & Environmental, Construction and Agriculture Machinery and Equipment). Sub-supply also includes paper and printing as well as basic and fabricated metals and polymers. International growth in these markets drives growth in the engineering firms serving those markets. Engineering (as a discipline) is crucial to all manufacturing sectors, and therefore has huge potential to tap into value chains, especially coupled with the increased tradability of engineering services. Agency supported companies employed over 49,000 people in 2023.[55] It is also an important exporting sector with total exports amounting to €7.4bn in 2022 [56].

Some of the key strengths identified by the Expert Group include strong capacity and capabilities in sectors such as energy, electronics, automation, along with a strong reputation for international and local sourcing. A strong skills base and flexible workforce was also highlighted.

There is a lot of opportunity foreseen, especially in areas such as renewable energy, sustainable technologies, hydrogen, industry-academia collaboration, digitalisation. There is also opportunity to position Ireland as a lead location for companies to establish and manage GVCs, with a focus also needed on business excellence to drive competitiveness.

[55] Annual Employment Survey 2023 - DETE (enterprise.gov.ie) Engineered products and sub-supply includes basic and fabricated metals, machinery and equipment, transport equipment, paper and paper products, rubber and plastics.
[56] Annual Business Survey of Economic Impact 2022 (total exports of above-mentioned sectors).

### Strengths

- Strong engineering capabilities in electrification, battery storage, skilled electricians from an established trade sector;
- Established electronics sector and an established manufacturing sector;
- 8 out of 10 global automation companies are based in Ireland;
- Investment in 5G and rural broadband;
- Some pockets of engineering innovation;
- Strong reputation in international and local sourcing of key components e.g. in aviation / automotive / machinery;
- Strong reputation e.g. agricultural machinery;
- High level of STEM graduates / new apprenticeships / career pathways;
- English speaking, flexible, adaptable, educated workforce;
- > 20 year experience in onshore wind.

### Opportunities

- Offshore and floating wind energy;
- Develop Irish hydrogen sector. Invest in Irish produced hydrogenated vegetable oils;
- Build alliances with technology centres inc. national/international clusters;
- Attract international academia to Irish universities;
- Attract renewable energy and sustainable technology companies;
- Alternative and dual sourcing of components / risk based procurement;
- Attract/establish Engineering OEM Global Supply Chains managed from IE;
- Become global supplier for machines / components targeted at engineering, automotive, aviation, renewables, hydrogen, agri-machinery;
- Digitisation – invest in sustainable technologies, solar, electrification, AI;
- Drive business excellence to maintain competitiveness;
- Develop new routes to Europe, EMEA, invest in ports and rail infrastructure;
- Increase investment in digitalisation, innovation to drive better customer service.

## 4.6 High Tech Construction

High-tech construction refers to the use of advanced technologies and innovative construction methods to create buildings and infrastructure that are more efficient, sustainable, and resilient. The sector in the Ireland has seen significant advancements in recent years with agency backed companies working to progress innovation, sustainability and Modern Methods of Construction (MMC) under the Government's 'Housing For All' programme. The sector provides a range of opportunities for participating in GVCs – both from a forward integration perspective in terms of providing expertise to the domestic and foreign construction projects, particularly data centre design and building. The sector is also highly important to the Irish economy in terms of exports and employment. In 2022, the

export value of agency-backed high-tech construction companies was estimated to be around €2.79 billion, with an estimated 47,668 people employed in the sector in 2023.[57]

### Strengths

- Dedicated construct to innovate research consortium (NUIG/TCD/ UCD);
- English speaking, highly skilled work force;
- Resources available in IE – concrete, cement, timber;
- Increasing power generation from renewables;
- Full DBO capability, turnkey capabilities, subcontractor base, trusted partners of MNCs e.g. pharma / semiconductors;
- Enhanced tradability of construction services e.g. remote engineering monitoring capabilities;
- Digital skills – tech services, visualisation analysis, data management;
- Reputation internationally in design and build of data centres.

### Opportunities

- Ramp up research collaboration to address gaps in digitisation and lower carbon production;
- Substitute fossil fuels with renewables;
- Offsite manufacture and modular works;
- Improved CSR, increased efficiency, reduced waste, lower CO2;
- More long term, sustainable employment opportunities;
- Continued growth in internationally traded construction services;
- Packaged solutions, skid-based/containerised/modular products;
- Increased use of automation, digitisation, robotics, data analytics, AI to enhance production

Some current strengths in the sector include a dedicated research consortium, skilled workforce, locally available inputs, growing use of renewables, increasing tradability of construction services and digital skills to support high tech constructions. Opportunities are identified in research collaboration (especially in digital and low carbon production), offsite manufacturing, efficiency gains, continued growth in international construction services trade and the use of automation and digitization in production.

[57] Enterprise Ireland: High Tech Construction and Housing | Support by Sector

## 4.7 Offshore Wind

Offshore wind energy opens an enormous opportunity – for jobs, for Irish business and for research and development. Recent economic analysis of the sector looked at a number of scenarios including where net zero is achieved by 2050 and a rapid decarbonisation scenario without a high level of energy exports. The findings suggest that there is huge potential for the sector in Ireland. It is estimated that the sector has the potential to deliver a lifetime economic benefit ranging from €17 billion to €96 billion. Similarly, it is estimated that potentially between 190,00 to 1.1m jobs could be created within the sector. The estimation for potential annual revenue from hydrogen export ranges from €200 million to €8.9 billion. Potential for FDI inflow in the sector is estimated in the range from €17 billion to €78 billion depending on the scenario.[58]

Current strengths in the sector include vast offshore resource; existing capabilities in development, operations and maintenance; base of STEM graduates and apprenticeships; track record in manufacturing of high spec components; and an established global hub for business services. There are significant opportunities identified in areas such as digital solutions; innovation (e.g. floating offshore wind); regional employment opportunities; export of surplus energy; and deployment of next generation technologies.

[58] gov - Consultation on the offshore renewable energy (ORE) Future Framework Policy Statement (www.gov.ie) Future Framework - Economic Analysis WS4

### Strengths

- Research Centre for Energy, Climate and the Marine (MaREI);
- Vast offshore resources (sea area 7x land area);
- Good capability in development, operations and maintenance;
- Strong base of reference clients across multiple sectors;
- Base of STEM focused skills / Apprenticeships;
- Track record in manufacture of large high spec components e.g. cranes, lifting equipment, aerospace, composites, medical devices;
- Grid development for renewables underway;
- Pool of relevant digital skills;
- Established global hub for business services.

