Increased energy efficiency in Scottish households: trading-off economic benefits and energy rebound effect

G. Figus* K. Turner* P. McGregor**

*Centre for Energy Policy University of Strathclyde

**Fraser of Allander Institute University of Strathclyde

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UNIVERSITY of STRATHCLYDE
INTERNATIONAL PUBLIC POLICY INSTITUTE
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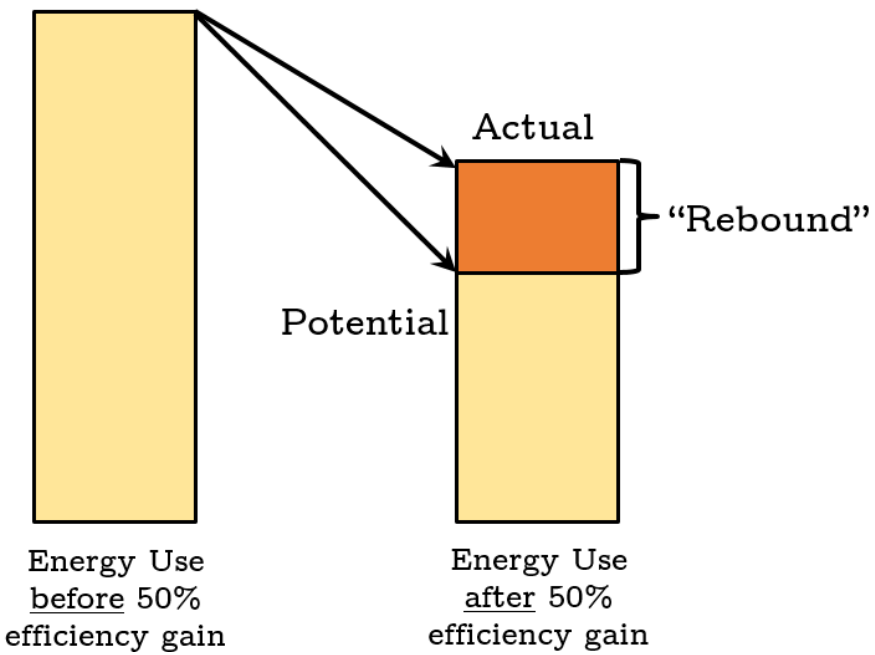
Energy efficiency and rebound effect

The introduction of energy efficiency enhancing technological improvements can be useful to reduce final energy consumption. However, potential energy saving from more efficient energy use can eroded by the behavioural response of economic agents. This is the **rebound effect**.



Is rebound necessarily bad?

Macroeconomic Benefits

Studies show that the presence of rebound is associated with a series of macroeconomic benefits. These include stimulus to important components the GDP such investment, consumption and trade, and key indicators of the labour market, unemployment, employment and real wage.

Energy Savings

Although potential energy savings are partially offset by the economic response to the efficiency improvement, energy efficiency will typically still helps to decrease final energy use.

