ELSEVIER

Journal of Development Economics
Vol. 68 (2002) 1–34

JOURNAL OF
Development
ECONOMICS

www.elsevier.com/locate/econbase

Rural–urban interdependence and industrialization

Yasusada Murata*

Faculty of Economics, Tokyo Metropolitan University, 1-1 Minami-Ohsawa, Hachioji, Tokyo 192-0397, Japan

Received 30 November 1999; accepted 30 June 2001

Abstract

This paper presents a model of industrialization through rural–urban interdependence. It shows how an economy with a low cost share of industrial inputs in agricultural production and a low expenditure share of manufactured goods, together with a limited variety of industrial inputs, can be caught in a low development trap. By escaping from the trap the economy moves toward more roundabout methods of agricultural production, mass consumption of manufactured goods, and urbanization. The transition from the low development trap to industrialization is consistent with the historical evidence on Japan.

JEL classification: O11; O18
Keywords: Hicks–Allen partial elasticity of substitution; Income feedback effect; Engel's law; Multiple Pareto-rankable equilibria; Economy of Japan

1. Introduction

It is widely observed that the process of industrialization involves substantial changes in production, consumption, and urban structures. The cost share of intermediate inputs in agricultural production grows steadily and therefore, more roundabout methods of production prevail. The expenditure share of food tends to decline, whereas the expenditure share of manufactured goods tends to rise. At the same time,

* Tel.: +81-426-77-2324.
E-mail address: ymurata@bcomp.metro-u.ac.jp (Y. Murata).

0304-3878/02/$ - see front matter
PII: S0304-3878(02)00004-4

people migrate from rural to urban areas and create a new variety of intermediate inputs.

These observations inspired a number of researchers on development economics and regional science to explore the process of industrialization through rural–urban interdependence. First, as for the production side of the economy, Johnston and Mellor (1961), Mellor (1966), and Johnston and Kilby (1975) attempted to find out how agricultural productivity was enhanced by utilizing non-agricultural inputs in the cases of India, Japan, the United States, Taiwan, West Pakistan, and so on. Furthermore, Jacobs (1969, Chap. 1 "Cities First–Rural Development Later") regarded these observations as more universal.[1,2]

> It can readily be seen in the world today that agriculture is not even tolerably productive unless it incorporates many goods and services produced in cities or transplanted from cities (p. 7).

> Modern productive agriculture has been reinvented by grace of hundreds of innovations that were exported from the cities to the countryside, transplanted to the countryside or imitated in the countryside...chemical fertilizers, mechanical sowers, cultivators, harvesters, tractors and other substitutes for draft animals and hand labor...The list is long (pp. 8–9).

On the other hand, the changes in the consumption structure were extensively examined by the studies beginning with Juréen (1956) and Houthakker (1957). They estimated the income and expenditure elasticities of food and showed that they are less than unity for numerous countries, both industrializing and industrialized, and for various social classes such as farmers, industrial workers, and the middle classes. Therefore, they confirmed that Engel's law is well established.

The purpose of this paper is to construct a theoretical model of industrialization that can help us understand these phenomena. Our model has two final goods, agriculture and manufacturing, and a composite of differentiated intermediate goods. Both final goods are produced by labor and the composite of intermediate goods, with a linear homogenous technology under perfect competition. Therefore, the cost shares depend on the relative factor price. Each intermediate good is produced by labor with an increasing returns technology under monopolistic competition. This yields the familiar results of the mark-up pricing rule and the profit function that is proportional to output. On the other hand, consumers have non-homothetic preference over both final goods, and change their expenditure shares of these goods according to their incomes. Thus, the demand and the profit faced by each intermediate goods producer are closely related to the endogenously determined shares of the economy: the cost shares of intermediate goods and the

[1] In addition, Matsuyama (1992) made a significant remark, although he did not go into details: "(T)he technological advances in manufacturing would certainly improve agricultural productivity by supplying better and cheaper intermediate goods, such as fertilizer, pesticide, drainage pipes, and harvesting equipment" (p. 330).

[2] These views are in opposition to the precondition theory proposed by Nurkse (1953) and Rostow (1960) where they stressed that agricultural revolution must precede industrialization.