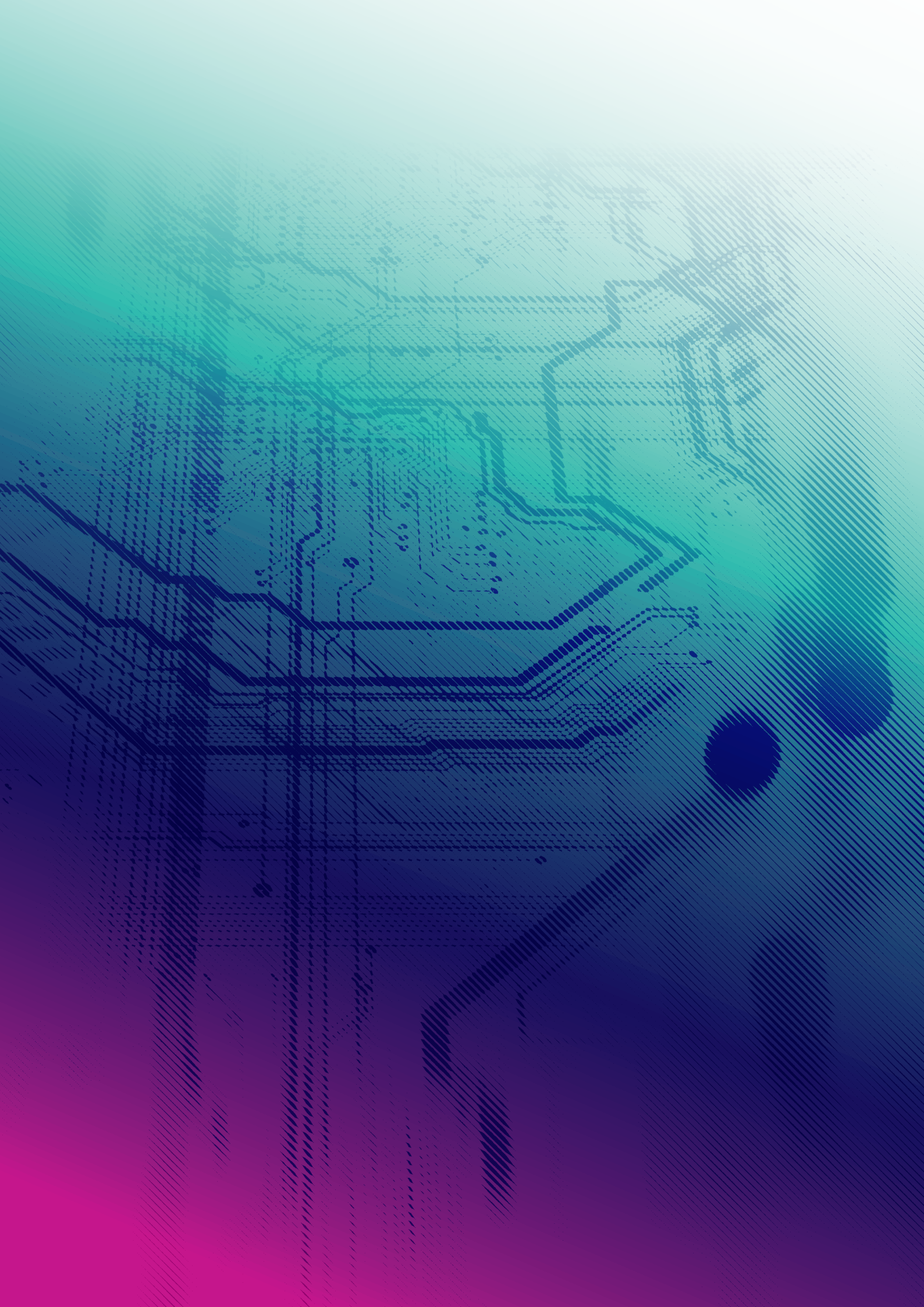
Technology Ireland

Ibec

Brexit and the Irish Technology Sector

frontier economics



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Executive Summary

The digitally-intensive sectors are of increasing importance to Ireland's prosperity

The digitally-intensive sectors make a significant, and growing, contribution to Ireland's prosperity. Ireland's digital sectors account for about 13% to Ireland's GDP.

The sector has also been growing, fast. Since 2013, the sector has grown at an average of 12% per annum. We estimate that the sector will contribute over €30 billion to Ireland's economy in 2017 and, on its current trajectory, over €44 billion in 2020.

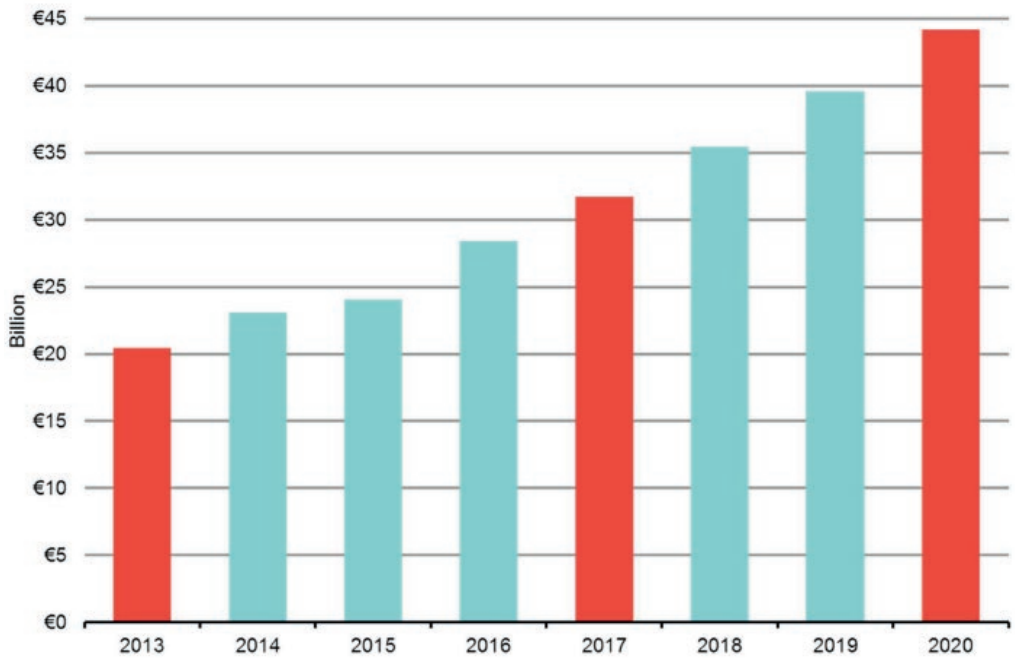
The sector also accounts for a significant share of Irish exports – approximately 26%. The UK is an important trading partner for digitally-intensive sectors. While the sector is not overly reliant on the UK at an aggregate level, for some firms or industries the UK is an important source of inputs and/or final export market.

Employment has also been growing in the digital sector – by about 10% over the last five years. The sector now directly employs over 210,000 people. Wages in the sector are also higher than elsewhere in the economy – in the ICT sector, wages are 50% higher than the rest of the economy.

€44 bn

It is estimated that the digitally-intensive sector will account for €4 billion in GVA by 2020

Figure 1. Irish digital sector estimated GVA



Brexit could disrupt the digitally-intensive sectors via a number of mechanisms

An important driver behind the growth of digital sectors has been the emergence of cross-border supply chain links. In the case of Ireland, cross-border links with the UK may be disrupted or adversely affected by Brexit. This is because Brexit could increase the costs associated with these links, reducing the competitiveness of the Irish tech sector and/ or diverting activity away from Ireland to the UK.

Cross-border links with the UK may be disrupted or adversely affected by Brexit…

…but the disruptive effects could be partially compensated for by diversion of trade and investment from the UK to Ireland.

The main mechanisms are:

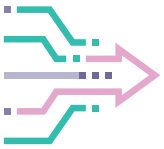
- **Market access:** The impact of Brexit on Ireland's trade in digital goods is relatively low as potential tariffs are generally low. However, customs delays and impositions could increase costs or risk sales to the sector. For service, the main risk is the imposition of non-tariff barriers, primarily via differences in regulatory settings impacting upon market access.
- **Regulation:** Depending on the Brexit scenario, fragmentation may occur unless EU regulation is regularly transposed into UK law. This may limit market access or increase the cost of business associated with relying on UK suppliers as part of the supply chain. There is also the risk that Ireland loses a strategic partner in shaping the future direction of EU digital regulation.
- **Data:** Depending on the Brexit scenario, the UK may need to negotiate access to GDPR or equivalence. This may impact Irish tech firms given close linkages with the UK. A hard Brexit would also provide weak or no protection against localisation provisions unless a specific agreement was put in place.
- **R&D**: Ireland has close R&D links with the UK. A large proportion of EU-funded R&D projects which Ireland's organisations participate in have UK partners. To the extent that Irish and UK activities are complementary, a reduction in funding to the UK, and diversion to other EU member states, could affect Irish R&D, and therefore the attractiveness of Ireland to digital sector firms.
- **Investment:** Under a Brexit scenario not involving membership of the single market, the UK may be less constrained by EU state-aid rules. WTO subsidies rules may allow more leeway to the UK in, say, granting regional development subsidies or broad-based (i.e. non-firm-specific) subsidies.

Brexit also provides some opportunities for the sector in Ireland

While disruption to Ireland's digitally-intensive sectors may be substantial, the disruptive effects could be partially compensated for by diversion from the UK to Ireland. For example, diversion of investment to Ireland could occur due to the following

- Market access: Firms relocate activities to Ireland to minimise the effects of non-tariff measures and regulatory compliance costs.
- Cross-border data flows: Should post-Brexit data flows between the EU and the UK not be resolved, there is the potential for diversion of investment to Ireland, as digital companies look to ensure ease of access with the EU.
- R&D collaboration: As some R&D activities are substitutable between the UK and Ireland, the digitally-intensive sectors in Ireland may benefit from increased R&D activity levels in Ireland post-Brexit.

Whether such opportunities are sufficient to offset the disruptive effects of Brexit on the sector is unclear. That will be driven not only by the final arrangements agreed by the EU and the UK, but also by Ireland's domestic policy response and its ability to maximise the opportunities that are presented.



Four Brexit priorities for the sector

1. GDPR
2. Market access for services
3. R&D links
4. Application of state aid rules

Priorities

The analysis has enabled us to identify a range of potential impacts on digitally-intensive sectors, and consider the order of magnitude for each of these risks.

Proposed policy responses can be split into two broad areas.

- Priorities for negotiating the future trading arrangements with the UK; and
- Domestic policy responses to help mitigate the impact of Brexit on the sector. Many of these are "no regret" options, in that they would be beneficial policies or interventions regardless of Brexit.

Negotiating priorities

GDPR has significant potential to disrupt the sector. In the event of a hard Brexit, additional legal protections (e.g. contractual safeguards) will be required in order to transfer personal data from EU Member States to the UK. It is essential either to have in place a transition arrangement to deal with such an outcome, or to ensure that any UK application for an adequacy decision from the European Commission (removing the need for these additional protections) is in place on the effective date of Brexit.

Services form an important element of the Irish technology sector supply chain. In the event of a hard Brexit the WTO/MFN terms provide far less certainty and security of access for services. There is the potential for significant disruption of Irish supply chains. It is essential that any transition arrangements provide for trade in services, not just trade in goods.

Ireland has close **R&D** links with the UK. A large proportion of EU-funded R&D projects which Ireland's organisations participate in have UK partners. It is vital that a transition is put in place to ensure that Irish research organisations are not disadvantaged as a

result of their historical relationships with UK research bodies. It may be helpful to provide support for the development of new research relationships between Irish institutions and institutions in other Member States.

If the UK is outside the single market, it may be less constrained by EU **state-aid** rules. The UK may have more scope in granting regional subsidies or broad-based subsidies. This may threaten the Irish technology sectors' ability to attract international investment.

The **public procurement** process in the UK may also be more easily able to discriminate in favour of indigenous firms at the expense of non-UK firms. This may deter investment in Irish firms for whom the UK is a major export market. It is critical that any transitional and ongoing arrangement with the UK ensures that there is a level playing field and that the UK is not in a position to unfairly advantage its technology sector at the expense of Ireland and other Member States.

Three domestic policy priorities

1. Growth capacity
2. Increased R&D capacity
3. Diversify and strengthen partners and collaborators

Policy priorities

The technology sector may also have the opportunity to attract more trade and investment post-Brexit, but this must be supported by a domestic policy response.

Domestic policy responses should include:

- **Growth capacity**
  - Ireland needs to ensure it has the capacity to grow should investment be diverted from the UK to Ireland.
  - This includes investment in areas such as infrastructure gaps, policy frameworks to allow for additional housing or skills shortages.
  - Investment in infrastructure needs to ensure capacity for growth throughout the country. For example, the timely rollout of rural high-speed broadband and better mobile coverage, and a well-connected intermodal land transport system.

- **Increased R&D capacity**
  - Implement Innovation 2020, which would put in place the necessary funding to grow the capacity of the R&D sector in Ireland.
  - Invest in R&D infrastructure, skills, and research frameworks in order to ensure talent is located into Ireland, and that R&D activity can grow in centres of excellence.
  - Professional development for Irish-based researchers to develop project management skills to lead future EU research programmes.

- **Diversify partners**
  - Strengthen existing cooperation between Europe's 'Digital Frontrunners' in order to help shape the European regulatory direction in a way which will maximise the growth potential of the digital market.
  - Support the research sector in Ireland to develop new partnerships with other EU R&D to strengthen and create new connections and collaborations.
  - Assist firms to diversify their export markets (particularly in the event of disruption of the UK export market).

Many of these policies are likely beneficial regardless of Brexit; but Brexit may increase the expected return.

1. Introduction

Brexit will impact significantly on trade between the UK and EU Member States. Given Ireland's close ties and extensive trading arrangements with the UK it has been widely acknowledged that Ireland's trade with the UK may be vulnerable to very significant disruption.

The technology sector, which makes a critical and growing contribution to the Irish economy, may be particularly at risk from Brexit disruption given its intrinsic links to the global market and heavy dependence on trade.

Technology Ireland has been working to understand the impact that Brexit may have on the sector in Ireland. It has prioritised the following key areas of impact:

1. trade barriers;
2. access to talent;
3. regulation (including IPR protection and standards)
4. data flows;
5. R&D cooperation; and
6. public procurements.

For these reasons, Technology Ireland has commissioned Frontier Economics to research the potential impact of Brexit on the digitally-intensive sector in Ireland. The purpose of this research is to assess both potential benefits and risks for the Irish sector.

Our approach to this research has been to:

1. define the digitally-intensive sectors of interest, and their contribution to Ireland's economy;
2. identify possible policy scenarios for the future UK-EU relationship;
3. identify how the value chains in these sectors are affected by Irish-UK linkages; and
4. assess the policy areas that may be impacted most severely from Brexit.

