The 6th ATRANS Symposium
"Transportation for a Better Life:
Infrastructure Development and Management Aspects"
(@Bangkok, Thailand on August 23-24, 2013)

Session 2A: Logistics & Disaster Management

Economic and Welfare Impacts of Disasters in East Asia and Policy Response

Fukunari Kimura
Professor, Faculty of Economics, Keio University
Chief Economist, Economic Research Institute for ASEAN and East Asia (ERIA)

1. Production networks or the 2nd unbundling and logistics links

- East Asian production networks in the manufacturing sector (particularly in machinery industries) are most advanced in the world.
- Mechanics of production networks
  - Fragmentation theory: Jones and Kierzkowski (1990)
  - Two-dimensional fragmentation: Kimura and Ando (2005)
  - The 2nd unbundling: Baldwin (2011)
- The key is connectivity with frequent, well-coordinated, and synchronized transactions.

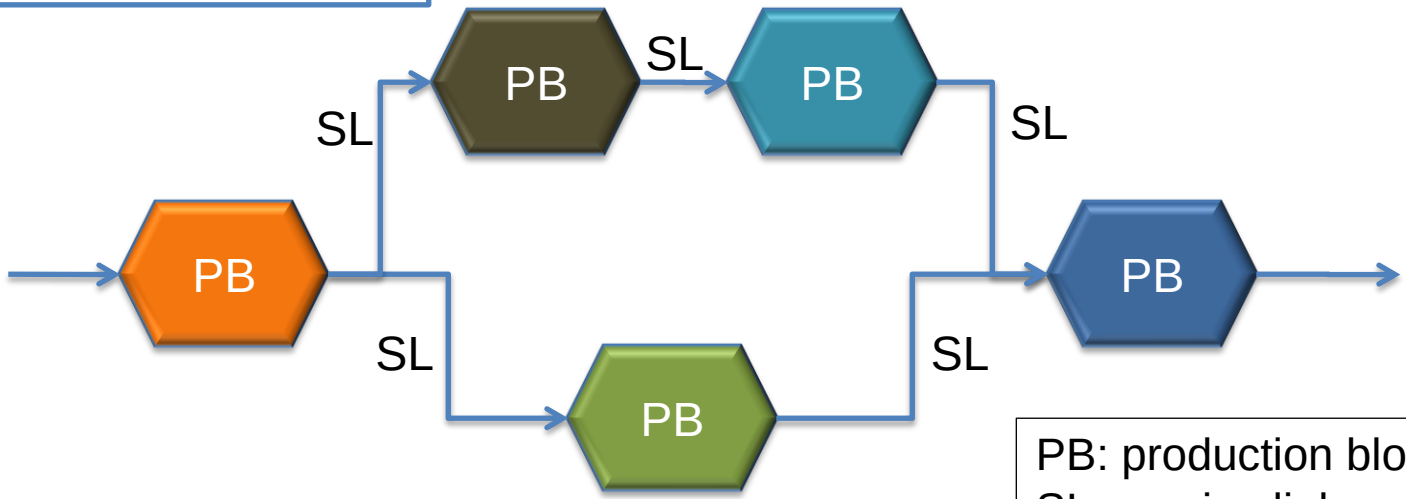
The fragmentation theory: Production blocks and service links

Tradeoff between the reduction in production costs in PB and the enhancement of SL costs. Fragmentation of production occurs particularly between countries at different development stages.

