

Chapter 1

Geographical Simulation Analysis for Logistic Enhancement in East Asia

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Geographical Simulation Analysis for Logistic Enhancement in East Asia

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Abstract

The IDE/ERIA Geographical Simulation Model (GSM) has developed as an economic geography model that predicts the effects of infrastructure development projects on the economy at the subnational level. The third-generation IDE/ERIA-GSM differs from the second-generation one in the following points: (1) geographic coverage is expanded to the east coast of India, Indonesia, and the Philippines; and (2) it incorporates realistic modal choice between land, sea, and air transport. These improvements enable the analysis of a wider variety of scenarios with more reliable results.

Keywords: Economic Geography; Infrastructure Development; Modal Choice

JEL Classification F15; O53; R15; R40

1. Introduction

In 2006, the first-generation IDE/ERIA Geographical Simulation Model (IDE/ERIA-GSM) was developed as a simple application of Krugman's Core-Periphery Model (1991). Then it was expanded with two major objectives: (1) to determine the dynamics of locations of populations and industries in East Asia in the long term and (2) to analyze the impact of specific infrastructure projects on the regional economy at the subnational level.

The initial simulations using IDE/ERIA-GSM revealed that (1) border costs play a big role and (2) nominal wages matter more than expected. In the simulations, elimination of border costs seemed to be much more effective than the development of physical infrastructure alone. In East Asia, there is quite a large difference in nominal wages not only internationally but also intranationally. It is so large that small advantages in location cannot counter the centripetal force of some central regions that attract the inflow of population due to higher nominal wages.

To make it possible for IDE/ERIA-GSM to derive more concrete policy implications, the second-generation IDE/ERIA-GSM model was developed in 2008. Most notably, the industrial sectors in the model were expanded from three to seven. This enabled the prediction of the impact of infrastructure development for each industry more precisely and derived policy implications that are more industry specific.

Building on these efforts, the third-generation IDE/ERIA-GSM model was developed from 2009 to 2010. The main points of improvement are (1) the extension of

the geographical coverage of the model from continental Southeast Asia (CSEA) to all ten members of the Association of Southeast East Asian Nations (ASEAN) plus some parts of China and India and (2) the inclusion of sea and air routes and modal choice between land, sea, and air traffic.

This paper is structured as follows: section 2 explains the background and objectives of the model; section 3 explains the features of the system; section 4 explains the model and parameters used in the simulations and the system of modal choice; section 5 depicts the current status of economic geography in the covered region; section 6 explains scenarios and results of the simulations; section 7 states the conclusions and the policy implications of this study.

2. Background and Objectives

2.1 Brief survey of literature

Since the beginning of the 1990s, spatial economics has been studied extensively as a cutting-edge field of economics. It explicitly incorporates "space," which had been not been handled well by mainstream economics, into its theory, and treats various geographic aspects of economic phenomena in the framework of general equilibrium. The dramatic increase in research on spatial economics in the last decade coincided with the globalization and regional integration of the world economy, as represented by the formation of the European Union (the EU) and the North American Free Trade Agreement (NAFTA).