

## Chapter 3

# Impact of the High-Speed Railway (HSR) Service, and the Eastern Economic Corridor Development in Thailand on the Lao PDR: A Geographical Simulation Analysis

Souknilanh Keola<sup>#1</sup>

*Research Fellow, Bangkok Research Center, IDE-JETRO*

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**Abstract:** This chapter examines the economic impact of Thailand's HSR service and the Eastern Economic Corridor's (EEC) development on the Lao PDR, based on IDE's Geographical Simulation Model (IDE-GSM) analysis covered in Chapter 2. The analysis focuses on the various development scenarios in Thailand, but does not include any major ongoing and planned development projects in Lao PDR. The major findings are as follows. Firstly, the provinces closer to the project sites in Thailand will generally achieve some benefit. Secondly, gain by the manufacturing sector will be greater than that achieved by the services sector, which will tend to be offset by any loss in the other industries. Thirdly, regional projects beyond Thailand will generate a much higher positive impact for Lao PDR, at both the regional and national level.

Keywords: Simulation, Lao PDR, Thailand, High-speed railway

JEL Classification: O53; R12; R13

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## 1. Introduction

In an increasingly integrated Greater Mekong Sub-Region (GMS), the impact of infrastructure development projects by one country may expand well beyond its national borders. In this Chapter, I examined the impact of Thailand's various high-profile development projects, such as the HSR service from Bangkok to different parts of the country, and the development of the Eastern Economic Corridor (EEC), on the neighboring Lao PDR (Laos henceforth). The analysis stated in this chapter relies entirely on the simulation results of several scenarios compiled and run in chapter 2. These scenarios do not include any planned or ongoing major infrastructure development projects in Laos. However, the negative/positive impact is expected to be lower/higher in reality when such projects are implemented. Thailand is currently planning to build four HSR projects linking Bangkok with the northeastern, northern, southern and eastern (or more precisely southeastern) parts of the country. The Eastern Line is planned as part of, or in conjunction with, the EEC's development stretching from Bangkok to Rayong.

The simulation in Chapter 2 was prepared with IDE's Geographical Simulation Model (IDE-GSM). Refer to Chapter 2 for the theoretical framework and assumptions

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<sup>#</sup> Author: Souknilanh Keola: Research Fellow, Bangkok Research Center, Bangkok, Thailand. E-mail: souknilanh\_keola@ide.go.jp

behind this simulation. As of January 2018, the IDE-GSM has the economic data divided 30 Asian countries/economies and 59 other countries of the world, into about 2,000 regions, connected to one another by over 12,000 communication routes. For Laos, the regional data is divided by province, for which the impact is analyzed in this chapter.

The impact on Laos has been studied from two dimensions. Firstly, the aggregated impact on all the industrial sectors is examined in order to evaluate gain and loss by each province. Secondly, the impact on each province is disaggregated into eight industries; agriculture, mining, services, and five manufacturing sectors. The rest of this paper is organized as follows. After introduction, the next section states the various simulated scenarios borrowed from Chapter 2 for easier reference and reading. Chapter 3 examines the aggregated impact by each province. Chapter 4 analyzes the impact on the industrial sector within each province. Chapter 5 concludes.

## 2. Scenarios

The various scenario maps are shown in Figure 3-1. Unless specified otherwise, it is assumed that the transfer time at a station is 30 minutes and the representative speed is 192kms/h. The cost per distance for the HSR service is assumed to be eight times that for the standard railway, twice that for the road, and half that by air service.

Firstly, the scenarios were separately set for each of the four HSR routes (Scenarios 1 to 4). The Northern Line runs to Phitsanulok in Scenario 20, and extends to Chiang Mai in Scenario 21. The Eastern Line runs from Lat Krabang to Rayong in Scenario 4, and extends to Don Mueang and adds U Tapao airport's underground HSR station in Scenario 50. In Scenario 51 we raise the HSR service's frequency, and in Scenario 52 we extend the line to Ayutthaya. In addition to the Eastern Line in Scenario 52, Scenario 6 includes the EEC's development. Scenario 7, includes the EEC's and MIEC's development combined with Scenario 52, and Scenario 7 *minus*, shows the Eastern Line if removed from Scenario 7.

### Scenario 1: North-eastern Line

- Bangkok (Bang Sue) - Nong Khai
  - Bang Sue, Don Mueang, Ayutthaya, Saraburi, Nakhon Ratchasima, Bua Yai, Ban Phai, Khon Kaen, Udon Thani, and Nong Khai stations are open
  - Operation starts in 2025

### Scenario 20: Northern Line (1)

- Bangkok (Bang Sue) - Phitsanulok
  - Bang Sue, Don Mueang, Ayutthaya, Lopburi, Nakhon Sawan, Phichit, and Phitsanulok stations are open
  - Operation starts in 2027

### Scenario 21: Northern Line (1)

- Bangkok (Bang Sue) - Phitsanulok
  - Bang Sue, Don Mueang, Ayutthaya, Lopburi, Nakhon Sawan, Phichit, and Phitsanulok stations are open

- Operation starts in 2027
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- Phitsanulok - Chiang Mai
  - Sukhothai, Satchanalai, Lampang, Lamphun, and Chiang Mai stations are open
  - Operation starts in 2029

Scenario 3: Southern Line

- Bangkok (Bang Sue) - Hua Hin
  - Bang Sue, Nakhon Pathom, Ratchaburi, Phetchaburi, and Hua Hin stations are open
  - Operation starts in 2025

Scenario 4: Eastern Line (1)

- Bangkok (Lat Krabang) - Rayong
  - Lat Krabang, Chachoengsao, Chonburi, Si Racha, Pattaya, and Rayong stations are open
  - Average speed 163kms/h
  - Operation starts in 2023

Scenario 50: Eastern Line (2)

- Don Mueang - Rayong
  - *Don Mueang, Bang Sue, Makkasan*, Lat Krabang, Chachoengsao, Chonburi, Si Racha, Pattaya, *U Tapao Airport*, and Rayong stations are open
  - Average speed 163kms/h
  - Operation starts in 2023

Scenario 51: Eastern Line (3)

- Don Mueang - Rayong
  - Don Mueang, Bang Sue, Makkasan, Lat Krabang, Chachoengsao, Chonburi, Si Racha, Pattaya, U Tapao Airport, and Rayong stations are open
  - Average speed 163kms/h
  - Transfer time at a station is 15 minutes
  - Operation starts in 2023

Scenario 52: Eastern Line (4)

- Don Mueang - Rayong
  - Don Mueang, Bang Sue, Makkasan, Lat Krabang, Chachoengsao, Chonburi, Si Racha, Pattaya, U Tapao Airport, and Rayong stations are open
  - Average speed 163kms/h
  - Transfer time at a station is 15 minutes
  - Operation starts in 2023
- Ayutthaya - Don Mueang
  - Ayutthaya station is open
  - Average speed 163kms/h
  - Transfer time at a station is 15 minutes
  - Operation starts in 2025

Scenario 6: Eastern Line and EEC

- Settings for the Eastern Line in Scenario 52 are used
- We expand Laem Chabang Port in 2020, so that the additional congestion at the port assumed in the baseline scenario is completely overcome
- We expand the terminal building of Suvarnabhumi Airport in 2020, so that the additional congestion at the airport assumed in the baseline scenario is reduced by half.
- We expand the passenger terminal at U Tapao Airport in 2025, and establish the same international flight routes as at Suvarnabhumi Airport
- We increase the productivity parameter of the services sector by 10% in 2025 in Bangkok, Mueang Chachoengsao, Mueang Chonburi, Si Racha-Chon Buri, Bang Lamung, Ban Chang, Mueang Rayong. The productivity parameters are increased in these provinces/districts for vehicles by (1.3%), electricity (1.72%), textiles (1.13%), food processing (0.85%) and other the other manufacturing sectors (1.62%).