Before fragmentation

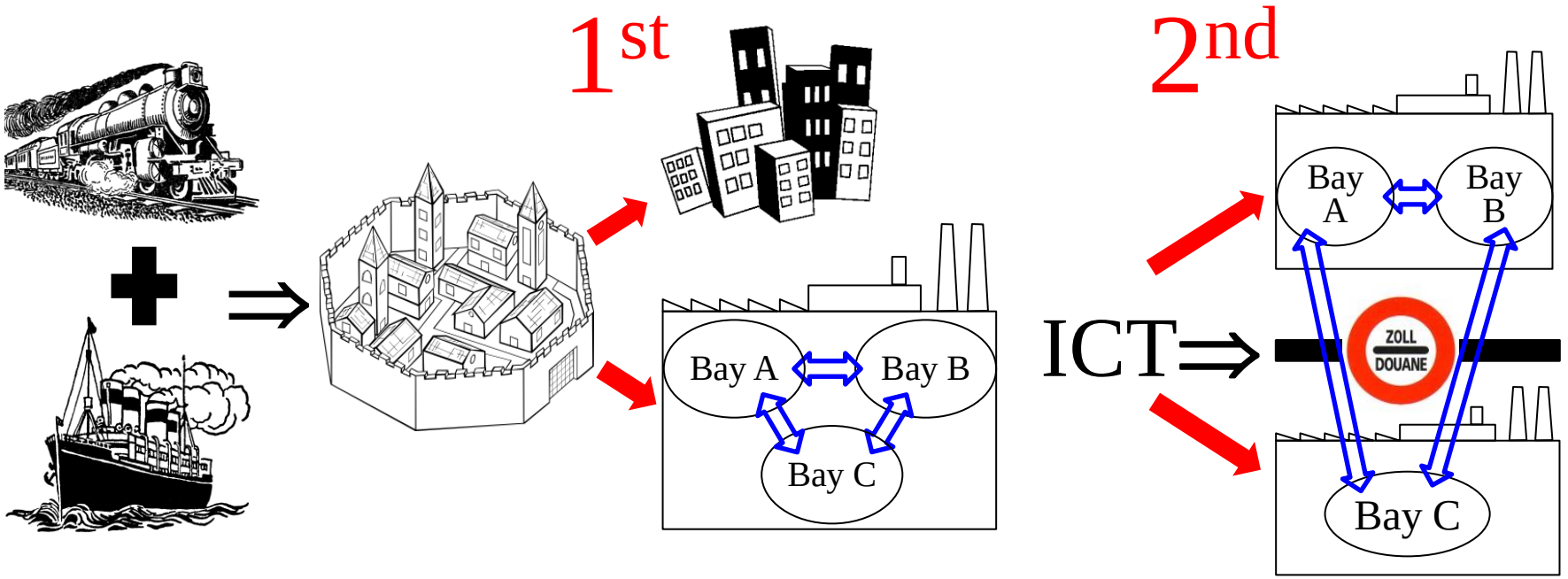
Large integrated factory

After fragmentation



The 2nd Unbundling

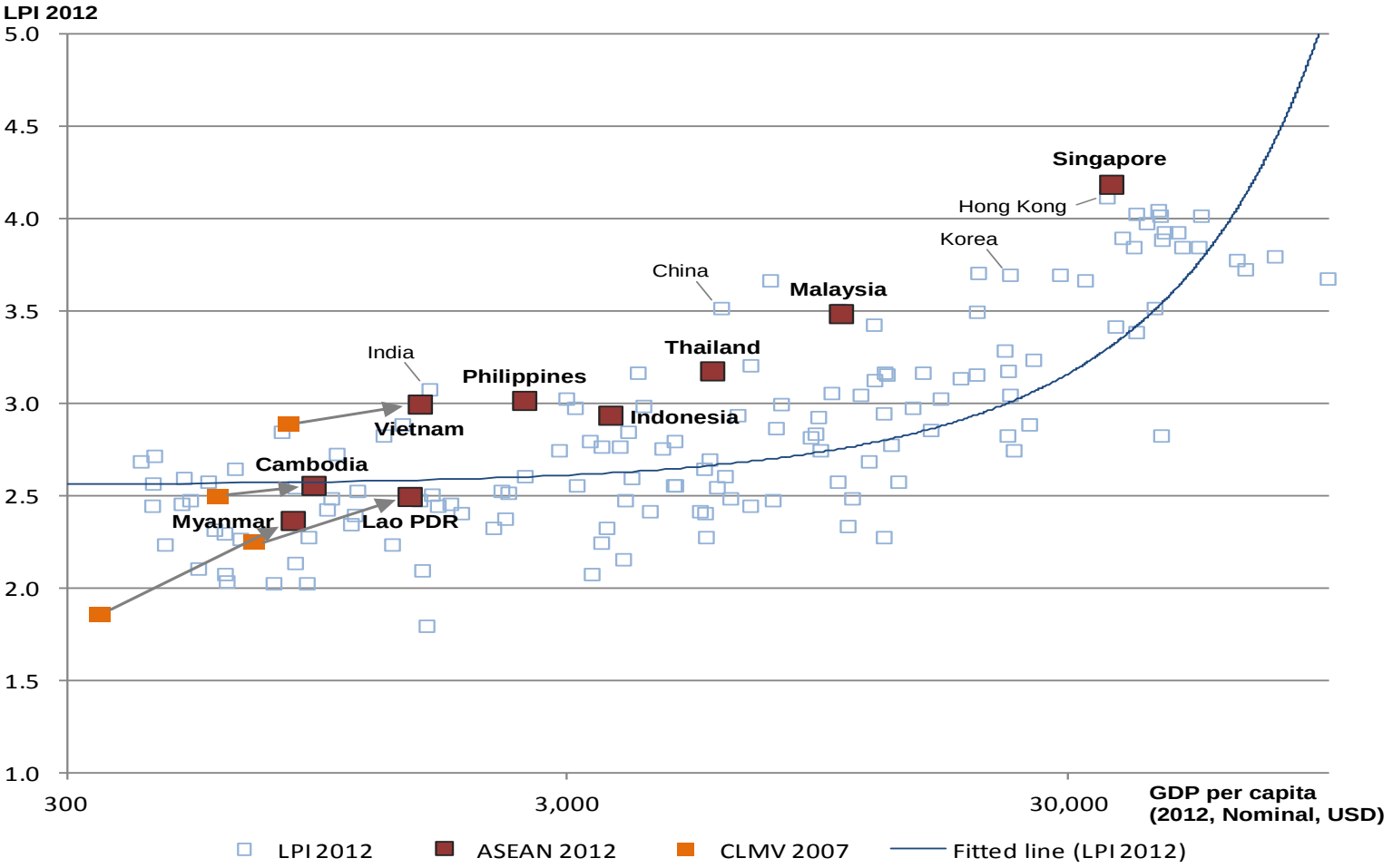
- The 2nd unbundling, i.e., international division of labor in terms of production processes and tasks, has developed since the 1980s, based on drastic reduction in coordination costs due to ICT revolution.
- The 2nd unbundling in the manufacturing sector is most advanced in East Asia.



