

# The CO<sub>2</sub> Trade Balance Between Scotland and the Rest of the UK: The Role of Prices in Transmitting Economic Shocks

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## Research Topic

The existence of emissions targets at a regional, national and international level has heightened interest in allocating responsibility for pollution generation. This has given rise to the concept of a 'CO<sub>2</sub> trade balance' between two economies: the enumeration of emissions spillovers that result from energy use associated with trade flows. This research considers the role of prices in transmitting a demand shock in the rest of the UK (RUK) region to the wider economy, and the associated impact on the 'CO<sub>2</sub> trade balance' with Scotland.

The results of the study are particularly significant for the growth of emerging renewable energy industries, such as new marine technologies. As such industries expand, shortages of skilled labour influence the relative price of capital and labour, inputs into the production of renewable electricity. These price effects feed through to the wider economy, ultimately affecting the overall economic impact of introducing new renewable technologies.

## Methodology

The study uses a Computable General Equilibrium model, which allows a detailed role for prices, including:

- **active supply-side constraints** (a shortage of labour or capital inputs following a shock can cause excess demand and affects relative prices in the short run).
- **labour and capital inputs can be used in varying proportions**, depending on relative prices.

## Results

Figure 1 shows the base case scenario: pollution generated in Scotland that is attributable to demand in Scotland is greater than that for the RUK. **Thus Scotland has a CO<sub>2</sub> trade deficit with the RUK.**

Following the demand shock, the consumption of RUK imports from Scotland increases, associated with a general increase in RUK economic activity. This reduces Scotland's CO<sub>2</sub> trade deficit.

When wages are flexible (Scenario 2), the increase in RUK activity leads to an increase in wages and a reduction in competitiveness. This dampens the effects of the demand shock compared to Scenario 1, and the corresponding increase in RUK consumption of Scottish imports. **Thus the implications for the CO<sub>2</sub> trade balance differ, depending on the exact role of prices in the economy (Figure 3).**

Figure 1: Scotland's Base Case CO<sub>2</sub> trade deficit (CO<sub>2</sub> tonnes, millions)

Scottish pollution attributable to RUK final demand:	18.8
RUK pollution attributable to Scottish final demand:	25.2
<b>Scotland's CO<sub>2</sub> trade balance</b>	<b>-6.4</b>

Figure 2: Example Scenarios for the role of prices

**Scenario 1:** the price of labour inputs (wages) remains fixed

**Scenario 2:** wages are flexible, and increase in response to a fall in unemployment

Figure 3: % Change in Scotland's CO<sub>2</sub> Trade Balance Following the Shock