Scenario 7: Eastern Line, EEC's and MIEC's Development

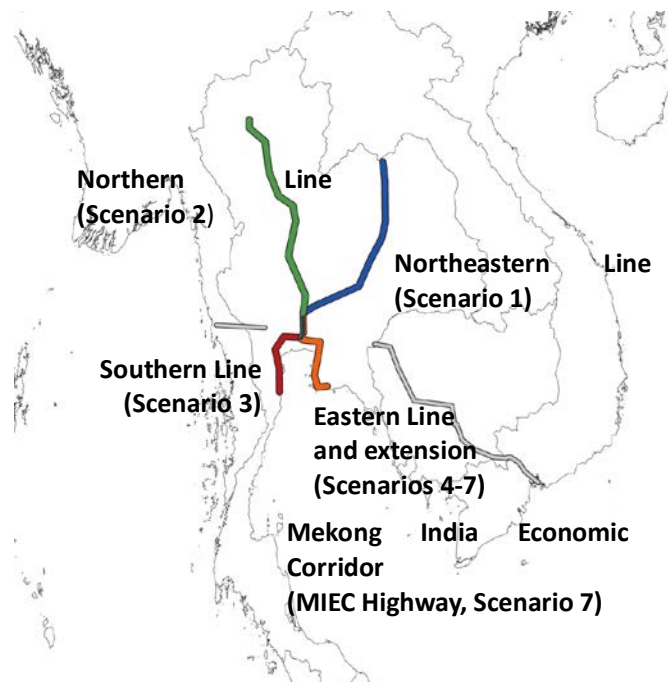
- Settings for the Eastern Line in Scenario 52 are used
- Roads are widened in the Mekong-India Economic Corridor (MIEC) section of Cambodia-Vietnam in 2025, and Customs clearance time and cost at the border crossings along the Corridor are reduced
- In 2025, Dawei Deep-sea Port opens and the expressway from Dawei to Thailand opens
- We expand Laem Chabang Port in 2020, so that the additional congestion at the port assumed in the baseline scenario is completely overcome
- We expand the terminal building at Suvarnabhumi Airport in 2020, so that the additional congestion at the airport assumed in the baseline scenario is reduced by half
- We expand the passenger terminal at U Tapao Airport in 2025, and set the same international flight routes as at Suvarnabhumi Airport
- We increase the productivity parameter of the services sector by 10% in 2025 in Bangkok, Mueang Chachoengsao, Mueang Chon Buri, Si Racha-Chonburi, Bang Lamung, Ban Chang, Mueang Rayong. The productivity parameters in these provinces/districts are increased by (1.3%), electricity (1.72%), textiles (1.13%), food processing (0.85%) and the other manufacturing sectors (1.62%)
- We reduce the NTBs for Thailand each year from 2021 to 2030 for vehicles by (0.65%), electricity (0.86%), textiles (0.565%), food processing (0.425%), the other manufacturing sectors (0.82%) and the services (5%)
- We reduce the NTBs for Myanmar, Cambodia, and Vietnam by 2% in the manufacturing and services sectors each year from 2021 to 2030

Scenario 7 minus: EEC's and MIEC's Development

- We adopt the Scenario 7 settings excluding the Eastern Line, that is, only the assumptions for the EEC and MIEC are set

(Based on Chapter 2)

**Figure 3-1: Scenario Maps**



Source: Chapter 2.

### 3. Results by Province

This section discusses the impact of the HSR projects and the EEC's development in Thailand on the provinces in Laos. The aggregated impact by province for each scenario is summarized in Figure 3-2b. Figure 3-2a shows the geographical location of the provinces of Laos. This chapter identifies the impact in each province according to various categories. The same summary for Cambodia, Myanmar, Vietnam, and Thailand is provided in the Appendices for reference.

#### 3.1 The Closer the Better

Economic geography aims to evaluate the effect of geographical location, and the IDE-GSM study is designed to do just that. It is easy to see from Figure 3-2b and the location of the projects in Figure 3-1 that the provinces of Laos closer to the project sites in Thailand will tend to benefit more accordingly. For example, Khammouan and Savannakhet, which are closer to the longer section of the Northeastern Line (SC1r1), are the top gaining regions in Scenario 1. Although the Northeastern Line connects Bangkok in Thailand to Vientiane, the capital in Laos, the longer section of this route is closer to Khammouan and Savannakhet in central Laos. On the other hand, Bokeo, Xaignabouli, and Louang-Namtha, although to a lesser extent, are the top gaining regions due to development of the Northern Line (SC20 and SC21). Most regions in

Laos will not see any gain by development of the Southern Line (SC3), the project farthest from Laos. Xaignabouli is the only region with a positive aggregated impact, but the magnitude will be extremely small compared to Northeastern Line (SC1r1) and Northern Line (SC20 and SC21). Some provinces will benefit from development of the Eastern Line (SC4R, SC50R, SC51R, SC52R), but the magnitude will be small. SC6R and SC7 involves the EEC's development, expressed by the faster productivity increase in the services sector, as well as the MIEC's development, which is not comparable with the other scenarios in this section, so will be discussed in the next section.

In short, infrastructure developments happen in specific places and the impact can spread across the region, and the locations closer to such projects would generally benefit more accordingly.