Source: Baldwin.

Logistics Performance Indexes and GDP per capita

- Logistics Performance Indexes (LPIs) in forerunner ASEAN and East Asia are relatively higher than the world average; CLM has room for improvement.



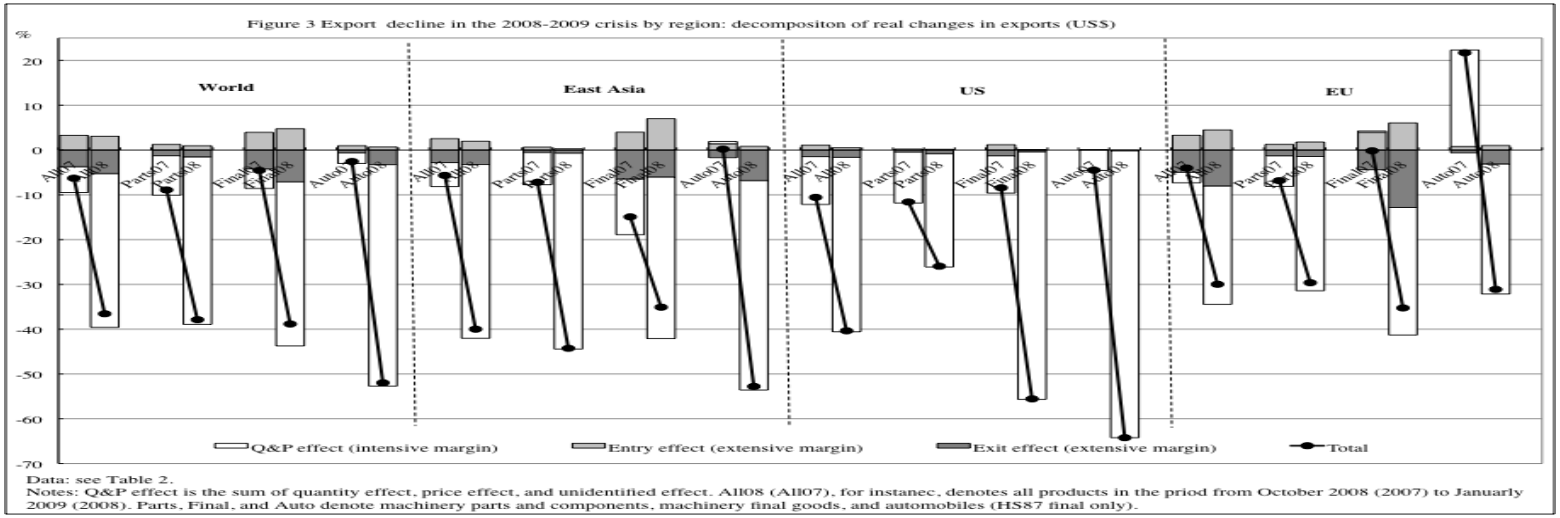
Source: Modified from ERIA (2010).

2. Stability and resiliency of production networks

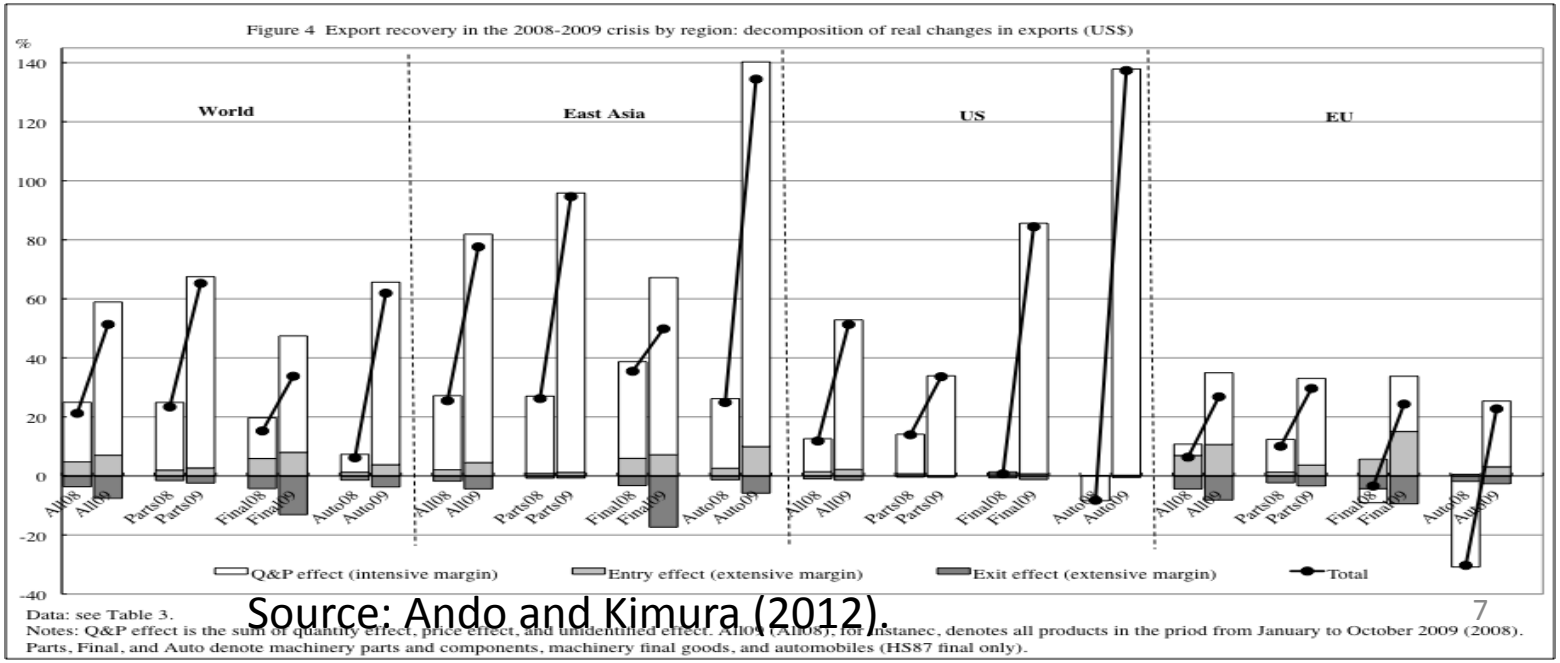
- Production networks may work as shock transmission channels.
- At the same time, production networks are less likely to be interrupted and more likely to recover quickly than other types of transactions because firms have strong incentive to keep production links.
  - Global Financial Crisis and East Japan Earthquake: Ando and Kimura (2012)