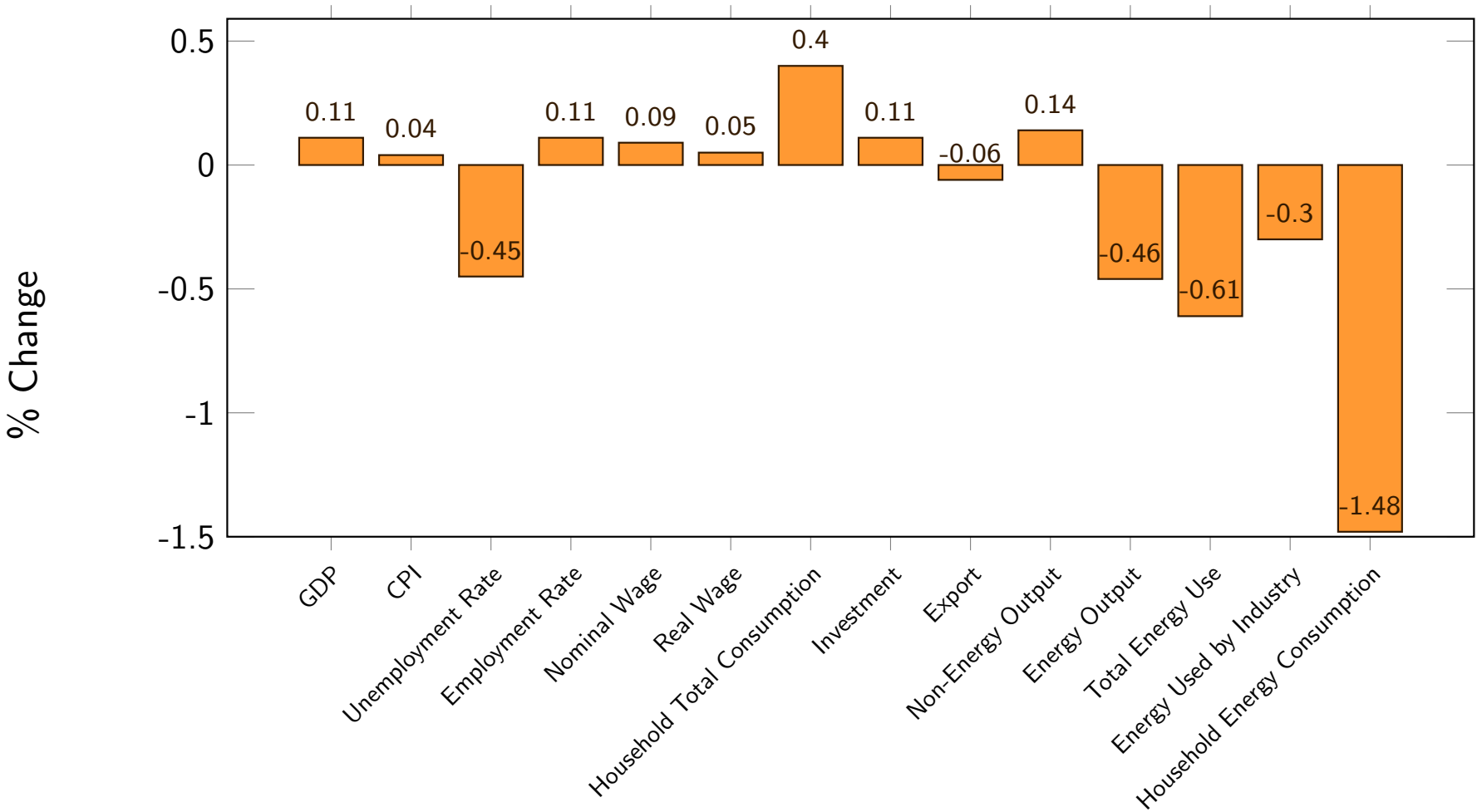
Does the Scottish economy rebound when households increase energy efficiency?

In this study we use a multi-sectoral macroeconomic model of the Scottish economy to investigate the consequences of a **5% energy efficiency increase** in Scottish household's energy use.

We perform simulations under two main scenarios.

