

Energy conservation, unemployment and the direction of technical change

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Abstract This paper extends the model by Smulders and de Nooij (Resour Energy Econ 25:59–79, 2003), where technical change can be biased towards labour or energy, by assuming a monopolistic union and a government which pays unemployment benefits, collects wage taxes and sells emission permits. The extended model is applied to the analysis of environmental tax reforms. A reduction in the level of energy use yields a double dividend by lowering pollution and unemployment, while temporarily inducing energy-saving technical change. It moves the economy to a new balanced growth path where unemployment is permanently lower, but long-run growth is not affected. A reduction in the growth rate of energy use induces a persistent bias in technical change towards labour and reduces long-run growth.

Keywords Unemployment · Double dividend · Directed technical change · Environmental tax reform

JEL Classifications J5 · O4 · Q4 · Q48

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