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CHALLENGES AND OPPORTUNITIES FOR IRELAND'S MAJOR OCEAN ECONOMY INDUSTRIES

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Challenges and Opportunities for Ireland's Major Ocean Economy Industries

Alan Ahearne and Stephen Hynes
SEMRU, Whitaker Institute, NUI Galway
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The Programme for Government commits "to prioritising the development of the marine." This paper identifies the three global economic developments that we believe will most affect the performance of Ireland's ocean economy industries in the near- and medium-term: (1) the COVID-19-related recession, (2) Brexit, and (3) the transition to a low-carbon economy. Our objective is to provide background and contextual information for marine policymakers in strategic planning for the sector over the next decade. In particular, we aim to inform the policy debate about how best Government can meet the commitment in the Programme for Government to develop "a new integrated marine sustainable development plan, as a successor to Harnessing Our Ocean Wealth, focusing on all aspects of the marine, with a greater focus on sustainability and stakeholder engagement." [1]

To set the scene, we first provide updated figures on the value of Ireland's ocean economy in 2019. We then discuss the implications of these global economic developments for Ireland's ocean economy industries.[2]

The value of Ireland's ocean economy

Ocean-based economic activity makes an important contribution to Ireland's economy. Recent estimates by the Socio-Economic Marine Research Unit (SEMRU) at NUI Galway put the overall turnover of Ireland's ocean economy in 2019 at €5.8 billion. Ocean economy industries directly contribute nearly €2 billion in value added (approximately 1 per cent of GNI*) to the Irish economy and provide almost 31,000 jobs. The ocean economy has an especially important role to play in regional development. The employment provided by ocean economy industries has a wide geographical spread, with most jobs in the sector located outside of Dublin. Moreover, the figures above refer only to the direct economic contribution of the ocean economy. Measures that take into account the indirect activity and employment generated from ocean-based industries show markedly higher contributions to overall economic activity, typically about twice that of the direct contribution.

[1] Programme for Government – Our Shared Future, page 70.
[2] This work was carried out with the support of the Marine Institute and is funded by the Marine Research Sub-Programme PBA/SE/16/01 Valuing and Understanding the Dynamics of Ireland's Ocean Economy.

Table 1 shows the estimated value of direct turnover, GVA and employment across the 13 sectors of the Irish ocean economy in 2019. Compared with 2018, turnover of Ireland's ocean economy was down 7 per cent last year. Gross value added (GVA) and employment declined 5 per cent and 1 per cent, respectively, over the same period. The fall in activity across the ocean economy mainly reflects declines in the output of the three key sectors: shipping and maritime transport, marine tourism and leisure, and the seafood sector. A sharp drop in the price of natural gas during 2019 also contributed to a substantial reduction in revenues for the oil and gas exploration and production sector.

Table 1: Estimated direct turnover, GVA and employment by industry, 2019 (€m, unless stated)

Sector	Turnover	GVA	Employment (FTEs)
Shipping and Maritime Transport	2,237	601	4,908
Marine Tourism and Leisure	1,213	610	17,471
International Cruise Industry	57	22	…
Marine Retail Services	172	77	954
Sea Fisheries	270	134	2,390
Marine Aquaculture	172	98	1,948
Seafood Processing	652	127	2,408
Oil and Gas Exploration and Production	396	52	150
Marine Manufacturing, Construction and Engineering	141	70	860
Advanced Marine Technology Products and Services	100	43	706
Marine Commerce	236	70	402
Marine Biotechnology and Bio-products	79	31	563
Marine Renewable Energy	59	38	482
Total	**5,786**	**1,973**	**30,852**

Source: Calculations based on various data sources including the CSO, BIM, IMDO and SEMRU company surveys. See SEMRU (2019) for full breakdown on methodology used and data sources.[3]

Following a record-breaking year for Irish tourism in 2018, last year saw a decline in visitor numbers and expenditure. The Fáilte Ireland Business Barometer for 2019 suggests that business sentiment

[3] SEMRU (2019). Ireland's Ocean Economy, SEMRU Publication, NUI Galway. https://www.nuigalway.ie/media/researchsites/semru/images/Online_Irelands-Ocean-Economy-Report_for-web.pdf

was down last year for the first time in several years. This deterioration, according to Fáilte Ireland, was due to rising costs, the restoration of the VAT rate to 13.5 per cent, the effects of low-priced competition as well as uncertainty surrounding Brexit. SEMRU estimate that the marine tourism and leisure sector experienced a decline last year of similar scale to that of the overall tourism market, with turnover in the sector down an estimated 1 per cent from the previous year.

The Irish Maritime Development Office (IMDO) iShip index, a quarterly weighted indicator that outlines trends within Ireland's shipping industry, declined 3 per cent in 2019. This performance suggests turnover in the shipping and maritime transport sector was an estimated €2.24 billion in 2019. The decline last year reflected weakness in the dry bulk market due to the unwinding of excess inventories built up during the previous year, which masked otherwise robust performances in other sectors. Significant stockpiling of inventories occurred in 2018, driven by a national fodder crisis that necessitated the large importation of agricultural commodities and by Brexit-related uncertainty in the run up to the UK's departure from the EU. The China-US trade conflict also had wider effects on international ports, particularity in relation to global flows of container traffic. In addition, the closure of the ESB's Moneypoint facility in Co. Clare contributed to declines in bulk shipments last year. These trends are also visible in the latest release of CSO statistics on port traffic[4].

