

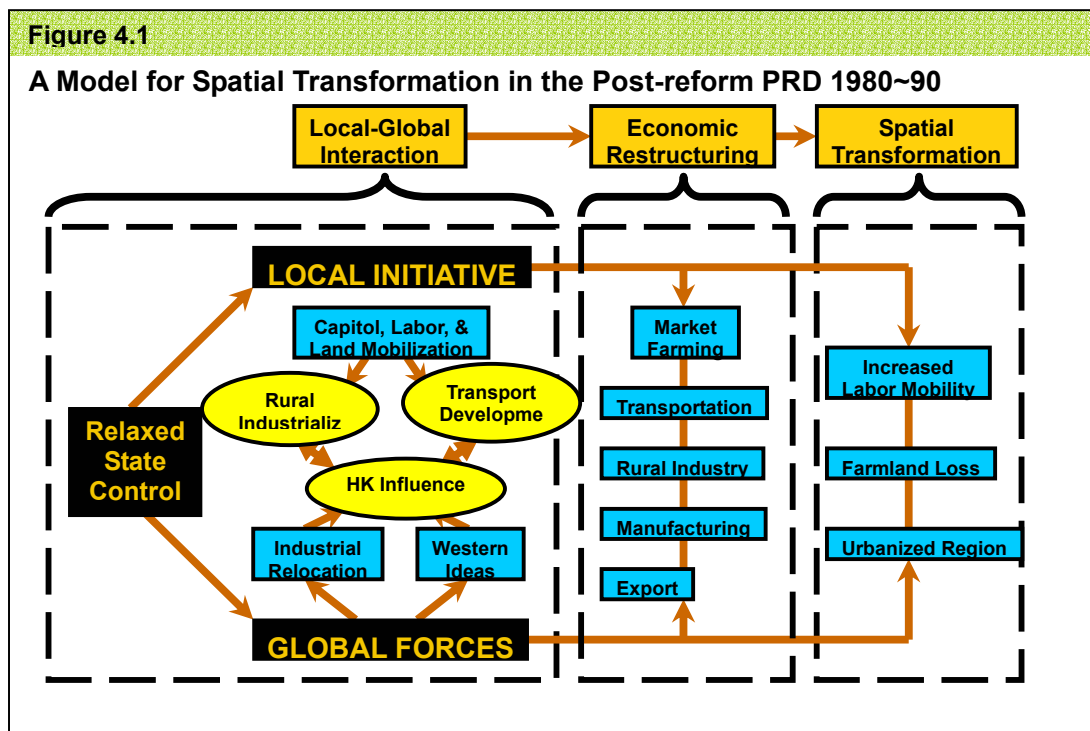
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Chapter

The objective of this chapter is to show how ideas from the economic and environmental literature have modeled the relationship between environment and FDI.

Lin's Spatial Transformation Model

A starting point of the theoretical framework for the paper comes from Lin, *A model for spatial transformation in the post reform Pearl River Delta* (Lin, 1997, p.191), as shown in the diagram below.



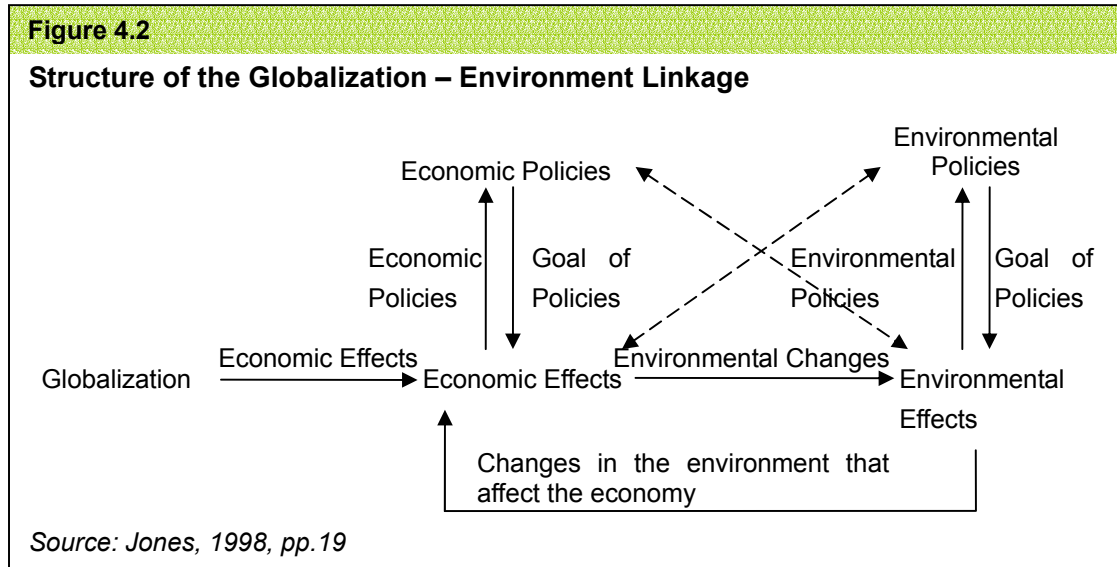
Lin's research shows that foreign investments are attracted to the smaller, less urbanized areas because of lower land and labor costs. Based on the experience of the Pearl River Delta region during the past 20 years, Lin suggests that neither exogenous nor endogenous factors alone can provide a satisfactory explanation for the dynamic of its economic development. Instead, as identified in the second and third stages of Lin's model, it is the *interaction* between local and global forces that has led to the rapid growth and restructuring of the regional economy and the spatial redistribution of population and land use in the PRD.