### 3.2 Larger Impact in the Manufacturing Sector

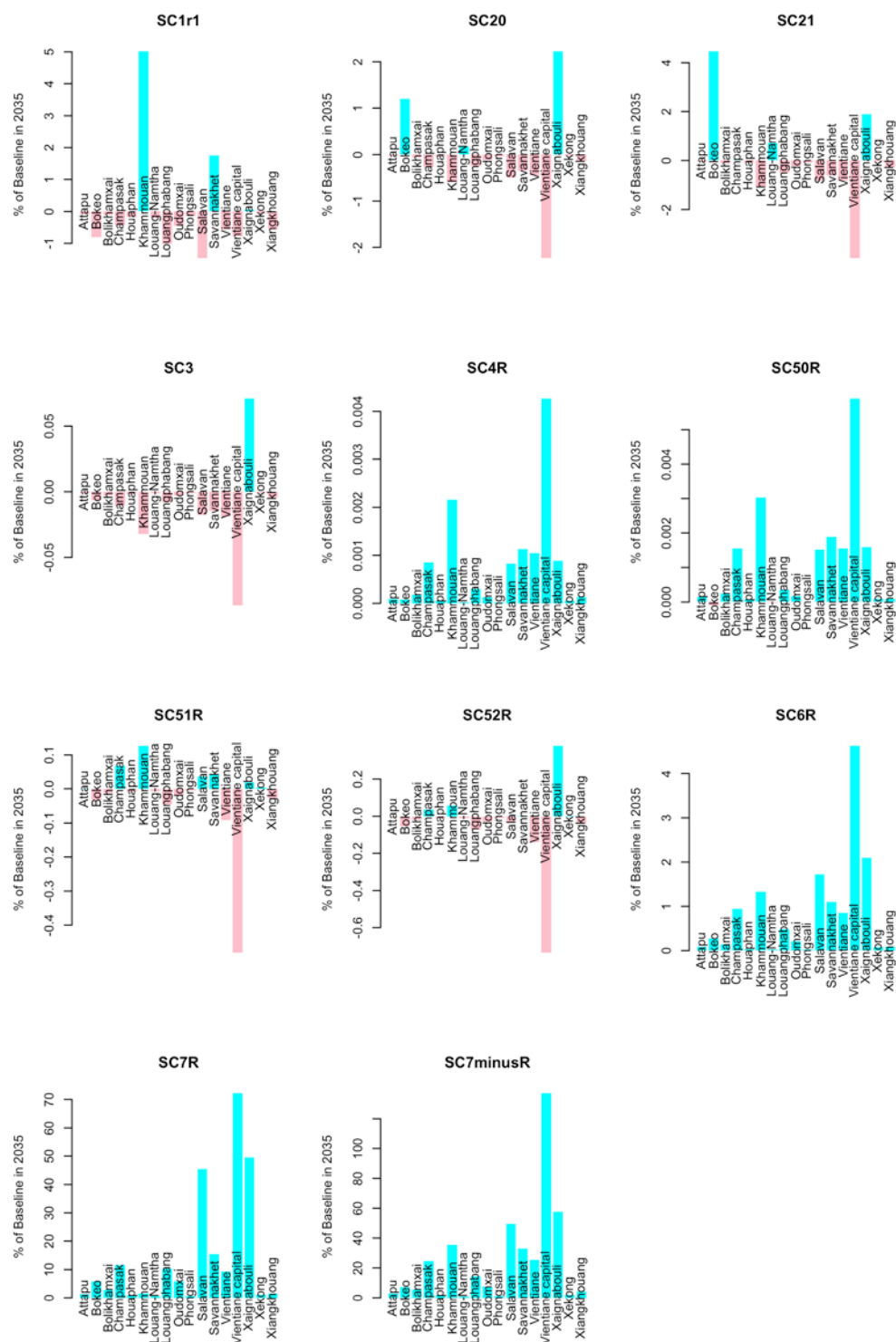
The provinces in Laos will gain much more according to SC6R and SC7. The biggest difference between up to SC52R and SC6R is inclusion of the EEC's development. This is done in the model by increasing the productivity of the services sector in Thailand. In fact, one of the main aims of the EEC's development, initiated by Thailand's Government, is to change the country's main growth engine from the lower value-added and labor-intensive manufacturing sector to the higher value-added services sector. In the IDE-GSM the labor force will move to the industrial sector with higher productivity. One obvious result from such scenarios is the movement of labor from the manufacturing sector to the services sector within Thailand. The IDE-GSM's simulation allows labor to move among the industrial sectors within a country, but not across the borders. However, firms may relocate to other countries. The positive impact observed in SC6R and beyond comes largely from the increase in the manufacturing sector in Laos as a result of the wage increases in Thailand. The same phenomenon is alternatively called the Thailand + 1 production network in other studies.

**Figure 3-2a: Lao's Provincial Map**



Source: Based on the simulation in Chapter 2.

**Figure 3-2b: Aggregated Economic Impact by Province**



Source: Based on the simulation in Chapter 2.



### **3.3 The Much Larger Impact from Regional Projects**

Although a positive impact in all the provinces of Laos is observed in SC6R and SC7, the magnitude in SC7 is several times greater. The major difference between SC6 and SC7 is the inclusion of MIEC's development, by which the roads connecting Cambodia and Vietnam are widened, and the Customs clearance time and cost at the border crossing along the Corridor are reduced. Some impact by province is observed, such as in the capital, Vientiane, in SC6R it is about 4%, whereas it is between 70% and 120% in SC7. While these projects do not pass through Laos directly, they connect the country with the much larger economies in the regions across the Indo-China peninsula. The benefit it will bring to the countries that are adjacent to Laos is much larger than the development projects in any one country, such as Thailand. The much larger impact for Laos is achieved through development projects in the neighboring countries. The significance of the impact due to the reduction of time and money costs at the border crossing points needs to be reemphasized. The simulation results of the IDE-GSM study have consistently shown that the benefit from trade facilitation is much greater than that achieved by development of hard infrastructure. More precisely, the impact from more efficient use of the available infrastructure is much larger than that achieved by new infrastructure. The impact seen in several simulation scenarios of Laos in this section reinforces this observation. In short, this means that infrastructure projects that connect more countries within the region will achieve a much greater impact compared to projects developed only in Thailand.

## **4. The Impact by Industrial Sector**

This section looks in more detail at the impact by the industrial sector within each province in SCR1 to SCR7. The relevant impact has been computed as a percentage difference, so a bias towards the poorer regions should be expected. In other words, a region starting from a lower level of development may benefit more from the same development projects. As seen below, three findings are observed in this section. Firstly, if only the HSR development projects in Thailand are considered, the positive impact on the nearby provinces in Laos will be observed only in the services sector. Secondly, the impact of the HSR and EEC's development in Thailand on the provinces of Laos will be small, no matter if either positive or negative. Thirdly, and consistent with the analysis in previous section, the impact from regional development projects, such as MIEC's development, will generate a greater positive impact for the provinces in Laos.

### **4.1 Economic Impact of the Northeastern Line (SCR1)**

SCR1 links Thailand's capital, Bangkok, with Vientiane the capital of Laos. Positive impacts are observed only in services (Table 3-1). The positive impact is largest in Khammouan (about 8%), followed by about 4% in Savannakhet and Vientiane capital. The gain of services in the capital most provinces including the capital are however offset by lost in manufacturing. This result can possibly be interpreted as follows. One the one hand, high-speed railway is mainly aimed for passenger transport, whose impacts happen from movement of people, and that is why benefit can mainly be



observed in services, or more precisely, tourism. On the other hand, better people connectivity, or increase of tourism in provinces in Laos affect its manufacturing industry negatively, through interindustry labour movement.

**Table 3-1: Economic Impacts of the North-Eastern Line (SCR1)**

Region	agr	auto	c.c	textile	food	oth	scr	min	Total
Attapu	(0.006)	(0.000)	(0.000)	(0.001)	(0.054)	(0.054)	0.030	(0.001)	(0.086)
Bokeo	(0.008)	(0.001)	(0.001)	(0.004)	(0.092)	(0.027)	(0.665)	(0.005)	(0.802)
Bolikhamxai	(0.000)	(0.000)	(0.000)	(0.002)	(0.116)	(0.101)	0.122	(0.002)	(0.101)
Champasak	(0.125)	(0.005)	(0.003)	(0.036)	(0.475)	(0.473)	0.704	(0.012)	(0.427)
Houaphan	(0.005)	(0.000)	(0.000)	(0.001)	(0.022)	(0.022)	(0.128)	(0.002)	(0.180)
Khammouan	(0.002)	(0.006)	(0.004)	(0.004)	(0.543)	(2.619)	8.196	(0.001)	5.016
Louang-Namtha	(0.006)	(0.000)	(0.000)	(0.000)	(0.008)	(0.008)	(0.175)	(0.002)	(0.200)
Louangphabang	(0.033)	(0.002)	(0.001)	(0.009)	(0.257)	(0.085)	(0.616)	(0.008)	(1.011)
Oudomxai	(0.025)	(0.001)	(0.012)	(0.000)	(0.135)	(0.029)	(0.246)	(0.003)	(0.452)
Phongsali	(0.010)	(0.000)	(0.000)	(0.000)	(0.013)	(0.012)	(0.103)	(0.001)	(0.139)
Salavan	(0.035)	(0.003)	(0.002)	(0.002)	(1.672)	(0.122)	0.386	(0.010)	(1.461)
Savannakhet	(0.205)	(0.193)	(0.007)	(0.046)	(1.079)	(1.043)	4.343	(0.018)	1.753
Vientiane	(0.033)	(0.004)	(0.003)	(0.014)	(0.362)	(0.597)	0.459	(0.012)	(0.565)
Vientiane capital	(0.116)	(0.167)	(0.286)	(1.434)	(1.213)	(2.294)	4.762	(0.038)	(0.787)
Xaignabouli	(0.037)	(0.001)	(0.001)	(0.001)	(0.984)	(0.122)	1.218	(0.011)	0.062
Xekong	(0.000)	(0.000)	(0.001)	(0.000)	(0.045)	(0.028)	0.018	(0.001)	(0.058)
Xiangkhouang	(0.016)	(0.001)	(0.001)	(0.012)	(0.029)	(0.070)	(0.429)	(0.005)	(0.562)