### Opportunities

- Potential for IE to become the 'go to' location for digital solutions in offshore wind;
- Potential to develop floating offshore wind innovation;
- Huge potential to decarbonise IE energy system;
- Employment and export opportunities, esp. in coastal communities, potential to develop regional hubs;
- Greater component of digital technologies – remote condition monitoring, IoT connectivity, Digital Twin, VR/AR;
- Potential to develop and export beyond than domestic requirements;
- Next Gen technology, investment and talent development e.g. Digital technologies (AI, remote drones, power management) Materials research (super conductors, composites, coatings) Floating offshore wind (anchoring, deployment); power (green hydrogen, battery and storage, SAF);
- Green grid development - potential to drive large capital investment e.g. hydrogen, ammonia, green chemistry, green steel, electric mobility;
- Development of high value services across technology, hardware, software, finance, leasing, asset management, business services.

## 4.8 Medical Technology

Medical technology (Medtech) encompasses medical devices and technologies for diagnosis, monitoring or treatment of diseases or medical conditions. The Medtech sector is diverse and encompasses a myriad of products across segments including Medical Devices - minimally invasive technology, implanted devices, diagnostic equipment and imaging systems, surgical systems, dental equipment and devices, drug delivery devices, and ophthalmic and optical products and technology and Medical Technology - Digital health, electronic health records, analytics, diagnostics and telecare/telemedicine. Companies may be involved in some or all activities in the supply chain including R&D; clinical trials; design

and/or manufacture of products and solutions; management of global business services; as well as sub-supply and services specific to the sector.

Ireland's Medtech sector has become one of the world's top five global Medtech hubs with most of the world's top 15 leading Medtech multinationals establishing operations in Ireland including companies such as Boston Scientific, Medtronic, Johnson & Johnson, Stryker, Becton Dickinson, and Baxter. This internationally traded sector is highly integrated into the GVCs and has the potential to benefit further from this participation - both from backward and forward integration in terms of activities such as RDI, manufacturing, logistics, sales etc. It is also one of Ireland's largest exporting sectors with annual exports of €12.6 billion in 2022.[59] The sector supported 44,282 employment in 2023.[60]

A range of key strengths which support GVC participation are identified, including the strong R&D and manufacturing base; trusted IP location; strong linkages between MNCs and domestic suppliers; focus on standards and track record on regulatory compliance; and expertise in support services including supply chain management. A wide spectrum of opportunities are identified including in the areas of technological convergence and digitisation of manufacturing and supply chains; increased research collaboration; target attraction of sub suppliers; strategic partnerships with contract manufacturing; advanced manufacturing; talent development; sustainability agenda as a source of competitive advance; potential to leverage other sectors (e.g. ICT) to attract growing Medtech services (data analytics and storage); potential to develop dedicated teams for procurement and supply chain vulnerabilities etc.

[59] Annual Business Survey of Economic Impact 2022 - DETE (enterprise.gov.ie)
[60] Annual Employment Survey 2023 - DETE (enterprise.gov.ie)

## Strengths

- Active R&D system.
- Unique ecosystem of large MNCs and SMEs
- Variety of RDI – product, process innovation, digitalisation, capital investment, engagement with research organisations;
- R&D tax credit and trusted IP management location;
- Spillover effects to local economy (wages, sub supply);
- Extensive relationships btw manufacturers and suppliers within IE;
- Digital Manufacturing Ireland Centre supports best in class manufacturing;
- Manufacturing base - Cluster, Longevity, Ecosystem, Execution on New Product Introduction / Indigenous Supply Base/Sectoral Resilience/ Global Reputation for Operational Excellence/Embedded Regional Presence;
- Established indigenous and MNC sector in packaging and sterilisation;
- Reputation/rich talent pool supporting shared service mandates, centralised business centres;
- Sophisticated business centres developing commercial, technical, digital, clinical support capabilities in central hubs;
- Linkages between MNEs and IE suppliers re: microchip supply;
- Close supply chain alignment and mutual standards within Ireland drives export growth;
- Sector focus on standards, move towards ISO2700; track record on regulatory compliance;
- Expertise in support services – customer support, finance, supply chain management.

## Opportunities

- Technology adoption, workforce development;
- Convergence with ICT, Consumer Tech, Data Analytics, Health Tech;
- Incorporate digitally enabled consumer engagement capabilities into product design;
- Digital Health – more sustainable health system with reduced costs;
- Increase research collaboration, scaling inc. with SFI centres, clinician community;
- Strategic partnerships with contract manufacturers;
- Attraction of key sub suppliers to enhance resilience;
- Enhanced digitisation of manufacturing and supply chains;
- Advanced manufacturing – AI, Industry 4.0 and 5.0 / traceability for quality control/ lifecycle assessment / carbon neutrality / design and materials sustainability;
- E-Beam / Gamma using green electricity;
- Streamline approach to Medication Device Regulation & Data;
- Target high value knowledge intensive leadership opportunities in MNCs;
- Align talent development programmes to global business services;
- Attract new services (data storage, data analytics, data management, quality/regulatory affairs, commercial, clinical, ESG reporting, strategic supply chain).
- Leverage sectors within Ireland - Financial Services / Insurance, ICT, Business Services.
- Embrace sustainability agenda as source of competitive advantage, especially sub suppliers;
- Dedicated teams/procurement for supply chain efficiencies/review bottlenecks, vulnerabilities

## 4.9 Conclusion

This analysis has highlighted that there is a strong existing base across strategic sectors with significant potential for further development. A conducive business environment, skilled workforce, technological adoption, and other sector-specific positive attributes are some of the factors that have supported Irish based companies to successfully participate in GVCs. There are opportunities to further strengthen R&D capabilities and collaboration, deploy new and emerging digital technologies across sectors to drive productivity and efficiencies, increased demand for sustainable products and production using renewable energy, opportunities to build domestic sourcing and sub supply capacity, build on existing markets, target emerging markets, and opportunities from the increased tradability of services.

In turn, the analysis indicates that policy responses needed are a combination of direct actions that can support companies to participate in GVCs to help address some immediate challenges and broader supports that help the long-term development and strength of sectoral ecosystems such as in innovation, infrastructure and skills. This dynamic is considered in the Policy Recommendations in Section 6.

# 5 International Policy Practice

As part of its work, the Expert Group also examined emerging policies in other countries which promote GVC participation and resilience. The purpose is to consider the potential relevance of these policies from an Irish perspective.