2. Defining Digitally-Intensive Sectors

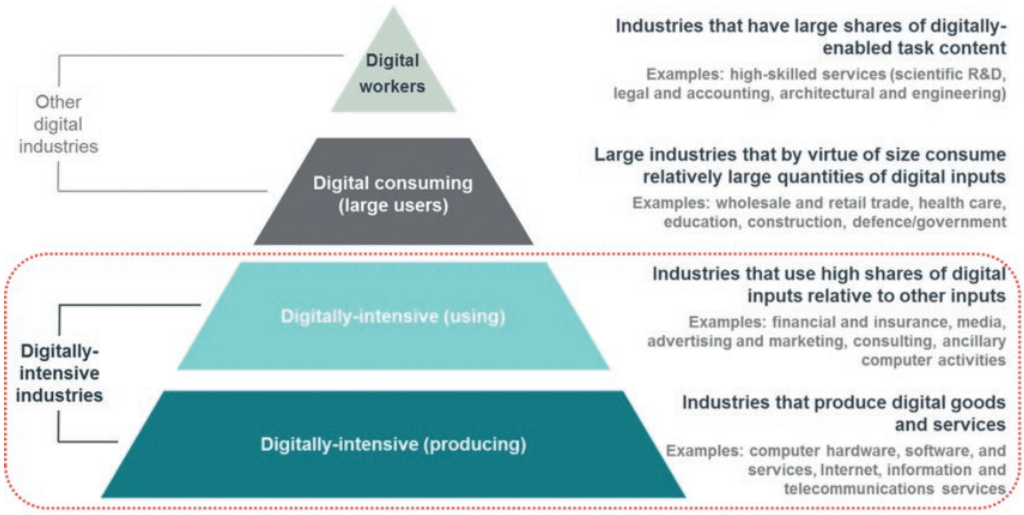
Digital technology is central to modern economies, and is a main driver of growth and innovation.

Digital technologies are ubiquitous – they are deeply embedded in all sectors of the economy, within many businesses, and are critical tools for most workers.

This means that defining the 'digital sector' is a challenge. We therefore take a relative approach in defining the sectors in Ireland that are *especially digital*.

Using our established methodology[1], we focus on the degree to which each industry utilises digital inputs (computer and information hardware, software, telecommunications and IT services) in production (as labour, capital, and intermediate inputs).

Figure 2. Defining the digital sectors



1 Frontier Economics 2017, "the UK digital sectors after Brexit".

We have analysed 58 sectors spanning the Irish economy and found that 11 intensively use digital goods and services (very high shares of digital capital, labour, and intermediate inputs relative to total inputs).[2] Four of these 11 digitally-intensive sectors also produce digital goods or services. The remaining seven produce services – in advertising, legal, post, and business services – but intensively use digital technologies in the course of production. Collectively, these 11 sectors constitute the 'digital sector' for analysis in this report.

We note that a group of industries exists that are sizable and account for large shares of the total use of digital goods and services in production but fail to meet our 'digitally-intensive' standard because they also use many other inputs. These include financial services, insurance and pension funding, wholesale trade, and renting and leasing activities. While these fall outside of this report's analysis, they are likely to be impacted by and impact on the digital sectors following Brexit – both directly and indirectly. These sectors account for 11 percent of total consumption of digital inputs in production. The 11 digitally intensive sectors account for a further 62 percent.

Scoping the digital sectors

Figure 3 lists the eleven digitally-intensive industries in the Irish economy, along with figures for nominal levels and shares of gross value add (the industry equivalent of GDP) and turnover (or revenue). Also included is an aggregate for the entire economy.

Figure 3. Digitally-intensive sectors

Category	Code	Industry
Producing	26	Computer, electronic and optical products
	27	Electrical equipment
	33	Repair and installation of machinery and equipment
Using	53	Postal and courier activities
	61	Telecommunications
	62-63	Computer programming, consultancy and Information service activities
	66	Activities auxiliary to financial services and insurance activities
	69-70	Legal and accounting activities, head offices and management consultancy activities
	73	Advertising and market research
	74-75	Other professional, scientific, technical and veterinary activities
	95	Repair of computers and personal and household goods

Source: Frontier analysis of most recent CSO input and output tables (2013)

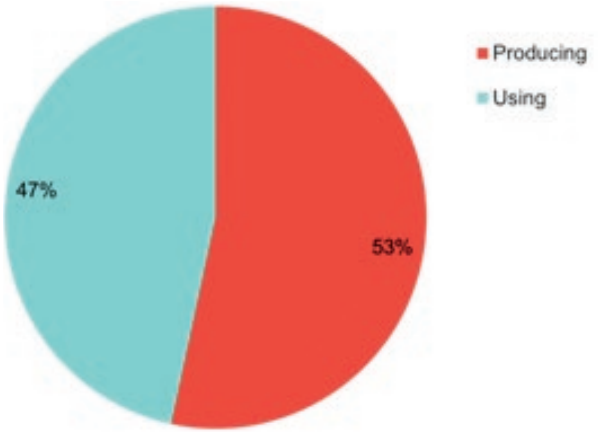
2 Based on the measure, this meant placing within a certain percentile (i.e. above the 80th percentile).

The digital sectors constitute about 12 percent of Irish economy GVA, with approximately half of this coming from digital producing industries and half from digital using industries. As a proportion of turnover, the digital industries make up 21 percent of the total economy, with three-quarters of this coming from the digital producing segment and the other quarter coming from the digital using segment. Whether measured as GVA or turnover, 85 percent of digital sector output is concentrated in services activities – with computer, electronic, and optical products and electrical equipment being the exceptions. About half of the digital-producing segment is concentrated in computer programming, consultancy and information services, while nearly 80 percent of activity in the digital-using segment is concentrated in legal, accounting and other business activities as well as activities supporting financial and insurance services.

12%
of output

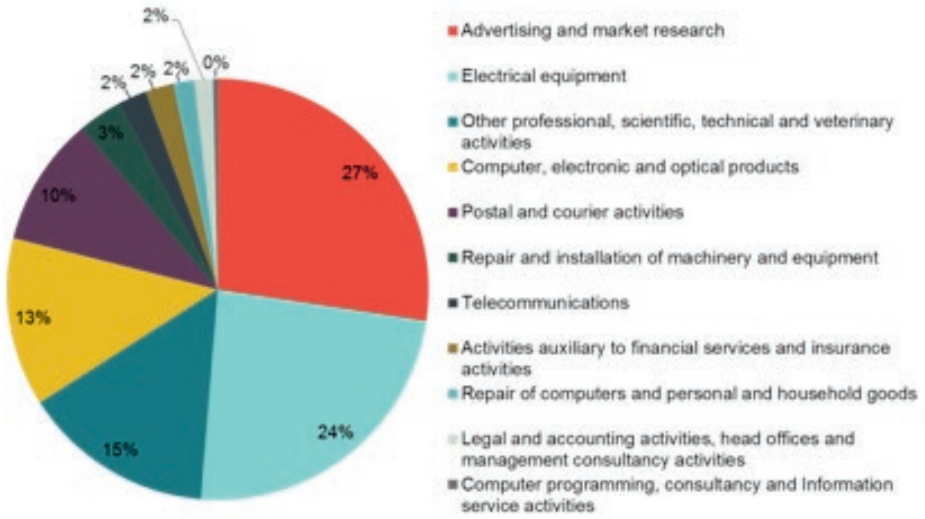
The digitally-intensive sectors account for 12 percent of gross value add.

Figure 4. Proportion of digitally-intensive GVA by using and producing



Source: Frontier analysis of CSO data

Figure 5. Proportion of digitally-intensive GVA by sector



Source: Frontier analysis of CSO data

3. Digitally-Intensive Sectors' Economic Contribution

In this section, we consider the digitally intensive sector's contribution to Ireland's economy, including (1) estimated value of the digitally-intensive sectors; (2) sector growth; (3) employment and wages; and (4) international trade.

Value of the sector

We estimate that the sectors will account for over €30 billion within Ireland's economy in 2017. Given the sectors' current trajectory, we estimate that this will grow to €44 billion by 2020[3].

Economic growth

The digitally-intensive sectors have been a key source of economic growth in recent years. Figure 7 shows the change in nominal GVA between 2009 and 2016 for the digitally-intensive sectors for which data is available.

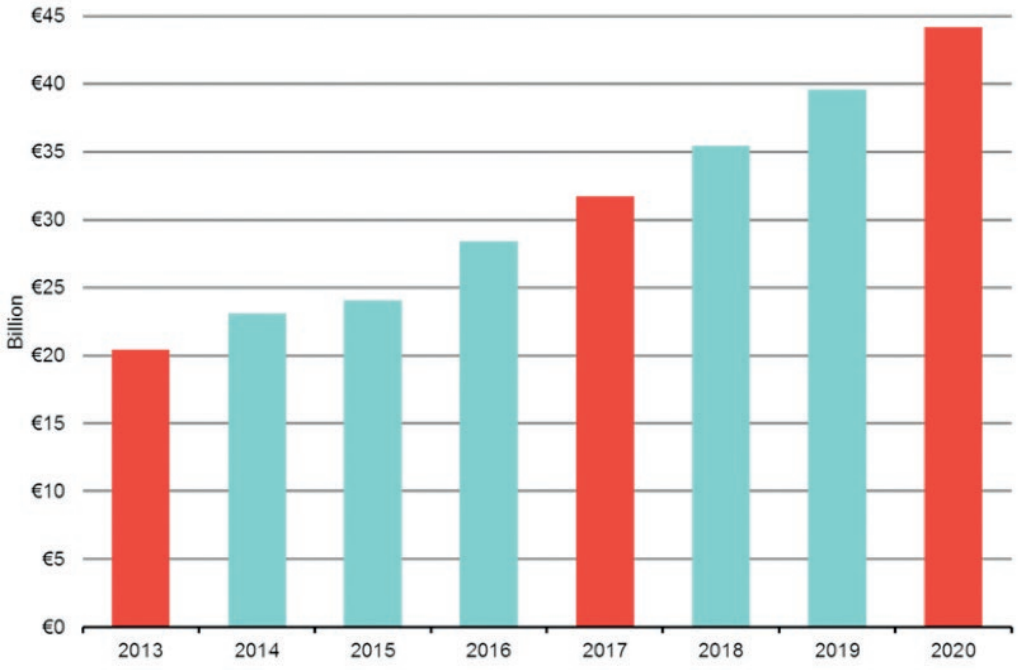
The digital sector had an average growth rate of 12 percent from 2013 to 2016, though there was considerable variation in growth by industry. Legal, accounting and technical services and computer programming, consultancy and information services have outpaced growth in the rest of the digital industries, with average annual growth rates from 2013 to 2016 of 16 percent and 21 percent respectively.

3 To do this, we used sector growth rates between 2013 and 2016, as outlined in section 3.2 below, to estimate the GVA of the total digitally-intensive sector in 2017 and 2020.

12% growth

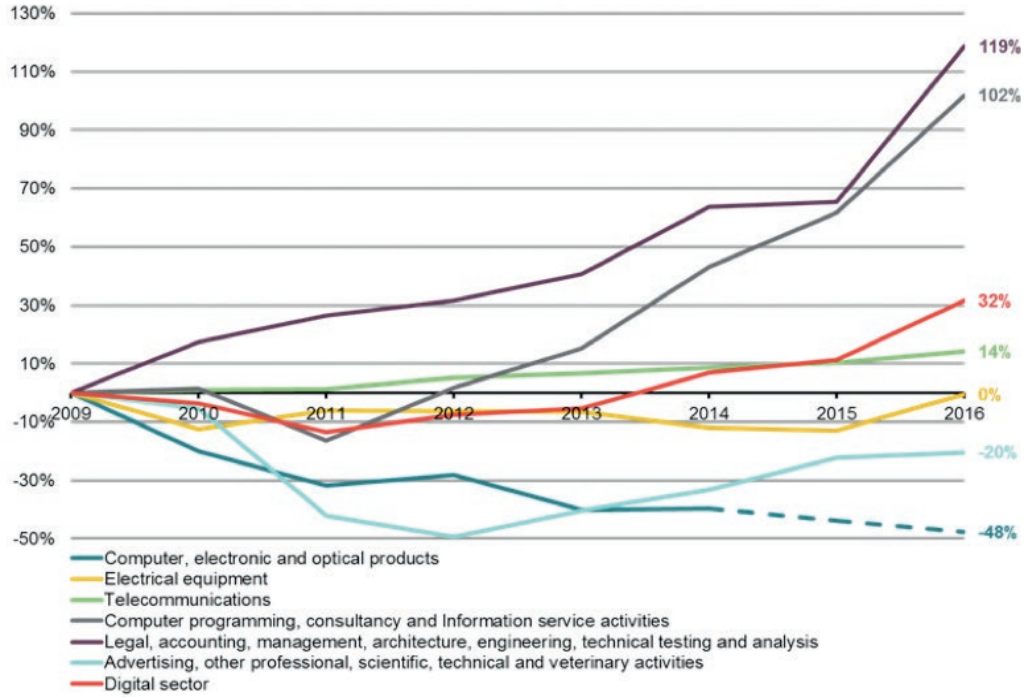
Digitally-intensive sectors grew at a compounded average growth rate of 12 percent from 2013 to 2016.

Figure 6. Irish digital sector estimated GVA



Source: Frontier analysis of CSO data; Frontier forecasts

Figure 7. Change in nominal GVA from 2009 to 2016 by industry



Source: Frontier analysis of CSO data
Note: Due to data availability limitations, we have forecasted GVA for computer, electronic and optical products for 2015 and 2016 – indicated by the dashed line in the above

Employment and wages

There were over 2 million employed workers in Ireland in 2016, and **over 212,000 of Ireland's workers – 10.6 percent – are employed in the digitally-intensive sectors**. The largest individual digital sector in terms of employment are computer programming and consulting, followed by legal and accounting activities, and other professional, scientific and technical activities.

Workers in the digital sectors are paid well, as evidenced by their 13 percent share of total employment compensation in 2013 (compared with 10 percent of total employment).

The digitally-intensive sectors saw employment growth faster than the economy wide average from 2009 to 2016. Employment in digital sectors grew by 9 percent from 2009 to 2016, relative to 3 percent employment growth for the economy as a whole over the period. The largest growth in a single industry was 44 percent employment growth in computer programming and consultancy.

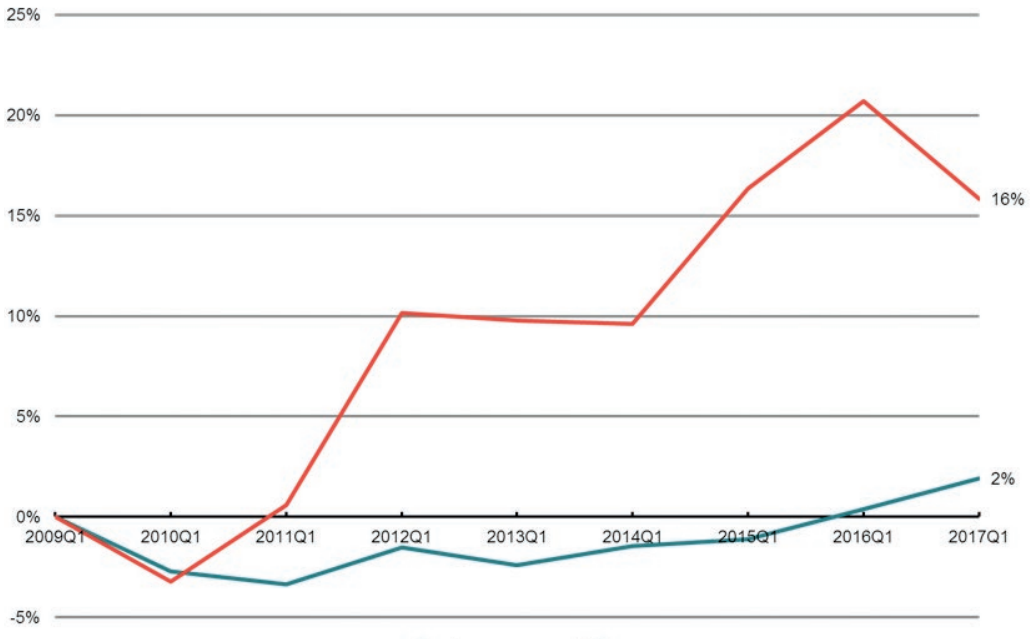
Employee pay in the digital sectors has been outpacing pay growth in the total economy. **In the digital sector, compensation was up by 9 percent between 2009 and 2013**[4]. Over the same period, wages in the total economy saw declines of 3 percent.

