

Residential and industrial energy efficiency improvements: A dynamic general equilibrium analysis of the rebound effect

Sondès Kahouli^a and Xavier Pautrel^b

The aim of this paper is to investigate bi-directional spillovers into residential and industrial sectors induced by energy efficiency improvement (EEI) in both the short- and long-term, and the impact of nesting structure as well as the size of elasticities of substitution of production and utility functions on the magnitude and the transitional dynamic of rebound effect.

Developing a dynamic general equilibrium model, we demonstrate that residential EEIs spillover into the industrial sector through the labor supply channel and industrial EEIs spillover into the residential sector through the conventional income channel. Numerical simulations calibrated on the U.S. suggest that not taking into account these spillover effects could lead to misestimating the rebound effect notably of residential sector EEIs. We also demonstrate how the size and the duration of the rebound effect depend on the elasticities of substitution's values. Numerical simulations suggest that alternative sets of value for the elasticities of substitution may give different sizable patterns of rebound effects in both the short- and long-term.

In policy terms, our results support the idea that energy efficiency policies should be implemented simultaneously with rebound effect offsetting policies by considering short- and long-term economy feedbacks. As a consequence, they require considering debates about what type of policy pathways are more effective in mitigating the rebound effect.

a Corresponding author. Université de Bretagne Occidentale. IFREMER, CNRS, UMR 6308 AMURE, IUEM. 12 rue de Kergoat, CS 93837 - 29238 Brest Cedex 3. France. Tel: +33(0)2 98 01 73 81. Fax: +33(0)2 98 01 69 35. E-mail address: sondes.kahouli@univ-brest.fr.

b Université d'Angers, GRANEM & TEPP, 13 Boulevard François Mitterrand, 49000 Angers, France. E-mail address: xavier.pautrel@univ-angers.fr.