According to the Scientific, Technical and Economic Committee for Fisheries (STECF), the gross value of landings in the Irish fishing sector declined from €311 million in 2018 to €270 million in 2019. Aquaculture registered a decline of 3 per cent in the value of output in 2019. After a challenging year in 2018, figures from Bord Iascaigh Mhara (BIM) suggest some growth in the seafood processing industries last year. BIM estimate that the number of seafood processing businesses in Ireland expanded 4 per cent to 164 in 2019 and there was an increase of 8 per cent in employment in the sector. Turnover in the sector rose 4 per cent. According to BIM statistics, foreign vessels accounted for 23 per cent of the 262,000 tonnes of total wild-caught fish landed into Irish ports in 2019. The quantity of foreign landings into Irish ports has been increasing over recent years[5] and these landings make an important input contribution to the seafood processing industry in this country.[6] In total,

[4] https://www.cso.ie/en/releasesandpublications/er/spt/statisticsofporttrafficquarter4andyear2019/

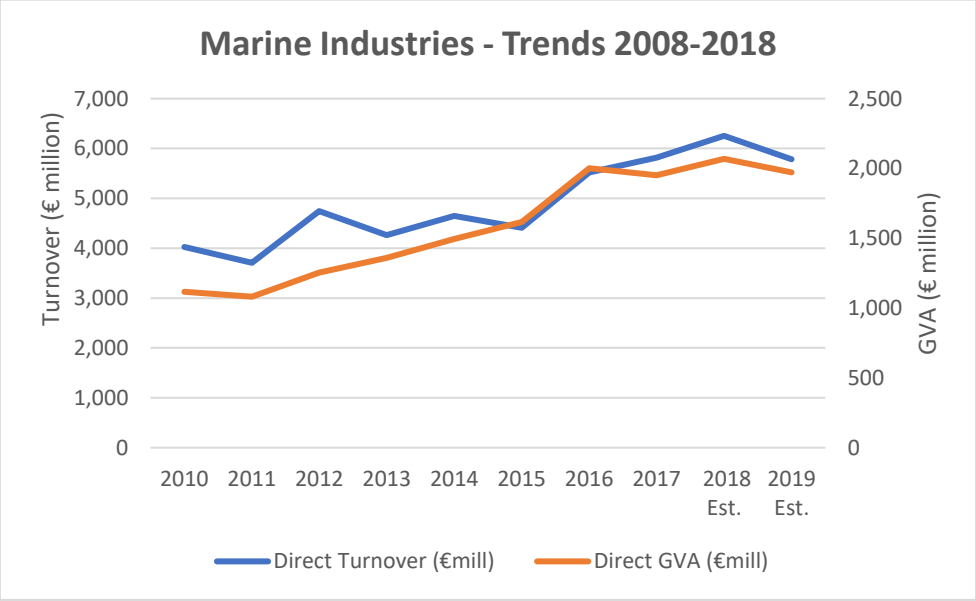
[5] According to CSO statistics, the volumes landed by foreign vessels in Irish ports doubled between 2009 and 2018. https://www.cso.ie/en/statistics/environmentstatistics/fishlandings/

[6] In line with best international practice in compiling nation ocean economy statistics, the value of Sea Fisheries shown in Table 1 presents only the values from the national fleet. The value of foreign vessel landings into Irish ports is turnover and value added for the sea fisheries of the foreign vessels' home countries. The value of foreign vessel landings into Irish ports does however increase the activity of the Irish ports and the seafood processing sectors and generates activity in haulage, ship repair and other associated services. Those contributions are reflected in the values shown for those other sectors in Table 1. Given this added value from the addition of foreign landings in Irish ports, policies that promote growth in such landings should continue to be encouraged.

6,746 full-time equivalent (FTE) individuals are estimated to be directly employed across sea fisheries, seafood processing and aquaculture. BIM estimates suggest that 9,187 individuals in either full-time, part-time or casual employment contribute to this FTE figure[7].

Figure 1 shows total turnover and GVA in Ireland's ocean economy from 2008 to 2019. While the ocean economy has been on an upwards trajectory since 2008, the growth in turnover will fall short of the targets for 2020 set out by the Government in 2012 in Harnessing Our Ocean Wealth – an Integrated Marine Plan. Table 2 records the sectoral 2020 targets. HOOW had set a target of increasing the overall turnover from Ireland's ocean economy to exceed €6.4bn by 2020. SEMRU's estimates suggest that turnover was 9 per cent short of that figure in 2019. Given the current economic crisis, activity will not make up the deficit in 2020. Nonetheless, given the ambitious nature of the original target, we consider getting to within 10 per cent of meeting that target to be a significant achievement.

Figure 1: Turnover and gross value added in Ireland's ocean economy, 2008 to 2019



Source: SEMRU estimates.

[7] All BIM figures referenced here are from the Business of Seafood 2019 report, unless otherwise stated. http://www.bim.ie/media/bim/content/publications/corporate-other-publications/BIM-Business-of-Seafood-2019-Spreads.pdf