While more recent data is unavailable for all of the digitally intensive industries, compensation pay data is available for the ICT sector up to 2017. ICT wages are significantly higher than wages in the rest of the economy. In the first quarter of 2017, average weekly earnings for the ICT sector were €1096, compared to €724 for the total economy, which is 50% higher[5]. Based on this, the average single worker in the ICT sector will pay about €17,200 in incomes taxes compared to €7,600 for the average

50% higher wages

Wages in the ICT sector are 50% higher, on average, than Ireland's total economy

Figure 8. Growth in average weekly earnings, 2009Q1-2017Q1



Source: Frontier analysis of CSO data

4 We analyse employment compensation growth from 2009 to 2013 as compensation data is only available on a granular level through 2013.

5 Average Weekly Earnings by Economic Sector NACE Rev 2 and Quarter, CSO

single worker across the total economy. Figure 8 below shows the growth in average weekly earnings in both the ICT sector and in the total economy since 2009. **Wages in the ICT sector have been increasing faster than wages in the total economy, with growth of 16% from 2009 to 2017 in the ICT sector relative to 2% growth in total economy wages over the same period.**

€57bn ICT exports

In 2015 Ireland exported over €57 billion in computer services, and computer services

International Trade

The digitally-intensive sectors are exposed to international trade and compete on a global basis more so than the rest of the economy – particularly for exports.

The digital sectors account for over a quarter of total Irish exports. Within this segment, computer programming, consultancy and information service activities alone account for 16% of total Irish exports. Other sectors which are particularly engaged in exports include computer, electronic and optical products manufacturing and other scientific and technical activities.

Computer service exports increased by 51 percent between 2012 and 2015. In 2015 Ireland exported over €57 billion in computer services, and computer services account for 47% of all service sector exports.

Figure 9. Exports and Imports by Product Sector

		Imports		Exports	
Code	**Industry**	**€m**	**% Total**	**€m**	**% Total**
--	**Total**	**157,476**	**100%**	**191,345**	**100%**
62-63	Computer programming, consultancy and Information service activities	516	0.30%	31563	16.50%
26	Computer, electronic and optical products	6541	4.20%	9281	4.90%
74-75	Other professional, scientific, technical and veterinary activities	6401	4.10%	3797	2.00%
27	Electrical equipment	1825	1.20%	1015	0.50%
66	Activities auxiliary to financial services and insurance activities	467	0.30%	678	0.40%
61	Telecommunications	1125	0.70%	538	0.30%
53	Postal and courier activities	425	0.30%	640	0.30%
69-70	Legal and accounting activities, head offices and management consultancy activities	1200	0.80%	346	0.20%
73	Advertising and market research	4553	2.90%	150	0.10%
33	Repair and installation of machinery and equipment	*	0.00%	*	0.00%
95	Repair of computers and personal and household goods	*	0.00%	*	0.00%

Source: Frontier analysis of CSO data
Note: Most recent Imports and Exports data analysed (2013).

Chapter Conclusions

- Digitally-intensive sectors make a significant, and growing, contribution to Ireland's prosperity. Ireland's digital sector accounts for about 13% to Ireland's economy.
- The sector has also been growing, fast. Since 2013, the sector has been growing at an average of 12% per annum. We therefore estimate that the sector will account for over €30 billion to Ireland's economy in 2017 and, on its current trajectory, over €44 billion in 2020.
- The sector also accounts for a significant proportion of Irish exports – approximately 26%. Computer services alone account for over €57 billion in exports and almost half of all service sector exports.
- Employment has also been growing in the digital sector – by about 10% in the last five years. The sector now directly employs over 210,000 people.
- Wages in the sector are also higher than elsewhere in the economy.

4. Context for this Study – Brexit Scenarios

On 20 March 2017, the UK notified the EU of its intention to withdraw from the EU. Formal negotiations began in June 2017, and after the first round of these negotiations, both parties issued terms of reference for the negotiations.

The terms of reference focus primarily on the terms of withdrawal, and contain no specific details about negotiations on the future treaty, if any, that is to replace current arrangements.

The scale of the impact on Ireland's digitally-intensive sectors depends on the final shape of these arrangements. Various types of scenario may be envisioned. The purpose of this section, and the report more generally, is not to predict which scenario will eventuate. Rather, we seek to examine how the digital sectors in Ireland stand to be affected by, and how they may respond to, possible scenarios.

We set out below a taxonomy of the type of arrangements that the UK and the EU may enter into. We present these in terms of progressively increasing differences vis-á-vis the status quo.

- **Retaining single market membership:** Under this model, the UK would renounce its EU membership, but subscribe to the four freedoms that underpin the single market, and incorporate EU regulation and law. It is likely to be within the jurisdiction of the EFTA court (or a bespoke institution analogous to it, responsible for the enforcement of EU law). Under this model, the UK would be free to conclude free trade agreements with the rest of the world, unless it chose to remain within the EU customs union, in which case it could not negotiate free trade agreements in goods (but could do so in services).

- **A bespoke trade agreement replacing the single market:** Under this variant, the UK leaves the single market, and rescinds its participation in the four pillars. This scenario may be motivated by a desire to constrain the free movement of labour, which in itself may have implications on the extent to which there is freedom of movement of goods, services and capital. The UK would not automatically take on EU regulations or law, though the parties may agree processes to ensure regulatory harmonisation. It could negotiate free trade agreements with the rest of the world, unless it was part of the EU customs union (see previous point). A key issue is the "depth" of the free trade agreement negotiated.
  - For example, deep commitments on trade in services, particularly in relation to the movement of people, and on regulatory harmonisation could help replicate single market outcomes; or
  - A more arms-length agreement might focus on eliminating tariffs and selected barriers to services, but would be more limited in its dealings with non-tariff measures, regulatory cooperation and would likely involve tighter limits to the movement of people.

- **A series of bilateral agreements:** This follows the example of Switzerland, which has a limited free trade agreement with EU (focusing mainly on industrial goods), sector- specific or thematic agreements (e.g. on aviation and government procurement and the free movement of people). The arrangement between the EU and Switzerland makes clear that all agreements are conditional on each other, including the agreement on the free movement of people. Under this arrangement, the UK would be able to negotiate free trade agreements with the rest of the world.
- **A "hard exit" under which no specific agreement is concluded:** UK-EU bilateral trade is governed by most-favoured nation provisions under WTO rules. This would involve an increase in applied tariffs on UK exports to the EU (and vice versa), unless either party chooses to apply zero duties to all its trade partners. In services, the degree to which UK (respectively, the EU) services exporters are afforded market access opportunities in the EU (UK) and protection from discrimination vis-à-vis EU (UK) suppliers will revert to levels that apply to non-EU third parties that do not have a free trade agreement with the EU (UK).

In the chapters that follow, we consider the impact on Ireland's digitally-intensive sectors by issue, and how those impacts differ by scenario. First, the table below summarises the main questions raised by the different Brexit scenarios, in relation to the key issues raised section 1. The rest of the report is devoted to assessing the implications for Ireland's digital sectors, given the structure of their value chain, in relation to:

- market access and digital trade;
- access to talent;
- regulation;
- cross border data flows;
- research and development cooperation; and
- public procurement.

Figure 10. Typology of UK-EU arrangements and implications

	Single market	Bespoke FTA	Limited bilateral	Hard Exit
Four freedoms, including labour	Yes	Extent depends on depth of agreement	Swiss model includes free movement of people	No. MFN rules apply to goods and services
FTAs with non EU partners	Yes. Services only if UK remains in customs union	Yes. Services only if UK remains in customs union	Yes. Services only if UK remains in customs union	Yes
Regulation	UK transposes EU regulation; UK services/ service providers considered "European"	Specific provisions on regulation to avoid fragmentation?	Specific agreement on transposition of EU regulations?	Fragmentation likely unless EU regulation transposed into UK law
Intellectual property	Remain part of EU IP protection frameworks and institutions	Include IP frameworks in agreement? Or unilaterally transpose EU IP law?	Include IP frameworks in agreement? Or unilaterally transpose EU IP law?	Unilaterally transpose EU IP law?
Data protection	GDPR applies automatically to counties within single market UK operators protected from localisation (e.g. of servers) laws	Need to negotiate access to GDPR or equivalence. Weaker protections against localisation provisions unless specific agreement.	Need to negotiate access to GDPR or equivalence Weaker protections against localisation provisions unless specific agreement.	Need to negotiate access to GDPR or equivalence Weak or no protections against localisation provisions unless specific agreement.
R&D cooperation	Loss of structural funds? Continued access to Horizon 2020	Loss of structural funds? Access to Horizon 2020? (may be conditional on commitments e.g. to free movement of labour)	Loss of structural funds? Access to Horizon 2020? (may be conditional on commitments e.g. to free movement of labour)	Loss of structural funds; access to Horizon 2020.
Procurement	EU single market provisions and procurement directives apply	Negotiate specific rules on access, non-discrimination	Negotiate specific rules on access, non-discrimination	Rely on WTO rules

5. Post-Brexit Trade Barriers and Market Access

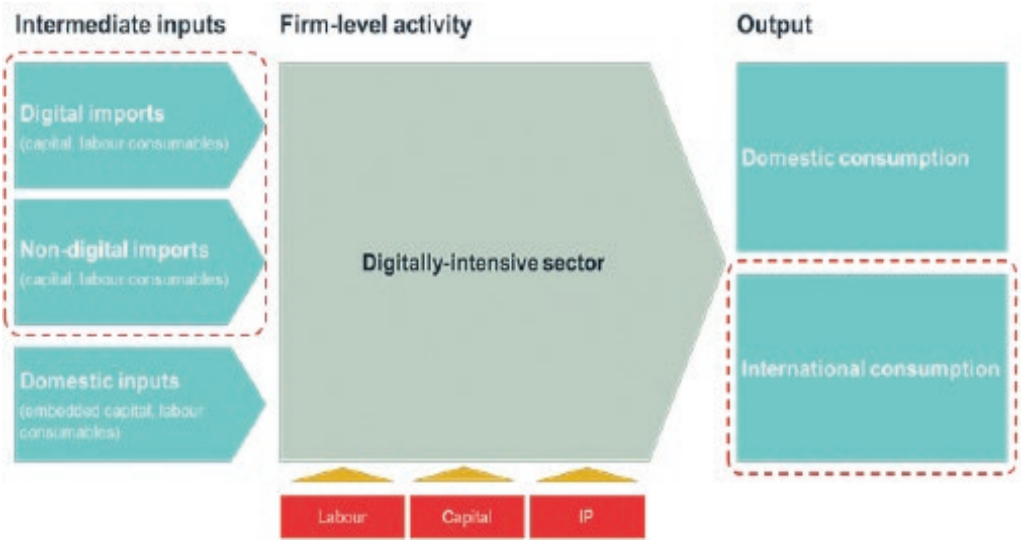
Ireland's digitally-intensive sector is heavily trade dependent. While the sector in aggregate does not appear overly dependent on trade with the UK, some individual firms may be more reliant on the UK either for inputs into their production process, or as a key export market. Brexit may put these value chains at risk by disrupting linkages between the digital sector and their suppliers and customers in the UK.

The digital sectors have many linkages with the rest of the economy, both through the goods and services they supply and through the goods and services they use as inputs into their own production. The economic value created by the digital sectors can thus be broken down into direct measures (value of goods and services produced) and indirect measures (activity generated in other sectors that are linked to the digital sectors).

Below provides a schematic representation of the sector, highlighting the role of cross-border linkages. **The digitally-intensive sectors use both imported and domestic intermediate goods as inputs into their own production process.** Therefore the digitally-intensive sectors are susceptible to changes in trade policy to the extent that those changes affect imports of goods and services into the sector. **The digitally-intensive sector also exports final output into global markets.** Again, the digitally-intensive sectors are susceptible to changes in trade policy to the extent that those changes impact upon their final markets.

The digitally-intensive sectors rely on global markets for their final output.

Figure 11. Schematic of value chain for digitally-intensive sectors



Source: Frontier Economics

Cross-border trade flows

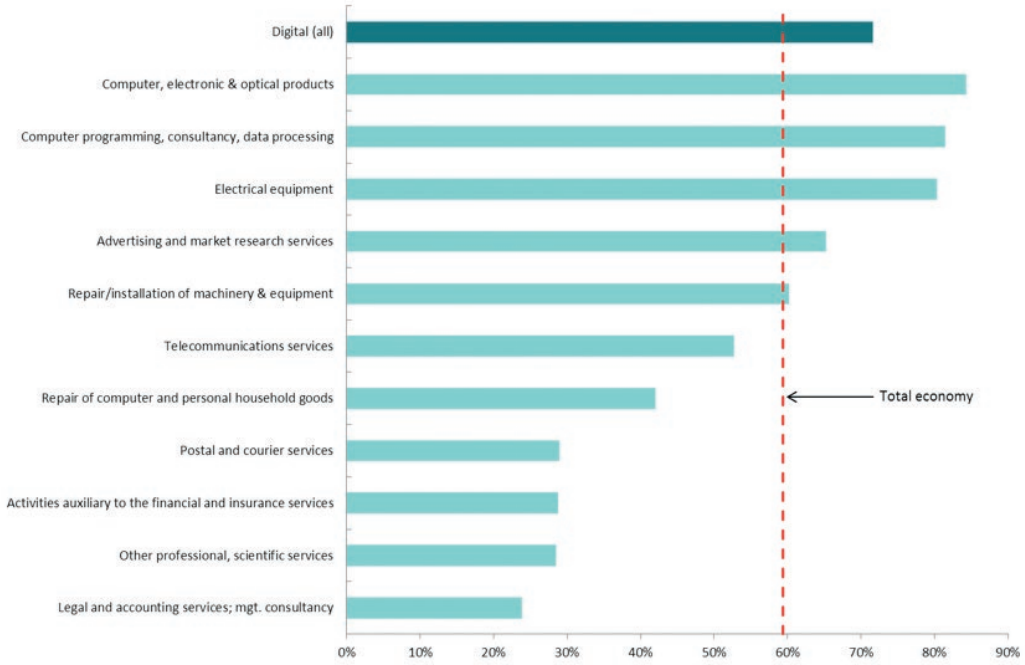
In the section below we consider:

- the extent to which Ireland's digitally-intensive sectors are reliant on imports in general, and on imports from the UK in particular; and
- the extent to which Ireland's digitally-intensive sectors are reliant on exports in general and exports to the UK in particular.