Decomposition Analysis: GFC

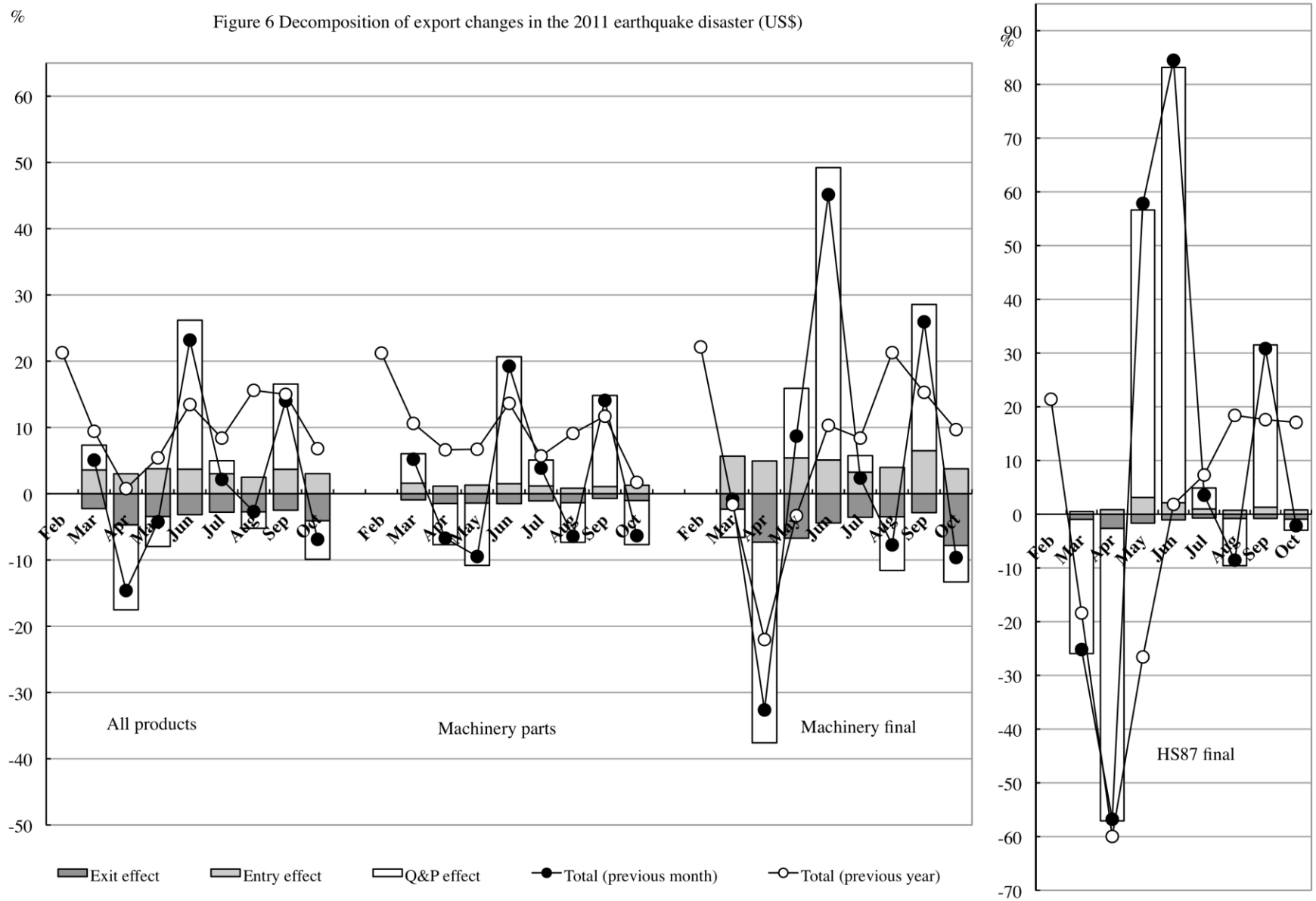
<Fall>



<Recovery>



Source: Ando and Kimura (2012).