Potter's observation on the further withdrawal of state control (based on the presumption that market-oriented policies necessitate this) supports Lin's model. "The Chinese government has removed long-held barriers to foreign control over economic distribution and basic energy production" (Potter, 2000, p.207). The removal of most restrictions on foreign participation has been welcomed by foreign business. However, FDI's role in local environmental changes may have increased as well. Apparently, Lin's model was not intended to address the environment element within the development process, although it touches on the spatial transformation caused by economic and political changes.

Jones's Globalization-Environment Linkage Model

A model that does tie in globalization as an economic factor impacting the environment is presented by Jones (1998, p.18-19). He shows the impact of globalization on economic growth in terms of scale, structural, technology, and product effects. Each of these changes may generate

environmental effects.



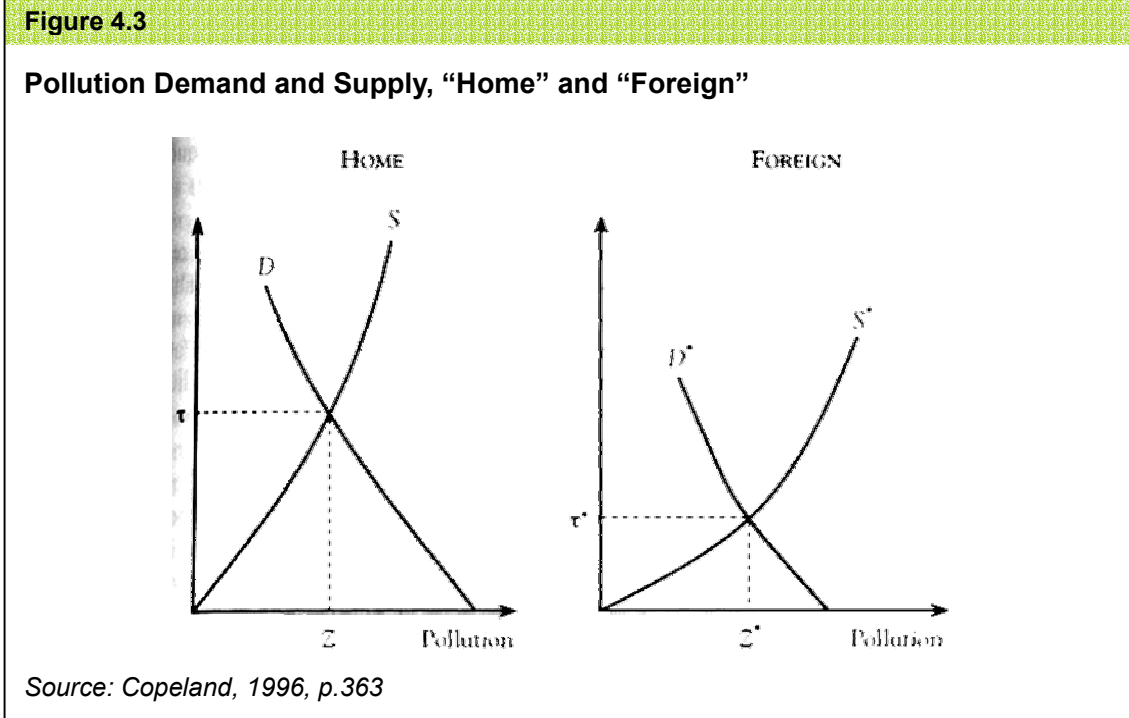
The relationships between globalization and the environment are often cast in negative terms. For instance, environmental costs, imposed by the public sector, are often perceived as an extra burden that business has to bear; similarly, environmental needs are often perceived as being sacrificed to business interests. On the other hand, positive aspects of the globalization-environment relationship may also exist. Appropriate attention to environmental quality will usually increase total social welfare. Jones's approach is to examine the globalization-environment linkage from two angles: type of economic activity (trade and investment liberalization, business behavior, technology development/diffusion, sectoral economic activities, and governance); and type of impact (scale, composition, technology, and product effects). Available evidence, even though local exceptions are often presented, prompts Jones (1998, p.21) to draw the conclusion that countries do not relax their environmental standards in order to attract new FDI or to generate a competitive advantage for domestic firms.

Industries continue to invest in countries with higher environmental standards because, in most cases, environmental costs are not the reason for the investment decision. They have no effect on long-term economic competitiveness. Jones's model is incomplete from the urban planning perspective. It lacks attention to other variables that might make an impact on the analytical framework, such as urbanization and population growth. It is, however, relatively straightforward in presenting relationships between globalization and environmental changes.