Digital sector reliance on imports

Figure 12 reports the **total share of imports as a proportion of intermediate inputs by sector.** This shows that in aggregate the sector relies more heavily on intermediate imports than the economy in total. Within the digitally intensive sector we see that four sectors in particular – computer, electronic and optical products; electrical equipment; computer programming, consultancy and data processing; and advertising and market research services – have greater import reliance for intermediate inputs than the economy as a whole.

Figure 12. Total import share of intermediate inputs by sector



Source: Frontier analysis of CSO data
Note: Most recent available data from 2011.

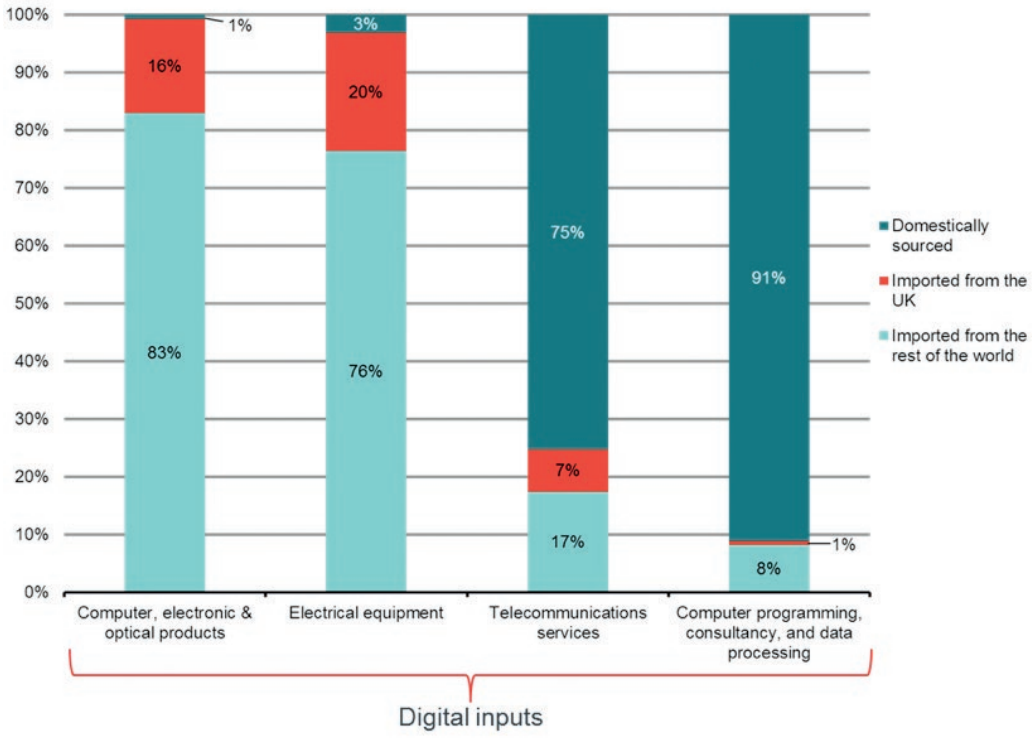
The above shows that the digitally-intensive sectors are relatively reliant on international imports. However, the impact of Brexit will depend on the extent to which these imports come from the UK.

The below chart considers **the origin of the sectors' "digital inputs"**[6]. That is, for the digitally-intensive sectors as a whole, where do their four main digital inputs come from?[7] This shows that this shows that while digital imports are very important for two sectors – computer, electronic and optical products; and electrical equipment – the UK accounts for 20% or less of total digital inputs. The sector is less reliant on the UK for digital services inputs, with 7.3% of telecommunications inputs coming from the UK and less than 1% of all computer programming, consultancy and data processing inputs.

6 Note the difference between Figure 12 and Figure 13 is as follows. The above chart shows the share of total imports (i.e. digital and non-digital) as a proportion of intermediate inputs for each digitally-intensive sector. The below chart shows for the digitally-intensive sectors in aggregate the origin of their digital inputs.

7 Those "digital inputs" are defined as computer, electronic and optical products, electrical equipment, telecommunications services, and computer programming, consultancy and data processing.

Figure 13. Origin of digital inputs for Ireland's digitally-intensive sector



Source: Frontier analysis of CSO data, and ComTrade and World Bank Trade Statistics
Note: The most recent World Bank data available is from 2016 while ComTrade and CSO data is from 2011.

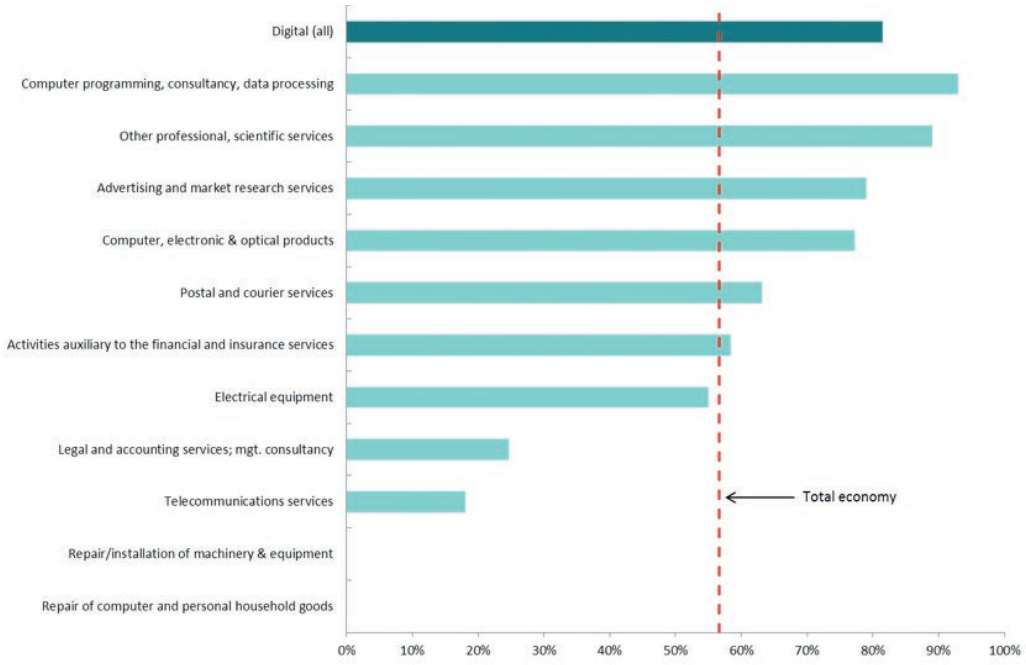
Digitally-intensive sectors' reliance on exports

Figure 14 reports the share of final demand for a product that is exported. The red dashed line indicates the average for the economy as a whole. Exports make up 81% of demand for the digital sector overall, compared to 57% for the economy as a whole. Six sectors have higher export intensity than the economy as a whole.

Again, the above shows that the digitally intensive sector has a relatively high reliance on international exports. However, the impact of Brexit will depend on the extent to which these exports are to the UK.

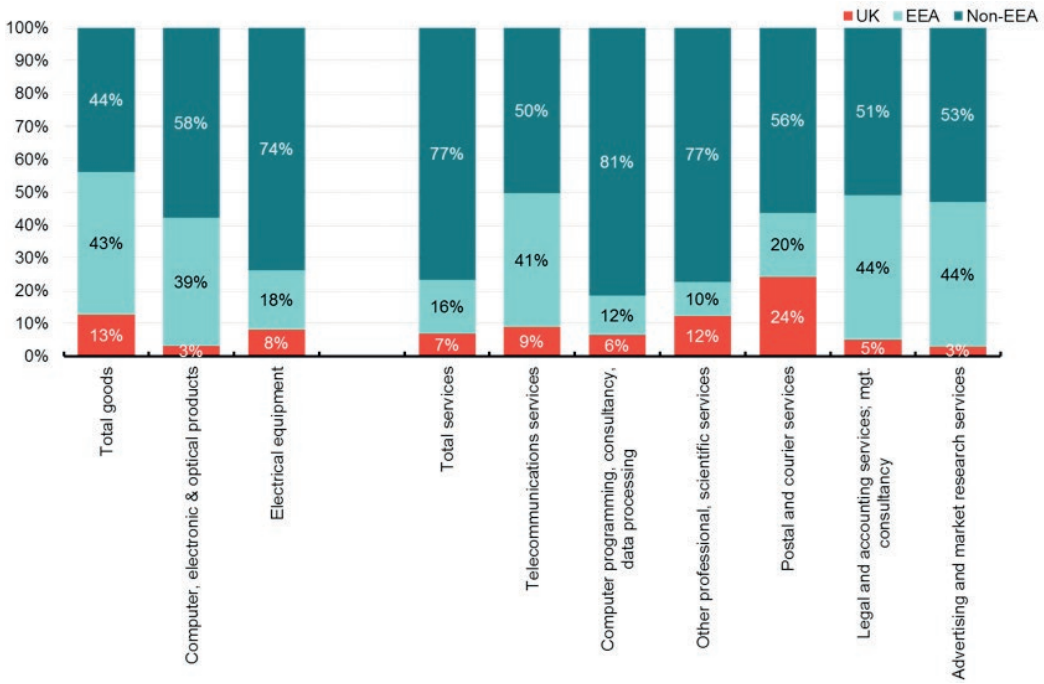
Again, data on exports from the sector is imperfect. However, Figure 15 below shows the split for between the UK and all other export markets for a number of the digital sectors. This shows that with the exception of postal and courier services, the UK accounts for between 3% and 12% of export demand, compared to 13% for goods and 7% for services across the economy as a whole. In consequence, while this suggests that the UK cannot be discounted as an important trading partner, our reliance on the UK as an export market may be significantly less than for other sectors such as agriculture.

Figure 14. Export Share of Final Demand for Goods and Services (2013)



Source: Frontier analysis of CSO data

Figure 15. Share of Exported Digital Sector Outputs by Partner Country in goods data is from 2016.



Source: Frontier analysis of World Bank Trade in Services data and Comtrade International Trade Statistics
Note: The most recent trade in services data available is from 2011 while trade

Trade and Brexit

The trade data in relation to Ireland's digital sectors allows us to draw some inferences on the consequences of various Brexit scenarios. Adverse effects will be a function of the degree of exposure to the UK and the extent to which trade restrictiveness – through tariff or non-tariff barriers – will increase under a particular Brexit pathway.

Trade restrictiveness between the EU and the UK may also have some positive benefits for Ireland's digitally-intensive sectors if trade and/or investment are diverted towards Ireland and away from the UK.

Trade in goods

If the UK remains within the single market or reaches a deep free trade agreement with the EU, then it is unlikely that trade in goods will be significantly different from present.

In other scenarios, there could be implications in relation to an increase in tariffs. Such increases in tariffs could affect either the supply side (by increasing the cost of imported inputs) or the demand side (by restricting market access). However, the extent of this impact would be limited to the MFN tariff rates committed to by the UK and the EU in the WTO.

In general, it is not expected that tariffs will be a major issue for Ireland's digitally-intensive sectors overall on either the supply side or the demand side.

This is for two reasons:

- **The sector is not overly reliant on the UK:** As noted in the section above, less than 20% of digitally-intensive inputs into the digital goods sector come from the UK. About 5% of digitally-intensive exports go to the UK.
- **Tariffs on digitally-intensive goods are relatively low:** The EU (and the UK, by virtue of being a member of the EU when the EU negotiated its WTO commitments) has bound most of the tariff lines at zero-duty or low rates, meaning they cannot be increased post-Brexit. We show below the UK's trade-weighted average tariffs by major product codes relevant to the digital sectors (where data is available) (Figure 16).

Figure 16. Trade-weighted average tariffs (2015)

Description	Trade-Weighted Average Tariff
Electrical machinery and equipment; sound recorders and reproducers, television image and sound recorders and reproducers	1.6%
Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus	1.7%
Clocks and watches and parts thereof	0.5%
Toys and games (games consoles)	0.0%

Source: Frontier analysis of United Nations and World Bank data

The other consideration for trade in digitally-intensive goods post-Brexit, are non-tariff measures. For Ireland, any impact of customs delays and checks could be particularly important. This is because Ireland has a physical border with Northern Ireland, over which significant amounts of trade is conducted, but also because the majority of Irish supply chains transit the UK mainland (e.g. from the rest of the EU, or further afield). The potential for customs delays could result in increased cost, or reduced sales, if the flow of goods is slowed. In industries characterised by 'just-in-time' logistics management practices this could reduce productivity and competitiveness. For Irish SMEs that trade intensively with Northern Ireland, this could be particularly problematic if they are highly reliant on timely cross-border trade.

It has been proposed that new technology solutions to manage customs processes, such as e-records systems, could help to reduce these effects.

Other issues – such as product standards – which are discussed further below in the regulation chapter, may also impact on the trade of digital goods. However, such impacts are likely to take time to materialise as existing regulatory regimes in relation to standards are unlikely to change immediately after Brexit.

In conclusion, while the digitally-intensive sector in Ireland is not overly reliant in the trade of digital goods with the UK, we consider the Ireland's digitally-intensive sector would benefit from future trading arrangements between the EU and the UK that minimised disruption in the trade of goods.

Customs

For Ireland, any impact of customs delays and checks could be particularly important.

Trade in services

For the UK, Brexit's primary trade-related impact on the digital sectors will likely be through non-tariff barriers related to the regulation of services activities. These non-tariff barriers would likely impact on Ireland's digitally-intensive sectors as well.

Non-tariff barriers on trade in services between Ireland and the UK may negatively impact on the Irish technology sector to the extent that Ireland is reliant on UK inputs, or the UK as an export market. Non-tariff barriers relating to regulatory issues (including flows of data) are discussed separately in chapters 7 and 9 below.

LOCATIONAL INCENTIVES

In order to mitigate the impacts of potential increases in trade restrictiveness, the UK could potentially consider introducing locational incentives in order to induce investment in the UK.

Under a Brexit scenario not involving membership of the single market, the UK may be less constrained by EU state-aid rules. WTO subsidies rules may allow more leeway to the UK in, say, granting regional development subsidies or broad-based (i.e. non-firm-specific) subsidies. The UK may therefore have considerably more scope in, say, granting regional development subsidies or broad-based subsidies. Similarly, the public procurement process in the UK may be more easily able to discriminate in favour of indigenous firms at the expense of non-UK firms. This may be a significant threat to the Irish technology sectors' ability to continue to attract international investment.

It is critical that any transitional and ongoing arrangement with the UK ensures that there is a level playing field and that the UK is not in a position to unfairly advantage its technology sector at the expense of Ireland and other Member States.

On the other hand, Brexit may present opportunities for Ireland's digitally intensive sector, if UK-based tech firms seek to relocate their businesses, or parts of their operations, due to the impact of non-tariff barriers. Again, we discuss these issues specifically in relation to cross-border data flows and regulation in Chapters 7 and 9 below.

Chapter Conclusions

Observations

- Ireland's digitally-intensive sectors are intrinsically connected to the global economy
- The UK is an important trading partner for Ireland's digitally-intensive sectors. While the sectors are not overly reliant on the UK at an aggregate level, for some firms or industries the UK is an important source of inputs and/or final export market.

Key threats/opportunities

- The impact of Brexit on Ireland's trade in digital goods is relatively low as potential tariffs are generally low. However, customs delays and impositions could increase costs or risk sales to the sector.
- For service, the main risk is the imposition of non-tariff barriers, primarily via differences in regulatory settings impacting upon market access.
- Brexit may present opportunities for Ireland's digitally intensive sector if UK-based tech firms seek to relocate their businesses, or parts of their operations, due to the impact of non-tariff barriers.

