Comparing the macroeconomic demand-side v supply-side impacts of offshore renewable energy

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In this paper, we analyse and compare the demand and supply-side macroeconomic impacts arising from investment in offshore wind, using Northern Ireland as a case study. A wide range of studies currently exist in which researchers analyse the impacts of offshore renewable energy investment, with many of these studies focusing solely on the economic activity arising from the construction and operation of offshore renewables. However, recent research has revealed that investment in offshore wind has a positive impact on electricity prices (compared to the business-as-usual case), resulting in lower consumer prices. Fundamentally, this is driven by increased energy security, with offshore wind replacing fossil fuel generation in the electricity mix, thereby reducing reliance on natural gas and coal imports, which are subject to significant price variation depending on geopolitical situations, as seen in 2022 with the onset of the Ukraine-Russia conflict. Nearly all industries across an economy use electricity in some form or another, so any decrease in wholesale electricity prices should lead to lower production costs, driving economic activity. Also, as offshore wind farms have an expected lifetime of around 25 years, the economic impacts from the lower electricity prices are much longer-term than those of the development and construction stages of offshore wind (usually around 5-6 years).

The main research question is to analyse the scale of the economic impacts resulting from the change in electricity prices compared to that of the construction and operation of offshore wind. A key objective of the paper is to help policymakers understand the mechanism by which offshore wind can drive economic activity in many industries, taking into account both supply-side impacts and traditional demand-side factors.
Many of the previous studies analysing offshore wind either use Input-Output (IO) or Computable General Equilibrium (CGE) models. For this paper, a CGE framework is applied. A purpose-built CGE model, calibrated to 2018 with 30 industrial sectors for Northern Ireland, was developed to analyse the economic and environmental impacts of the energy transition, which is a key part of the nationâ€™s recently published energy strategy (DfE, 2021). The model was based on the AMOS (A Model of Scotland) CGE framework.

Using this framework, two core scenarios are modelled â€“ first, a standard appraisal of the impacts arising from investment in building and running offshore wind farms in Northern Ireland, and second, an evaluation of the impacts arising from lower electricity prices compared with the BAU case. Currently, there are no offshore wind farms in Northern Ireland. However, through discussions with policymakers and industry, we estimate that 2GW will be needed by 2040 if the country is to reach its net-zero carbon targets. Cost estimates are based on a generic fixed foundation offshore wind farm in the UK, provided by the Offshore Renewable Energy Catapult (ORE, 2023). Key to economic appraisal is the amount of local content, and for this, we use information from our previous work on the offshore wind supply chain in Northern Ireland (FAI, 2023). The supply-side estimates are based on recent work by Hosius et al (2023), who estimate the pricing impacts of 1GW of wind across different regions of Northern Europe.

Overall, we find that there is a significant difference in the economy-wide demand and supply-side impacts related to investment in offshore wind, with a 4.6 and 2.9 times increase in GVA and employment, respectively, over a 60-year period. This is an important issue presented to

policymakers, as the focus is often on the â€˜green jobsâ€™ related to the construction and operation of renewable technology, but we have shown that the economic impact is severely underestimated if pricing impacts are not accounted for.

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