## 5.1 European Union

Building on existing work on strategic dependencies and capacities, the European Commission has recently positioned its approach to supply chain risks and vulnerabilities within the context of its Economic Security Strategy published in January 2024.[61] The aim of this strategy is to protect the EU's economic security and reinforce the resilience of the economy, while working to ensure that maintenance and growth of technological edge. This means investing in EU competitiveness, diversifying supply chains, and responding to practices such as economic coercion. It aims to prevent the leakage of sensitive emerging technologies, as well as other dual-use items, to destinations of concern that operate civil-military fusion strategies. Four main risk areas are identified in the strategy:

- **Risks to the resilience of supply chains, including energy security –** Risks of price surges, the unavailability or scarcity of critical products, or inputs in the EU, including those linked to the Green Transition and those needed for a stable and diversified energy supply and pharmaceuticals.
- **Risks to the physical and cyber-security of critical infrastructure –** Risk of disruptions or sabotage of critical infrastructures, such as pipelines, undersea cables, power generation, transportation, electronic communication networks, which undermine the secure and reliable provision of goods and services or data security in the EU.
- **Risks related to technology security and technology leakage** – Risk to the EU's technological advancements, technological competitiveness, and access to leading-edge technology, including through malicious practices in the digital sphere such as espionage or illicit knowledge leakage. In some cases, technology leakage risks strengthening the

[61] Communication on European economic security.pdf (europa.eu)

military/intelligence capabilities of those that could use them to undermine peace and security, especially for dual-use technologies such as Quantum, Advanced Semiconductors or Artificial Intelligence, and therefore require specific risk mitigation measures.

- **Risk of weaponization of economic dependencies or economic coercion** – Risk of third countries targeting the EU, its Member States and EU businesses through measures affecting trade or investment to bring about a change of policy falling within legitimate policymaking space.

On 3 October 2023, the Commission adopted a Recommendation to the Member States identifying ten technology areas as critical for the EU's economic security. Four of these technologies were recommended for an urgent joint risk assessment by the Commission and the Member States: Advanced Semiconductor Technologies, Artificial Intelligence Technologies, Quantum Technologies and Biotechnologies. This work is complementary to the work of the Commission run Observatory of Critical Technologies, which provides regular monitoring and analysis of critical technologies of the EU defence, space and related civil value chains.

The Commission is also continuing work on the three other risk assessments that were identified in the strategy (i.e. resilience of supply chains; physical and cyber-security of critical infrastructure and weaponization of economic dependencies or economic coercion).

Supply chain risks are monitored via the Supply Chain Alert Notification "SCAN" analysis to assess strategic dependences and supply chain distress. This risk assessment is based on data-driven methodologies to identify EU strategic dependencies across sensitive industrial ecosystems (i.e. relating to areas like security and safety, the health of Europeans, the green and digital transitions), as well as those dependencies which may represent vulnerabilities to the EU's economic security. The data-driven approach is complemented with an intelligence-based qualitative assessment in order to understand the supply chain implications of disruptive effects affecting particular goods and ecosystems.

As regards the physical and digital security of critical infrastructure, the Critical Entities Resilience Directive which entered into force on 16 January 2023 provides for Member States to carry out risk assessments by 17 January 2026 on essential services. The NIS 2

Directive provides the framework for coordinated risk assessment on the cybersecurity of critical infrastructure. These risk assessments will also guide the actions set out under the proposed Cyber Solidarity Act by the Commission in April 2023, and in particular the coordinated preparedness testing.

The Commission is also working with Member States to assess risk levels and areas of potential weaponisation of economic dependencies or economic coercion. This assessment looks at the potential impacts and likelihood of such practices directed against the EU. It considers various actions that could seek to interfere with the legitimate sovereign choices of the EU and its Member States or otherwise weaponise economic dependencies in relations with the EU.

Risk assessments will contribute to informing decisions on whether further action is warranted. If considered necessary, the Commission will propose additional actions to be taken to mitigate risks through promoting, protecting or partnering measures.

## 5.2 USA

In February 2021, President Bident commissioned a 100 day comprehensive review of US supply chains to identify risks, address vulnerabilities and develop a strategy to promote resilience.[62] The review concentrated on four sectors:

- Semiconductor manufacturing and advanced packaging;
- large capacity batteries;
- critical minerals and materials;
- pharmaceuticals and active pharmaceutical ingredients.

The initial report recommended 6 specific policy actions to identify risks and address vulnerabilities in the supply chains relating to these four sectors;

[62] 100-day-supply-chain-review-report.pdf (whitehouse.gov)

1. Rebuild production and innovation capabilities through dedicated funding for semiconductor manufacturing and R&D (at least $50 billion) and establishing a new Supply Chain Resilience Program.
2. Support the development of markets that invest in workers, value sustainability, and drive quality through identifying potential U.S. production and processing locations for critical minerals and improving transparency throughout the pharmaceuticals supply chain.
3. Leverage the government's role as a purchaser of and investor in critical goods through federal procurement to strengthen U.S. supply chains, strengthening domestic production requirements in federal grants for science and climate R&D and strengthening stockpiles.
4. Strengthen international trade rules, including trade enforcement mechanisms by establishing a trade strike force and evaluating whether to initiate an investigation into the imports of neodymium permanent magnets to the US.
5. Work with allies and partners to decrease vulnerabilities in the GVCs. Specifically, expand multilateral diplomatic engagement, including hosting a new Presidential forum and leverage the U.S. Development Finance Corporation (DFC) and other financing tools to support supply chain resilience.
6. Monitor near term supply chain disruptions as the economy reopens following the COVID-19 pandemic. Specifically, establish a Supply Chain Disruptions Task Force and create a data hub to monitor near term supply chain vulnerabilities.

Subsequent to the review, seven Federal agencies conducted deep-dive industrial base reviews of critical supply chains, building on the insights from the 100-day reviews.[63] The reviews revealed vulnerabilities in a number of key industrial sectors due to supply chain concentration. For example, for each of the key battery material inputs lithium, cobalt, and graphite, a single country controlled at least 60 percent of one or more stages of global production. In semiconductors, 88 percent of semiconductor production occurs overseas, reflecting a decline in U.S. manufacturing capacity over time. Similarly, the Department of

[63] Issue Brief: Supply Chain Resilience | CEA | The White House

Defense identified 37 critical minerals where more than half of global production relied on a single country. Informed by the supply chain reviews a number of actions have been taken:

- A number of major pieces of legislation including the Bipartisan Infrastructure Law, the CHIPS & Science Act, and the Inflation Reduction Act were passed to address key supply chain vulnerabilities. According to the White House, as of November 2023, private companies have announced more than $614 billion in planned investment in industries including semiconductors, electric vehicles, and batteries.
- In June 2022 the Ocean Shipping Reform Act was passed to address port and ocean shipping challenges. The legislation allows the Federal Maritime Commission to introduce a ban on unfair and discriminatory practices for shipments and authorized the Bureau of Transportation Statistics to collect additional data about dwell times at various ports, among other provisions.
- In 2021, President Biden held a Summit on Global Supply Chain Resilience with partners from the European Union and 14 other countries to discuss opportunities for collaboration on embedding resilience into GVCs.
- The US is also working with allies to develop shared standards for manufacturing, investment, and production to ensure that international efforts are mutually reinforcing. For example, the US has launched the Indo-Pacific Economic Framework for Prosperity (IPEF) in partnership with Australia, Brunei Darussalam, Fiji, India, Indonesia, Japan, the Republic of Korea, Malaysia, New Zealand, Philippines, Singapore, Thailand, and Vietnam. One of the framework's four pillars focuses on supply chains, including by establishing an IPEF Supply Chain Council and an IPEF Supply Chain Crisis Response Network. The crisis response network can serve as an emergency communications channel in the event of acute supply chain disruptions to help minimize impacts on workers, businesses, and consumers.
- The US and EU have jointly established a Trade and Technology Council (TTC), which focuses on promoting US and EU competitiveness in advanced technological products and advancing U.S. and EU collaboration. For example, the US and the EU created a joint early warning mechanism for semiconductor supply chain disruptions with a playbook to follow in the event of a future large disruption.
- A Minerals Security Partnership has been developed between the US, Australia, the United Kingdom, the EU, South Korea, and others to mobilize private sector investments

in projects to support mining, extraction, processing, and recycling of these critical minerals that enable the transition to zero-carbon energy.

- The US is engaging in bilateral negotiations with countries to develop critical minerals agreements, like the one signed with Japan in 2023, to promote a more diverse supply chain by lowering trade barriers.
- A number of measures have been undertaken to facilitate data availability and flows, including dedicated supply chain offices/initiatives in the Department of Energy, Department of Health and Human Services and Department of Commerce.

## 5.3 United Kingdom

In the UK, the Department for Business and Trade has developed a supply chains resilience framework, which identifies five areas that companies can assess when reducing dependencies on supply chains.[64] These include:

1. **Diversification** – identify alternate source of supply to create flexibility in the supply chain;
2. **International partnerships** – work with international partners to identify common challenges, bring down barriers to trade and strengthen the resilience of international supply chains and systems;
3. **Stockpiling and surge capacity** – identify whether it may be beneficial to hold stocks and strategic reserves of components or goods and consider whether surge capacity can be included in contracts;
4. **Onshoring** – identify whether increasing or expanding domestic capacity might be helpful in reducing risks;
5. **Demand management** – identify whether it may be beneficial to manage the demand for components or goods, considering substitutes and alternatives, innovation, and circularity.

This framework has been further developed by the Department of Business for Trade in collaboration with the Centre for the Protection of National Infrastructure and the Chartered

[64] DBT supply chains resilience framework - GOV.UK (www.gov.uk)

Institute for Procurement and Supply to provide guiding principles for companies to strengthen and build resilience into supply chains.[65] Specifically, this provides companies with a diagnostic tool to help:

- Supply chain mapping including supply chain complexity, cost pressures, offshoring, map their supply chains; geography, communication, production method and supplier map.
- Vulnerability and risk assessment, regarding supply issues, potential for border disruptions, substitutability of inputs, storage and logistics.
- Impact reduction plan using the supply chain resilience framework (diversification, international partnerships, stockpiling/surge capacity, onshoring and demand management.
- Implementation and review based on SMART objectives.

Furthermore, the UK and Australia are developing a joint supply chain resilience initiative to engage interested countries to develop and improve public sector approaches to managing critical supply chain risks. This will initially begin with a pilot project to determine further scope.[66] This initiative will support countries that want to:

- improve public sector approaches to building critical supply chain resilience.
- strengthen global supply chains through shared learning and coordinated action.
- build greater transparency into key global supply chains.
- promote international action to respond to supply chain disruptions.

It will include:

- a series of modules designed to support the capability of interested partner governments.
- sharing approaches to strengthen critical and vulnerable supply chains and enhance global supply chain resilience for mutual benefit.

[65] Safeguarding Supply | NPSA
[66] UK-Australia supply chain resilience initiative - GOV.UK (www.gov.uk)

## 5.4 Australia

In Australia, the Office of Supply Chain Resilience has been established under the Department of Industry, Science and Resources.[67] Its focus is on critical supply chain vulnerabilities that could impact Australia's national interest, particularly with regard to:

- health, safety and wellbeing;
- economic stability/viability;
- national security;
- international partners.

It also monitors access to essential goods and services including:

- personal protective equipment (PPE);
- critical pharmaceuticals;
- agricultural chemicals;
- semiconductors;
- telecommunications equipment;
- water treatment chemicals; critical plastics.

The Office engages directly with targeted sectors to provide an understanding of Australia's supply chain risks. These insights can provide early warning signs of disruptions to critical supply chains. The Office also hosts a supply chain roundtable with peak bodies across key manufacturing and services sectors, including healthcare, food production, chemicals and construction. The Office applies a Supply Chain Resilience Framework to identify risks in Australia's supply chains based on measures of vulnerability, criticality, residual risk and proportionate responses. The framework also includes four types of policy responses (see Table below for further detail).

[67] Office of Supply Chain Resilience | Department of Industry Science and Resources

| Supply Chain Resilience Framework | Policy Actions |
|---|---|
| **Assess and identify vulnerability** (through quantitative and qualitative analysis using government and business data, engagement with stakeholders and scenario analysis)<br><br>**Criticality** (by measuring the potential impact of supply disruptions on Australia's national interest)<br><br>**Residual risk** (by understanding whether industry has enough opportunity, capacity and incentive during disruptions to prevent, absorb, adapt (substitute) or transform processes)<br><br>**Targeted and proportionate responses** (by considering which policy is most appropriate to manage any residual risk) | **No regrets Action** (organising private investment, information sharing, international collaboration, reducing trade barriers, deregulation for business, managing market efforts)<br><br>**Responsive Support to businesses** (ration or extend current supplies, find alternate supply sources, use substitutes, adapt production processes)<br><br>**Pre-emptive support to business** (stockpiling, contingent contracting arrangements, building in pivotable capabilities before a disruption occurs)<br><br>**Onshoring and restrictions** (sovereign capability, time-limited export restrictions, mandatory import concentration thresholds) |

## 5.5 Canada

In 2022 a National Supply Chain Task Force was established to inform development of a National Supply Chain Strategy. The Task Force assessed numerous factors that are contributing to high levels of uncertainty: including rapidly changing trade patterns; human and climate-caused transportation supply chain disruptions; shifting geopolitical risk; and increased consolidation in major transportation modes. Recent crisis such as COVID-19 have also exposed and exacerbated several longstanding structural and systemic weaknesses in Canada's transportation supply chain. As such, joint action is needed by government, transportation and logistics providers, shippers, producers, manufacturers and retailers who must act decisively and urgently together to create a supply chain system that is more agile, flexible, resilient, competitive and efficient than it is today.

