ICT and Energy Use: Patterns of Substitutability and Complementarity in Production

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Abstract

In this project we investigate the relationship between ICT capital, energy use and economic growth. We first formulate and estimate a production model which embodies rational expectations and dynamic optimization in the presence of efficiency gains and adjustment costs. We investigate the role of price increases, though price elasticities, and how technical efficiency levels affect inputs and especially energy. The results suggest that efficiency gains from energy improvements or new energy inputs are not offset by their adjustment costs. They have though lower efficiency when compared to the other inputs. The elasticities suggest that energy is complement with ICT and non-ICT capital, skilled and unskilled labor; and a substitute to material inputs.

Keywords: ICT capital, energy, substitutability, complementarity, efficiency gains, adjustment costs.

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