Source: IDE-GSM simulation result

## 4.2 Economic Impacts of the Northern Line (SCR2)

SCR20 links Thailand’s Bangkok with Phitsanulok in the North. Positive impacts both by industries and in total are observed only in three provinces in northern part of Laos with most proximity to this project (Table 3-2). The largest impact is observed in Xaignabouli, the Laos’ province closest to longest section of the project, followed by Bokeo and Louang-Namtha, showing the decreasing positive impacts by distance. If the line is extended to Chiang Mai, services in Bokeo, the Laos’ province closest to Chiang Mai would gain the most (Table 3-3). Champasak in Sothern Laos would also gain, although the mechanism behind it is not very obvious. Similar to SCR1 the gain is observed entirely in services, or more precisely tourism.

**Table 3-2: Economic Impacts of the North-Eastern Line (SCR20)**

Region	agr	auto	c.c	textile	food	oth	scr	min	Total
Attapu	(0.001)	(0.000)	(0.000)	(0.000)	(0.007)	(0.005)	(0.015)	(0.000)	(0.028)
Bokeo	(0.003)	(0.001)	(0.001)	(0.005)	(0.120)	(0.042)	1.374	(0.001)	1.200
Bolikhamxai	(0.000)	(0.000)	(0.000)	(0.000)	(0.016)	(0.010)	(0.031)	(0.001)	(0.058)
Champasak	(0.013)	(0.000)	(0.000)	(0.003)	(0.057)	(0.043)	(0.143)	(0.004)	(0.264)
Houaphan	(0.001)	(0.000)	(0.000)	(0.000)	(0.005)	(0.004)	(0.036)	(0.001)	(0.046)
Khammouan	(0.000)	(0.000)	(0.000)	(0.000)	(0.049)	(0.168)	(0.375)	(0.004)	(0.597)
Louang-Namtha	(0.003)	(0.000)	(0.000)	(0.000)	(0.006)	(0.008)	0.188	(0.001)	0.169
Louangphabang	(0.004)	(0.000)	(0.000)	(0.001)	(0.053)	(0.015)	(0.175)	(0.002)	(0.251)
Oudomxai	(0.003)	(0.000)	(0.002)	(0.000)	(0.032)	(0.006)	(0.072)	(0.001)	(0.116)
Phongsali	(0.001)	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)	(0.031)	(0.000)	(0.038)
Salavan	(0.005)	(0.000)	(0.000)	(0.000)	(0.234)	(0.013)	(0.240)	(0.004)	(0.496)
Savannakhet	(0.015)	(0.010)	(0.000)	(0.002)	(0.082)	(0.056)	(0.177)	(0.005)	(0.349)
Vientiane	(0.004)	(0.000)	(0.000)	(0.002)	(0.055)	(0.071)	(0.313)	(0.004)	(0.449)
Vientiane capital	(0.019)	(0.021)	(0.036)	(0.166)	(0.186)	(0.278)	(1.506)	(0.017)	(2.228)
Xaignabouli	(0.011)	(0.002)	(0.002)	(0.001)	(1.428)	(0.213)	3.881	(0.002)	2.222
Xekong	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.003)	(0.017)	(0.000)	(0.026)
Xiangkhouang	(0.002)	(0.000)	(0.000)	(0.002)	(0.006)	(0.012)	(0.121)	(0.002)	(0.144)

Source: IDE-GSM simulation result

**Table 3-3: Economic Impacts of the North-Eastern Line (SCR21)**

Region	agr	auto	e.e	textile	food	oth	ser	min	Total
Attapu	(0.001)	(0.000)	(0.000)	(0.000)	(0.010)	(0.009)	(0.028)	(0.001)	[0.048]
Bokeo	(0.006)	(0.003)	(0.002)	(0.012)	(0.276)	(0.101)	4.858	(0.001)	4.457
Bolikhamxai	(0.000)	(0.000)	(0.000)	(0.000)	(0.022)	(0.017)	(0.063)	(0.001)	[0.103]
Champasak	(0.020)	(0.001)	(0.001)	(0.005)	(0.088)	(0.081)	0.212	(0.007)	0.010
Houaphan	(0.001)	(0.000)	(0.000)	(0.000)	(0.007)	(0.007)	(0.076)	(0.001)	[0.091]
Khammouan	(0.001)	(0.001)	(0.000)	(0.000)	(0.067)	(0.273)	(0.703)	(0.008)	[1.054]
Lonang-Namtha	(0.008)	(0.001)	(0.001)	(0.001)	(0.016)	(0.021)	0.764	(0.002)	0.714
Lonangphabang	(0.006)	(0.000)	(0.000)	(0.002)	(0.075)	(0.024)	(0.377)	(0.005)	[0.490]
Oudomxai	(0.004)	(0.000)	(0.004)	(0.000)	(0.044)	(0.009)	(0.173)	(0.002)	[0.237]
Phongsali	(0.002)	(0.000)	(0.000)	(0.000)	(0.004)	(0.004)	(0.072)	(0.001)	[0.083]
Salavan	(0.007)	(0.001)	(0.000)	(0.000)	(0.322)	(0.021)	(0.459)	(0.007)	[0.818]
Savannakhet	(0.022)	(0.018)	(0.001)	(0.003)	(0.112)	(0.092)	(0.343)	(0.009)	[0.601]
Vientiane	(0.006)	(0.001)	(0.001)	(0.002)	(0.076)	(0.116)	(0.605)	(0.008)	[0.816]
Vientiane capital	(0.029)	(0.035)	(0.058)	(0.252)	(0.260)	(0.456)	(2.856)	(0.031)	[3.977]
Xaignabouli	(0.014)	(0.003)	(0.002)	(0.001)	(1.502)	(0.227)	3.653	(0.004)	1.902
Xekong	(0.000)	(0.000)	(0.000)	(0.000)	(0.008)	(0.004)	(0.033)	(0.000)	[0.046]
Xiangkhouang	(0.003)	(0.000)	(0.000)	(0.003)	(0.008)	(0.020)	(0.246)	(0.003)	[0.283]

Source: IDE-GSM simulation result

### 4.3 Economic Impacts of the Southern Line (SCR3)

SCR3 links Thailand’s Bangkok with Hua Hin in South Western Thailand. This is the farthest project from Laos among simulated scenarios (Table 3-4). All provinces gain, although by very small margin in agriculture. I cannot think of any mechanism based on structure of IDE-GSM which can explain why. Xaignabouli also gains a little in services, nonetheless only by quite small margin in aggregated level. In addition, the largest negative impact manufacturing industries in Laos’ capital. The mechanism behind this is however very difficult to interpret. Nevertheless, the general rule, that the farther the project site, the larger the negative impact holds.

