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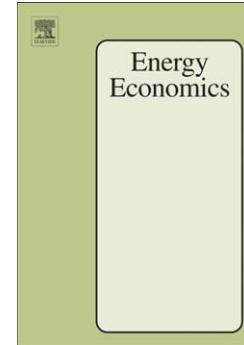
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Estimation of global rebound effect caused by energy efficiency improvement

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Abstract

Rebound effect refers to the phenomenon that the actual reduction in energy use and emissions is less than the expected reduction caused by an energy efficiency improvement due to induced behavior adjustment of relevant economic agents. This article studies the global rebound effects on energy use and related emissions caused by an energy efficiency improvement. We adopt a global computable general equilibrium (CGE) model to design a scenario of energy efficiency improvement, which is compared to a business-as-usual (BAU) scenario to identify the global rebound effect. Our results show very large rebound effect on energy use (70%) and related emissions (90%) in 2040 at the global level with regional and sectoral differences. Important determinants, among others, are induced labor movement among economic activities and labor supply, and substitution elasticity between energy and other goods. Labor mobility has a marked impact on both rebound effects and on fuel mix. The global rebound effect is still considerable even with a low substitution elasticity between energy and other goods. The effect of capital accumulation over time contributes marginally to the global rebound effect as it is utilized to promote economic growth by using energy input more efficiently.

Key words: Rebound effect; Energy productivity; Energy consumption; General equilibrium; Emissions; Global warming

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