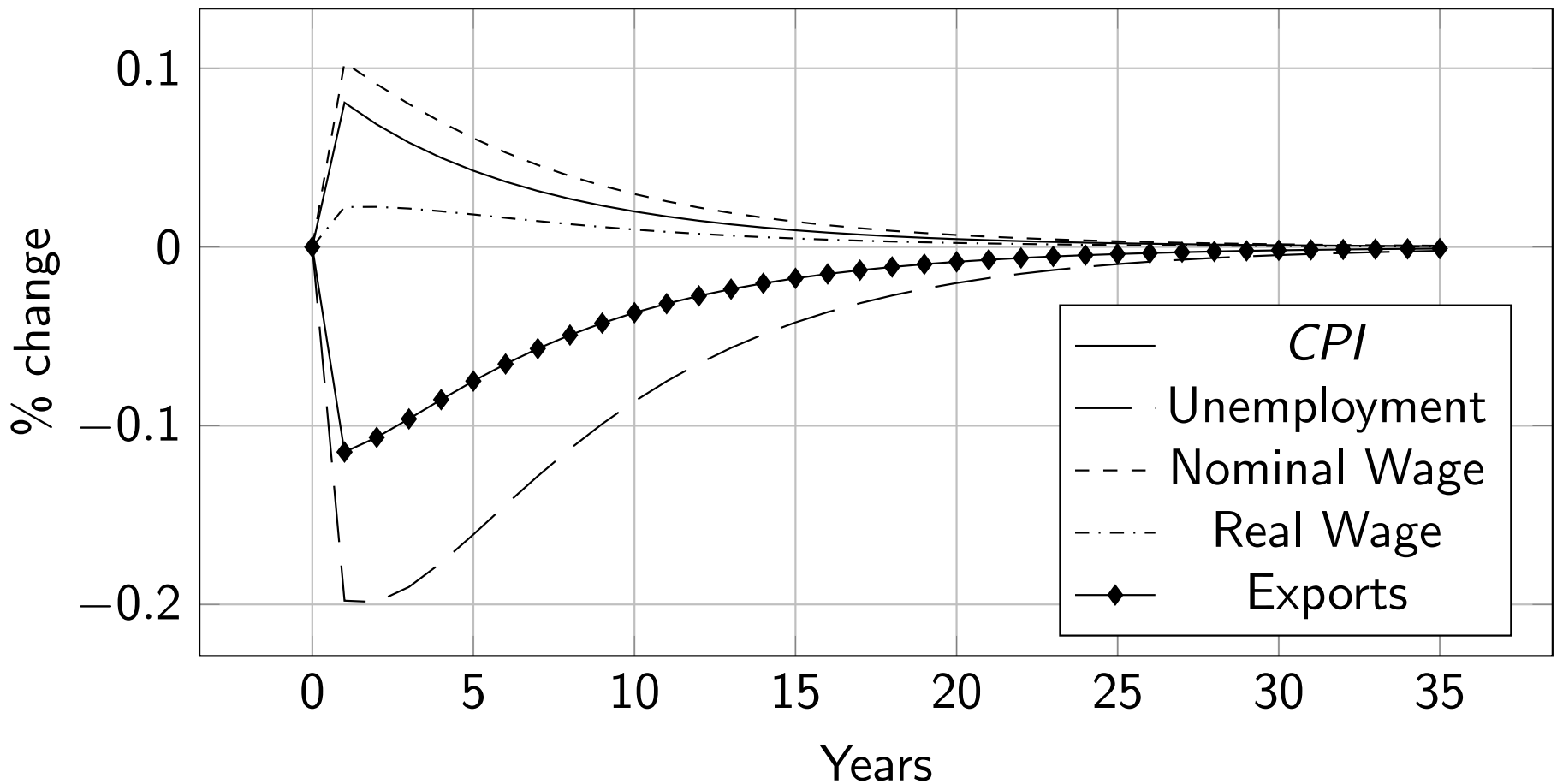
- **Scenario 1** The Scottish economy is a more closed system because there is no movement of workers to the rest of the UK.
- **Scenario 2** The Scottish economy has free migration of workers to the rest of UK in response to differences between regional and national unemployment and real wage rates.

Scenario 1: the macroeconomic impacts of a 5% increase in household's energy efficiency



Scenario 2:The implications of free workers migration

Figure: Transition Path of Key Variables



Comparing the two scenarios

Table: Percentage change in key macroeconomic variables in the long-run

	No migration	Migration
Economy-Wide Rebound effect	50.08	53.48
Gross Domestic Product	0.11	0.17
Energy productivity	0.81	0.81
Energy intensity of consumption	-1.88	-1.88

Trading-off economic benefits and energy savings

- Increasing energy efficiency can lead to both energy savings and macroeconomic benefits.
- When workers can migrate there is a greater economic expansion.
- The greater economic further limits energy savings from increased efficiency.
- However underlying the bigger rebound, GDP per unit of energy is unchanged.
- Similarly the percentage of energy used in total household consumption is unchanged.

Thank You for Your Attention

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