Table 2: HOOW sectoral targets

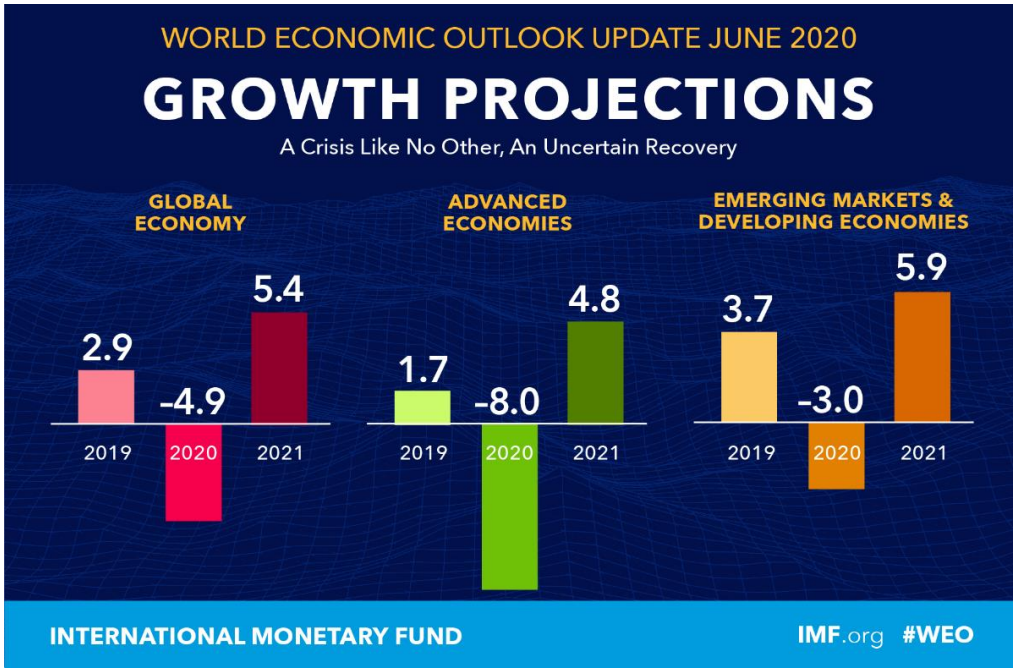
Sector	Ocean Wealth 2020 target (€m)*
Seafood (fisheries, aquaculture, seafood processing)	1,000
Maritime Commerce and Ship Leasing	2,600
Marine and Coastal Tourism and Leisure (including Cruise Tourism)	1,500
Marine ICT and Biotechnology	>61
Ports and Maritime Transport Services, Maritime Manufacturing, Engineering, Offshore Oil and Gas, other marine industries	>1,200

Source: Harnessing our Ocean Wealth – An Integrated Marine Plan for Ireland. *Projected annual turnover by 2020. Baseline period: 2007

COVID-19-related recession

The COVID-19 crisis has driven the global and Irish economies into steep recession. Forecasts for the global economy published by the IMF in late June show a 4.9 per cent contraction for 2020 (Figure 2). The IMF expects the recession to be especially severe in advanced economies, with projected GDP declines of 8 per cent in the US, 10 per cent in the euro area and 10 per cent in the UK.

Figure 2: IMF economic projections



Source: IMF World Economic Outlook Update, June 2020.

The IMF's baseline forecast is for recovery in 2021, though the Fund warn that the outlook remains clouded by uncertainty and dependent on the path of the health crisis. Assuming that the pandemic fades in the second half of this year and containment efforts can be gradually unwound, advanced economies are projected to grow 4¾ percent in 2021.

Table 3 shows the Department of Finance's latest official forecasts for the Irish economy, published in late April in the update of Ireland's *Stability Programme*. Following seven consecutive years in which the Irish economy recorded by far the fastest rate of growth among European peers, the economy is expected to experience a sharp recession this year, with GNI* projected to drop about 15 per cent. Having declined to its lowest level in almost 13 years in 2019, the unemployment rate is forecast to soar. Baseline projections from the Central Bank of Ireland are for the national unemployment rate to move down to 10½ per cent by Q4:2020 from a peak rate of more than 28 per cent in April, before gradually trending down to 7 per cent by Q4:2022.[8]

Table 3: Outlook for the Irish economy (% change y/y, unless stated)

	2019	**2020**	**2021**
Real GDP	5.5	-10.5	6.0
Real GNI*	4.1	-15.5	9.6
Personal consumption	2.8	-14.2	8.7
Employment	2.9	-9.3	5.5
Unemployment rate (%)	5.0	13.9	9.7
Budget balance (% of GDP)	0.4	-7.4	-4.1
Public debt (% of GNI*)	99	125	122
Household savings (% of GNI*)	6.3	12.4	10.3

Source: Department of Finance, Stability Programme Update 2020

Customer-facing sectors of the economy have been the most affected by the measures implemented by Government to contain the pandemic, including hotels, bars, pubs, restaurants, leisure, personal services and tourism. These sectors are dominated by domestic SMEs and micro businesses. Containment measures in Ireland and abroad have also had a major impact on Ireland's main ocean economy industries: marine tourism and leisure; seafood; and shipping and maritime transport.

[8] Central Bank of Ireland, Quarterly Bulletin No.2 2020.

Marine tourism and leisure

As shown in Table 1 above, more than half of all jobs in Ireland's ocean economy industries are in marine and coastal tourism.[9] SEMRU estimate that total coastal tourism expenditure by domestic residents and overseas visitors was €2.6 billion in 2018, while total marine tourism generated about €1 billion. The COVID-19 pandemic has essentially halted tourism activity in Ireland and abroad, with practically no visitors from overseas during the past two months and most hotels and tourist attractions closed. Tourism Ireland has predicted a slump in business in the overall tourism sector of 80 per cent this year.[10]

When tourism businesses do reopen, there are good reasons to believe that marine and coastal tourism can be an engine for recovery in the broader tourism sector.

- Irish residents spent about €5 billion on foreign holidays last year.[11] With foreign travel curtailed, some of this expenditure is likely to shift to domestic tourism.
- Although unemployment has soared over the past few months, Government schemes have cushioned the impact on household incomes. As shown in Table 3, household savings are expected to jump this year, in part because of so-called "forced saving" by households during the lockdown. The *Stability Programme Update* projections imply an additional €10 billion of household savings, consistent with recent data from the Central Bank of Ireland showing that household bank deposits jumped nearly €3 billion in April, the largest monthly increase in bank deposits on record. It is plausible that households will use some of these savings to finance a substantial increase in spending on domestic tourist activities as virus-related uncertainty eases.
- When tourism businesses reopen, they will be forced to operate at significantly reduced capacity because of social distancing rules. It is relatively easy to maintain social distancing while participating in many marine and coastal tourist activities. This should give businesses in these sectors of the tourism industry a competitive advantage.

