

Sustainable Growth: Modelling, Issues and Policies

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Abstract

Economic growth is *sustainable*, if it “meets the needs of the present generations without compromising the ability of future generations to meet their own needs” (World Commission, 1987). This concerns both the availability of resources for future generations as well as the environmental impacts of current economic activities on future activities. In the first part of the paper, we discuss modelling, issues and policy measures related to the resource problem. Basic dynamic decision models, where the exhaustible resource is used as an input for production, are studied. The model is extended to an open economy framework, introduces a backstop technology, and accounts for climate change effect of economic growth. We also study issues of a transition of dirty technology to a clean technology, as well as public finance issues related to this transition. In addition, issues related to the problem of intergenerational equity and the different criteria to deal with equity between generations are presented. In the second part, origins and effects of natural resource abundance and major external and internal problems are examined. Those include changes and trends in world prices of the resources, resource depletion, peak production, “Dutch disease”, and external debt. If the environment is affected by economic growth then the abatement of environmental

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damages must be included into the discussion of sustainable economic growth. In the third part, resource extraction as well as environmental impacts of economic activities are presented in the context of multiple decision makers. This introduces decisions with strategic dependence between different agents, with strategic interactions of the major actors, such as firms, households and nations. The issue of strategic dependence, framed in terms of a game theoretical set up with multiple agents, are considered. Strategic dependencies are first worked out on the firm level with respect to Cournot and Bertrand games. We then discuss diverse micro and macro policies that consider incentive compatibility. Also nations as interdependent actors are considered. As to the solution method of our various models, we show how approximately such models can be solved numerically by a finite horizon procedure called Nonlinear Model Predictive Control (NMPC).

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