**Table 3-4: Economic Impacts of the Southern Line (SCR3)**

Region	agr	auto	e.e	textile	food	oth	ser	min	Total
Attapu	0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
Bokeo	0.000	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.005)	(0.000)	(0.007)
Bolikhamxai	0.000	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.003)
Champasak	0.001	(0.000)	(0.000)	(0.000)	(0.002)	(0.006)	(0.003)	(0.000)	(0.011)
Houaphan	0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)
Khammouan	0.000	(0.000)	(0.000)	(0.000)	(0.002)	(0.020)	(0.010)	(0.000)	(0.032)
Lonang-Namtha	0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Lonangphabang	0.000	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)	(0.004)	(0.000)	(0.008)
Oudomxai	0.000	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.003)
Phongsali	0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Salavan	0.000	(0.000)	(0.000)	(0.000)	(0.010)	(0.002)	(0.006)	(0.000)	(0.017)
Savannakhet	0.001	(0.001)	(0.000)	(0.000)	(0.003)	(0.007)	(0.004)	(0.001)	(0.014)
Vientiane	0.000	(0.000)	(0.000)	(0.000)	(0.002)	(0.008)	(0.008)	(0.001)	(0.019)
Vientiane capital	0.001	(0.001)	(0.002)	(0.005)	(0.007)	(0.031)	(0.040)	(0.002)	(0.086)
Xaignabouli	0.000	(0.000)	(0.000)	(0.000)	(0.055)	(0.010)	0.136	(0.000)	0.071
Xekong	0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Xiangkhouang	0.000	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)	(0.000)	(0.005)

Source: IDE-GSM simulation result

### 4.4 Economic Impacts of the Eastern Line

SCR4 links Thailand’s Bangkok with Rayong in South-Eastern Thailand. Contrary to

results so far, negative impacts are observed in services for all Lao provinces (Table 3-5). Negative impacts are also observed in all provinces except Xaignabouli. Positive impacts are observed in almost all other industries, though only by small margin. Mechanism at play behind this result is not very obvious, but one possible explanation would be the fact that South-Eastern Thailand, or Phattaya in particular, is one of the major tourist destinations in Thailand. Better connection by high speed railway from Bangkok may have diverted tourist from to provinces in Laos. Nonetheless the impact, both positive and negative, is extremely small in this scenario.

**Table 3-5: Economic Impacts of the Eastern Line (1) (SCR4)**

Region	agr	auto	e.e	textile	food	oth	ser	min	Total
Attapu	(0.000)	0.000	0.000	(0.000)	0.000	0.000	(0.000)	0.000	0.000
Bokeo	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Bolikhamxai	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Champasak	(0.000)	0.000	0.000	0.000	0.000	0.001	(0.001)	0.000	0.001
Houaphan	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Khammouan	(0.000)	0.000	0.000	0.000	0.000	0.003	(0.001)	0.000	0.002
Louang-Namtha	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Louangphabang	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Oudomxai	(0.000)	0.000	0.000	(0.000)	0.000	0.000	(0.000)	0.000	0.000
Phongsali	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Salavan	(0.000)	0.000	0.000	0.000	0.001	0.000	(0.001)	0.000	0.001
Savannakhet	(0.000)	0.000	0.000	(0.000)	0.000	0.001	(0.001)	0.000	0.001
Vientiane	(0.000)	0.000	0.000	0.000	0.000	0.001	(0.001)	0.000	0.001
Vientiane capital	(0.000)	0.000	0.001	0.000	0.001	0.005	(0.003)	0.001	0.004
Xaignabouli	0.000	0.000	0.000	(0.000)	0.001	0.000	(0.000)	0.000	0.001
Xekong	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Xiangkhouang	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000

Source: IDE-GSM simulation result

Positive impacts increased a little if high speed railway is extended to Don Mueang (SCR50) (Table 3-6). This likely comes from higher positive impacts in manufacturing. If fact, one major aim of eastern line is to link two major airports in Thailand (Don Mueang and Suvarnabhumi) and newly developed Utapao Airport to facilitate more than 60 million visitors in the future. These airports are supposed to function seamlessly with high-speed railway connectivity. This will not just expand tourism in Thailand, but also facilitate location of high-tech industry along EEC. When transfer time is reduced to 15 minutes (SCR51) positive impacts are observed in Laos' provinces along Mekong river. The result is not so much different for SCR52, when high speed rail is extended to Ayutthaya.

**Table 3-6: Economic Impacts of the Eastern Line (2) (SCR50)**

Region	agr	auto	e.e	textile	food	oth	ser	min	Total
Attapu	(0.000)	0.000	0.000	(0.000)	0.000	0.000	(0.000)	0.000	0.000
Bokeo	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.001)	0.000	(0.000)
Bolikhamxai	(0.000)	0.000	0.000	(0.000)	0.000	0.000	(0.000)	0.000	0.000
Champasak	(0.000)	0.000	0.000	0.000	0.001	0.003	(0.002)	0.001	0.002
Houaphan	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Khammouan	(0.000)	0.000	0.000	(0.000)	0.000	0.007	(0.005)	0.001	0.003
Louang-Namtha	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	(0.000)
Louangphabang	(0.000)	0.000	0.000	0.000	0.001	0.001	(0.001)	0.001	0.000
Oudomxai	(0.000)	0.000	0.000	(0.000)	0.000	0.000	(0.001)	0.000	0.000
Phongsali	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	(0.000)
Salavan	(0.000)	0.000	0.000	0.000	0.003	0.001	(0.003)	0.001	0.002
Savannakhet	(0.000)	0.000	0.000	(0.000)	0.001	0.003	(0.003)	0.001	0.002
Vientiane	(0.000)	0.000	0.000	0.000	0.001	0.003	(0.003)	0.001	0.002
Vientiane capital	(0.000)	0.000	0.002	0.001	0.002	0.013	(0.014)	0.003	0.006
Xaignabouli	0.000	0.000	0.000	(0.000)	0.002	0.001	(0.002)	0.001	0.002
Xekong	(0.000)	0.000	0.000	0.000	0.000	0.000	(0.000)	0.000	0.000
Xiangkhouang	(0.000)	0.000	0.000	0.000	0.000	0.001	(0.001)	0.000	0.000

Source: IDE-GSM simulation result

**Table 3-7: Economic Impacts of the Eastern Line (3) (SCR51)**

Region	agr	auto	e.c	textile	food	oth	ser	min	Total
Attapu	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.004)	0.010	0.000	0.001
Bokeo	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.028)	0.001	(0.033)
Bolikhamxai	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.001)	(0.008)	0.000	(0.013)
Champasak	(0.009)	(0.000)	(0.000)	(0.003)	(0.040)	(0.033)	0.152	0.003	0.068
Houaphan	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.007)	0.000	(0.008)
Khammouan	(0.000)	(0.000)	(0.000)	(0.000)	(0.024)	(0.088)	0.236	0.003	0.126
Louang-Namtha	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	0.000	(0.008)
Louangphabang	(0.002)	(0.000)	(0.000)	(0.000)	(0.012)	(0.001)	(0.032)	0.002	(0.046)
Oudomxai	(0.002)	(0.000)	(0.000)	(0.000)	(0.007)	(0.000)	(0.010)	0.001	(0.019)
Phongsali	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.004)	0.000	(0.005)
Salavan	(0.002)	(0.000)	(0.000)	(0.000)	(0.125)	(0.007)	0.168	0.003	0.036
Savannakhet	(0.010)	(0.008)	(0.000)	(0.002)	(0.049)	(0.036)	0.145	0.003	0.043
Vientiane	(0.002)	(0.000)	(0.000)	(0.000)	(0.013)	(0.008)	(0.071)	0.003	(0.091)
Vientiane capital	(0.007)	(0.005)	(0.003)	(0.051)	(0.044)	(0.035)	(0.346)	0.010	(0.481)
Xaignabouli	(0.002)	(0.000)	(0.000)	(0.000)	(0.128)	(0.014)	0.162	0.003	0.019
Xekong	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.002)	0.010	0.000	0.005
Xiangkhouang	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.024)	0.001	(0.026)

Source: IDE-GSM simulation result

#### 4.5 Economic Impacts of the Eastern Line, EEC and Beyond

First, I start with SCR6. EEC is added from this scenario, and productivity of service is raised by 10% in 2025. Most provinces in Laos gain significantly, compared to previous scenarios, in most industry except agriculture and auto (Table 3-8). As previously mentioned, increase of productivity of services, encourage more labour in Thailand to move from lower value-added manufacturing activity to higher value-added services, and therefore push some of them to Laos.