[9] Coastal tourism refers to any tourism activity that takes place in a coastal city, town, village or rural area close to the sea. Marine tourism refers to refers to overnight visits that involve sea-based activities such as swimming, surfing, boating, yachting, cruising, sea kayaking, diving and other nautical sports, as well as land-based activities, including beach activities, sun bathing, marine related sight-seeing and other coastal recreation activities taking place on the coast for which proximity to the sea is a necessity.

[10] https://www.newstalk.com/news/tourism-industry-will-take-longest-time-recover-tourism-ireland-ceo-warns-1020021

[11] https://www.cso.ie/en/statistics/tourismandtravel/overseastravel/

- Recent surveys of overseas and domestic tourist in Ireland have shown that marine active tourists have a higher rate of expenditure than the average overseas or domestic tourist.[12] High-quality marine tourism assets attract tourists from abroad and encourage Irish consumers to spend in the domestic market. When travel opens up again, tourism policies that target the marine active traveller and encourage the development of new forms of marine leisure product offerings could result in higher spending visitors and greater revenue in coastal areas.
- There is evidence that ocean-based tourism benefits the health and well-being of people and that people are increasingly aware of the health and well-being benefits of blue spaces.[13] People may place greater value on such opportunities post-COVID-19. Wellness tourism is the industry's fastest growing sector worldwide, with growth rates in recent years more than twice as fast as general tourism.[14] The current crisis also offers an opportunity to develop new marine tourism offerings focused on this expanding consumer demand for wellness services and products building on the known mental health benefits individuals receive by interacting with Ireland's high-quality marine environment.[15]
- Ireland has a comparative strength globally in marine and coastal tourism owing to natural advantages, substantial past investment in the tourism product and infrastructure, and expertise and skills built up by those working in the sector.

In designing State support packages for businesses, policymakers could consider the marine and coastal tourism sector to be of strategic importance.

Seafood

Although official data for the past two months are not yet available, media reports and our industry contacts suggest that parts of Ireland's seafood sector have been significantly affected by the pandemic.[16] Demand for seafood in Ireland's main fish export markets in France, Spain and Italy has collapsed, in large part because of the shuttering of restaurants. Exports of lobster, crab, prawn,

[12] Hynes, S., Aymelek, M., Norton, D., Tsakiridis, A. & Corless, R. (2020). A survey of domestic coastal and marine tourism and leisure activities in Ireland, SEMRU Report Series.
Hynes, S., Aymelek, M., Corless, R. & Evers, N. (2019). A Survey of Marine and Coastal Overseas Tourism Activity in Ireland, SEMRU Report Series.
[13] http://www.oceanshealth.udg.edu/en/home.html. For more information about the use of blue and green spaces such as parks, coasts and other nature-based solutions to improve peoples' health and wellbeing, see: Nature and Environment to Attain and Restore (NEAR) Health, Whitaker Institute, NUI Galway, 2019.
[14] GWI (2018). Global Wellness Tourist Economy, November 2018. Global Wellness Institute Publication, Miami, USA.
[15] Britton, E., Kindermann, G., Domegan, C., and Carlin, C. (2018). Blue care: a systematic review of blue space interventions for health and wellbeing Health Promotion International, 1–20, doi: 10.1093/heapro/day103
[16] https://www.rte.ie/news/coronavirus/2020/0422/1134124-fish-industry/

megrim, and monkfish have been severely impacted, as has domestic demand for lobster and crab in restaurants. With markets shut to exports and Irish fishermen still landing fish, wholesalers have been forced to stockpile landed fish in warehouses at many Irish fishing ports. This excess supply may further depress the price of certain fish in the medium term as markets reopen and the backlog is gradually cleared.

The COVID-19 crisis has affected different segments of the fishing fleet differently. Much of the pelagic fleet would likely have been tied up at this time of year before fishing resumes in late summer, so with proper quota management the impact of the crisis can be lessened. For these fishermen, arguably a bigger concern at this particular point in time is the impact of Brexit on access to valuable stocks in British waters (discussed below). In contrast, the one- and two-man operated inshore fleet made up of potters and shellfish harvesters, which accounts for the bulk of the Irish fishing fleet, have been the worst affected. Like all other businesses, they are at present covered by the State support schemes but this fishing segment in particular may need support in the recovery phase[17].

The COVID-19 crisis presents an opportunity to build the foundations for more localised seafood supply chains in Ireland. The further development of small businesses that can market and deliver fish directly to consumers should be encouraged. At present, Ireland exports much of what is caught by the Irish fleet, while a high proportion of fish consumed by people in Ireland (largely cod and salmon) is imported. If Irish consumers could be reintroduced to locally caught fish then the buyers would be in a position to find local outlets to take the produce that is being landed. Better developed downstream supply chains would alleviate the need for warehousing and prevent prices falling to the same extent.

