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Comprehensive Asia Development Plan and IDE-GSM toward African Geographical Data

Project Organizer

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IDE-JETRO

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The Institute of Developing Economies (IDE) has been developing the Geographical Simulation Model (IDE-GSM) since 2007, which is a unique numerical general equilibrium simulation model based on New Economic Geography (NEG). IDE-GSM has two objectives, namely (1) to simulate the dynamics of locations of populations and industries in East Asia in the long term and (2) to analyze the impact of trade and transport facilitation measures (TTFMs) on the regional economy at the subnational level.

Our model comprises seven sectors, including manufacturing and non-manufacturing sectors, and more than 1,800 regions in 21 countries/economies in East and South Asia. The East and South Asian countries/economies are Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Hong Kong, India, Indonesia, Japan, Korea, Lao PDR, Macao, Myanmar, Malaysia, Nepal, Philippines, Singapore, Sri Lanka, Taiwan, Thailand, and Vietnam.

IDE-GSM enables us to predict the economic impacts of various TTFMs, such as lowering tariffs, customs facilitation measures, reduction in non-tariff barriers, and the development of transport infrastructure. In this project, we have carried out the analyses on various infrastructure development projects, economic corridors and FTA/RTAs

using IDE-GSM. For instance, ASEAN economic integration is a complex of these TTFMs, and hard to predict the impacts without proper analytical tools. IDE-GSM provides references for better understanding of this multi-layered economic integration effort.

Our objective of the project this year is two-fold. First, we estimate the economic impacts of the Comprehensive Asia Development Plan (CADP). Second, we explore to develop new theoretical models, to estimate parameters on domestic and international border effects, to utilize a GIS for automatic calculation of sea distances, and to measure the speed of migration by utilizing remote sensing data. The details of each research are in the following papers.

Comparing the Economic Impacts of Asian Integration by Computational Simulation Analysis (Isono, Kumagai, Hayakawa, Keola, Tsubota, and T. Gokan: DP567)

In this paper, we mainly compare the prioritized projects of the Master Plan on ASEAN Connectivity (MPAC) and the Comprehensive Asia Development Plan (CADP). MPAC focus on specific hard or soft infrastructure projects that connect one ASEAN member state to another while the CADP emphasizes the importance of economic corridors or linkages between a large cluster and another cluster. As compared with MPAC projects, the simulation analysis shows that CADP projects have much larger positive impacts on ASEAN countries.

On the sustainability of a monocentric city: Lower transport costs from new transport facilities (Gokan: DP548)

This paper proposes a general equilibrium model of a monocentric city based on Fujita and Krugman (1995). Two rates of transport costs per distance and for the same good

are introduced. The model assumes that lower transport costs are available at a few points on a line. These lower costs represent new transport facilities, such as high-speed motorways and railways. Findings is that new transport facilities connecting the city and hinterlands strengthen the lock-in effects, which describes whether a city remains where it is forever after being created. Furthermore, the effect intensifies with better agricultural technologies and a larger population in the economy. The relationship between indirect utility and population size has an inverted U-shape, even if new transport facilities are used. However, the population size that maximizes indirect utility is smaller than that found in Fujita and Krugman (1995).

Domestic and International Border Effects (Hayakawa: DP548)

Previous studies in the border-effect literature surprisingly found that domestic border effects are larger than international border effects (e.g., in the United States or Brazil). One interpretation of this result is that these estimates include the effects of producer agglomeration. Therefore, in this study, we estimate those border effects exclusively for transactions for final consumption, in which such agglomeration forces will be weak, in China and Japan. As a result, we found larger international border effects and could not find a significant role for producer agglomeration in the estimates of border effects. We also found that China's accession to the World Trade Organization reduces border effects in trading between China and Japan but does not decrease domestic border effects.
References

Economic Impacts of the Kra Canal: An Application of the Automatic Calculation of Sea Distances by a GIS (Chen and Kumagai: DP568)

A plan to construct a canal through the Kra Isthmus in Southern Thailand has been proposed many times since the 17th century. The proposed canal would connect the South China Sea and the Andaman Sea, and it would become an alternative route to the over-crowded Straits of Malacca. In this paper, we attempt to utilize a Geographical Information System (GIS) to calculate the realistic distances between ports that would

be affected by the Kra Canal and to estimate the economic impact of the canal using a simulation model based on spatial economics. We find that China, India, Japan, and Europe gain the most from the construction of the canal, besides Thailand. On the other hand, the routes through the Straits of Malacca are largely beneficial to Malaysia, Brunei, and Indonesia, besides Singapore. Thus, it is beneficial for all ASEAN member countries that the Kra Canal and the Straits of Malacca coexist and complement one another.

Measuring Population Mobility Speed from Space (Keola and Kumagai: DP574)

Ad-hoc population dynamics in Krugman's type core and periphery models adjust population share of a region, based on its real wage rate deviation from national average, at pre-specified speed of population mobility. Whereas speed of population mobility is expected to be different across countries, for geographical, cultural, technological, etc. reasons, one common speed is often applied in theoretical and simulation analysis, due to spatially patchy, and temporally infrequent, availability of sub-national regional data. This article demonstrates how, increasingly available, high definition spatio-temporal remote-sensing data, and their by-products, can be used to measure speed of population mobility in national and sub-national level.

The progress in each research agenda described above will provide essential feedbacks to the development process of IDE-GSM, which is a complex of a NEG model, economic parameters and sub-national regional data. Especially, the estimation of economic data and mobility parameters from remote sensing data is a promising frontier and we would explore the field more with a high-resolution remote sensing data in the next fiscal year.

References

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