

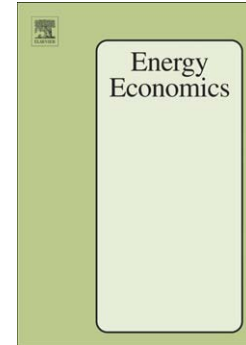
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Induced Technological Change and Energy Efficiency Improvements

Jan Witajewski-Baltvilks*, Elena Verdolini[†] and Massimo Tavoni[‡]

October 27, 2017

Abstract

We present a theoretical and empirical model which (1) shows that the demand for energy is shifted down by innovations in energy intensive sectors and (2) highlights the drivers of innovative activity in these sectors. The theoretical model and the empirical analysis of patent and energy data indicates that the level of innovative activity is determined by energy expenditure as well as international and inter-temporal spillovers. The solution of the theoretical model along the balanced growth path suggests that in general equilibrium the level of innovative activity depends on the growth rate of energy generation cost. The model predicts also that a level increase in the cost of energy does not alter the long-run energy share of income. Finally, we show that our results can be used to calibrate Integrated Assessment Models to project energy efficiency growth.

JEL classifications: O31, O33, Q43

Keywords: energy efficiency, directed technological change, induced innovations, patents econometrics

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