



Comerford, D. and Cui, C.X. and Lecca, P. and McGregor, P. and Swales, K. and Tamba, M. (2017) How will Brexit affect the offshore wind industry in the UK? In: Applied Environmental Economics Conference 2017, 2017-03-03 - 2017-03-03, The Royal Society. ,

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How will Brexit affect the offshore wind industry in the UK?

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Envecon2017, The Royal Society, London, 3rd March 2017

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Table of contents

Introduction

Projections of Offshore Wind Deployment

Economic Impact: Input-Output Approach

The Home Market Effect

The Impact of Brexit

Conclusions

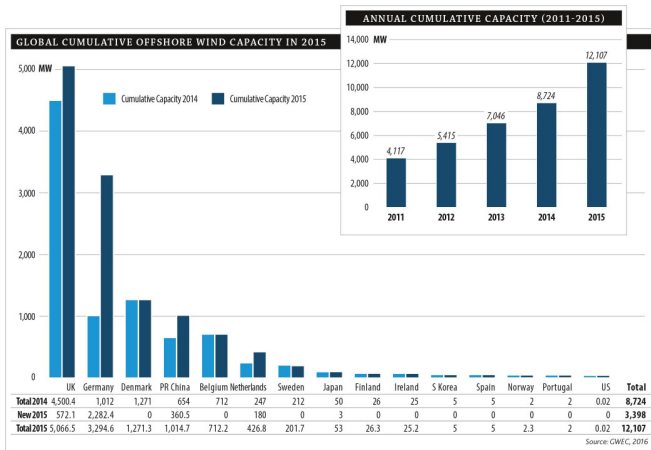
Introduction

- ▶ The UK is a leading country in the deployment of offshore wind energy
- ▶ The UK Government has produced projections for the offshore wind industry that feature increases in UK content in the supply chain, and increased exports from this supply chain

In this paper we:

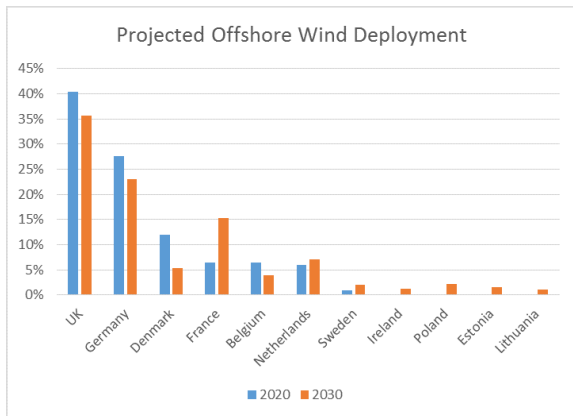
- ▶ Look at the wider economic impact assuming this projected growth materialises, within an Input-Output framework
- ▶ Start to consider the potential impact of Brexit upon this assumed growth, using a trade model which embodies the Home Market Effect

Current Offshore Wind Deployment



UK had ~ 5/12ths of global offshore wind capacity in 2015. Chart from The Global Wind Energy Council (the international trade association for the wind power industry)

Projections of Offshore Wind Deployment

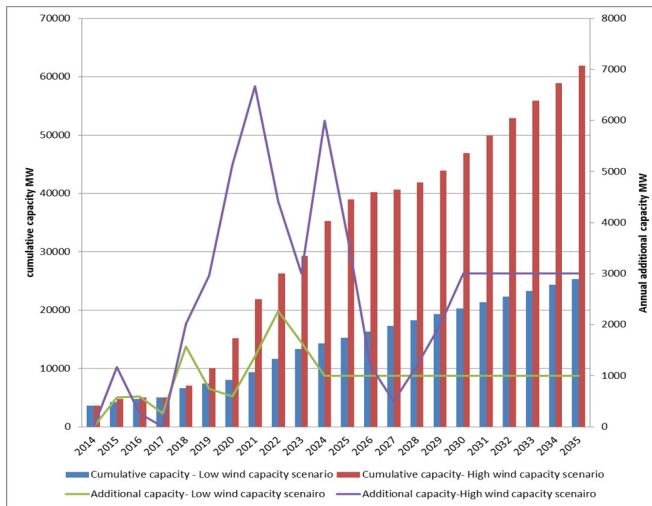


Totals for European Offshore Wind go from 8GW in 2014 to projections of 23GW in 2020 and up to 98GW in 2030. Projections from European Wind Energy Association report of August 2015, “Wind energy scenarios for 2030”