Gain for Laos' provinces increase dramatically when MIEC is added (Table 3-9). As previously mentioned, regional wide projects such MIEC generate much higher impacts for Laos then projects in Thailand alone. MIEC includes infrastructure development projects in countries such as Cambodia, Vietnam, Myanmar and India, in addition to Thailand. Moreover, MIEC includes trade facilitation, expressed by reduction of money and time cost to move goods across border. Such trade facilitation has been proof much more effective in generating higher growth in most previous simulations using IDE-GSM, and is again reinforced by current simulation. The important policy implication from this finding is, trade facilitation generates much higher than installation of infrastructures.

**Table 3-8: Economic Impacts of the Eastern Line and EEC (SCR6)**

Region	agr	auto	e.c	textile	food	oth	ser	min	Total
Attapu	(0.007)	(0.000)	0.001	0.000	0.044	0.013	0.019	0.012	0.083
Bokeo	(0.011)	(0.001)	0.003	0.000	0.097	0.014	0.125	0.052	0.279
Bolikhamxai	(0.000)	(0.000)	0.001	0.000	0.087	0.027	0.012	0.023	0.149
Champasak	(0.108)	(0.002)	0.010	0.002	0.333	0.104	0.474	0.135	0.948
Houaphan	(0.011)	(0.000)	0.001	0.000	0.027	0.017	(0.019)	0.021	0.036
Khammouan	(0.003)	(0.002)	0.007	0.000	0.226	0.300	0.673	0.134	1.336
Louang-Namtha	(0.012)	(0.000)	0.001	0.000	0.008	0.006	0.002	0.020	0.025
Louangphabang	(0.054)	(0.001)	0.005	(0.001)	0.238	0.040	0.164	0.090	0.482
Oudomxai	(0.050)	(0.000)	0.067	(0.000)	0.142	0.019	(0.009)	0.035	0.203
Phongsali	(0.021)	(0.000)	0.001	(0.000)	0.016	0.010	(0.000)	0.016	0.022
Salavan	(0.034)	(0.002)	0.007	0.000	1.136	0.020	0.478	0.122	1.727
Savannakhet	(0.142)	(0.051)	0.011	0.002	0.461	0.140	0.511	0.176	1.108
Vientiane	(0.029)	(0.002)	0.008	0.002	0.269	0.182	0.268	0.152	0.850
Vientiane capital	(0.099)	(0.080)	0.850	0.274	0.914	0.716	1.515	0.537	4.626
Xaignabouli	(0.018)	(0.002)	0.005	(0.000)	0.929	(0.011)	1.074	0.125	2.102
Xekong	(0.000)	(0.000)	0.002	0.000	0.029	0.005	0.030	0.009	0.075
Xiangkhouang	(0.024)	(0.001)	0.003	0.002	0.030	0.040	(0.010)	0.055	0.095

Source: IDE-GSM simulation result

**Table 3-9: Economic Impacts of the Eastern Line, EEC and MIEC (SCR7)**

Region	agr	auto	e.e	textile	food	oth	ser	min	Total
Attapu	(0.021)	(0.000)	0.006	0.016	1.850	(0.810)	0.313	0.020	1.375
Bokco	(0.041)	(0.004)	0.029	0.178	4.674	(0.661)	1.517	0.104	5.797
Bolikhamxai	(0.002)	(0.001)	0.008	0.067	3.525	(1.378)	0.569	0.048	2.837
Champasak	(0.432)	(0.013)	0.102	0.950	13.324	(6.314)	3.629	0.243	11.489
Houaphan	(0.028)	(0.001)	0.011	0.037	1.010	(0.503)	0.367	0.047	0.939
Khammouan	(0.013)	(0.001)	0.083	0.068	10.081	(17.157)	8.321	0.197	1.579
Louang-Namtha	(0.035)	(0.001)	0.011	0.018	0.325	(0.174)	0.415	0.041	0.599
Louangphabang	(0.183)	(0.009)	0.053	0.330	9.920	(1.844)	1.800	0.196	10.263
Oudomxai	(0.165)	(0.006)	0.653	0.017	5.893	(0.808)	0.163	0.073	5.821
Phongsali	(0.059)	(0.001)	0.012	0.003	0.603	(0.291)	0.279	0.034	0.579
Salavan	(0.138)	(0.017)	0.067	0.045	45.633	(1.965)	1.548	0.232	45.405
Savannakhet	(0.534)	(0.270)	0.123	0.709	18.708	(8.098)	4.507	0.279	15.424
Vientiane	(0.128)	(0.005)	0.084	0.426	11.140	(7.861)	5.430	0.324	9.411
Vientiane capital	(0.456)	(0.395)	8.651	40.923	35.389	(31.397)	18.350	1.168	72.234
Xaignabouli	(0.187)	(0.013)	0.046	0.046	52.493	(4.061)	0.906	0.245	49.476
Xekong	(0.001)	(0.000)	0.024	0.004	1.221	(0.352)	0.285	0.016	1.197
Xiangkhouang	(0.074)	(0.003)	0.034	0.424	1.119	(1.304)	1.349	0.122	1.666

Source: IDE-GSM simulation result

## 5. Conclusion

In this chapter, I examine the economic impacts of high-speed railway and the Eastern Economic Corridor (EEC) developments in Thailand on Laos, based on IDE’s Geographical Simulation Model (IDE-GSM) analysis carried out in Chapter 2. The analysis focuses on development scenarios in Thailand, and does not include major ongoing and planned development projects in Lao PDR. The findings can be summarized as follows. First, provinces closer to project sites in Thailand gain more in general. Second, gain from manufacturing is larger than gain from services which tend to be offset by lost in other industries. Third, regional wide projects beyond Thailand generate much higher positive impacts for Laos, both in regional and national level.

Although this chapter focuses on impacts of development projects being planned or implemented in Thailand, similar high-speed railway project is actually progressing at faster pace in Laos. The high-speed (or more precisely mid-speed) Lao-China railway project is reported to be more than 20% progressed as of early 2018, while it is expected to be completed by early 2022. Inclusion of such scenario would likely to enhance positive impacts from high-speed railway and EEC projects in Thailand, given circular causality of IDE-GSM. Inclusion of planned and ongoing projects in Laos would be included in my next study.

