# Stability and Specialization under Environmental Regulation: Quota vs. Pigouvian Tax

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July, 2012

**Abstract**

This paper introduces production externality into the HO type of model with emissions as input. The concern of the paper is domestic pollutant emissions in a small open economy. Both quota and Pigouvian tax (emission tax) are considered. This paper examines (i) the effects of regulation on factor prices and on outputs, (ii) the stability of equilibrium and (iii) the production patterns.

Three main results are obtained. First, the effects on factor prices and on outputs are ambiguous and depend crucially on sector-specific emission sensitivity. Second, assuming simple dynamic adjustment processes, a diversified equilibrium (equilibrium in incomplete specialization) under quota regulation is globally asymptotically stable except for special values of adjustment speed. In contrast, a diversified equilibrium under Pigouvian regulation is generally unstable. Finally, a sufficiently stringent environmental regulation (small quota or high emission tax) leads to complete specialization in labor-intensive good. In contrast, a lax regulation does not necessarily lead to complete specialization in emission-intensive good.

**Keywords:** Endowment augment effect, TFP deterioration effect, Lyapunov function, complete specialization

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