一橋大学博士学位請求論文　要旨

“Essays on Production Externalities: Microeconomics, Trade and Environmental Economics”

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Economists have long recognized the importance of externalities and discussed its various forms in many fields of economics including microeconomics, welfare economics, public economics, growth theory, trade theory, and environmental and resource economics. Despite the large body of literature on externalities, there are still questions not resolved or addressed yet, as well as issues newly emerging.

In the dissertation, I focus on production externalities and deal with four related questions and issues in two fields of economics. In Chapter 2 and Chapter 3, I examine the production possibility frontier (PPF) from the perspective of microeconomics. In Chapter 4 and Chapter 5, I consider production externalities in the context of trade and the environment.

In Chapter 2, I ask whether full employment of factors is still required for production efficiency in the presence of production externalities. The question is important. First, full employment is the direct outcome of inelasticity of factor supply, which is assumed in many economic models. Second, following the first, if the answer is NOT necessarily, government interventions are expected. Surprisingly, there seems no formal answer to this basic but essential question in the literature.

To answer the question, I consider two general formulations of production externalities: input-generated and output-generated. The result is impressive. If externalities are input-generated, the answer is NOT necessarily: full employment may be inefficient. In contrast,

if externalities are output-generated, the answer is YES: full employment is a necessary condition for operating on the PPF, as in a world without production externalities.

In Chapter 3, I examine the properties of the PPF in the presence of strong input-generated externalities. Here, "strong" indicates the situation that full use of factors is not efficient. The problem is important. First, strong input-generated externalities such as traffic jams are often seen in real life. Second, the convexity of the PPF provides an explanation to the symmetry breaking among ex-ante identical agents, such as division of labor and comparative advantages: if the PPF is convex, each agent can enjoy higher efficiency by cooperating and specializing in narrower range of tasks.

To highlight the effect of strong input-generated externalities on the properties of the PPF, I focus on the single-factor case and examine monotonicity, continuity, and convexity of the PPF. I show that, in the presence of strong input-generated production externalities, a sufficient condition for the PPF to be convex is the quasi-concavity of the by-product generation function. Moreover, under reasonable conditions, the PPF is either entirely strictly convex, or entirely linear.

In Chapter 4, I try to understand the endogenous link between trade, economic development, and the environment. The issue is important. In recent years, the rapid process of globalization promotes the separation of production and consumption, aggravating externality problems that affect the environment. The globalization often stimulates economic development, too, imposing more environmental pressures. It becomes an increasingly pressing issue to understand the close nexus between the three elements. However, possibly due to the complexity of the problem, existing theoretical studies on this issue are far from satisfactory.

To tackle this pressing issue, I develop a two-sector dynamic general equilibrium model, in which economic development is described by the accumulation of private capital. I consider both laissez faire and the optimal policy. Among a rich set of results, the following two are especially interesting. First, in the short run, trade can be good or bad to the environment, depending on the direction of composition effect. However, in the long run, trade necessarily harms the environment thanks to the scale effect. Second, the social

optimum can be achieved through a pollution tax. I show that the optimal pollution tax can be interpreted as a dynamic version of the Pigouvian tax.

In Chapter 5, we notice the gap between the multi-functional environment in reality and its single role in theoretical economic models. Most models formulate only the aspect of the environment directly relating to the issue of interest. For example, if renewable resources is the interest, the environment is then a place that grows resources. If environmental pollution is the concern, the environment then becomes a pollution sink. These extreme simplifications come at risks of misleading implications.

To move one step toward modeling the multi-dimensional roles of the environment, we construct a two-sector general equilibrium model allowing environmental impacts from both sectors. This small step brings in a new agenda for considering the link between trade and the environment. Beside a rich set of results on the properties of the model, the following two provide important insights. First, countries can be categorized into two types depending on the slope of long-run supply curve: the Copeland–Taylor type with an upward-sloping supply curve and the Brander–Taylor type with a downward-sloping one. Thus, a country of Copeland–Taylor type tends to specialize in trade. Second, both countries can export their own dirty goods to each other, and, consequently, both may lose from trade.

In Chapter 6, I present some concluding remarks.