Preferred future arrangements

- While digitally-intensive sectors in Ireland are not overly reliant on trade with the UK, we consider that Ireland's digitally-intensive sectors would benefit from future trading arrangements between the EU and the UK that minimised disruption in the trade of goods and services.

6. Access to Skilled Workers

Access to skilled workers is vital to be able to compete in globalised markets. However, access to talent is unlikely to be significantly impacted by Brexit as the sector is not overly reliant on UK workers. Also, Ireland will retain access to UK talent if the free travel area between Ireland and the UK is maintained.

Also, Ireland will retain access to UK talent if the free travel area between Ireland and the UK is maintained. If the UK restricts immigration from the EU, or more generally becomes less attractive to migrants, then this will potentially increase Ireland's relative attractiveness, and therefore ability to attract UK and other foreign talent.

Migration in the Irish digital sectors

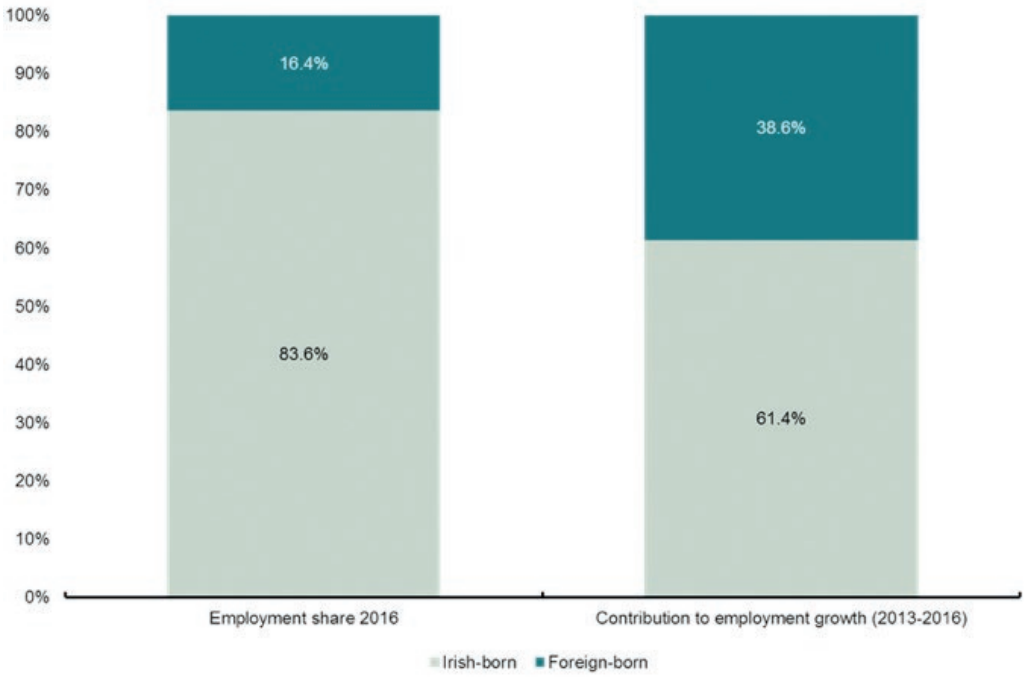
Global workers play a fundamental role in the Irish economy. For the last decade, migrants have accounted for about 15% of total employment in Ireland (Figure 17). In 2016, over two-thirds of these workers came from EU countries (including the UK)[8].

In order to understand the potential impact of Brexit on the supply of skilled workers, we consider on a more disaggregated level where the sector's workers originate from. Figure 18 below shows where workers are born for those employed in the Irish ICT sector, and the Irish economy as a whole[9]. We can see that foreign-born workers represent a larger proportion of the workforce in the ICT sector than in the economy as a whole. However, the majority of these workers come from the EU (excluding the UK) or from outside the UK, with relatively little dependence on the UK.

8 Persons Aged 15 Years and Over in Employment by Nationality, CSO

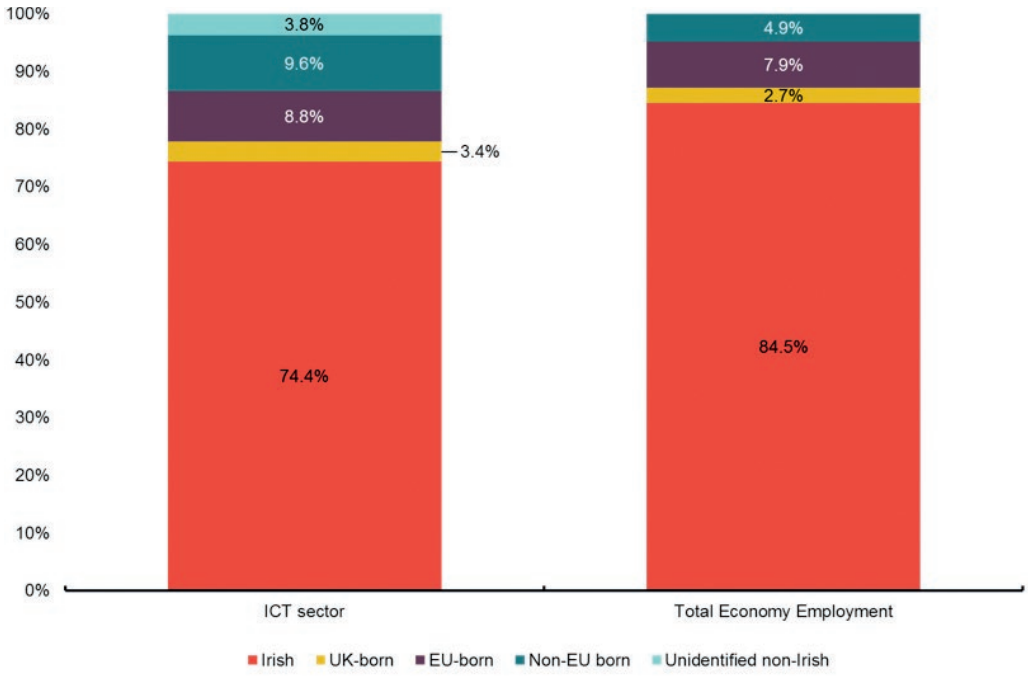
9 Due to limitations in the data it is challenging to identify the nationality of workers for all digital sectors. As such, we use the ICT sector as a proxy for the digitally intensive sectors.

Figure 17. Digital sector employment and growth



Source: Frontier analysis of CSO data
Note: Most recent data on ICT and total economy employment analysed (2016).

Figure 18. ICT and total economy employment by birth region



Source: Frontier analysis of CSO data
Note: Most recent data on ICT and total economy employment analysed (2016).

Labour migration and Brexit

UK workers currently residing and working in Ireland are unlikely to lose their right to remain. Accessing new UK workers is unlikely to be impacted due to the existence of the Common Travel Area (CTA). The CTA between the UK and Ireland predates both countries' EU membership. The rights and protections provided by the CTA[10] are independent from the rights provided to EU citizens under EEA treaty rights. As such, the CTA is recognised in Protocol 20 of the Treaty on European Union and the Treaty on the Functioning of the European Union which states that "The United Kingdom and Ireland may continue to make arrangements between themselves relating to the movement of persons between their territories ("the Common Travel Area")".[11]

Post-Brexit statements from the UK and Irish Governments point towards the preservation of the CTA. The Irish Government, in their position paper on Brexit, stated their intention to "secure acknowledgement from EU partners and institutions that the long-standing bilateral CTA arrangements with the UK will be maintained (in conformity with EU law)" as "its continued operation is fundamental to Ireland's interests and those of Irish citizens."[12] The UK Government has also stated that "the UK wants to continue to protect the CTA and associated reciprocal bilateral arrangements."[13] These statements, in conjunction with the fact that the European Commission has confirmed that the bilateral agreements are in conformity with EU Law, should allay any concerns about the continued access to UK workers. In the unlikely event that a situation was to emerge where the CTA was revoked, it would be unlikely to have a significant impact on the digital sector as UK-born workers make up a small proportion of the total digital sector workforce.

The UK wants to continue to protect the CTA and associated reciprocal bilateral arrangements

Northern Ireland and Ireland: Position Paper' HM Government, August 2017

Changes to UK immigration and work permit policies post-Brexit also have a number of important implications for the Irish technology sector. The UK government has signalled its intention to preserve the right of EU citizens currently resident to stay in the UK. However, the UK may become a less accessible and/or less desirable location for future EU and non-EU migrants in the tech sector. This opens up opportunities for the Irish tech sector to attract these future migrants to work here. And, if the Irish technology sector is enabled to take advantage of opportunities identified elsewhere in this report, then the technology sector here will need to attract these future migrants in order to continue its growth trajectory.

Ireland has already recognised a skills shortage in the digitally intensive industries and occupations and is moving to improve access to skilled workers. According to Europe's Digital Progress Report (EDPR) 2013[14], Ireland ranks first for STEM graduates. However, it is ranked poorly for the general public's ability to use technology, ranking 24th. The report states that only 44% of people have basic digital skills. Many companies face difficulties with trying to recruit ICT specialists. There is a review of the ICT action plan taking place, with the target being able to "meet 74% of industry demand for high-level ICT skills from the education system by 2018" (p.5). There are also targets for ICT graduates, and focus on attracting ICT workers to move to Ireland from abroad. New 'earn-and-learn' apprenticeships are being proposed, to meet industry demand for people with skills in software development.

10 These rights include the right of UK and Irish citizens to reside, work and study in either state without the need to obtain permission. The CTA also allows access to social welfare and health benefits and provides the right to certain voting rights in either state.

11 Consolidated version of the Treaty on the Functioning of the European Union [2012] OJ C326/293

12 'Ireland and the negotiations on the UK's withdrawal from the European Union: The Government's Approach' Irish Government Publication, May 2017.

13 'Northern Ireland and Ireland: Position Paper' HM Government, August 2017.

14 'Europe's Digital Progress Report (EDPR) 2017 Country Profile Ireland', European Commission

Chapter Conclusions

Observations

- Foreign-born workers account for about 15% of Ireland's total workforce. The digital sector is more reliant on foreign-born workers, however. About 25% of the ICT sector's workforce was born outside of Ireland.
- Reliance on UK workers, at an aggregate level, is relatively low, with about 3% of workers identified as being from the UK.

Key threats/opportunities

- The risk of losing access to that UK talent is also relatively low if the Ireland:UK free travel area remains in place.
- If the UK restricts immigration from the EU, or more generally becomes less attractive to migrants, then this will potentially increase Ireland's relative attractiveness.

Preferred future arrangements

- The continuation of the Ireland:UK free travel area would ensure that Ireland's digitally-intensive sectors maintain access to UK talent, and would also ensure ease of travel and business between Ireland and the UK, thus helping to maintain trading relationships.

7. Regulatory Compliance and Co-operation

Depending on the Brexit scenario, the UK's access to some markets may become more challenging due to cross-cutting and sector specific regulation. Regulatory fragmentation may also occur over time as the EU progresses with its Digital Single Market initiatives.

These disruptions risk increasing costs to Ireland's digitally-intensive sector as they may act as a trade barrier between Ireland and the UK.

However, they could also result in diversion of investment and trade to Ireland. Ireland may need to increase collaboration with other EU digital frontrunner countries, in order to help shape the future of the EU's regulatory and digital strategy.

The EU promotes a harmonised regulatory environment and ongoing cooperation. Over time traditional trade barriers have been eliminated. In service markets, deepening the single market has required common regulation to be agreed on an EU basis and enacted locally. The goal has been to move to a point where regulatory barriers provide no impediment to an entity in one Member State competing to provide services to consumers in other Member States.

While significant progress has been made in deepening the single market, in some area progress has been patchy. In particular, the digitisation of many services and markets has brought about new challenges for the EU in relation to ensuring entities have unfettered access to the single market across the EU. This has led to the EU advancing the Digital Single Market (DSM) to deepen the single market in the digital sphere (the DSM is discussed in further detail below).

Should the UK not remain in the single market, regulatory issues could disrupt the digitally-intensive sectors via two main mechanisms:

- **Market access:** Cross-cutting and sector specific regulations could impact on the UK's access to markets, which may have implications for Ireland's digitally-intensive sectors.
    - **Regulatory fragmentation:** Ove time, the UK's regulatory regime could be expected to diverge from the EU's regulations, in particular as the EU advances its DSM initiatives.

These issues are discussed in greater detail below. We also discuss specific regulatory issues (i.e. IP protection and standards), and the impact of Brexit on Ireland's ability to impact the EU's future regulatory direction.

Free movement of people

Brexit's largest impact on the digitally-intensive sectors may be in traded services. In particular, trade in services could be significantly impacted if the arrangements between the EU and the UK do not include free movement of people.

The impact of regulation on market access

As noted in chapter 5 above, Brexit's largest impact on the digitally-intensive sectors may be in traded services, where market access is governed more by regulation than by tariffs. In particular, trade in services could be significantly impacted if the arrangements between the EU and the UK do not include free movement of people. This is because EU Member States often retain specific national restrictions on the movement of labour that apply to non-EU services suppliers, while EU service suppliers in general benefit from the principle of free movement.

Specific sector regulation may also have a direct bearing on market access. If the UK falls outside the scope of such regulation this may impede its access to the single market. This is most notably the case for data flows (which we discuss separately in chapter 8 below). Two other examples are audio-visual and media services and financial passporting.

- **Audio-visual and media services:** The existence of local content requirements stipulate threshold-broadcasting levels of "European content", based on the country of origin principle. Should UK-based producers of audio-visual and media content be unable to meet the definition of European content post-Brexit, they would no longer qualify for preferential access under local content requirements in EU markets. There is therefore potential for investment in these services to be diverted to EU countries, such as Ireland. The extent of this effect will depend partly on whether locations such as Ireland can match other factors that have given the UK a competitive edge as an investment location to begin with, and how far servicing EU markets as opposed to global markets remains an objective.
- **Financial passporting:** Current arrangements give UK financial institutions a "passport" to all EU markets. Depending on the Brexit scenario, this could be lost and the UK would become a "third country". However, it could still be allowed access to clients in the EU if its regulatory regime is recognised as "equivalent. Impacts on the financial sector can also impact on digitally-intensive sectors as the financial sector is a large user of digital inputs.

The ability to enforce regulation is an important consideration in relation to the UK retaining reliable market access. If the UK is outside of the single market, it would either need to rely on the creation of a supranational court that both it and the EU would sign up to, or otherwise default to WTO rules. We note that in relation to WTO dispute settlement, disputes are settled state-to-state, without the possibility of private action.

The implications for Ireland's digitally-intensive sectors are that:

- trade in services between Ireland and the UK may become costlier, which could impact on the competitiveness of Ireland's digitally-intensive sector, and reduce export demand for its services; and
- the more severe the disruption to the UK sector, the more likely that trade and investment will be diverted to other locations, such as Ireland.

Brexit and the risk of regulatory fragmentation

In a scenario where the UK leaves the single market, and where no deep FTA between the EU and the UK is reached, then it is likely that regulatory fragmentation will occur over time unless EU regulation continues to be transposed into UK law. This is especially the case where the EU's Digital Single Market initiatives drive the pace of regulatory change in the digital sphere.

WHAT IS THE DIGITAL SINGLE MARKET?