Data: see Table 6.

Note: Q&P effect is the sum of quantity effect, price effect, and unidentified effect.

Source: Ando and Kimura (2012).

Table 4 Logit estimation: Japan's machinery exports at GFC

(Excerpt)

	Machinery EX		Machinery EX (except HS87)	
	Fall	Recovery	Fall	Recovery
Distance (log)	-0.05	0.10 *	-0.02	0.09
Parts	-0.51 ***	0.28 ***	-0.59 ***	0.33 ***
Korea	-1.37 ***	1.38 ***	-1.52 ***	1.51 ***
China	-1.74 ***	1.20 ***	-1.95 ***	1.43 ***
Taiwan	-1.31 ***	1.05 ***	-1.44 ***	1.13 ***
Hong Kong	-1.35 ***	0.91 ***	-1.39 ***	0.97 ***
Viet Nam	-0.96 ***	1.38 ***	-1.10 ***	1.42 ***
Thailand	-1.53 ***	1.11 ***	-1.67 ***	1.21 ***
Singapore	-1.39 ***	0.68 ***	-1.55 ***	0.77 ***
Malaysia	-0.91 ***	0.92 ***	-1.02 ***	1.00 ***
Brunei	0.88 ***	-0.75 **	1.18 ***	-1.57 ***
Philippines	-0.99 ***	1.03 ***	-1.07 ***	0.99 ***
Indonesia	-0.91 ***	0.86 ***	-1.06 ***	0.92 ***
Cambodia	0.76 ***	0.30	0.57 ***	0.00
Laos	0.53 *	-1.05 **	2.29 ***	-1.35 *
Myanmar	0.35 **	0.12	0.54 ***	-0.03
US	-1.99 ***	0.37 **	-2.22 ***	0.54 ***
EU	-0.53 ***	0.07 *	-0.63 ***	0.12 ***
Constant	0.93 ***	-2.09 ***	0.82 **	-2.15 ***
Log likelihood	-29744	-11949	-25209	-10302
Sample	45979	20507	39546	17930

Table 7 Logit estimation : Japan's machinery exports at EJE

(Excerpt)

	Machinery EX		Machinery EX (except HS87)	
	Fall	Recovery	Fall	Recovery
Distance (log)	-0.14 ***	0.11 **	-0.08 **	0.13 **
Parts	-0.47 ***	0.06 *	-0.53 ***	0.13 ***
Korea	-1.88 ***	0.96 ***	-1.91 ***	1.05 ***
China	-2.11 ***	0.89 ***	-2.18 ***	0.98 ***
Taiwan	-1.69 ***	0.95 ***	-1.76 ***	1.18 ***
Hong Kong	-1.58 ***	0.74 ***	-1.63 ***	0.89 ***
Viet Nam	-1.30 ***	0.87 ***	-1.37 ***	1.04 ***
Thailand	-1.76 ***	0.79 ***	-1.90 ***	0.81 ***
Singapore	-1.39 ***	0.77 ***	-1.48 ***	0.84 ***
Malaysia	-1.18 ***	0.77 ***	-1.21 ***	0.83 ***
Brunei	1.02 ***	-0.38	2.07 ***	-0.49
Philippines	-1.18 ***	0.33 **	-1.18 ***	0.47 **
Indonesia	-1.15 ***	0.83 ***	-1.24 ***	0.99 ***
Cambodia	0.43 ***	0.12	0.53 ***	0.23
Laos	0.67 *	-1.79 **	1.28 ***	-2.11 **
Myanmar	0.06	-0.03	0.25	-0.05
US	-1.78 ***	0.52 ***	-1.94 ***	0.58 ***
EU	-0.50 ***	0.14 ***	-0.57 ***	0.19 ***
Constant	1.53 ***	-2.06 ***	1.14 ***	-2.35 ***
	(4.48)	(-3.89)	(3.01)	(-4.04)
Log likelihood	-26132	-9749	-22388	-8507
Sample	41827	16221	36156	14317

Source: Ando and Kimura (2012).

3. Simulation analysis with the Geographical Simulation Model

- The speed of recovery matters: temporary and permanent shocks
- In East Asia, enhancing connectivity is a powerful tool for recovery.
  - E.g.1: The East Japan Earthquake (Isono and Kimura (2011))
  - E.g. 2: Thai flooding (Isono and Kumagai (2013))

Figure 2: Economic impacts of the Great East Japan Earthquake in selected prefectures and regions in Japan (GDP difference from the baseline, 2030)