The Task Force was mandated to identify pressing supply chain issues in Canadian and global contexts. The Task Force's report 'Action, Collaboration, Transformation' included 21 short-term and longer-term recommendations to develop resilient and competitive supply chains. Some of the main recommendations are listed below.

***Short - term recommendations***

- Develop a long-term transportation supply chain strategy including initiating a review to update and modernise related regulations.
- Develop a transportation supply chain labour/workforce strategy.
- Waive 50% of airport rent payments.

***Long- term recommendations***

- Establish a Supply Chain Office to unify the federal government's responsibility/authority over transportation supply chain management across federal departments.
- Engage the United States and the provinces/territories to achieve reciprocal recognition of regulations, policies and processes to enhance transportation supply chain competitiveness and productivity.
- Digitalise and create end-to-end supply chain visibility for efficiency, accountability, planning, investment and security.

Subsequent to the report, in December 2023, the Canadian Government established the National Supply Chain Office. The Office works with industry, governments and partners to make Canada's supply chains more efficient, fluid, resilient and reliable and has locations across Canada, with staff concentrated in Ottawa and Vancouver, and other hubs throughout the country. Specifically, the Office is mandated to:

- Develop and implement a National Supply Chain Strategy;
- Support the federal government's efforts in responding to significant supply chain disruptions, such as those related to extreme weather and labour disputes;

- Support data sharing so that goods can move more efficiently, as well as facilitate strategic policy, regulatory and investment decisions by governments and industry; and
- Provide overarching leadership and coordination, foster collaboration and conduct external outreach with regard to interprovincial/territorial and global supply chain issues.

## 5.6 Conclusion

The review of international practice has identified a variety of policy approaches in efforts to build value and supply chain resilience. Some key features include:

- Dedicated new systems or offices to monitor supply chains, improve information, undertake risk assessments (EU, US, AU, CA);
- Focus on specific sectors (e.g. digital, green, security) (EU, US, AU);
- Top-down strategic approaches with supporting legislative initiatives (EU, US, CA);
- Significant focus on improving supply chains and efficiencies at the company level (CA, UK);
- Tools to help companies diagnose supply chain vulnerabilities (UK);
- Collaboration with international partners (EU, US, UK, CA).

These features can help to inform various policy approaches that could potentially by adopted in Ireland. These are explored in the next section.

# 6 Policy Actions

## 6.1 Context

The work of the Expert Group to date has covered a number of quantitative and qualitative analyses:

- Orientation paper detailing international developments in GVCs and future outlook.
- Detailed statistical profile of Ireland and Global Value Chains.
- Product level import dependency analysis identifying an initial list of 655 products.
- PESTLE analysis identifying the main political, economic, social, technological, legal and environmental factors impacting on the current and future development of value chains in Ireland.
- Analysis at a sectoral level, detailing strengths and opportunities that facilitate company participation in global value chains.
- Comparative analysis of international policy practice and presentation from the OECD on resilient supply chains.

The PESTLE and sectoral analysis, along with the review of international policy practice have underlined the breadth of factors that underpin effective participation and resilience in global value chains. Some issues have more direct relevance, for example, shortages of raw materials, automation or supply chain risk management. Others play a more peripheral role in developing, strengthening and coordinating the sectoral ecosystems (for example, skills, R&D, including collaborative R&D) clustering, infrastructure etc.) which enterprises operate in. These actions have a supporting role in helping companies to participate in GVCs.

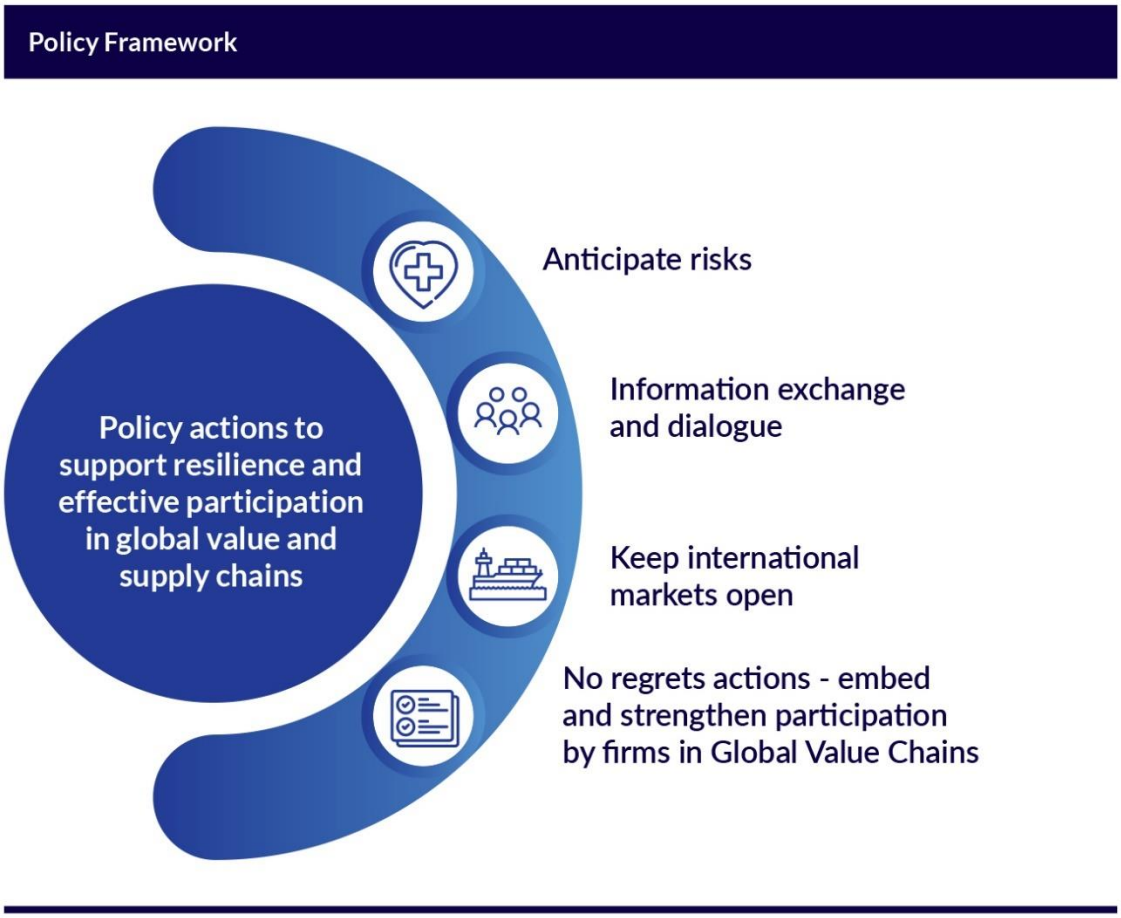
In terms of policy development, the Expert Group focuses on the more direct type actions that Government can take to support company participation in and resilience of Ireland's place in global value chains. At the same time, it is important to capture and reflect the range of proposed policy levers which stakeholders have referenced, including many which Government are already undertaking, as important for strengthening the overall enterprise ecosystem so that these can be communicated back to the relevant policy leaders.