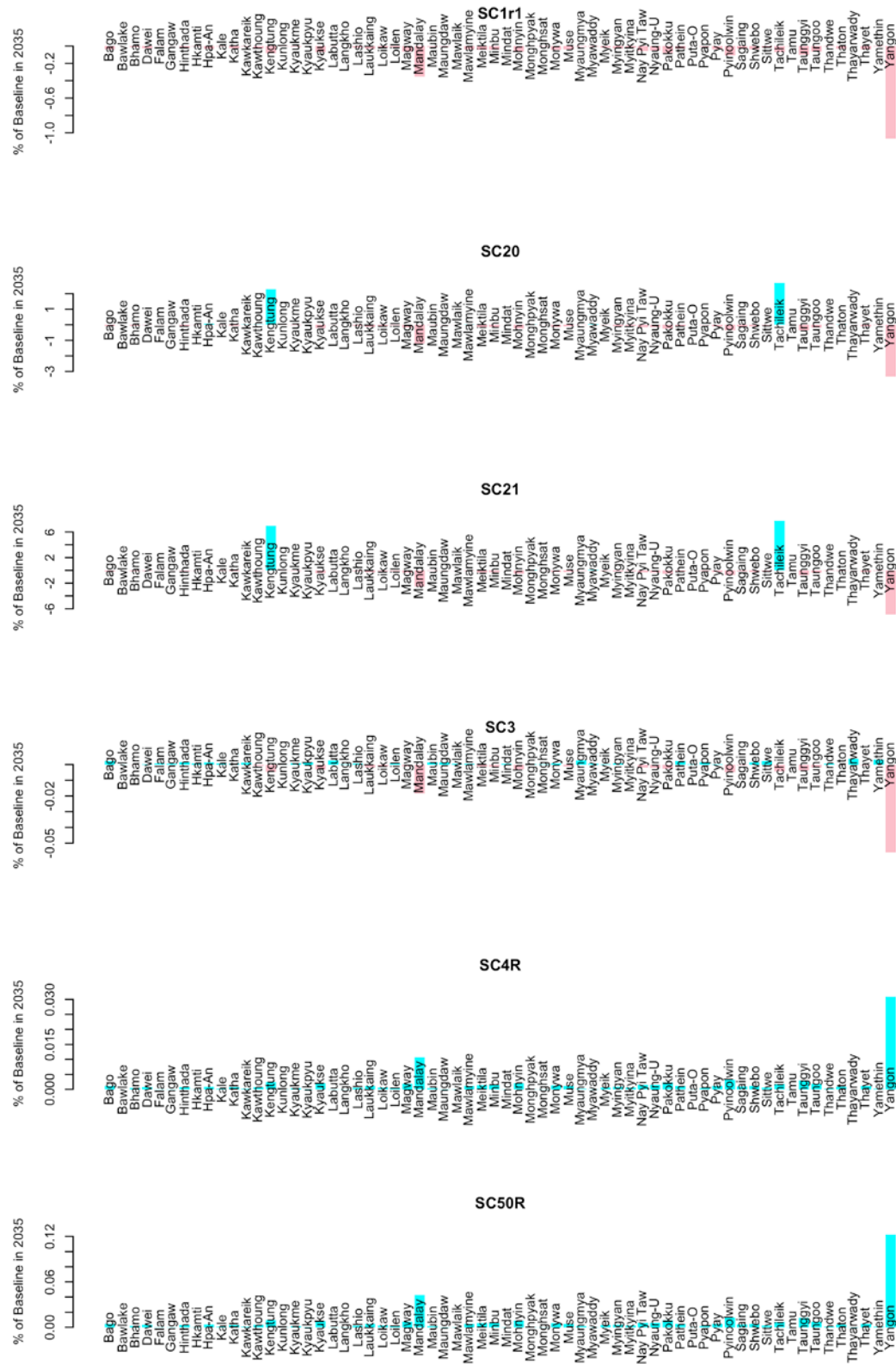
## References

- ASEAN (2010), *The Master Plan on ASEAN Connectivity*. Jakarta: ASEAN Secretariat.
- Economic Research Institute for ASEAN and East Asia (ERIA) (2010). *The Comprehensive Asia Development Plan*, ERIA Research Project Report FY2009, No.7-1. Jakarta: ERIA.
- Economic Research Institute for ASEAN and East Asia (ERIA) (2015). *The Comprehensive Asia Development Plan 2.0*. Jakarta: ERIA.
- Kumagai S., Hayakawa K., Isono I., Keola S. & Tsubota K. (2013). Geographical simulation analysis for logistics enhancement in Asia. *Economic Modelling*, 34, 145–153.



