

Measurement of the opportunity cost of health risk, the value of time and rebound effect of energy efficiency improvement: the household production approach with stochastic health care

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Abstract:

Energy efficiency improvement of the households has been attracting much more attention than ever before by the government authorities because they consume quite a bit of energy not only for energy services but also for transportation services. The rebound effect hypothesis and double dividends hypothesis were pervasively examined in literature with different results. Most of the studies, used to focus on clean and dirty commodities, fail to incorporate both energy services and transportation services, for which time is one of the indispensable inputs. Accordingly, the household consumption model requires more elaboration in its time allocation, particularly when health care is of much greater concern to the household and links to labor income and leisure as well.

In our model, we consider the household's demand not only for clean and dirty commodities, but also for energy and transportation services, leisure, and environmental quality, in line with a stochastic health production function (HPF). We modify the HPFs in literature structurally so that the illness-time is stochastic with such arguments as medical treatment expenditure, prevention expenditure, environmental quality. The results shed some lights on the household's budget allocation between medical treatment and prevention expenditures, valuation of time for alternative uses, rebound effects, and the social damage cost of pollution, that are different to some extent from those observed in the literature and presented graphically based on the decision rules derived from our model.

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