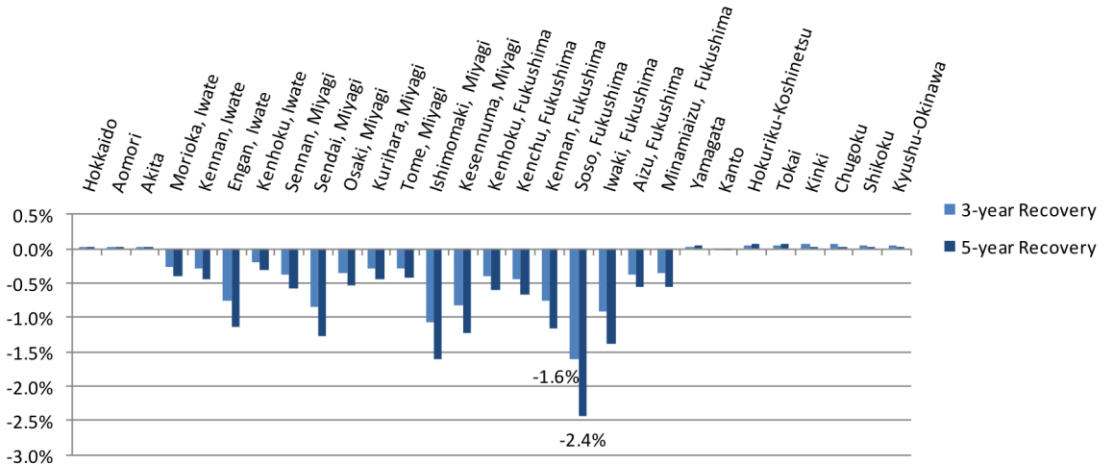
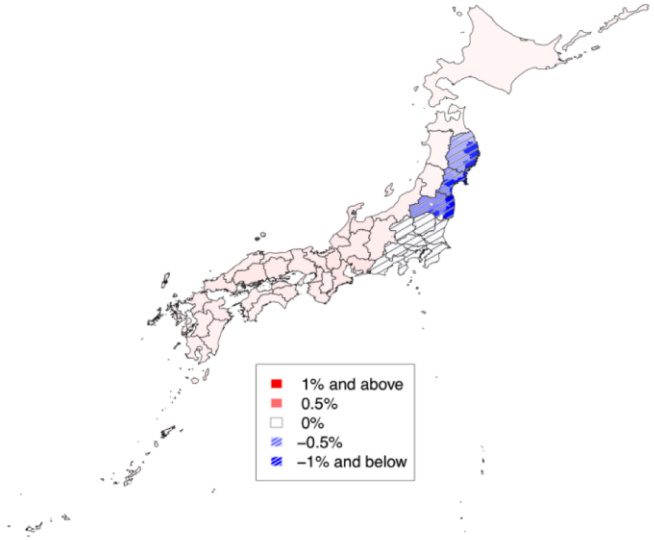


Figure 3: GDP difference in 3-year recovery scenario (compared with the baseline, 2030)



Source: Isono and Kimura (2011).

Figure 7: Economic impacts of MIEC, link enhancement, and PCBs reduction (compared with the baseline, 2030)