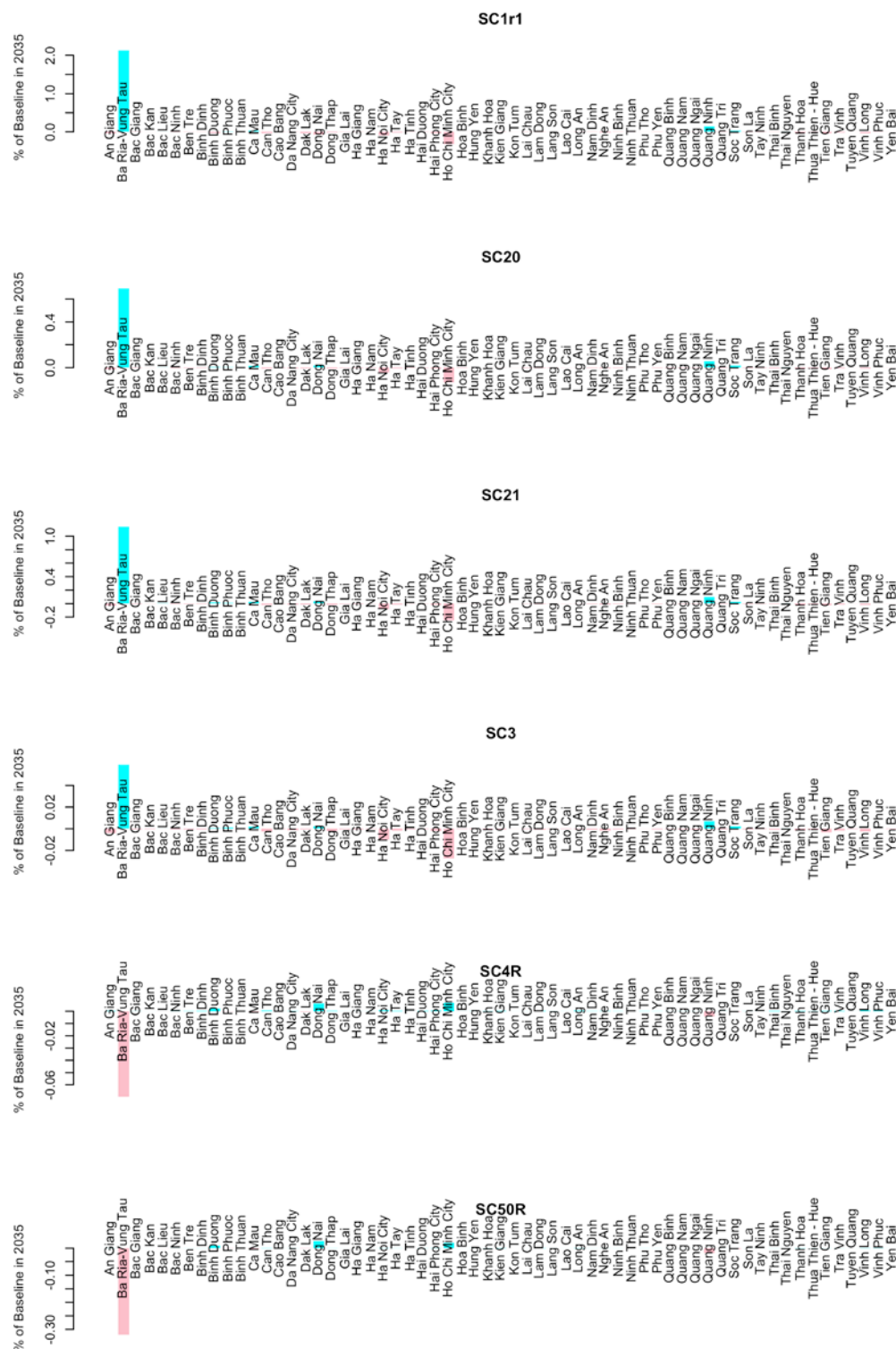


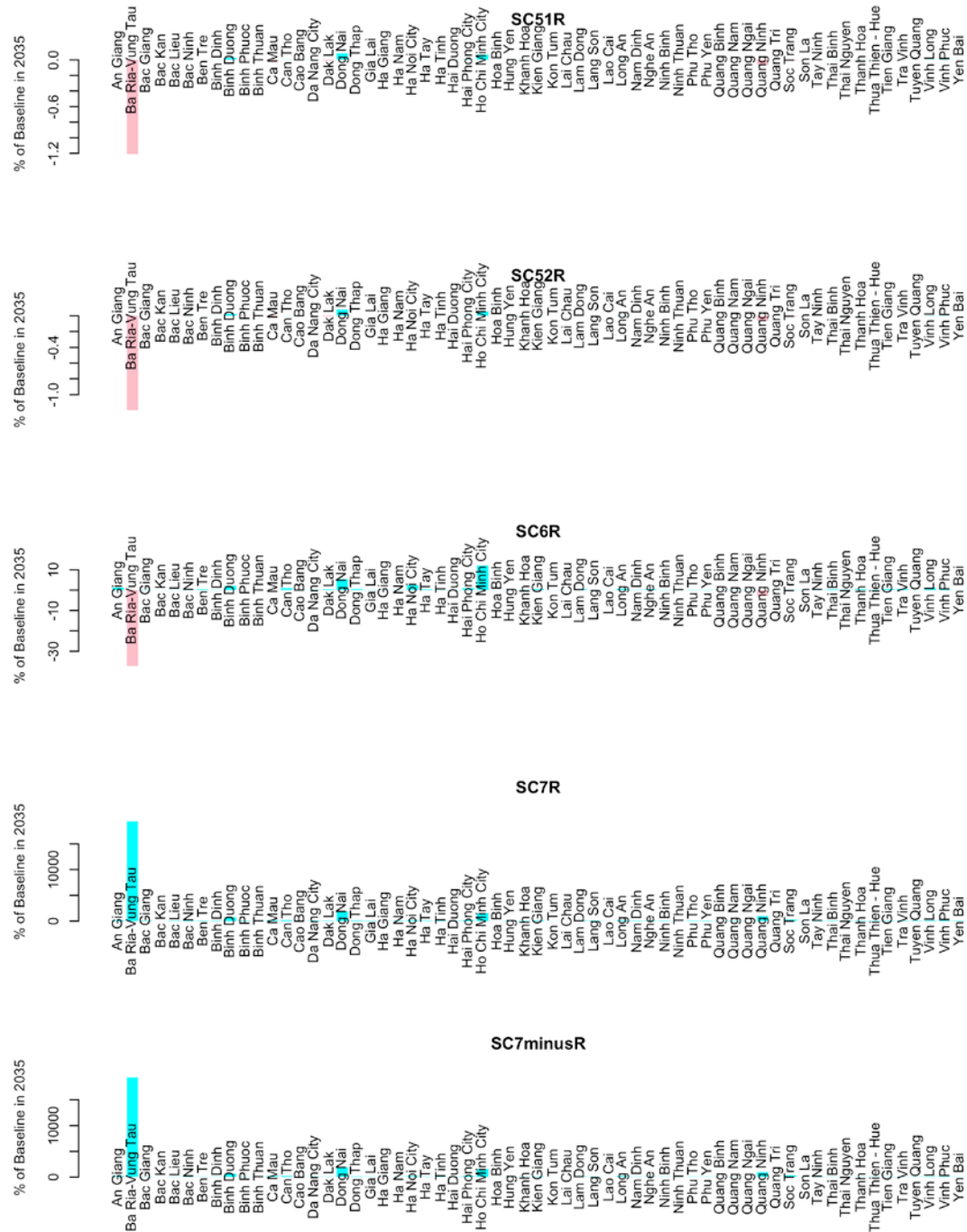
## 2 Aggregated Economic Impacts by Province (Myanmar)





### 3 Aggregated Economic Impacts by Province (Vietnam)



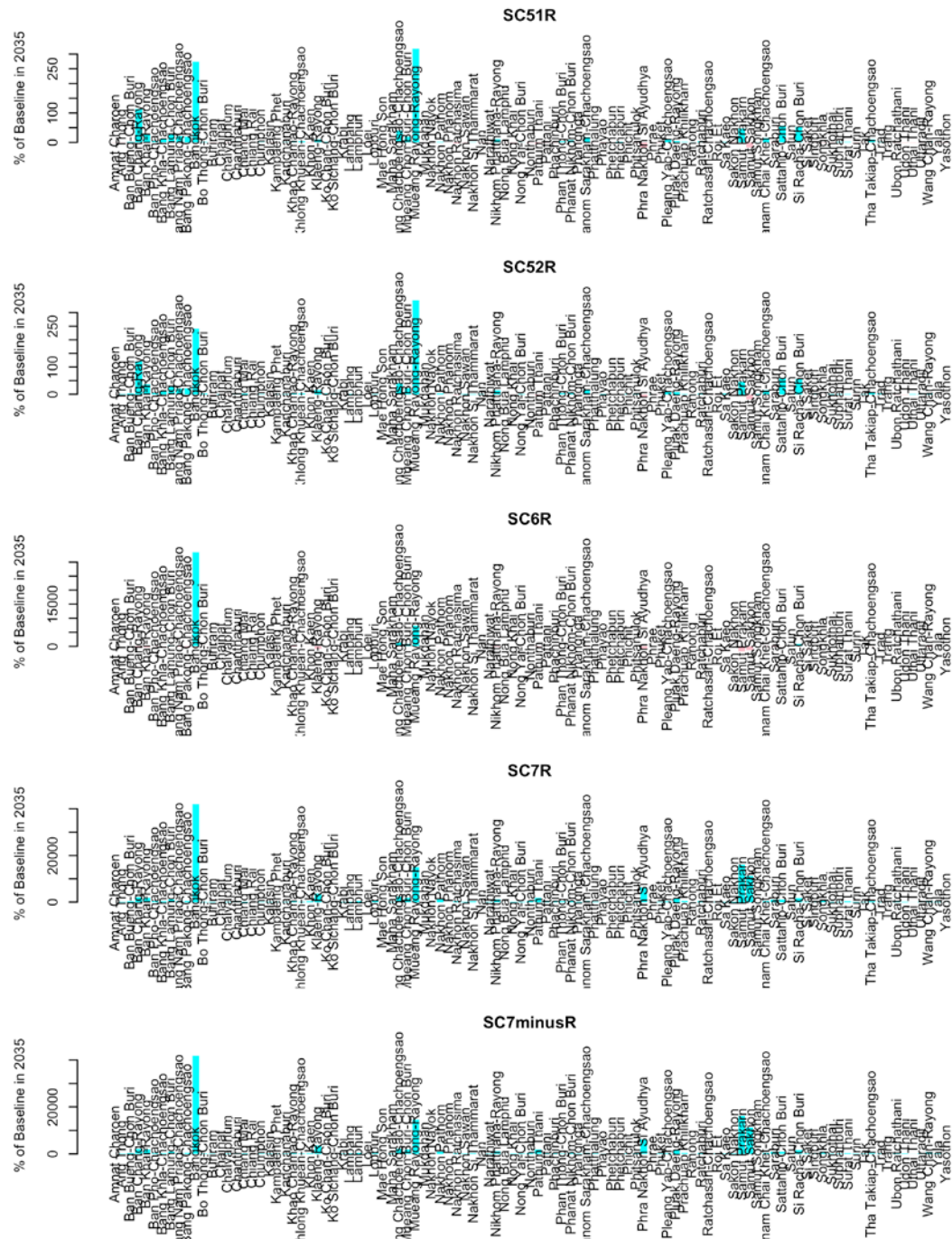


Source: Based on simulation in chapter 2.









Source: Based on simulation in chapter 2.