While it is noted that there are initiatives at the EU level that could entail a greater role for state involvement in the operation of supply chains, an important principle for the Expert Group is that policy actions should not overly interfere in the operation of supply chains. Even within sectors, different companies will be targeting different customers, different markets and have different raw materials, production processes etc. The Expert Group received a presentation from the OECD which concluded that resilience first comes from firm strategies, and that governments can help by reducing logistics and regulatory frictions and by not overly intervening in the design of supply chains. In addition, the OECD highlighted that strategies which are based on 'dynamic capabilities' (flexibility, agility, co-operation, etc.) can work for any type of crisis. This 'dynamic capabilities' principle would appear particularly relevant for Ireland as a relatively small, open, advanced economy that relies heavily on trade as a driver of economic growth. By taking this dynamic approach it is intended that the policy actions can be delivered, for the most part, from within existing resources.

On the basis of the issues and principles raised above, a range of specific actions to strengthen and support company participation in GVCs are proposed.

## 6.2 Policy Framework

The following policy framework is proposed, developing on the *OECD's 4 Keys to Resilient Supply Chains*.[68]




### 6.2.1 Anticipate Risks

#### Monitor and communicate trade Dependencies

Increasing trade tensions are concerning for Ireland as an export-led economy which has long championed open, fair and rules based international trade. In addition to exporting,

[68] Resilient supply chains | OECD

many Irish companies depend on their inputs to production and exports from third countries. Against this background of uncertainty, there is a need to continually monitor Ireland's major trade dependencies and to identify any major vulnerabilities in terms of overreliance on certain trade and investment partners in the face of increasingly interventionist and defensive trade strategies and policies.

Analysis undertaken for the Expert Group identified an initial list of 655 imported products with a combined import value of €11.8bn (8% of total imports) that meet the threshold of a trade dependency (i.e. significant market share, concentrated in a small number of suppliers and limited substitutability). The top 25 products accounted for €10.6bn or 91% of the total value and included important strategic products for industry and society such as gas, petroleum, coal, fertilizer, palm oil, solar panels, semiconductors and transport machinery. It is proposed that DETE develop this analysis further in 2024 to capture both export and import dependencies and categorise them according to the most sensitive and critical products. It will be updated on an annual basis (for the next 3 years) and communicated to the wider policy system and stakeholders.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| 1 | Further develop trade dependency analysis in 2024 to capture both export and import dependencies and update on annual basis | DETE in consultation with Govt Depts and Industry Stakeholders |

### Stress test Supply chain disruptions

Another action under anticipating risks is for DETE to coordinate a shock diagnosis on one or two strategic sectors in order to stress test disruption to value chains. Shocks create impacts across demand, supply, transport and logistics networks. They may also result in some information gaps, which in turn may lead to panic buying, bulk purchasing or hoarding. Shocks may also lead some governments to introduce export restrictions or other defensive trade measures. Certain scenarios may result in sanctions on key producers.

Although shocks by their nature are of course extremely difficult to anticipate in terms of their impacts, stress testing supply chains could help determine where policy action is needed. It could be most useful focus on sectors providing essential goods and products for which “out of stock” poses the biggest problem, and to identify weak links in supply chains and bottlenecks when facing increased demand. This approach can also provide useful information to the policy system to integrate into risk management strategies, such as the need for contingency plans.

The overall objective is to ‘war game’ how a given scenario might play out and how the policy system would need to react to issues such as impacts on demand, supply, logistics, information gaps, supports to companies etc. There are lessons too that can be captured from more recent crises such as Covid-19 and the Russian invasion of Ukraine. Stress testing would need to be undertaken in close consultation with Enterprise Agencies and industry stakeholders. It is proposed that a full terms of reference will be developed by DETE taking into account the concept of ‘Conference Preparedness’ which the OECD is currently developing.

It is also notable that Ireland’s international partners are developing similar strategies for testing and enhancing supply chain resilience. Ireland should exchange learnings with close partner countries, including the UK and other European countries, and consider joint stress-testing exercises that can build on the impact of domestic exercises.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| 2 | (a) Pilot 1-2 sectoral stress tests of disruptions to supply chains, their impacts and required policy responses<br><br>(b) Develop joint stress test scenarios with partner countries including in Europe | DETE in consultation with Govt Depts and Industry Stakeholders |

### Develop focused supports to address supply chain vulnerabilities

Risk mitigation must be primarily driven at the firm level. However, assistance and guidance, may be required. This action is targeted specifically at helping companies to review their exposure or vulnerabilities from a value chain perspective and to provide to support companies where serious vulnerabilities arise. This is particularly relevant for SME's that may not have the internal resources to dedicate to risk management procedures. In this context, Enterprise Ireland should, following a review of possible approaches, develop and roll out support for companies to help them review their supply chains and develop plans to enhance supply chain resilience. The Enterprise Agencies should review and report to DETE on the capacity, capability and budgetary requirements to implement this action. There are some helpful examples of diagnostic tools from the United Kingdom in this regard which can inform possible approaches[69] as well as the EUs Supply Chain Alert Notification approach.

Specifically, the guidance could help companies to:

- Map their supply chains and understand vulnerabilities including complexity, length and number of touch points (e.g. border crossings); tier one and tier two suppliers etc.
- Assess critical risks such as bottlenecks, single suppliers of strategic items and develop a risk assessment to stratify the potential impacts of vulnerabilities.
- Develop a plan to mitigate impacts and build resilience including options for alternative suppliers; potential partnerships with complementary organisations to solve problems; need for just-in-case vs just-in-time inventory management; alternative sourcing to reduce touch points, for example within the Single Market; and demand management of key inputs for example, substitutability of goods or recycled goods as inputs.