Opportunities also still exist in the reutilisation of some of the waste in capture fisheries. In some segments of the fleet, targeted fish species are gutted and the viscera thrown back into the ocean. There is also now bycatch that must be landed since the introduction of the discard ban. While some of the waste potential is already utilised, there remains opportunities to generate further added value from the waste of capture fisheries. It is estimated that another one-third of what is processed is wasted during distribution and at the retail and consumer level.[18] The waste at all points along the

[17] Mills, G. and Flynn, G. (2020). Perfect storm' on the horizon for inshore fishermen. Ocean Focus Spring Issue. https://view.digital-hub.global/ocean-focus-spring-2020/p/5

[18] Love, D. C., Fry, J. P., Milli, M. C., & Neff, R. A. (2015). Wasted seafood in the United States: Quantifying loss from production to consumption and moving toward solutions. Global Environmental Change, 35, 116-124.

supply chain present opportunities to produce further valuable by-products by turning these wastes into feed for finfish aquaculture and other applications such as fertilisers and poultry feed additives.[19]

Looking further ahead, the United Nations Food and Agriculture Organization (FAO) project that under certain scenarios the global demand for food will increase 60 per cent by 2050.[20] Consumer behaviour may swing to healthier foods such as seafood in the aftermath of the COVID-19 health crisis. Ireland lags behind others countries in what could be sustainably produced in marine aquaculture to satisfy some of this growing demand. For example, Ireland produced 12,200 tonnes of farmed salmon in 2018 compared with a figure of 156,000 tonnes for Scotland and 1.3 million tonnes for Norway.

The Programme for Government commits "to develop the aquaculture sector in a sustainable way, including shellfish aquaculture." Ireland has sites that are suitable for marine aquaculture and there is a willingness in the business community to expand production, but the sector suffers from misinformation and poor planning. Of course, we recognise that there are environmental considerations, but options offshore are now viable which lessen environmental impacts and feed is being produced much more sustainably.[21] We see the potential to expand significantly the aquaculture of organisms that extract their nutrients directly from the water (for example, shellfish[22]) as well as the aquaculture of organisms that require feed (finfish). Indeed, as a sustainable food producing sector, the European Commission has identified aquaculture as the having the greatest potential for global expansion.[23] According to research for the High Level Panel for a Sustainable Ocean Economy, the sector could supply over six times more food than it does today, equal to more than two-thirds of the animal protein needed to feed the global population by 2050.[24]

Moreover, as a source of food, evidence suggests that aquaculture and sea fisheries products have low-to-medium carbon footprints compared to pastoral livestock products (beef and veal, sheep meat

[19] SAPEA, Science Advice for Policy by European Academies. (2017). Food from the oceans: how can more food and biomass be obtained from the oceans in a way that does not deprive future generations of their benefits? Berlin: SAPEA. doi:10.26356/foodfromtheoceans

[20] http://www.fao.org/publications/fofa/en/

[21] We note, for example, Calysta, a California-based biotech company developing a novel feed for farmed fish which is produced via gas fermentation and can be manufactured without using any arable land and almost no water.

[22] Shellfish aquaculture has also been shown to provide other ecosystem service benefits to society beyond food provision such as filtration services that improves water quality, carbon sequestration, nursery habitat services, storm surge elevation and coastal erosion prevention (for further discussion see van der Schatte Olivier (2020). A global review of the ecosystem services provided by bivalve aquaculture. Reviews in Aquaculture 12, 3–25).

[23] EU. (2017). Food from the Oceans - How can more food and biomass be obtained from the oceans in a way that does not deprive future generations of their benefits? European Commission report.

[24] https://www.woi.economist.com/how-to-have-your-fish-and-eat-it/

and dairy).[25] However, aquaculture is relatively energy intensive, and therefore production requires the efficient use of energy and resources and the employment of low carbon technologies that strengthen aquaculture's sustainability.

Shipping and maritime transport

The World Trade Organization (WTO) forecasts that world merchandise trade will plummet between 13-32 per cent this year, depending on the severity of the global recession. Trade will likely fall steeper in sectors with complex value chains, particularly electronics and automotive products. Merchandise trade volumes were flat in 2019, weighed down by trade tensions and slowing economic growth. A recovery in trade in 2021 is expected, but is dependent on the duration of the COVID-19 outbreak.

Irish shipping markets have been markedly affected by the COVID-19 emergency. The quarterly iShip index produced by the Irish Maritime Development Office (IMDO) recorded a decline of 6 per cent in overall shipping activity at Irish ports in the first three months of this year compared with the same period a year ago. More recent data from the IMDO show a decline in Roll-on/Roll-off (RoRo) freight of between 25-30 per cent through April and May, while Lift-on/Lift-off (LoLo) traffic is down between 15-20 per cent. On the passenger side, tourist passenger numbers at Irish ports are down 95 per cent from a year earlier.

As shipping activity is highly correlated with global GDP, the gradual recovery projected by the IMF would be expected to drive a revival in Irish shipping markets. However, tourist passenger numbers at Irish ports are unlikely to experience any recovery in the near term while the two-week quarantine regulations remain in place as the majority of trips taken to Ireland by car are for less than two weeks.

The COVID-19 crisis has also put a spotlight on the vulnerabilities of the cruise line industry during a global health pandemic. Port closures, travel bans and flight restrictions have made it extremely difficult for cruise liners to operate. The spread of the virus on board ships and the refusal of entry for vessels with sick passengers to certain ports internationally is expected to affect consumer confidence in the industry and cause a fall in demand for passenger berths and fewer ship visits to Irish ports in the medium term.

[25] Tsakiridis, A., O'Donoghue, C., Hynes, S., Kilcline, K. (2020). Comparison of Environmental and Economic Sustainability across Seafood and Livestock Product Value Chains, Marine Policy, 117, 103968.

Other considerations

Several other aspects of the global economic outlook are relevant for the near-term performance of Ireland's ocean economy industries and their potential role in contributing to recovery in Ireland's economy.