Copeland's Income, Trade and Pollution Model

The third important model considered in the paper is by Brain R. Copeland (1996, p.362 - 370). Copeland's model evaluates the effects of economic growth and trade on the environment. The model is based on the theory that a country's environmental quality is the result of a complex interaction between its natural ecosystem and its economy. It begins with a simple demand and supply model for pollution to try to highlight some of the forces determining environmental quality. His view on pollution is as follows,

Pollution is a special case of the use of environmental services – when one pollutes, one releases wastes into the environment and exploits services provided to us by the natural environment.



Copeland's basic model illustrates two countries "HOME" and "FOREIGN," of which the former (i.e. Canada) has a higher income in autarky (a country that has not yet opened up to international trade). His assumption is that pollution is not transboundary. The demand curve for pollution is derived from producer and consumer behavior. τ is the implicit cost to a firm or individual of releasing a unit of pollution. τ can assume the following meanings:

- If pollution taxes are charged explicitly, then τ is the pollution tax.
- If regulations are imposed, then τ is the shadow price of pollution induced by the regulations (the addition to the marginal cost of production or consumption that is induced by the need to comply with pollution regulations).
- If pollution is unregulated then $\tau = 0$ (Copeland, 1996, p. 362-363).

On the other hand, the supply curve for pollution represents the trade-off between income

and pollution that society is willing to make at the aggregate level. Copeland argues that although the trade between these two hypothetical countries is sometimes criticized by environmentalists as being exploitive because the difference in the effective price of using environmental services creates a motive for pollution-intensive industries to relocate to the low-income countries, this trade actually benefits both countries. It reflects much the same type of exchange as occurs when high-income countries sell human capital-intensive goods to poor countries in return for goods intensive in unskilled labor. The poorer country is worse off than the rich country before and after trade, but trade raises the absolute welfare levels of each (Copeland, 1996, p.366).

The environmental costs and needs Jones mentions above are expressed in economic terms as supply and demand in Copeland's model. Further, Copeland explains the effects of economic growth on pollution in terms of what Grossman and Krueger (1993) and Copeland and Taylor (1994) call scale, composition and technique effects. Jones and Copeland's perspectives on these effects are somewhat different, I have summarized in the matrix below:

Table 4.1
Perspectives on the Effects of Globalization & Economic Growth

| | <i>Jones</i> | <i>Copeland</i> |
|---------------------------|--|--|
| Scale Effect | The expansion of world economic growth will increase pollution. | Provided consumption patterns and pollution regulations stay the same, derived demand for pollution will rise. |
| Composition Effect | Production may shift to countries without or with weak environmental controls. | If growth is biased toward pollution-intensive industries, the derived demand for pollution may increase. |

| | | |
|------------------------------------|---|---|
| Technique/Technology Effect | Different technology paths will be promoted in different countries depending on limits on produce expenditures and regulatory controls. | Growth should lead to an increase in the demand for environmental quality and hence a reduction in the willingness to allow pollution. Thus, if that policy responds to the collective wishes of consumers, the supply curve will shift in. |
| Structural Effect | Globalization will generate shifts in the composition and location of production and consumption activities. | Ditto |
| Product Effect | Different product mixes will be produced and consumed in different countries. | Ditto |

Source: Jones, T 1998, pp.18; Copeland, B. 1996, p.363.

From this simple model, Copeland predicts that the effects of growth on environmental quality in an autarkic country depends on the strength of the income elasticity of demand for environmental quality and on the responsiveness and effectiveness of the political and regulatory systems. International trade can increase the scale of production and incomes, but the derived demand for pollution may rise or fall with trade. “Whether or not a country has a comparative advantage in clean or dirty industries depends on the interaction between the relative supply of factors (such as capital, labor, and land), how factor intensities of production correlate with pollution intensities (e.g., are capital-intensive industries more or less pollution intensive than labor-intensive industries), and on absolute income levels (which influence pollution policies)” (Copeland, 1996, p. 365).

Although Copeland’s model was aimed at trade, environmental services and government regulations, which are not the direct focus of this research, it does provide an insight of how

government regulations react and how important they are in the relationship between FDI and local natural environment. Copeland agrees that there is some evidence that pollution will rise with global economic growth. There is evidence that the pollution intensity of exports from lower-income countries with relatively weak enforcement of environmental standards has increased over time. This suggests that trade may well be contributing to an increase in global pollution, while there is little convincing evidence that differences in environmental policies have a significant influence on trade patterns (Copeland, 1996, p.388).

Copeland's conclusion is consistent with Jones's in that FDI impact on a country's economy does not necessarily have an impact on environmental policies and environmental quality. It depends on how responsive and effective the local political and regulatory systems are. The effects of FDI can include a combination of both positive and negative outcomes.

However, it seems clear from Copeland's analysis that negative environmental quality impacts are more likely to occur in a developing country like China than in a wealthier and more democratic country like Canada or the U.S. Hence, my analysis in Chapter 4 will emphasize use of the Jones's model as more realistic in application to China.