

On Green Growth with Sustainable Capital

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Abstract

We develop an endogenous growth model to address a long standing question whether sustainable green growth is feasible by re-allocating resource use between green (natural) and man-made (carbon intensive) capital. Although the model is general we relate it to the UK's green growth policy objective. In our model, natural output is produced with two reproducible inputs, green and man-made capital. The growth of man-made capital causes depreciation of green capital via carbon emissions and related externalities which the private sector does not internalize. A benevolent government uses carbon taxes to encourage firms to substitute man-made capital with green capital in so far the production technology allows. Doing so, the damage to natural capital by emissions can be partly reversed through a lower socially optimal long run growth. The trade-off between environmental quality and long-run growth can be overcome by a pollution abatement technology intervention. However, if the source of pollution is consumption, the optimal carbon tax is zero and there is no trade-off between environment policy and growth. A corrective consumption tax is then needed to finance a public investment programme for replenishing the green capital destroyed by consumption based emissions.

Keywords Green growth, sustainability, carbon tax, clean growth, resource substitution.

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