Where immediate risks to the viability of goods and services inputs have been identified, Enterprise Ireland should seek to support vulnerable companies with their sourcing strategies, including nationally and internationally. These would likely be in areas where global shortages of inputs emerge or are likely to emerge (for example, with the green and digital transitions). This action is with the objective of helping companies overcome blockages in supply chains and to build resilience and diversity in their production base and

[69] For example see https://www.npsa.gov.uk/supply-chain-resilience

should build upon IDA Ireland/Enterprise Ireland Strategic Industries Initiative. This would require a centralised resource to be established. Enterprise Ireland should review and report to DETE on the capacity, capability and budgetary requirements to implement this action. The insights and in-market expertise of EI and other partners in Ireland's global network of Local Market Teams and Regional Market Teams may also be an asset to be availed of in this context.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| 3 | **Develop focused advisory supports**<br><br>Develop costed proposals to support firm-level supply chain assessments, resilience and company sourcing strategies. | DETE and Enterprise Agencies |

### 6.2.2 Information exchange and dialogue

As a relatively small country, Ireland has the advantage of strong established networks between government and industry, for example, through the Trade and Investment Council, the DETE Enterprise Forum and other sectoral fora (e.g. retail, life sciences). As such, when specific issues arise, there can be a relatively short circuit needed in terms of communication with stakeholders and platforms for dialogue between industry and the policy system.

Maintaining effective value chains critically requires information and communication flows. Information gaps have the ability to significantly disrupt supplies, causing confusion and uncertainty. Although a relatively simple action, it is important that open and two-way dialogue is maintained between government and industry. In this regard, it is proposed that global value and supply chain issues and bottlenecks are periodically made a standing item under AOB on relevant government-industry fora agenda so they can be brought to the attention of Government and the relevant agencies.

Equally, it is important that Government continue to inform and consult industry on emerging geopolitical developments, regulations and policies on the horizon affecting global value

chains that may have implications for industry with regard to certain raw materials, products (e.g. digital/green) procurement rules, technologies and opportunities for companies to ramp up participation in EU and domestic value chains. These include, for example, EU strategies and legislation such as the Economic Security Strategy; the Critical Raw Materials Act; the Net Zero Industry Act; the Carbon Border Adjustment Mechanism and Important Projects of Common European Interest (IPCEIs). This dialogue can be enhanced by annual communication on the trade dependencies list (Recommendation 1) by public consultation.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| 4 | Provide regular two-way dialogue between Government and Industry on key GVC issues by consulting with industry on emerging geopolitical developments, regulations and policies impacting on supply chains and ensuring that supply chain issues and bottlenecks are periodically made a standing item under AOB on relevant government-industry fora agendas. | DETE, Enterprise Agencies, Industry Stakeholders |

### 6.2.3 Promoting open international markets

As a country which heavily depends on trade and investment for its overall economic wellbeing, keeping markets open and supported by trade rules which create a level playing field are key strategic interests for Ireland. These interests are brought into sharp focus in the current geopolitical climate. The expansion of Global Value Chains has slowed since the financial crisis in 2008. The Russian invasion of Ukraine has generated significant inflation in energy prices and brought about supply chain challenges in other commodities, including some critical raw materials and food. The statistical analysis undertaken for the Expert Group highlights that China is relying less on foreign inputs in its exports, with its trade policy increasingly driven by self-sufficiency and economic security. Trade relations between China and the US are increasingly strained. Brexit has significantly changed the terms of trade between the UK and the EU, including with Ireland. Some trade partner policies are

increasingly interventionist and defensive in nature. The OECD estimates that the global incidence of export restrictions on critical raw materials increased more than five-fold from 2009 to 2020.[70]

Globally, economic security and resilience are more prominent features of industrial strategies. Some policies aim to reduce reliance on international trade for critical industries or to build strategic trade partnerships in order to secure supplies of inputs in strategic sectors. These include the Inflation Reduction Act in the US, the Economic Security Bill in Japan and the European Economic Security Strategy.

### Engagement at EU and Other International Fora

International trade policy is a competence vested in the European Commission under the EU treaties, whereby the Union's negotiating strength is as a bloc of 27 member states representing some 450 million citizens. This ensures that actions, decisions and negotiations conducted by the Commission on behalf of the member states are more impactful than unilateral action by a single member state.

Against this background, it is important that Ireland maintain a sharp trade policy focus on various EU policy instruments that impact on trade. These include EU FTAs, which provide preferential market access to key trade partners on a bilateral basis. They also include aforementioned EU policies developed in other Commission DGs, but which have implications for trade and supply chains, for example, the Carbon Border Adjustment Mechanism; the Net Zero Industry Act; the Critical Raw Materials Act; Regulation on De-forestation Free products; the Corporate Sustainability Due Diligence Directive; the Corporate Sustainability Reporting Directive; critical technologies assessed under the European Economic Security Strategy. In addition, the EU Single Market is itself a valuable – and as yet, under-utilised – resource for companies in developing their supply chain and sourcing strategies.

[70] OECD (2023) Raw materials critical for the green transition: Production, international trade

In terms of engaging internationally, there are a number of actions that DETE can continue or strengthen to ensure that Ireland's interests are 'GVC proofed' from a perspective of supporting open markets and promoting resilient global value chains. These include:

- Continued implementation of the national Trade and Investment Strategy, including with regard to trade missions and review of the Local Market Teams in overseas markets.
- Advocating for and safeguarding key strategic Irish interests in EU Free Trade Agreements, including with regard to sectors.
- Strengthening coalitions with like-minded Member States in the EU around key trade policy developments that impact on global value chains.
- Effectively represent Ireland's interests in the development of EU trade defence and other trade instruments, and ensure they are proportionate and evidenced-based.
- Support and provide impetus for the continued implementation of the Trade Facilitation Agreement at the WTO along with the WTO reform agenda with a view to strengthening the multilateral rules-based environment that can promote investment, diversification, and sustainability.
- Scrutinising non-trade measures (e.g. environmental, technologies, due diligence etc.) to ensure they are WTO compatible and do not have market distorting impacts that create level playing field issues for affected companies.
- Press for full implementation of the EU Single Market, including a renewed impetus to the removal of barriers to its smooth operation, and promotion of its relevance to Irish companies in the context of supply chain resilience.
- At the OECD Trade Committee, support research, analysis and continued development of the evidence base on the level playing field (including below market finance and market distorting industrial subsidies) and global value chain resilience in future Programmes of Work and Budget and ensure that it is disseminated appropriately within the national policy community.
- Engage with the OECD initiatives on supply chain resilience, including workshops and the OECD Member Economist Conference and apply the evidence base to the Irish context.

| No. | Policy Action | Ownership / Responsibility |
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| 5 | DETE Trade Division to ensure Ireland's interests are 'GVC proofed' at relevant EU and multilateral fora, including by continuing support for open markets, rules-based trade and scrutinising non-trade measures for trade impacts. | DETE in consultation with Govt Depts, Industry Stakeholders |