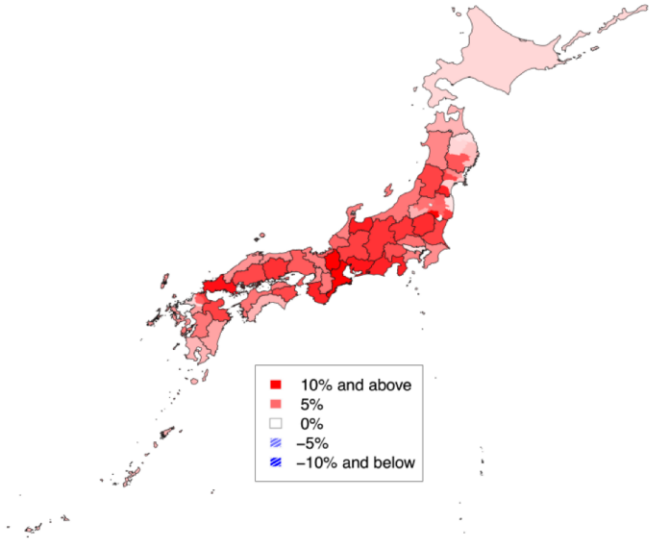
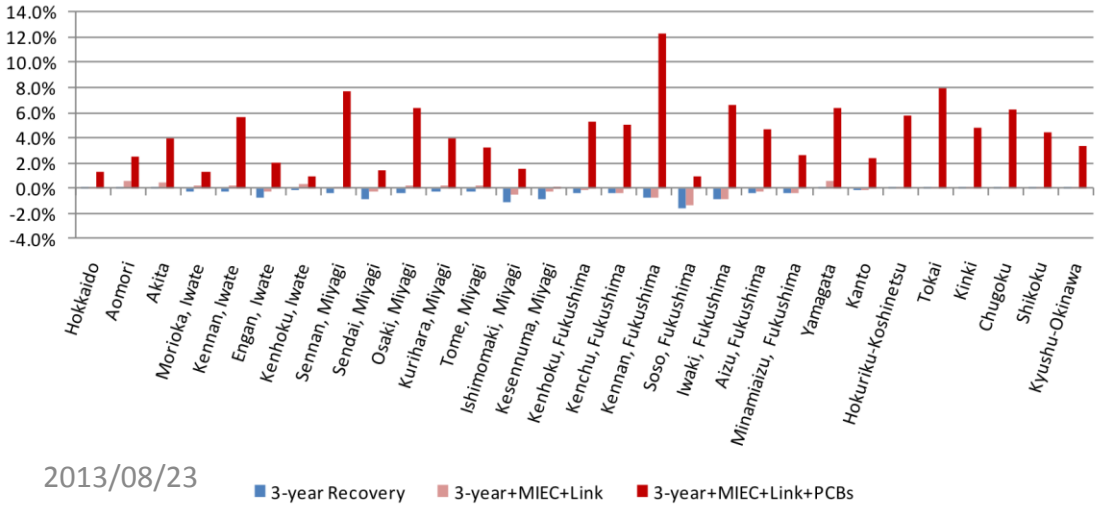
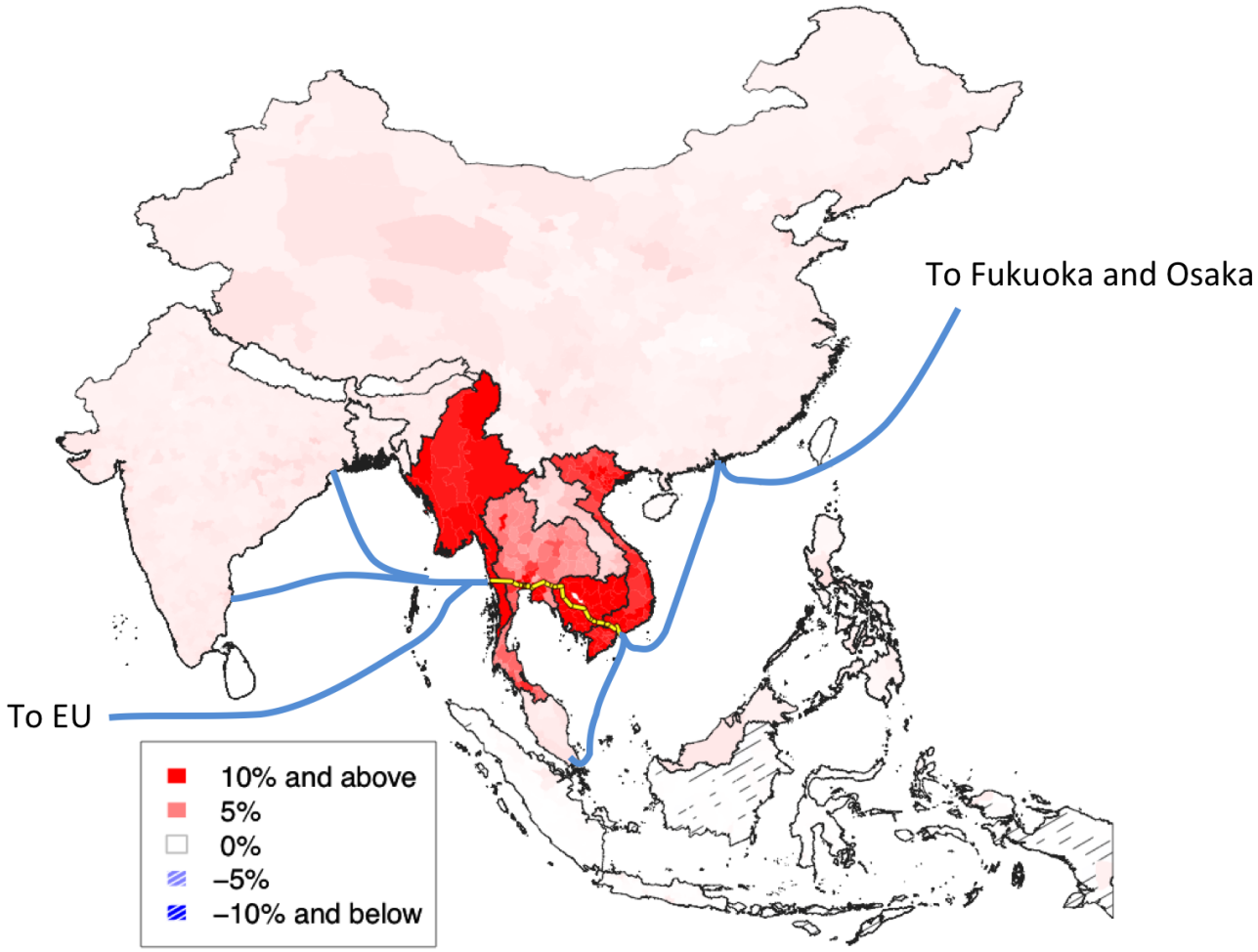


Figure 8: Economic impacts on selected prefectures and regions of MIEC, link enhancement, and PCBs reduction (compared with the baseline, 2030)



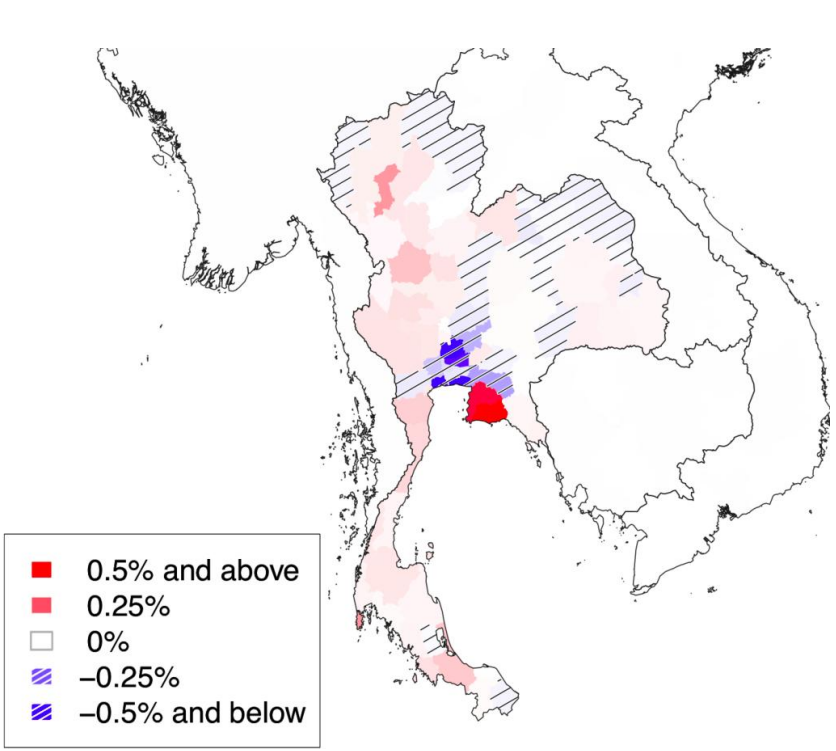
Source: Isono and Kimura (2011).