The 'Digital Single Market' is an extension of the European Single Market. The European Single Market mandates the free movement of goods, services, capital and people within the European Union (EU) - the Digital Single Market (hereafter known as the DSM) is being created to focus specifically on applying these principles to the digital economy. The digital economy encompasses (but is not limited to) areas such as e-commerce, data and data security, online services, telecommunication and online platforms.

The European Commission states that the aim of the DSM is to guarantee "the free movement of goods, persons, services, capital and data" so that "citizens and businesses can seamlessly and fairly access online goods and services, whatever their nationality, and wherever they live"[15].

The DSM is built on three pillars[16]:

1. **Access:** better access for consumers and businesses to digital goods and services across Europe;
2. **Environment:** creating the right conditions and a level playing field for digital networks and innovative services to flourish;
3. **Economy & Society:** maximising the growth potential of the digital economy.

As can be seen in Figure 11, there a number of key components to the Digital Single Market. If the UK sits outside the single market, then there is the risk of increased regulatory fragmentation over time as initiatives within this are progressed by the EU.

Similarly to market access issues above, the implications for Ireland's digitally-intensive sectors are that regulatory fragmentation may increase the costs of doing business with the UK, but may ultimately lead to trade and investment shifting to Ireland if the UK is significantly disadvantaged.

15 https://ec.europa.eu/commission/priorities/digital-single-market_en
16 https://ec.europa.eu/digital-single-market/en/digital-single-market

Figure 19. Key components of the digital single market

Pillar	Objective
Access	Rules to make cross-border e-commerce easier, including consumer protection
	Ensure quick, consistent enforcement of consumer rules
	Ensure a more efficient and affordable parcel delivery service
	End unjustified geo-blocking
	Identify potential competition concerns affecting e-commerce markets
	Create a more modern, Eurocentric copyright law
	Review the Satellite and Cable Directive to see how to increase access to broadcasting services from across the EU
	Reduce the burden on businesses of different VAT regimes, through harmonisation/creation of a common denomination of policy
Environment	Changes to EU telecoms rules
	Review the audiovisual media framework
	Analyse online platforms, such as search engines, social media and app stores, to see how they affect the market.
	Alleviate the concerns about personal data handling by reviewing the e-Piracy directive
	A partnership with the industry on cybersecurity in the area of technologies and solutions for online network security.
Economy And Society	Promote the free movement of data within the EU through the 'European free flow of data initiative'
	Priorities for standards and interoperability in areas critical to the Digital Single Market
	Creation of an e-government to facilitate data sharing between public bodies

Source: https://ec.europa.eu/digital-single-market/en/digital-single-market

Specific regulatory issues

There are some further specific regulatory issues for digitally-intensive sectors that may be impacted upon by Brexit, and are worth considering separately. These are:

- intellectual property rights; and
- standards.

Intellectual property rights

Similar to regulatory issues more generally, depending on the Brexit scenario, there is a risk of increased fragmentation and increased costs to the technology sector, thereby potentially reducing its competitiveness.

Patent protection

Even if the UK leaves the single market, the UK could potentially remain part of European Patent Convention. This is because the European Patent Convention is an agreement that sits outside the EU.

However, the EU is currently moving towards a Unified Patent Court (UPC). The UPC will be a common patent court open to any Member State of the European Union, but not open to states outside of the European Union[17]. It is therefore unlikely that the UK will be able to participate if it leaves the European Union unless there is a change to the UPC Agreement.

This could have implications for Ireland's digitally-intensive sectors as:

- we understand that many Irish firms may currently prefer to register patents in the UK first, rather than in Ireland, due to a more streamlined patent application process, and this option may not be as attractive in the future; and
- patent applications in two jurisdictions (i.e. the EU and the UK) where previous only one was required would increase innovations costs.

Fragmentation of IPR protection mechanisms

Within Europe, there are a number of IPR protection mechanisms, such as:

- EU copyright framework for the digital single market;
- the Directorate-General for Taxation and Customs Union; and
- the Directorate-General for Trade protects intellectual property rights in non-EU countries.

We expect the UK would re-enact most EU IP regulations on a national basis. However, as discussed above, the EU's Digital Single Market initiatives may lead to changes in IP protection mechanisms overtime, such as copyright law. Therefore, there is potential for IPR protections in the EU and the UK to diverge over time.

Again, this has implications for Ireland's digitally-intensive sectors that export to the UK, and may have to do business under two differing regimes, potentially increasing their costs.

17 https://www.unified-patent-court.org/

Standards

Similar issues exist for standards in that, depending on the Brexit scenario, there is a risk of increased fragmentation.

Standards can be viewed as an important sub-set of overall regulatory cooperation and compliance. Harmonised standards across the EU can make trade easier and less costly.

There are three key European harmonised standards organisations, namely:

- **European Committee for Electrotechnical Standardisation (CENELEC):** Responsible for European electrical engineering standards.
- **European Telecommunications Standards Institute (ETSI):** Responsible for European telecommunications standards.
- **European Committee for Standardisation (CEN):** Responsible for European standards in other technical areas.

Each follow the single-standard model, which is based on the adoption of one agreed standard on any given industry issue. This means that:

- every European standard must be adopted identically by all 34 member countries' standards bodies; and
- existing conflicting national standards must be withdrawn.

CEN and CENELEC are not agencies of the EU. Therefore, the UK can remain a member even if it were to leave the single market. The UK could also maintain voting rights within these organisations. However, the UK may lose influence over what products require harmonised standards, as these directions are provided by the European Commission.

Given the standards in digitally-intensive sectors are driven by industry, and the UK will likely remain within these organisations, there is currently relatively low risk for Ireland's digitally-intensive sectors arising from diverging standards over time.

Influencing the regulatory direction

It has been identified that Brexit could lead to Ireland losing a close strategic partner in setting the direction of EU regulation. That is because Ireland and the UK have similar strategic priorities in terms of the digital single market.

Ireland may therefore need to consider how it can coordinate with other digital front runner countries. It may also need to consider where it can increase its own presence in the setting of future regulatory direction.

IRELAND AND THE DIGITAL FRONTRUNNERS

Ireland has the opportunity to strengthen existing cooperation between Europe's 'Digital Frontrunners'. The 'Digital Frontrunners' are a group of countries highlighted by Boston Consulting Group (BCG) as high performing in a "number of digitization and market openness parameters" (p.9.)27. According to BCG these groups are characterised by small populations, an economic dependence on exports related to ICT, and an economy that is more digitized than average.

The countries highlighted by BCG as digital frontrunners are: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway and Sweden.

Essentially the frontrunners have a large dependence on digital exports, and so the expanding free movement within the digital economy will be extremely beneficial for the frontrunners.

Frontrunners, which have smaller domestic markets, will benefit from the DSM through being able to access a greater range of consumers. They will benefit from the ability to export more goods and services.

Chapter Conclusions

Observations

- Depending on the Brexit scenario, the UK may find market access more challenging in some areas due to cross-cutting and sector specific regulation.
- Regulatory fragmentation is also likely over time as the EU progresses with its Digital Single Market initiatives.

Key threats/opportunities

- These disruptions risk increasing costs to Ireland's digitally-intensive sectors as they will act as a trade barrier between Ireland and the UK, in particular in services markets.
- However, the risks to the UK's sector are such that diversion of investment and trade to Ireland is likely, which will present significant opportunities for the sector and for Ireland's economy.

Preferred future arrangements

- Given the potential impact of differing regulatory regimes on the sector, a scenario where the EU and UK are able to continue to trade seamlessly particularly in services, is the preferred outcome. Failing that, a suitable transition period is required to allow firms the necessary time to adjust, thereby minimising costly disruption.

Potential domestic policy response

- Strengthen existing cooperation between Europe's 'Digital Frontrunners' in order to help shape the European regulatory direction in a way which will maximise the growth potential in digital markets.

8. Free Flow of Data

Ireland's digitally-intensive sectors rely on the free flow of data across borders. The UK is one of Ireland's main trading partners, and there are significant data flows and connectivity between the two countries. Brexit presents significant risks to these data flows in the future.

In particular, if the UK's data protection regime is not determined to be "adequate" in a post-Brexit scenario, then data flows between Ireland and the UK could become more costly, impacting the competitiveness of Ireland's digitally-intensive sectors. Therefore, it will be important to ensure transitional arrangements are in place that will allow for the continuation of the current data regime, before a decision around adequacy comes into place.

The economic value of cross-border data flows

Cross-border flows of data and information help power modern economics. For a small, outward facing economy like Ireland, such global connectivity is vital. For example, Ireland's service industries account for 70 per cent of economic output and 73 per cent of trade exports. Previous estimates suggest that about half of all trade in services is "digitally-enabled"—they have the potential to be delivered remotely via information and communication links[18]. Therefore we can see the critical importance of data flows and information links to Ireland's prosperity.

Data flows are also important on a global basis. McKinsey recently estimated that cross-border data flows accounted for a 3.8 per cent uplift of global GDP in 2014, and the primary channels through which this manifests is productivity improvement and increased capital and labour inputs[19]. The importance of data flows is only likely to increase in the future.

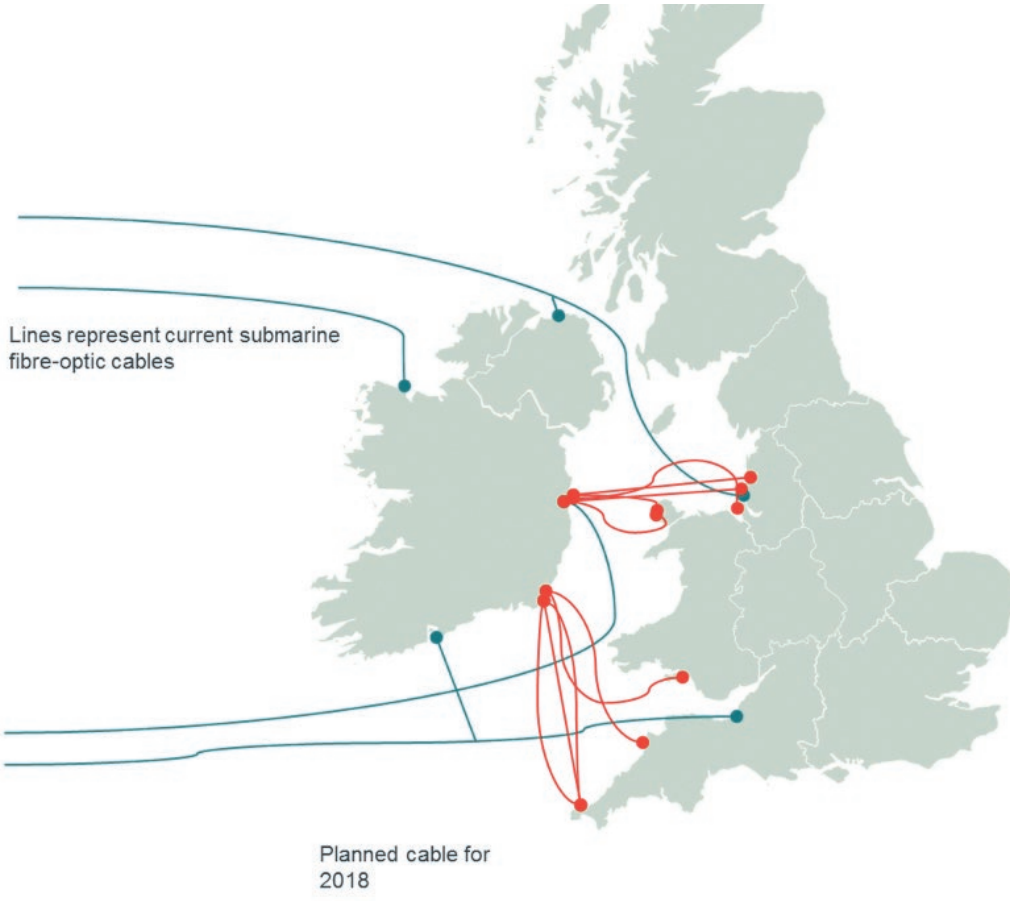
18 For example, UNCTAD (2009), Lee-Makiyama (2014), and Nicholson (2016)
19 McKinsey (2016) Digital globalization: The new era of global flows

In the EU, the data economy was estimated to be worth €272 billion and employed 6 million people in 2015. By 2020, it is estimated that the data economy could be worth €739 billion, if the right policy and legal conditions are put in place[20]. Therefore, we can see that data flows are of critical importance to innovation and growth on a pan European basis.

Irish cross-border data flows

Ireland's global internet connectivity is physically dominated via its connections to the UK and the USA (Figure 20). Essentially, the UK is a hub for much of Ireland's data flows through to Europe. Accurate data is not available for Ireland bandwidth connectivity to the world. However, we note that Ireland is estimated to be the UK's fifth biggest partner. Since 2011, internet bandwidth (MBPS) between Ireland and the UK is estimated to have increased by a compound growth rate of 26% (Figure 21). (This compares to a 25% growth rate for the UK's connectivity with the rest of the world.)

Figure 20. Ireland's submarine cable connectivity

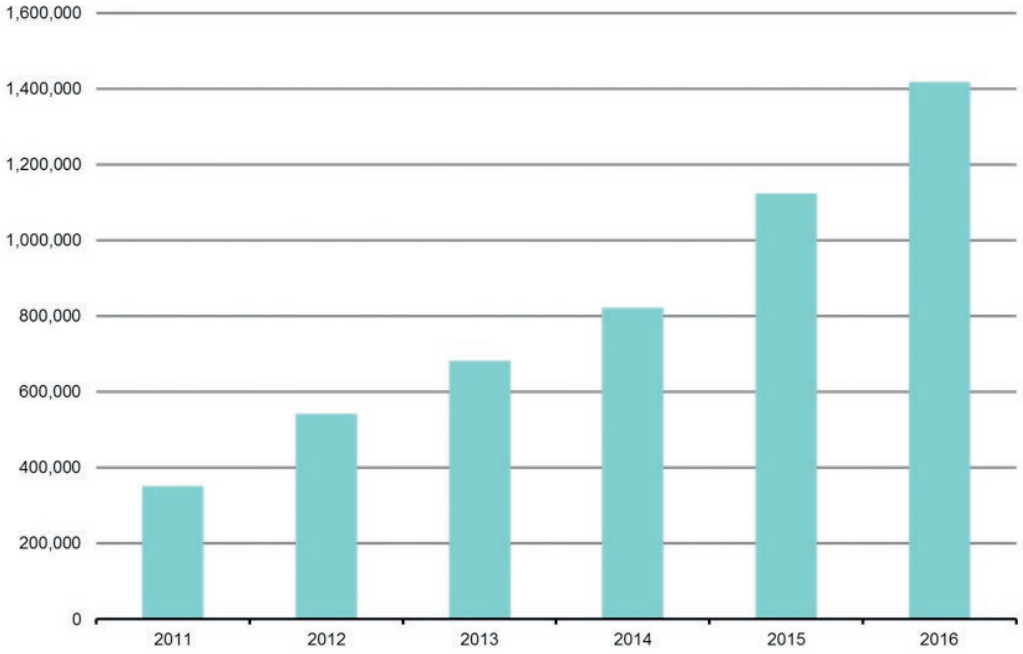


Source: Telegeography, Submarine Cable Map

20 IDC and Open Evidence, (2017) "European Data Market Study", Prepared for the European Commission

There are a number of potential consequences if the UK fails to secure adequacy, or if transitional arrangements are not put in place.