Projections of Offshore Wind Deployment

- ▶ UK Government and National Grid also have projections for growth of the offshore wind sector in UK
- ▶ Expect 50GW of wind (with a bias towards offshore) by 2035
- ▶ Ambition is to achieve similar levels of UK content in capital expenditures as seen in North Sea Oil & Gas industry ~ 70%, and ~ 50% lifetime UK content (includes capital and operating expenditures)
- ▶ Levelised costs of energy from offshore wind should fall to £100/MWhr
- ▶ The UK-based offshore wind industry should become a centre of engineering excellence that delivers exports to overseas markets

Projections of Offshore Wind Deployment



UK offshore wind: FAI projections, based on project pipeline and UK Gov figs

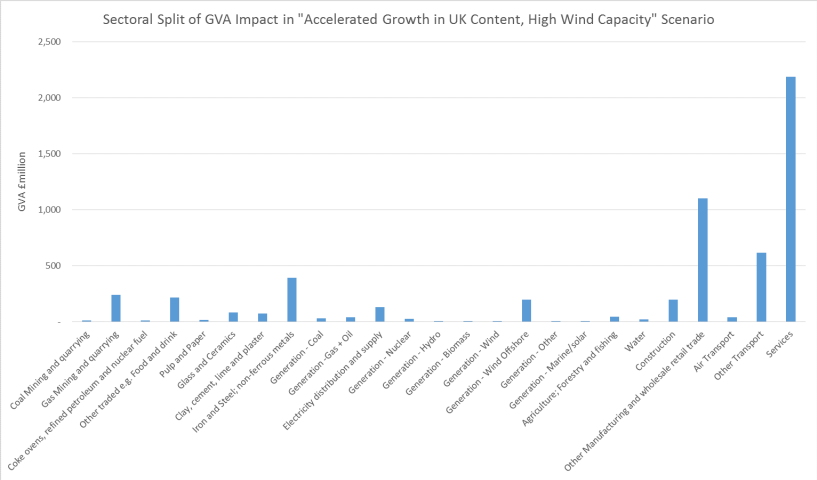
Economic Impact: Input-Output Approach

- ▶ Use IO modelling to assess economic consequences of development of offshore wind industry and its supply chain
- ▶ Relevant multipliers for calculating knock-on effects derived from analysis itself, not selected in an ad-hoc manner
- ▶ Have deployment projections, and make assumptions on linkages between offshore wind sector and other sectors of the economy
- ▶ We produce a 4 series of IO tables (and hence multipliers) consistent with the deployment of offshore wind
 - ▶ Gradual growth in UK content, Low Wind Capacity
 - ▶ Gradual growth in UK content, High Wind Capacity
 - ▶ Accelerated growth in UK content, Low Wind Capacity
 - ▶ Accelerated growth in UK content, High Wind Capacity

Economic Impact: Input-Output Approach

2035 Impact	Gradual Growth		Accelerated Growth	
	Low Wind	High Wind	Low Wind	High Wind
Demand disturbance (£million)	1,181	2,577	1,751	3,922
Direct FTE jobs	9,091	19,630	13,228	29,059
Direct GVA impact (£million)	463	937	642	1,337
Type II Impact on total production				
<i>£million</i>	5,090	10,991	7,494	16,644
<i>%change from base year value</i>	0.24%	0.51%	0.35%	0.77%
<i>Output Multiplier- Type II</i>	4.31	4.27	4.28	4.24
Type II Impact on GVA				
<i>£million</i>	1,775	3,776	2,575	5,638
<i>%change from base year value</i>	0.17%	0.36%	0.25%	0.54%
<i>GVA Multiplier- Type II</i>	3.83	4.03	4.01	4.22
Type II Impact on Employment				
<i>FTE jobs</i>	38,467	83,164	56,574	125,535
<i>%change from base year value</i>	0.16%	0.35%	0.24%	0.53%
<i>Employment Multiplier- Type II</i>	4.23	4.24	4.28	4.32

Economic Impact: Input-Output Approach



The Home Market Effect

- ▶ IO Analysis reveals potential economic impacts of growth of Offshore Wind industry in the UK
- ▶ Especially if deployed on a large scale and with high levels of UK content
- ▶ The growth in UK content in this industry, and the emergence of an UK export industry, is consistent with a concept from the economics of international trade:
 - ▶ The Home Market Effect
- ▶ This is the hypothesis that an internationally mobile industry will likely locate in countries with large domestic markets for its output
- ▶ This is supported by
 - ▶ empirical findings e.g. Head & Ries (2001), Behrens et al (2005)
 - ▶ New Trade Theory models e.g. Krugman (1980)

