Rural Environmental Degradation, Growth, and Income Distribution in a Structuralist Two-Sector Model

Rabindra Nath Chakraborty
University of St. Gallen
Institute for Economy and the Environment [1]

[1]Tigerbergstrasse 2, CH-9000 St. Gallen, Switzerland
e-mail: rabindra.chakraborty@unisg.ch

Summary

Environmental degradation has become widespread in the rural areas of many developing countries. Rural environmental degradation does not only impair the general quality of life (in the sense of inflicting a disutility on individuals) but also reduces the productivity of land, labour, and capital. Furthermore, the poor are more strongly affected by these productivity declines than the rich (the non-poor) in many cases.

This paper examines the hypothesis that rural environmental degradation reduces industrial growth in a developing country both directly (through its impact on agricultural output) and indirectly (through increased rural poverty and income inequality). To this end, it integrates a neoclassical model of renewable resource exploitation into a structuralist two-sector framework.

The model contains three components. The *first component* is a two-sector model originally developed by Taylor (1991) that describes the relationship between industry and agriculture.[1] Industrial production is constrained by effective demand while agricultural production is constrained by the scarcity of land, physical infrastructure, and 'modern' inputs. Labour is not considered as a constraint to the expansion of output.

Growth is driven by the investment demand of the two sectors. Investment determines saving through the Keynesian mechanism of effective demand. Furthermore, it is assumed that an oligopolistic market structure prevails in the industrial sector. Firms set prices by adding a fixed percentage markup to labour costs and adapt to changes in demand by varying output rather than price. Industrial wages are considered as institutionally determined. Labour supply is infinitely elastic at the prevailing wage rate. As a result, the allocation of labour between the two sectors is determined by the level of the effective demand for industrial goods.

The assumptions of price setting behaviour and investment-driven growth imply that excess capacity exists in the industrial sector even in the long run. It is assumed that agricultural producers are unable to adjust their output to short-term fluctuations in effective demand. As a result, the market for agricultural goods clears by variation of the price.

The *second component* of the model describes the causes of environmental degradation and its impact on agricultural output. It is based on a neoclassical renewable resource exploitation model that was first published by Gordon (1954). Environmental degradation results from a common pool externality which causes a renewable resource to be overexploited. It is assumed that the externality is fully internalized initially through traditional common property institutions. These institutions lose their strength as a result of (exogenous) modernization, which leads to decreasing resource stock levels. The depletion of the resource is linked to the agriculture-industry

---

[1]The basic structure of this model dates back to Kalecki (1954/1976).

framework through its impact on agricultural output: agricultural productivity positively depends on the stock of the renewable resource.

The *third component* concerns the impact of income distribution on growth. It considers the case of a differentiated peasantry where poor farmers experience higher relative productivity declines (induced by the environmental externality) than the non-poor because they own less land both in terms of quantity and quality. Furthermore, the poor are assumed to have a lower marginal savings ratio than the non-poor. As a result, environmental degradation raises the aggregate marginal savings ratio in agriculture, which affects industrial growth because it has an impact on the demand for industrial goods.

The model generates the following results. *First*, environmental degradation reduces the rate of industrial growth in the short run but *raises* the level of the industrial capital stock per capita in the long run if agricultural investment is not too responsive to agricultural prices. The reason is that the decline in agricultural productivity raises agricultural prices, which reduces the consumption demand for industrial goods in the short run but increases industrial capital accumulation through increased agricultural investment demand in the long run. These results are termed *production effect* here; they differ from the predictions of the neoclassical "environment and growth" models in that an environmental externality that reduces the productivity of a factor of production increases the level of the growth path in the long run.

Second, environmental degradation raises rural inequality and increases the poverty of poor farmers and non-farming communities who depend on renewable resource extraction for their livelihoods. *Third*, if the poor have a lower marginal propensity to save than the rich, an additional effect on industrial growth arises which is termed *distribution effect*. The distribution effect is ambiguous in the short run but unambiguously weakens the production effect in the long run. These results suggest that the case for environmental or redistributive policies is not unambiguous.

References

Gordon, H. Scott (1954): The economic theory of a common-property resource: The fishery. *Journal of Political Economy*, Vol.62, pp.124-142.

Kalecki, Michal (1954/1976): The problem of financing economic development, reproduced in: Kalecki, Michal (ed.): *Essays on developing economies*, Hassocks/New Jersey: Harvester Press, S. S.41-63.

Taylor, Lance (1991): *Income distribution, inflation, and growth. Lectures on structuralist macroeconomic theory*, Cambridge/London: Cambridge University Press.