- Long-term interest rates have dropped to record low levels in advanced economies, including Ireland. Borrowing costs for governments and investment-grade corporates had trended down from elevated levels over the past few decades, in part reflecting the excess of global savings over desired investment spending.[26] Policy actions by the European Central Bank in responding to the economic and financial fallout from the COVID-19 emergency have driven borrowing costs even lower.[27] Coupled with the recently announced €750 billion EU recovery fund ("Next Generation EU, 2021-2024"), these policy moves are likely to mitigate to some extent the effect of increased deficits on Ireland's borrowing capacity. The State's debt maturity profile is also favourable. This in turn should allow considerable headroom for the State to borrow for public investment to boost the economy and employment.
- In the context of exceptionally low borrowing costs, prospective net returns on investments in parts of Ireland's ocean economy industries are likely to be high, making these sectors attractive areas for State stimulus spending and private investment.
- The COVID-19-related recession has disproportionately affected younger, relatively lower-paid workers in customer-facing sectors of the economy. Policy should focus on supporting the creation of new jobs suitable for this demographic cohort. Schemes to retrain and upskill these younger people to work in the ocean economy may potentially be rewarding.

Risks of a No-Deal Brexit

Recent EU-UK trade talks have made seemingly little progress and the risks are increasing that the EU-UK trading relationship will default to WTO terms on 1 January 2021. A 'No-Deal' Brexit would compound the damage done to the Irish economy by the COVID-19 pandemic. Bergin et al (2019) find that GDP in Ireland in 2030 will be nearly 5 per cent lower in a No-Deal scenario compared to a situation where the UK would have remained in the EU.[28]

[26] See, for example, Larry Summers and Łukasz Rachel. (2019). "On falling neutral real rates, fiscal policy, and the risk of secular stagnation", Brookings Papers on Economic Activity, Spring.
[27] These measures include the ECB's €1,350 billion Pandemic Emergency Purchase Programme (PEPP) launched in March and expanded in early June.
[28] Bergin, A. and Economides, P. and Garcia-Rodriguez, A. and Murphy, G. (2019) Ireland and Brexit: Modelling the impact of deal and no-deal scenarios. Quarterly Economic Commentary Special Article, Spring 2019.

As is well understood, EU-UK trade relations would be governed by WTO rules under a No-Deal scenario. In that case, the EU and UK would apply 'Most Favoured Nation' (MFN) tariff rates to imports. WTO MFN tariff rates vary by product, ranging from 0 per cent to 80 per cent across more than 5,000 products. MFN tariff rates are highest for food products and lowest or zero for hi-tech products. Roughly 40 per cent of Ireland's agri-food exports go to the UK, with agri-food accounting for 10 per cent of total exports of goods. Estimates from the ESRI suggest that Ireland's total exports to the UK could decline 10-15 per cent in a WTO scenario, including a 30-50 per cent drop in food exports.

A No-Deal Brexit would significantly affect Ireland's ocean economy industries. Such an outcome poses major risks for Irish fisheries associated with fishing rights in UK waters and potential tariffs on Irish exports of seafood to the UK.[29] The Programme for Government recognises these risks.[30] Analysis by SEMRU of data from the EU Scientific, Technical and Economic Committee for Fisheries (STECF) suggests that about 30 per cent of landings by the Irish fleet by volume (and 25 per cent by value) are caught in UK waters. The top six species most affected by loss of access to UK waters would be mackerel, nephrops, herring, horse mackerel, whiting and great Atlantic scallop. These six species represent approximately 90 per cent of Irish landings from UK waters in both tonnes and value.

Access to UK waters, the impact of customs and tariffs on the trade of fish and fish-related products, impacts on the workings of the Hague Preference arrangement for Ireland within the Common Fisheries Policy (CFP) and how quota will be distributed post-Brexit are questions that still remain to be answered. It appears that fishing rights is becoming one of the most intractable issues of the entire Brexit talks process. Currently, the EU wants to uphold the system in place under the CFP from the end of 2020. However, the UK is now insisting it will be an independent coastal state from the end of 2020 and that there needs to be a new relationship with the EU in regards to fisheries, similar to that in place between the EU and Norway.

The impact on shipping activity in Ireland of a No-Deal Brexit and resulting tariffs and non-tariff measures on imports and exports could also be significant, given the high volume of trade between Ireland and Great Britain and the fact that shipping and maritime transport is responsible for the bulk of that trade volume. Bergin et al (2019) estimate that without a trade deal, Ireland's total exports and imports in 2030 will be about 8 per cent below where they otherwise would have been were the

[29] Mills, G. (2019). Getting Brexit ready: a no-deal UK departure looms on the horizon. Inshore Ireland, Spring Issue, Ocean Focus Publication.
Hynes, S. (2016), "Uncharted waters: What would Brexit mean for the Irish ocean economy?" Whitaker Policy Brief Series No. 9, April 2016.
[30] Programme for Government – Our Shared Future, page 70.

UK to have remained in the EU. Moreover, the UK is an important route for Irish exports to mainland Europe, with nearly 40 per cent of Irish exports to EU using the UK landbridge.[31]

On the other hand, a No-Deal Brexit could offer opportunities for growth for some sectors of the ocean economy.

- Imports into the EU from the UK will be subject to tariffs and non-tariff barriers in a WTO scenario, which would create opportunities for Irish exporters to increase their market share in the EU27 at the expense of UK exporters. In general, this points to a strategy of diversification of Irish exports away from the UK and towards mainland Europe.
- Opportunities may exist in terms of developing port infrastructure in Ireland to take some of the shipping trade that previously entered UK ports from where short sea shipping services redistributed around the UK and to other ports in the EU.
- It may be possible to encourage marine financial services companies to relocate from the UK to Ireland in order to maintain access to the EU markets. Ireland has considerable experience in the aviation leasing area and this expertise could be fostered to target the lucrative ship leasing business.