The Home Market Effect

- ▶ Models which exhibit a home market effect rely upon two main features:
 - ▶ agglomeration benefits (increasing returns to scale)
 - ▶ trade costs
- ▶ Agglomeration benefits mean that firms want to cluster in a few locations in order to maximise productivity and hence profits
- ▶ Firms also want easy low cost access to their largest potential markets. Trade costs incurred in accessing their most important markets from other countries will lead these firms to locate directly in those countries with the largest potential markets
- ▶ Agglomerating in the largest markets, this industry will then export to the rest of the world (despite the trade costs of doing so)

The Home Market Effect

- ▶ Both features are essential
- ▶ With agglomeration benefits but no trade costs (and with identical costs of production):
 - ▶ Firms would locate in a single place and export to the rest of the world from this location
 - ▶ However, this location would not necessarily be in the largest domestic market since no trade costs means firms do not care about distance - it could be in a location with no domestic market at all
- ▶ With trade costs but no agglomeration benefits (and with identical costs of production):
 - ▶ Firms would locate in all countries in which there was a domestic market. They would supply their local markets, and no international trade would occur in this industry
 - ▶ Costs are minimised/profits maximised by minimising trade costs, and there is no benefit to forming an industrial cluster

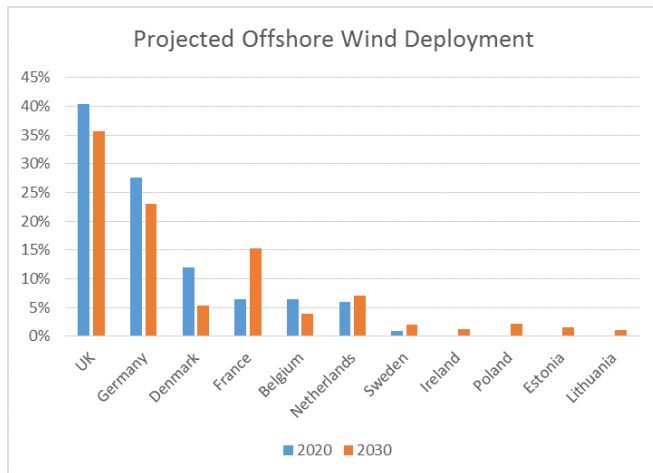
The Home Market Effect

- ▶ The UK is an important market for offshore wind generation and a high level of UK content in its supply chain, and exports from this supply chain, look like the equilibrium outcome of a world with a Home Market Effect
- ▶ Manufacturing industries are typically assumed to exhibit increasing returns to scale and to see agglomeration benefits - therefore there are benefits in firms clustering
- ▶ A UK based cluster of offshore wind supply chain firms would receive these agglomeration benefits, and minimise its trade costs in supplying the UK's relatively large offshore wind sector
- ▶ If new demand from abroad can be serviced most profitably by this highly productive industrial cluster despite the trade costs of doing so, as opposed to forgoing the agglomeration benefits and setting up directly in the location to meet this demand, then we are seeing the Home Market Effect in action

The Impact of Brexit

- ▶ Brexit is estimated to raise trade costs. Ottaviano et al (2014) calculate that a rise in trade costs reduces the UK's long run real GDP by 3.1%
 - ▶ Their lower bound on the costs, as comes through pure trade effects, before any factor reallocation which would be expected to compound these losses
- ▶ But trade costs are necessary for the home market effect. Will this increase in trade costs lead to a larger or smaller UK offshore wind industry?
- ▶ It could be larger because firms based in rEU who, without Brexit, would export from rEU to UK, now choose to locate in the UK because of the importance of this market
- ▶ It could be smaller because firms based in the UK who, without Brexit, would export from the UK to rEU, now choose to locate in rEU because of the importance of this market

The Impact of Brexit



Which is the more important market? UK or rEU? Not obvious

The Impact of Brexit

- ▶ Our approach:
 - ▶ Construct an augmented Krugman model with intermediate goods and three sectors:
 - ▶ a tradable offshore wind supply chain sector
 - ▶ a non-tradeable offshore wind generation sector
 - ▶ and the rest of the economy (tradeable)
 - ▶ Calibrate this model to international trade data, adjusted for the projected offshore wind outputs in 2030 (no-Brexit scenario)
 - ▶ Increase the calibrated trade frictions between the UK and rEU countries by some percentage in order to reduce the UK's real GDP by 3.1% (Brexit scenario)
- ▶ How does the output of the offshore wind supply chain and generation sector compare between the Brexit and no-Brexit scenarios?

Conclusions

- ▶ None! (As yet...)
- ▶ Model largely complete but have not yet taken it to the data
- ▶ Watch this space!