Figure 21. Internet bandwidth connectivity between Ireland and the UK



Source: Telegeography

Note: These figures show capacity, not traffic.

Data flows and Brexit

One of the largest challenges in relation to data flows stemming from the UK leaving the European Union relates to the implementation of the EU's General Data Protection Regulation (GDPR). The GDPR is aimed at improving data protection for individuals living within the European Union. According to the European Council it "sets out the rights of the individual and establishes the obligations of those processing and those responsible for the processing of the data. It also establishes the methods for ensuring compliance as well as the scope of sanctions for those in breach of the rules"[21].

The GDPR was adopted in April 2016, and is set to be enforceable starting from May 2018. Therefore, GDPR will be in place before the UK leaves the EU. The UK has stated that it intends to implement the GDPR via its new Data Protection Bill, which will transcribe GDPR requirements into national law.

In a post-Brexit scenario, the application of GDPR to the UK will depend on the arrangements agreed between the EU and the UK. In a scenario in which the UK remains part of the EEA, GDPR applies automatically. However, in a scenario where the EU and the UK agree an FTA or other agreement, or trade defaults to WTO arrangements, there will be a need to negotiate access to GDPR or equivalence.

In that scenario, the UK can apply for "adequacy", which can apply to third-countries and is decided by the European Commission. An "adequacy" decision determines that a third country offers an equivalent level of protection compared to provisions laid out in EU law. Any UK adequacy decision would be based on the Commission's full review of the UK's domestic data regime to determine how the UK's data protection landscape matches the requirements of EU law.

21 http://www.consilium.europa.eu/en/policies/data-protection-reform/data-protection-regulation/

However, there is no set timeframe for an adequacy decision. Therefore, in the absence of an alternative agreement, there could be a period of time post Brexit where the UK neither has access to the GDPR nor has an adequacy decision. This would suggest the need for transitional arrangements to be put in place before the UK exits the European Union.

There are a number of potential consequences if the UK fails to secure adequacy, or if transitional arrangements are not put in place.

- **Increased costs and uncertainty:** Without adequacy, or a similar arrangement for data flows, firms would have to resort to costly alternative legal mechanisms, many of which could be subject to ongoing legal challenge and uncertainty. These alternatives include standard contractual clauses, binding corporate rules and consent of individuals. Each of these alternatives brings additional costs, risk and uncertainty to companies involved in cross-border data flows. This not only increases costs for existing activities and may deter new investment. The effect on Ireland's sector overall is ambiguous depending on whether this uncertainty causes UK firms to repatriate activities to the UK from Ireland or whether UK firms relocate activities to Ireland to supply the EU on less uncertain terms.
- **Data localisation:** Failure to secure adequacy may lead to weak or no protections against localisation provisions absent a specific agreement between the UK and the EU. This risks fragmented communications links and data flows between Ireland and the UK, and the UK and other EU partners. Previous research has found that data localisation may also have impacts on the UK economy; acting as a barrier to trade in data services that increases costs, and reduces investment, competition and innovation[22]. To the extent that Ireland's digitally-intensive sectors have close linkages with the UK sector – such as data storage – this may have spillover effects into Ireland in terms of increased costs and reduced competitiveness.
- **Data centres:** Continued uncertainty over EU-UK data flows could also see companies change the location where data is processed. Data localisation measures imposed by the UK may cause activities currently supplied to UK firms from Ireland to migrate to the UK. Alternatively, if the EU imposes localisation requirements, it may be that UK-based services migrate to Ireland to supply the rest of the EU. Such an outcome could impact data infrastructure and in particular data centres in the UK, which are among the regions and the world's most active. While this may lead to potential diversion of data centres investment to Ireland, other jurisdictions would also be competing for this investment. This means that the effects of cost and competitiveness for Ireland could in principle be ambiguous.

Such consequences risk increased costs for Ireland's digitally-intensive sectors, and could reduce innovation over time (as discussed further below), therefore inhibiting future growth both here, in the UK and across Europe more broadly.

22 Frontier Economics, The UK Digital Sectors after Brexit

DATA FLOWS AND EMERGING DIGITAL TECHNOLOGIES

One risk to impeded data flows is reduced innovation. Emerging digital technologies—cloud computing, advanced analytics, the internet of things (IoT) and artificial intelligence (AI)—hold significant economic potential. They also require vast quantities of data—along with seamless links of distributed computing, high-speed communications, and mobile and autonomous digital equipment. Frontier partnered with Accenture to estimate the impact of the internet of things and artificial intelligence (separately) on economic performance for a number of advanced and emerging countries[23].

Our models project that IoT could raise GDP by as much as 2 per cent in the UK by 2030, and AI could raise annual GDP growth by as much as 50 per cent by 2035. Our models adjust for the ability of countries to fully absorb the benefits of these technologies—accounting for stark differences between potential and realised economic benefits.

Issues like free flowing data can accelerate—or deter—this technology-driven growth.

Future trade arrangements between the EU and the UK, including the free flow of data, could therefore impact upon European technology-driven growth, which may in turn impact upon the growth of Ireland's digitally-intensive sectors.

23 Purdy and Davarzani (2015); Purdy and Daugherty (2016)

Chapter Conclusions

Observations

- Data flows underpin a modern, services-oriented economy. Data flows are particularly important for a country like Ireland, where the digital sector accounts for a large and growing part of the economy.
- Key threats/opportunities
- GDPR has the largest potential to significantly disrupt the sector. In the event of a hard Brexit, where the UK is no longer a member of the EEA, additional legal protections (e.g. contractual safeguards) will be required in order to transfer personal data from EU Member States to the UK.
- Determination of third-country "adequacy" is unclear, and would be the purview of the European Commission to make such a decision. Moreover, there may be a transition period in which UK neither has access to the GDPR or an adequacy decision.
- Should post-Brexit data flows between the EU and the UK not be resolved, there is the potential for diversion of investment to Ireland, as digital companies look to ensure ease of access with the EU.

Preferred future arrangements

- Given the importance of data flows to continued economic growth both in Ireland and the EU, it is essential either to have in place a transition arrangement to deal with such an outcome, or to ensure that any UK application for an adequacy decision from the European Commission (removing the need for these additional protections) is in place on the effective date of Brexit.

Potential domestic policy response

- Concerns relating to the free flow of data to and from the UK could lead to future investment in digital sectors being diverted from the UK to EU countries, such as Ireland. Therefore, Ireland needs to ensure that any impediments to those investments taking place here – such as infrastructure gaps or skill shortages – are minimised.

9. Research and Development Co-operation

Ireland has close R&D links with the UK. While a large proportion of Ireland's EU-funded R&D projects have UK partners, Ireland is also reasonably well diversified across other partners. If the UK does not have access to EU R&D programmes post-Brexit, this could impact on future Irish:UK R&D collaboration. There is also a risk that it could impact negatively on Ireland's share of EU R&D funding.

However, given appropriate domestic policy responses, there may also be the potential for increased R&D activity in Ireland post-Brexit. For example, UK researchers may (partly) relocate to Ireland, providing opportunities to increase innovation activity in the sector. Additionally, Ireland may be able to strengthen links with partners in other Member States to ensure it is in a strong position to access EU R&D funds.

R&D cooperation is of critical nature to the sector in Ireland – in particular due to the collaborative aspects of modern R&D and the requirements for significant amounts of cross-border research funding.

Ireland's R&D system is well integrated within the global innovation system, with strong connections at both the public and private level, within Europe and more widely across the world[24]. Such interconnection is vital for a small open economy such as Ireland, in order to leverage its expertise and benefit from the global innovation marketplace.

24 OECD Science (2016), Technology and Innovation Outlook 2016: Ireland

Cross-border R&D interactions can generally be characterised by complementarities or by substitutability.

- **Complementarities:** For example, if X and Y collaborate, then Y will be negatively impacted if X losses funding. The more complementary Irish activities are with the UK, and the more Ireland depends specifically on the UK (i.e. inputs from the UK cannot be substituted with inputs for elsewhere) the more it stands to lose from reductions in funding or activity in the UK, absent other measures (e.g. attracting the UK researchers to Ireland).
- **Substitutability:** For example, funding is interchangeable between X and Y. The more Irish and the UK activities are substitutes, the more Ireland has to gain from any loss in funding to the UK.

48%

of publications

Ireland's published science and technology papers that involved international collaboration.

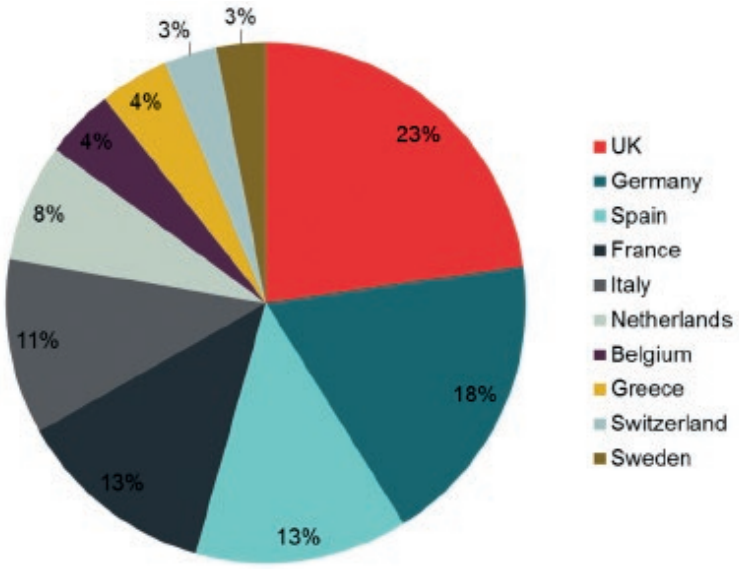
Ireland's R&D collaboration partners

A substantial element of R&D in Europe is currently funded or conducted on a cross-jurisdictional basis. EU funding supporting research comes from two main sources, namely:

- **Horizon 2020** (running from 2014 to 2020) and
- **Structural funds**, supporting research conducted in more disadvantaged regions of the EU.

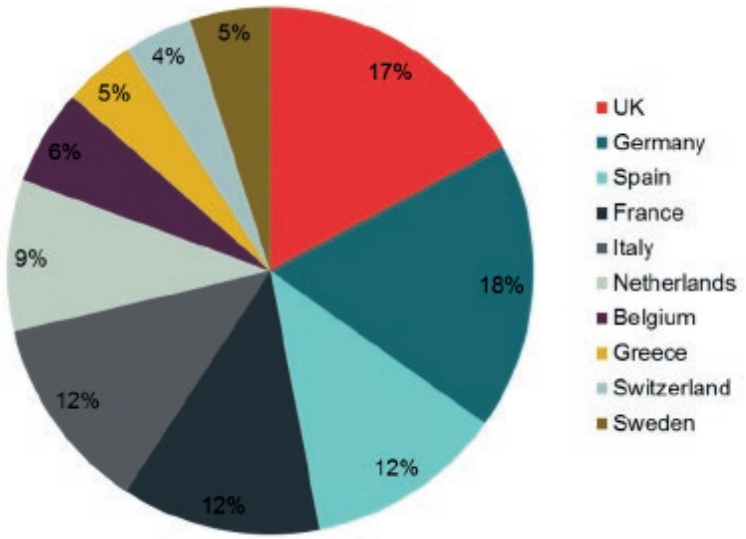
Ireland's R&D top ten collaborators for 7th EU Framework Programme (i.e. the predecessor to Horizon 2020) projects are shown below in Figure 22 and Figure 23. The UK was Ireland's largest partner for projects coordinated in Ireland, with 23% of Irish projects including a UK collaborator. For projects where Ireland was a participant (rather than coordinator), 18% of projects had a German collaborator and 17% of projects had a UK collaborator.

Figure 22. Top 10 collaborations based on projects with Irish coordinator



Source: Technopolis 2016

Figure 23. Collaborations based on projects with Irish participants



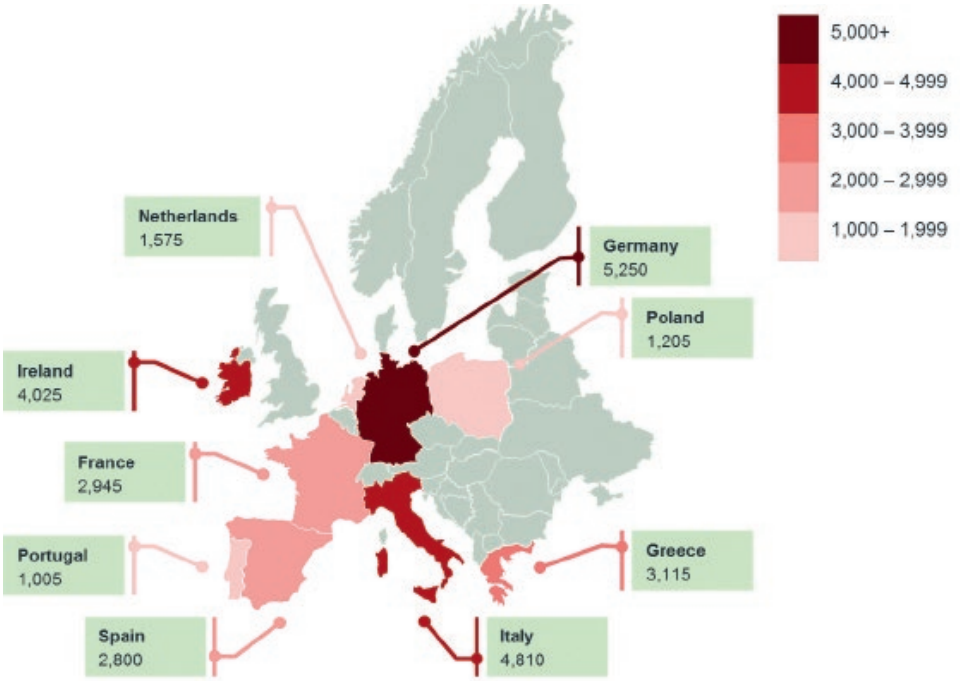
Source: Technopolis 2016

Complementarities: Ireland's R&D links with the UK

As evidenced above, the UK is a very important R&D collaborator for Ireland. Stakeholders we spoke to considered this to be particularly the case in digitally-intensive sectors where Ireland and the UK have similar R&D priorities.

Cultural ties between Ireland and the UK also lead to significant cross-border R&D links. For example, given Ireland's small population, there are currently a large number of Irish academics working in the UK (Figure 24).

Figure 24. Nationalities of EU academics working in the UK, 2014-15



Source: HESA, Frontier analysis Note: Map shows all countries with 1,000 or more FTE academics in the UK

The UK has a strong international reputation for the quality of its science base. Five UK Universities are ranked in Europe top ten Universities in terms of winning EU Horizon 2020 funding. It is also a large recipient of EU R&D funding. For example, the UK received €8.8 billion out of a total of €107 billion in the 7th EU Framework Programme (the predecessor to Horizon 2020) funding[25].

Therefore, depending on the Brexit scenario, there is a risk to Ireland's digitally-intensive sectors if Ireland can no longer readily partner with UK researchers to access EU R&D funding. There are some indications that the UK's access to EU R&D programmes will be closely linked to what happens with free movement. When the Swiss voted in 2014 to put quotas on all immigration – effectively putting it in breach of the agreement between Switzerland and EU on free movement – the EU froze Swiss accession to Horizon 2020 and then gave it only partial associate status, halving the amount of funds received. When in 2016 the Swiss parliament voted to enact the 2014 referendum result while preserving free movement with the EU, the EU decided to reinstate full associate status for Switzerland.