Figure 9: Economic impacts of MIEC, link enhancement, and PCBs reduction for East Asia (compared with the baseline, 2030)

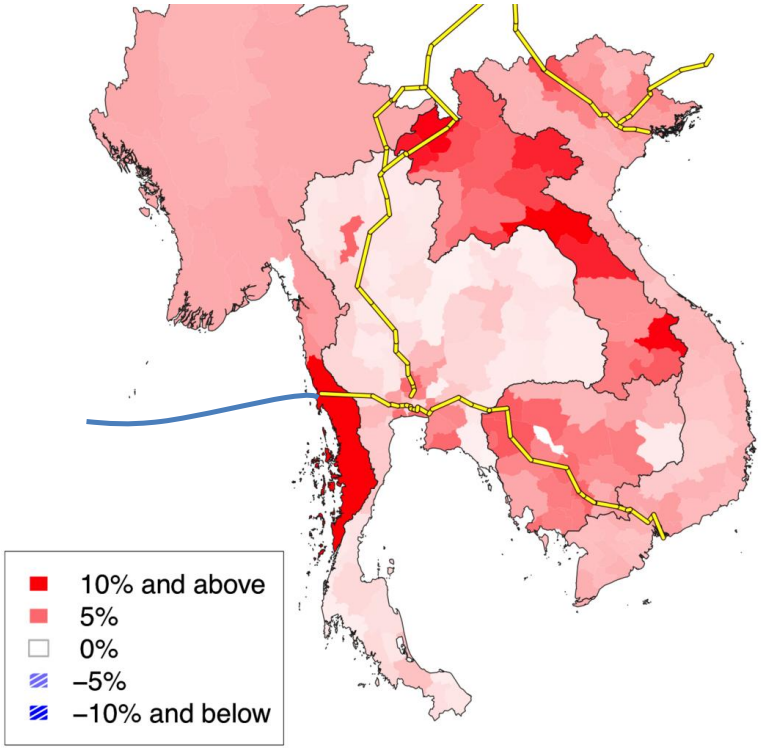


Source: Isono and Kimura (2011).

Economic Impacts of the Flood (2020)



Economic Impacts of MIEC, NSEC and Soft Infrastructure Development (2020)



S
o
u
r

4. Policy implication

- Although production networks may work as shock transmission channels, they also enhance stability and resiliency in economic activities.
- The speed of recovery matters in order to avoid negative permanent effects.
- It is effective to take advantage of production networks for strong recovery by enhancing connectivity.

References

- Ando, Mitsuyo and Kimura, Fukunari. (2012) "How Did the Japanese Exports Respond to Two Crises in the International Production Networks? The Global Financial Crisis and the East Japan Earthquake." *Asian Economic Journal*, 26, No. 3: 261-287.
- Baldwin, Richard. (2011) "21st Century Regionalism: Filling the Gap between 21st Century Trade and 20th Century Trade Rules." Centre for Economic Policy Research Policy Insight No. 56 (May) (http://www.cepr.org).
- ERIA. (2010) *Comprehensive Asia Development Plan* (http://www.eria.org/projects/CADP.html).
- Isono, Ikumo and Kimura, Fukunari (2011) "Links with East Asia for a Recovery from the Great East Japan Earthquake: Geographical Simulation Analysis." *ERIA Policy Brief*, No. 2011-03 (August)(http://www.eria.org/publications/policy_briefs/index.html).
- Isono, Ikumo and Kumagai, Satoru. (2013) "Long-run Economic Impacts of Thai Flooding: Geographical Simulation Analysis." *ERIA Discussion Paper Series*, ERIA-DP-2013-08 (July)(http://www.eria.org/publications/discussion_papers/index.html).
- Jones, Ronald W. and Kierzkowski, Henryk. (1990) "The Role of Services in Production and International Trade: A Theoretical Framework." In Ronald W. Jones and Anne O. Krueger, eds., *The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin*, Oxford: Basil Blackwell: 31-48.
- Kimura, Fukunari and Ando, Mitsuyo. (2005) "Two-dimensional Fragmentation in East Asia: Conceptual Framework and Empirics." *International Review of Economics and Finance (special issue on "Outsourcing and Fragmentation: Blessing or Threat" edited by Henryk Kierzkowski),* 14, Issue 3: 317-348.