Transition to a low-carbon economy

> *"The harm from climate change will be slower than the pandemic but more massive and longer-lasting. If there is a moment for leaders to show bravery in heading off that disaster, this is it. They will never have a more attentive audience."*
>
> "Seize the moment", The Economist, 21 May 2020

The Government's Climate Action Plan has set a target of 70 per cent of all electricity generation to come from renewable resources by 2030, compared with about 30 per cent at present. The development of offshore wind energy has the potential to play a significant role in meeting these targets, with a target of at least 3.5GW of offshore wind energy in Ireland by 2030.[32] Meeting these targets will require ambitious but plausible growth in renewable deployment. Moreover, Ireland could eventually become a significant exporter of offshore wind energy to the rest of the EU. The EU has set a target of zero net emissions of greenhouse gases by 2050 under the EU Green Deal roadmap.[33] The Next Generation EU recovery plan mentioned earlier focuses on EU Green Deal initiatives.

[31] Breen, B., Brewster, P., O' Driscoll, C., Tsakiridis, A., (2018) The Implications of Brexit on the Use of the Landbridge, Dublin: Irish Maritime Development Office.
[32] Ireland currently has installed capacity of 25MW at a single facility.
[33] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Arguably, the greatest marine-related opportunity for Ireland lies in the underdeveloped energy potential off our coasts. Ireland ranks second only to the UK for gross resource potential in offshore wind in terms of sea area and wind speeds. Technological advances have reduced the cost of generating power using offshore wind (with fixed foundation technology) to the point where it is now economically viable. In May 2019, the Irish government designated seven offshore wind projects on the east coast as 'relevant', meaning they will be fast-tracked through the new marine planning regime which is being introduced under the forthcoming Marine Planning and Development Management (MPDM) Bill. The selected projects include the Oriel, Innogy's Dublin Array Offshore Wind Farm Project on the Bray and Kish Banks, Codling I and II, Skerd Rocks and North Irish Sea Array (NISA) wind farms.

As illustrated in the quote above from a recent edition of *The Economist* newspaper, the time is ripe to reap the benefits from marine renewable energy if Ireland can credibly commit to developing the needed infrastructure. The installation of renewables infrastructure requires heavy up-front investment. As argued above, however, the cost of borrowing for the State and investment-grade companies is currently extremely low, and likely to stay that way for the foreseeable future.

In this context, we see several near-term priorities for policymakers:

- Our view is that a policy framework that streamlines regulatory decision-making and reduces uncertainty could spur private sector investment in offshore wind energy. The forthcoming MPDM Bill seeks to establish in law a new regime "that replaces existing marine development consent regimes and streamline arrangements on the basis of a single consent principle i.e. one state consent (Maritime Area Consent) to enable occupation of the Maritime Area and one development consent (planning permission), with a single environmental assessment"[34]. Our view is that the MPDM Bill should be enacted quickly to provide a streamlined regulatory system for the marine area. The completion and implementation of this new planning legislation will be critical in finally achieving the potential of Ireland's offshore renewable energy resources. The MPDM Bill is designed to secure the objectives of the National Marine Planning Framework, a draft of which has recently come back from public consultation. We would note that its implementation should also result in a reduction in the planning bureaucracy that has plagued the development of the aquaculture sector in the last two decades.
- The fast-tracking of offshore wind projects on the east coast mentioned above is a positive development. Renewed commitments by the new Government to develop offshore wind

[34] https://www.housing.gov.ie/planning/marine-spatial-planning/foreshore/marine-planning-and-development-management-bill

generation expeditiously could reduce uncertainties, while funding supports by state agencies (e.g. IDA, Enterprise Ireland) for businesses in this sector should deliver high economic and social returns.

- Businesses in the sector require access to a good mix of young, well-educated talent. Our training and education systems should focus on the need to upskill the indigenous work force to meet the labour demands that will be needed for the growth of offshore wind.

We also see several medium- and longer-term priorities for policymakers:

- Medium- and longer-term opportunities exist for offshore wind energy off the south and west coasts for both domestic use and export, based on recent developments in floating offshore wind technology.[35] Opportunities also exist for the development of one or more business clusters involved in the manufacturing of floating offshore wind equipment.
- Advances in the development of wind-to-hydrogen (WTH) technology also offer huge potential. WTH technology passes the electricity generated by offshore wind through water to split it into hydrogen and oxygen. The resulting hydrogen can be transported and later converted back into electricity.[36]
- The ongoing development of international electricity transmission infrastructure will allow energy produced by renewables projects to be traded between Ireland, the UK and mainland Europe. For example, when completed, the Celtic Interconnector electrical link between Ireland and France will allow the export of surplus renewable electricity to mainland Europe. Domestically, existing onshore electricity transmission infrastructure (for example, that associated with the Moneypoint generating station) could be employed to connect wind farms off the west coast into the National Grid System.
- The offshore renewable energy industry can be facilitated by ports that have the necessary infrastructure to support its development and ongoing maintenance. Offshore wind in particular represents an opportunity for Irish ports to develop a new source of revenue.
- To underpin the cheap but intermittent electricity supplied by wind energy, we see considerable merit in Government continuing to issue licences for natural gas exploration. We agree with the Climate Change Advisory Council that continued exploitation and use of natural

[35] KPMG (2018) "Offshore Wind: Ireland's Economic and Social Opportunity".
[36] An example of the use of such technology (in an on-shore context) is the Wind2H2 project located at the National Wind Technology Center near Boulder, Colorado: https://www.nrel.gov/hydrogen/wind-to-hydrogen.html. An EU Interreg project SEAFUEL, led by scientists at NUI Galway is also investigating the feasibility to power coastal transportation networks using hydrogen fuels produced by offshore wind energy and seawater (http://www.seafuel.eu/).

gas in energy production in Ireland must be accompanied by development of carbon capture and storage (CCS) technologies (Climate Change Advisory Council, 2019).[37]

Offshore wind energy has the potential to deliver substantial positive externalities to other important sectors of the Irish economy. For example, increased demand for electricity to power data centres associated with the growing ICT industry could be met using offshore wind energy.