Ireland has an interest in the UK's continued access to EU R&D programmes. This suggests that a preferred arrangement for R&D collaboration between the UK and the EU would entail close and ongoing R&D collaboration and funding links. Failing that, a sufficient transition period should be established that would enable the completion of Horizon 2020 projects and allow R&D researchers and organisations sufficient time to adapt to future arrangements.

70% funding

R&D expenditure in Ireland is incurred by foreign-controlled affiliates

Diversification of R&D collaboration

Figure 22 and Figure 23 above show that Ireland is reasonably well diversified in terms of its international collaborators for EU funding. Ireland is also reasonably well diversified in terms of private R&D investment. In 2013, funds from abroad represented 30% of total business R&D performed in Ireland[26]. About 70% of R&D expenditure in Ireland is incurred by foreign-controlled affiliates[27]. We also note that many of Ireland's SFI Research Centres in the digital space have close links with US companies and research centres.

However, Brexit may lead to Ireland needing to strengthen its relationships further with other EU countries in order to diversify the risk away from the UK.

This may be particularly the case if the UK loses its influence in setting the agenda for EU-wide research programmes. Ireland and the UK have been previously well-aligned in terms of research priorities. It may be that in the future Ireland will have to look to other digital front running economies to coordinate with in terms of R&D priorities.

Therefore, at a domestic level, Ireland may consider putting in place new networks and platforms to allow new partnerships with other EU R&D to strengthen and create new connections and collaborations.

25 Frontier Economics, (2017), The UK Digital Sectors After Brexit
26 OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society
27 OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, Ireland

Growth in R&D

Brexit may present Ireland with the opportunity for increased its R&D activity

Substitutes: Brexit provides an opportunity for increased R&D activity in Ireland

While Ireland's digitally-intensive sectors may be impacted due to the complementarities with the UK, Ireland could also stand to benefit if it is seen as a substitute location for R&D activities.

Depending on the Brexit scenario, the UK could potentially lose access to EU R&D programmes in the future, or the UK could see R&D activity and funding fall as uncertainty leads to academic flight. This may present the opportunity for Ireland to increase its R&D activity. We have identified two broad opportunities here:

- Relocation of UK research: In order to maintain access to EU funding, UK researchers may potentially relocate/co-locate to Ireland. For example, a significant opportunity to recruit outstanding researchers from the UK who are uncomfortable about the uncertainty or final outcome of the Brexit negotiations for UK scientific research[28]. There is, however, competition to attract UK researchers.
- Increased collaboration with EU partners: The potential loss of the UK as a collaborator may lead to EU partners seeking alternative collaborators in the future. Ireland may be well placed to take advantage of that given our current diversification of R&D partners. Ireland should therefore be looking for other EU partners, especially in digital sectors, if it is overly reliant on the UK in that sector.

In order to maximise these opportunities there may be a need for increased investment in R&D infrastructure, skills, and research frameworks in order to ensure talent is located to Ireland, and that R&D activity can grow in centres of excellence.

28 Science Foundation Ireland, 2017, "Brexit: Challenges, Opportunities and Strategy for Scientific Research", Opening Statement to Seanad Special Select Committee.

Summary Conclusions

Observations

- Ireland's R&D ecosystem has very close global links, especially in the digitally-intensive sectors; and these links help drive innovation.
- Ireland's links with the UK are close, including a large proportion of EU-funded R&D projects which Ireland's organisations participate in that have UK partners.
- However, Ireland is also diversified across other European countries for EU funding, and more broadly across the world in terms of private R&D investment.

Key threats/opportunities

- To the extent that Irish and UK R&D are complements, if the UK is no longer able to participate easily in European-funded R&D projects, then Ireland's close R&D ties with the UK could be impacted.
- More generally, given the UK strong science base, any Brexit scenario that undermines investment in R&D in the UK and Ireland's ability to collaborate with UK researches, may have spill over effects into Ireland's digitally-intensive sectors and its ability to continue to innovate and grow. This may also impact on the level of innovation in the EU more broadly if efficient scientific collaboration is impinged.
- Ireland also risks losing a close partner in terms of setting the direction of R&D priorities at a European level.
- As some R&D activities are substitutable between the UK and Ireland, the digitally-intensive sectors in Ireland may benefit from increased R&D activity levels in Ireland post-Brexit.

Preferred future arrangements

- Ensure that EU R&D funding arrangements benefit both the EU and the UK through new collaborative agreements or, if necessary, develop alternative new programmes and an appropriate transition path.

Potential domestic policy response

- Domestic policy solutions to mitigate the impact of Brexit on R&D include:
  - Implement Innovation 2020, which would put in place the necessary funding to grow the capacity of the R&D sector in Ireland.
  - Investment in R&D infrastructure, skills, and research frameworks in order to ensure talent is located to Ireland, and that R&D activity can grow in centres of excellence.
  - Put in place new networks and platforms to allow new partnerships with other EU R&D to strengthen and create new connections and collaborations.
  - Professional development for Irish-based researchers to develop project management skills to lead future EU research programmes.

10. Public Procurement

14%
of GDP

The EU estimates that public procurement contracts are worth around 14% of EU-28 GDP per year.

The UK's public procurement market is an important export market for many Irish digital firms. Future trading arrangements between the EU and the UK should seek to ensure that current public procurement processes are maintained, including access to resource mechanisms.

The EU public procurement market

EU Directives currently regulate public procurement processes. The EU estimates that public procurement contracts are worth around 14% of EU-28 GDP per year. This includes tenders by:

- central government ministries, authorities and agencies in the EU-28;
- the European Commission;
- sub-central government authorities and agencies (e.g. regional or municipal governments); and
- public utilities.

Irish export firms bid for contracts at all these levels. The UK is a large export market for publicly procured good and services. In 2015, the UK's public procurement market was valued at £260 billion[29]. Moreover, the UK is often seen as a launching pad for exporters of services, given the ease of doing business from a language and cultural perspective.

In particular, close ties with Northern Ireland mean that many Irish services suppliers bid successfully into Northern Ireland[30]. The Northern Irish public procurement market alone is estimated to be worth €15 billion over the next 5 years[31].

29 European Commission (2016) "Public Procurement Indicators 2015 - DG GROW G4 - Innovative and e-Procurement"
30 Brennan, P. (2016) "Public Procurement in Ireland A Critical Review", PPAN Conference
31 Brennan, P. (2016) "Public Procurement in Ireland A Critical Review", PPAN Conference

Post-Brexit, the concern for these firms is whether access to the public procurement market in the UK will be impinged. The current ability of Irish technology firms to access UK public procurement markets on a cross-border basis depends in part on the legal and policy framework for Government Procurement within the EU. This in turn derives from:

- **Treaty provisions**, notably the four freedoms enshrined in the Single Market Act that prohibits discrimination within the EU on the basis of origin of the service provider.
- **Various EU directives** that regulate the conduct of public tenders. These regulations carry over the general prohibitions on discrimination, and also set out various stipulations regarding the bidding process, transparency, evaluation criteria, recourse etc. National governments are required to transpose these directives into national law. The directives specify "de minimis" thresholds below which national authorities have the permission to deviate from the requirements of the directives. Overall treaty requirements (especially non-discrimination) are supposed to apply to all tenders.

From a Brexit standpoint, the key issue is how much of this would carry over into future arrangements.

Future public procurement options

If the EU and the UK are able to agree to a deep and comprehensive free trade agreement, then that is likely to include a specific chapter on procurement, as is the case with most free trade agreements concluded by the EU. The key feature of these chapters on government procurement is a commitment to non-discriminatory treatment, as well as additional commitments on transparency, due process, recourse etc.

If the UK and EU separate on hard terms, the fall-back is to WTO rules, in the shape of the WTO's agreement on Government Procurement (the GPA). The EU is a signatory to the GPA, and the UK is a signatory in its own right. We therefore consider the GPA in further detail.

THE WTO'S AGREEMENT ON GOVERNMENT PROCUREMENT AGREEMENT (GPA)

The GPA includes only a subset of WTO members. The provisions are legally binding and infringement can lead to dispute settlement proceedings between the WTO member states at the WTO.

The key principle is non-discrimination. There are a number of key relevant points.

- Non-discrimination "kicks-in" above de minimis thresholds set out in the member's schedule of commitments. In the EU's case, for example, the thresholds for central government entities are Special Drawing Rights (SDR) 130,000 for goods and services.
- The provisions of the agreement only apply to those goods and services specified in the list of schedule of commitments. This is known as a "positive-list approach".
- The provisions apply only to the authorities specified in the schedule of commitments.

The main considerations to take into account are:

- **The application of the GPA to services is particularly patchy.** The list of services to which the EU's commitments apply are based on a UN classification that dates back to 1991.
- **Recourse mechanisms are more limited.** A company could not take legal action against the UK under the GPA. It would need to petition its government, and persuade it that there is some systematic breach by the UK of the GPA that has caused it damage. By contrast, internal EU law, and indeed the provisions of more recent trade agreements signed by the EU, have more developed mechanisms, including the possibility of company-state litigation.

  Ambiguities in drafting mean there may be difficulty in determining whether an entity is covered by the provisions of the agreement or not, and this leaves scope for discretionary policy change.
- **Greater scope for de facto discrimination:** For example, public procurement selection could favour UK firms on an individual basis, even if there is no direct policy or legislation in place that directs such discrimination. Given the lack of recourse mechanisms, as discussed above, such de facto discrimination may increase if the UK is not bound by EU public procurement processes.

Policy implications

In the case of a hard Brexit scenario, the main public procurement issue for Irish digitally-intensive firms exporting to the UK are whether its activities come under the scope of the GPA.

The lack of clarity may also leave Irish digitally-intensive firms exposed to "de facto discrimination". That is if they are not accorded due consideration because the scope and means for redress are unclear, or deemed to be unfeasible for them to access.

Finally, the policy space for procurement is dynamic and evolving. Any prospective "buy-UK" approaches to procurement could be exploited if there is ambiguity and a lack of clarity in law and policy.

Therefore, to mitigate these risks to Ireland digitally-intensive sectors, the preferred Brexit scenario should include a commitment to non-discriminatory treatment, as well as additional commitments on transparency, due process, and recourse.

Chapter Conclusions

Observations

- The UK's public procurement market is an important export market for many Irish digital firms. In 2015, the UK's public procurement market was valued at £260 billion.

Key threats/opportunities

- If future EU and UK trading arrangements do not include specific agreements on public procurement, then arrangements will default to WTO rules.
- The main concerns with this are that the application of the GPA to services is particularly patchy, recourse mechanisms are more limited, and there is greater scope for de facto discrimination.

Preferred future arrangements

- Future trading arrangements between the EU and the UK should seek to ensure that current public procurement processes are maintained, including access to resource mechanisms.

Potential domestic policy response

- If future trading arrangement between the EU and the UK lead to increased barriers for Irish firms bidding for contracts in the UK public procurement market, then consideration may be given to assisting firms to diversify their export markets.
- In particular, if UK firms face increased barriers in servicing EU public procurement markets, then this may lead to increased opportunities for Ireland's digitally-intensive sectors.

11. Policy Implications and Priorities

Three domestic policy priorities

1. Growth capacity
2. Increased R&D capacity
3. Diversify and strengthen partners and collaborators

The analysis has enabled us to identify a range of potential impacts on the digitally-intensive sector, and consider the order of magnitude for each of these risks.

Proposed policy responses can be split into two broad areas.

- **Priorities on future arrangements with the UK:** These are the policy priorities that are important for the sector, and should be a focus in relation to future EU:UK treaty or trading arrangement negotiations.
- **Domestic policy responses:** These are policy responses to Brexit that Ireland can implement unilaterally in order to minimise the risk to the sectors, and to Ireland's economy, or to maximise the opportunity presented to Ireland to grow the sector over the coming years. Many of these policy options are "no regret" options, in that they would be beneficial policies or interventions regardless of Brexit; with various Brexit scenarios amplifying the potential payoffs from these policies.

Four key priorities on the future arrangements with the UK are as follows:

- **GDPR** has significant potential to disrupt the sector. In the event of a hard Brexit, additional legal protections (e.g. contractual safeguards) will be required in order to transfer personal data from EU Member States to the UK. It is essential either to have in place a transition arrangement to deal with such an outcome, or to ensure that any UK application for an adequacy decision from the European Commission (removing the need for these additional protections) is in place on the effective date of Brexit.
- **Services** form an important element of the Irish technology sector supply chain. In the event of a hard Brexit the WTO/MFN terms provide far less certainty and security of access for services. There is the potential for significant disruption of Irish supply chains. It is essential that any transition arrangements provide for trade in services, not just trade in goods.

- Ireland has close **R&D** links with the UK. A large proportion of EU-funded R&D projects which Ireland's organisations participate in have UK partners. It is vital that a transition is put in place to ensure that Irish research organisations are not disadvantaged as a result of their historical relationships with UK research bodies. It may be helpful to provide support for the development of new research relationships between Irish institutions and institutions in other Member States.
- If the UK is outside the single market, it may be less constrained by EU **state-aid** rules. The UK may have more scope in granting regional subsidies or broad-based subsidies. This may threaten the Irish technology sectors' ability to attract international investment.
- The **public procurement** process in the UK may also be more easily able to discriminate in favour of indigenous firms at the expense of non-UK firms. This may deter investment in Irish firms for whom the UK is a major export market. It is critical that any transitional and ongoing arrangement with the UK ensures that there is a level playing field and that the UK is not in a position to unfairly advantage its technology sector at the expense of Ireland and other Member States.

The technology sector may also have the opportunity to attract more trade and investment post-Brexit, but this must be supported by a domestic policy response.

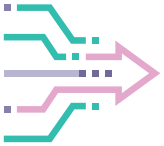
Domestic policy responses should include:

- **Growth capacity**
  - Ireland needs to ensure it has the capacity to grow should investment be diverted from the UK to Ireland. This includes investment in areas such as infrastructure gaps, policy frameworks to allow for additional housing or skills shortages.
  - Investment in infrastructure needs to ensure capacity for growth throughout the country. For example, the timely rollout of rural high-speed broadband and better mobile coverage, and a well-connected intermodal land transport system.

- **Increased R&D capacity**
  - Implement Innovation 2020, which would put in place the necessary funding to grow the capacity of the R&D sector in Ireland.
  - Invest in R&D infrastructure, skills, and research frameworks in order to ensure talent is located into Ireland, and that R&D activity can grow in centres of excellence.
  - Professional development for Irish-based researchers to develop project management skills to lead future EU research programmes.

- **Diversify partners**
  - Strengthen existing cooperation between Europe's 'Digital Frontrunners' in order to help shape the European regulatory direction in a way which will maximise the growth potential of the digital market.
  - Support the research sector in Ireland to develop new partnerships with other EU R&D to strengthen and create new connections and collaborations.
  - Assist firms to diversify their export markets (particularly in the event of disruption of the UK export market).

Many of these policies are likely beneficial regardless of Brexit; but Brexit may increase the expected return.



Four Brexit priorities for the sector

1. GDPR
2. Market access for services
3. R&D links
4. Application of state aid rules

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