### Maintaining 'best in class' trade facilitation

An important part of keeping markets open from Ireland's perspective is to ensure that our trade facilitation measures which support companies to trade across borders are best in class. These are measures that streamline and simplify the technical and legal procedures for products entering or leaving a country to be traded internationally. Trade facilitation covers the full spectrum of border procedures, from the electronic exchange of data about a shipment, to the simplification and harmonisation of trade documents, to the possibility to appeal administrative decisions by border agencies. Trade facilitation measures allow better access for businesses to production inputs from abroad and supporting greater participation in global value chains, including small- and medium-sized enterprises (SMEs). They also help to lower overall trade costs and increase economic welfare, in particular for developing and emerging economies, and ensure the timely delivery of medical goods and perishable agricultural products. A study by the OECD in 2023 finds that the impact of trade facilitation reforms, supported by the conclusion and entry into force of the WTO TFA have contributed to reducing trade costs worldwide by 4.5% on average over the last decade and to enhancing trade by up to 16% in some regions.

The biennial OECD Trade Facilitation Indicators (TFI) cover the full spectrum of border procedures for more than 160 economies across different income levels, geographical regions, and levels of development. The latest results (2022) for Ireland show that Ireland exceeds or is closest to the best performance across the sample in all areas. Performance has improved since 2019 in the areas of information availability and internal border agency co-operation. Recommended areas for improvement with the greatest benefit for Ireland are

in the areas of information availability, advance rulings, fees and charges, automation and streamlining of procedures, specifically with regard to:

- Improve the operation of customs hotlines.
- Improve the availability of online information about judicial decisions.
- Further expand the acceptance of copies of documents
- Advance the development of the Single Window; Expand the coverage of Authorised Operator programmes.

It is clear that Ireland's performance on the trade facilitation indicators is already best in class, and it is recommended that DETE holds a biennial consultation with Revenue on the publication of the Trade Facilitation Indicators as the basis for a periodic consultation on trade facilitation to discuss developments. DETE will seek stakeholder input in advance of the consultation.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| **6** | DETE to engage with Revenue on periodic basis to review trade facilitation developments. | DETE, Revenue |

In addition, DETE will also monitor and consult with relevant stakeholders on issues identified the OECD Services Trade Restrictiveness Index and OECD Digital Services Trade Restrictiveness Index with a view to identifying any bottlenecks and associated policy implications.

### 6.2.4 Embed and strengthen participation by firms in Global Value Chains

Through its sectoral analysis, the Expert Group also proposed a range of opportunities to ramp up and deepen participation by Irish companies in Global Value Chains. These actions

have the potential promote flexibility and agility in the operating environment for internationally trading companies and help them overcome barriers to trade. They include actions that Government may already be taking, for example, – in the Enterprise White Paper, the work of the Expert Group on Future Skills Needs, the National Research Strategy currently under development, Food Vision 2030 and sectoral strategies currently under development etc. These actions may be considered 'no regrets' types of measures that Government can take to promote participation in GVCs. In other words, they play a positive role in supporting firm resilience and capabilities to participate in global value chains regardless of the international trading environment. It is important that Government Departments and Agencies note and consider these actions in the implementation of current strategies and development of future policy. In this context, the outcomes of the sectoral analysis will be relayed to relevant policy units and Agencies to inform current and future for consideration. These are summarised as:

- Continued development of the innovation system to meet national and global challenges, including in the areas of digitisation, cyber security, health, AI and sustainability.
- Focus on strengthening capacity within enterprises which drive efficiencies, particularly regarding investment in latest technologies, waste management programmes, customs and logistics capabilities,
- Ensure leadership and skills programmes remain relevant to industry current and skills needs, with flexible models of delivery and especially in areas of acute shortages and with a supportive and dynamic work permit system.
- Support automation and deployment of AI for efficient and sustainable production and leverage the digital transition fund to drive transformation,
- Support companies to develop sustainability strategies and meet climate target obligations, including adoption of biofuels, hydrogen, microgeneration, waste reduction programmes, embedding the circular economy in product design and innovation.
- Improve tax and financial supports to facilitate the digital and green transitions and consider introduction of accelerated capital allowances for advanced manufacturing, digitalisation and industry 5.0.
- Support continued development of strategic sectors which are supported by global value chains such as Agri-food, Life Sciences, Engineering, ICT, Med Tech, Wind Energy, Hi Tech Construction.

The Trade & Investment Council is well-placed to consider periodic assessments of the progress that Ireland is making in availing of these opportunities to strengthen supply chain resilience and ensure embedding of Irish companies within GVCs.

| No. | Policy Action | Ownership / Responsibility |
|---|---|---|
| **7** | **Proactively support GVC participation and resilience**<br>(a) Pursue the broad spectrum of 'no regrets' measures identified by the Expert Group, including investment in the innovation system, strengthening enterprise capacity and development of strategic sectors<br>(b) Report annually to the Trade & Investment Council on Ireland's progress in GVC participation and resilience | DETE in consultation with Govt Depts, Industry Stakeholders |

# Members of the Expert Group on Global Value and Supply Chains

Ronnie Downes (Chair), Assistant Secretary, Trade Division, Department of Enterprise, Trade and Employment

Dermot Coates, Department of Enterprise, Trade and Employment

Shane Conneely, Chambers Ireland

Denise Cuffe, Department of Transport

Stephen Curran, Department of Enterprise, Trade and Employment

Klaudia Dudzinska, Ibec

Pauline Flanagan, Ibec

Eoghan Glynn, Department of Agriculture, Food and the Marine

Shane Hamill, Bord Bia

Cillian Harford, IDA Ireland

Gary Hartnett, Johnson & Johnson

Jennifer Hawkins, IDA Ireland

John Hughes, Department of Enterprise, Trade and Employment

Karen Hynes, Department of Enterprise, Trade and Employment

Pat Ivory, Ibec

Katie Kent, Enterprise Ireland

Neil McDonnell, Irish Small and Medium Firms Association

Simon McKeever, Irish Exporters Association

Joseph Moore, Department of Further and Higher Education, Research, Innovation and Science

Professor Edgar Morganroth, Dublin City University

Liam Morris, Department of Enterprise, Trade and Employment

Thomas Murray, Department of Enterprise, Trade and Employment

Karl Pickard, Irish Exporters Association

Michael Ryan, Science Foundation Ireland

### Research and Secretariat - Department of Enterprise, Trade and Employment

Andrew Colgan (Head of Research and Analysis)

Santosh Aryal

Sean Drumm

Lisa Bowe

Conor Kirwan (Intern)

Shay Power (seconded from IDA Ireland)