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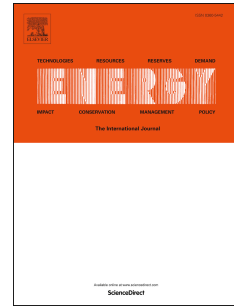
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Inter-fuel substitution possibilities in South Africa: A translog production function approach

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Abstract

This study applies the translog production function to investigate technical change and energy substitution possibilities among petroleum, coal and electricity over the period 1980-2012. Ridge regression technique is introduced to correct for multicollinearity in the data. The study documents several findings: first, electricity and coal are found to be the major drivers of South African output and also have a faster technological progress over petroleum. Second, all energy inputs were found to be substitutes; therefore removing all price ceilings and subsidies on petroleum will decrease the demand for petroleum in effect protecting South African economy from external petroleum price shocks while reducing CO₂ emissions. This will also increase the demand for electricity from renewable sources; however the success of this substitution will depend on policies geared towards large scale electricity production to meet demand. Third and finally, this study points to evidence that, even though coal dominates as the main energy source of South Africa, enhancement in research and development of renewable energy technologies could present opportunities for electricity as a potential replacer of coal; and as such, accelerating the CO₂ mitigation effort of the South African government.

Key words: Inter-fuel substitution, South Africa, output elasticity

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