Apart from the economic benefits, the development of the offshore renewable energy sector would be timely in terms of EU renewable energy targets and greenhouse gas emissions reduction targets, all of which Ireland lags behind. Moreover, from a renewable energy perspective, Ireland is running out of options on land and offshore deployment is not only more productive than onshore placement but also will likely meet with fewer objections.

Finally, we would note that climate change and sea level rises will cause significant changes to our coasts. This creates opportunities for businesses that can apply engineering and eco-based solutions to strengthen our coastal defences. Moreover, this is expertise that if fostered here could lead to the export of these services to other coastal economies.

Conclusions

Ocean-based economic activity makes an important contribution to Ireland's economy. The ocean economy has expanded markedly since the Global Financial Crisis in 2008/9, though growth up to 2019 is marginally below the *HOOW* targets for 2020. Against a backdrop of a deep COVID-19-related recession, with the rate of unemployment expected to remain at elevated levels over the near term, Ireland's ocean economy industries offer prospects for new sources of growth, jobs, innovation and economic resilience.

Offshore wind has the potential not only to help Ireland to meet its targets for domestic renewable energy supply, but also to build a productive energy export sector. With proper State support, marine and coastal tourism can be an engine for recovery in the broader tourism sector. Policy could aim to develop improved downstream supply chains at home for Irish seafood. Marine aquaculture has enormous potential for expansion. In sum, we see a compelling case for increased public and private investment in ocean economy industries, with Brexit and the transition to a low-carbon economy posing both challenges and opportunities for Ireland's ocean economy.

[37] The National Mitigation Plan (NMP) (2017) identifies CCS as part of the current plan to retain natural gas electricity generation as a key back-up to renewable sources in the medium term.

Authors' profiles

Prof Alan Ahearne is Professor of Economics and Director of the Whitaker Institute at NUI Galway. He is Chair of the Risk Committee of the Central Bank of Ireland, having served as a member of the Bank's Commission from 2011 to 2020. He Chair of the Joint ESRI/Department of Finance Research Programme on the Macroeconomy, Taxation and Banking. He is also a member of the External Advisory Group to the Parliamentary Budget Office. He served as Special Adviser to former Minister for Finance, the late Brian Lenihan from 2009 to 2011. He has also served as Adviser to the IMF, Consultant to the U.K. Department for International Development, and as a Research Fellow at Bruegel, the Brussels-based think tank. Prior to joining NUI Galway in 2005, he was Senior Economist at the Federal Reserve Board in Washington, DC.

Dr Stephen Hynes is Director of the Socio-Economic Marine Research Unit (SEMRU) and Senior Lecturer in Economics at NUI Galway. He has a strong background in marine economics and applied environmental/natural resource economics. His main research interest is in microeconomic behaviour analysis, related to natural resource/environmental policy and the valuation of marine ecosystem service benefits. He has been responsible for the production of ocean economy statistics for Ireland on an annual basis over the last 10 years. This output is used by the Irish Government to monitor progress under the national integrated marine plan 'Harnessing Our Ocean Wealth'.

Socio-Economic Marine Research Unit (SEMRU)

Based at the Whitaker Institute for Innovation and Societal Change at NUI Galway, SEMRU conducts research on a variety of marine-related issues. The main research focus of the unit is on the economic importance of coastal and off-shore marine environments. This involves examining the economic utility of the marine environment (transportation, recreation) and ecological value (fisheries, aquaculture) derived from the productivity of associated ecosystems. The coastal and contiguous marine environment surrounding Ireland and the EU in general provides the geographical focus for the research carried out in the unit. Consideration of the human dimension in the management of marine ecosystems is also a critical component of all research projects undertaken. Since its establishment in 2009, SEMRU has been successful in attracting research funding to support the expansion of its marine socio-economic research programme. The unit is now a partner on several European-funded projects in the area of the socio-economics of the marine environment.

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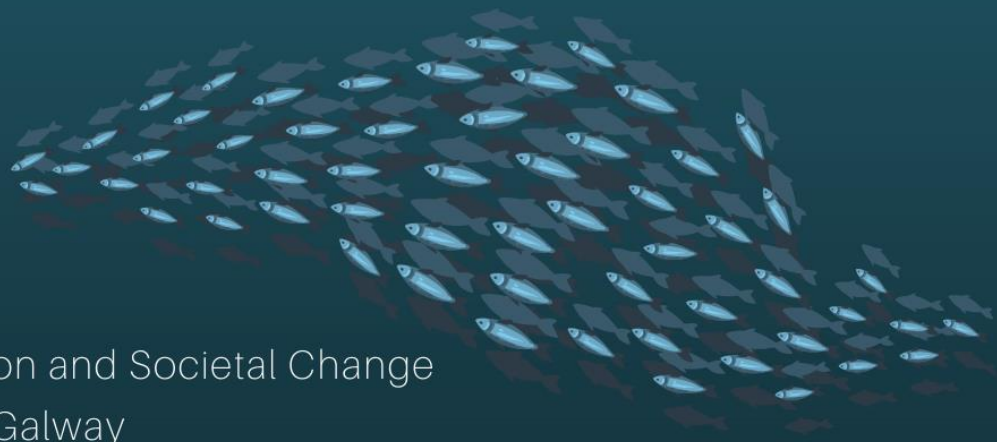

Whitaker Institute for Innovation and Societal Change
National University of Ireland Galway

Email:
alan.ahearne@nuigalway.ie
stephen.hynes@nuigalway.ie
Web:
www.whitakerinstitute.ie

semru
Socio-Economic Marine Research Unit