

# **The Effect of differences in the National Innovation Systems on National competitiveness**

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**June 12, 2014**

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# Agenda

Structural difference in National Innovation System over the world and Industrial competitiveness.

Background

Research Question & Objective

Methodology

Summary

# Background

Business relationship is matter in innovation competitiveness?

Does it contribute to industrial sectoral specialization at national level?

## LME vs CME\*

(Hall & Soskice, 1997;2001)

LMEs (Liberal Market Economies)	CMEs (Coordinated Market Economies)
<u>US</u> , UK, Australia, New Zealand	Germany, Sweden, Norway, <u>Japan</u>
Short term labor contract Responsive capital market <b>Market Mechanism</b> Market mechanism Flexibility	Stable employer-employee relationship Patient capital <b>Relationship btw entities</b> Non-market mechanism Relation specific asset investment
<div style="border: 2px dashed red; padding: 5px; display: inline-block;"><b>Disruptive innovation</b></div>	<div style="border: 2px dashed red; padding: 5px; display: inline-block;"><b>Incremental innovation</b></div>

\* LME: Liberal Market Economy

CME: Coordinated Market Economy

# Background

Business relationship is matter in innovation competitiveness?

Does it contribute to industrial sectoral specialization at national level?

- Country-specific institutional conditions

→ sector-specific innovation competitiveness (Porter, 1990).

- Difference in institutional governance structure of each country

→ competitiveness in different industrial sectors (Kischelt,1991).

- National Business system configuration (Individual vs Communitarian system)

→ **Relationship dependency in collaborative innovation**

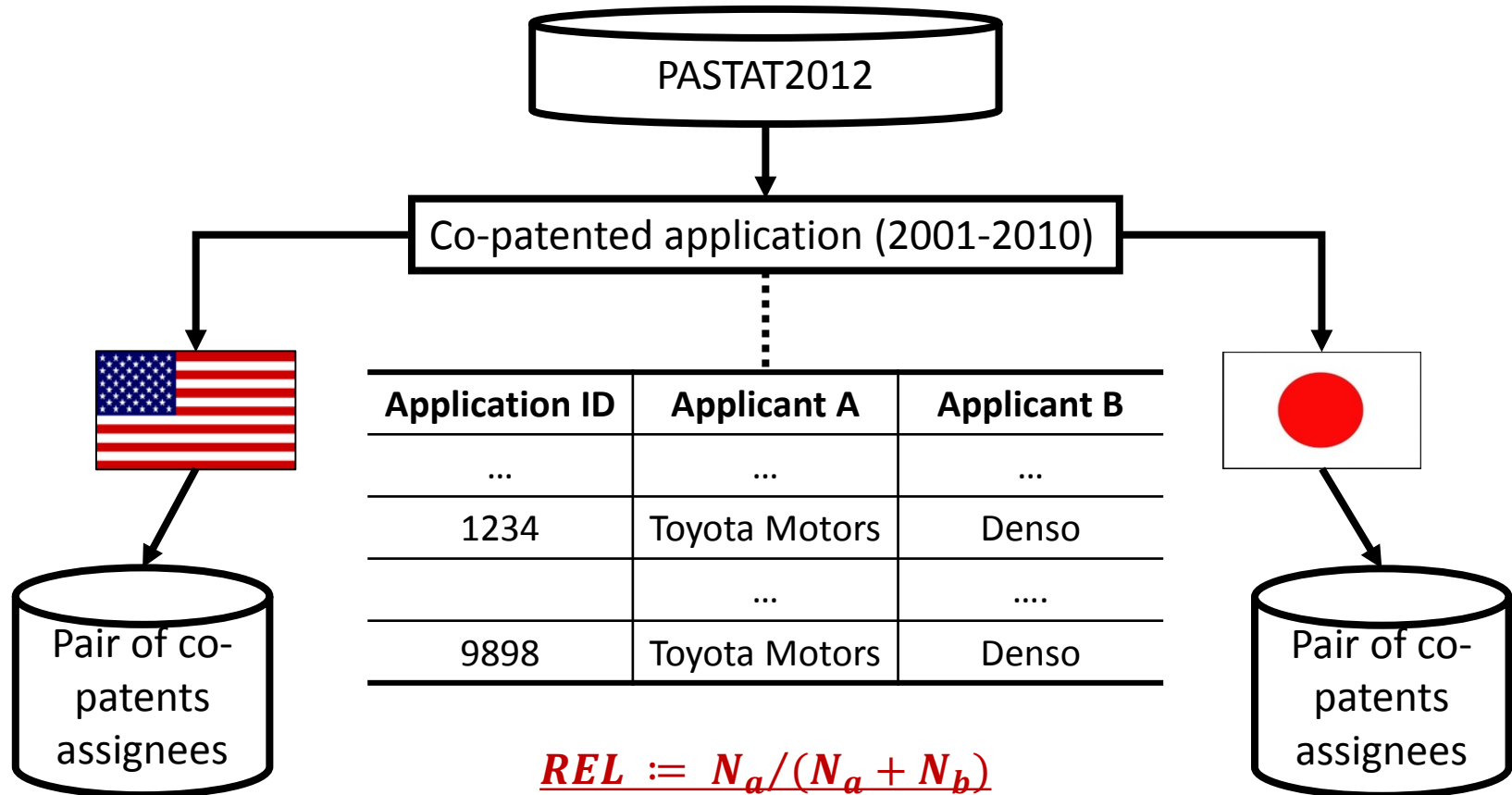
- LMEs are not always specialized in radical innovation driving industry and CMEs are not always strong in incremental innovation. It is varied across the industry (Akkermans et al.,2009).

- We cannot simply categorize the economy system into LME and CME, but there are hybrid form and should consider “transformation” of institutional configuration and learning process (Schneider & Paunescu, 2012).

**Institutional configuration → industry-specialization, but it comprises complex dynamics**

# Background

Is there actual difference? In particular, difference in the “relationship-dependency”?  
If it is the case, how can we empirically read it?



$$REL := N_a / (N_a + N_b)$$

$N_a$ : No. of co-applicant pair with more than 2 co-patent applications  
 $N_b$ : No. of co-applicant pair with less than 2 co-patent applications

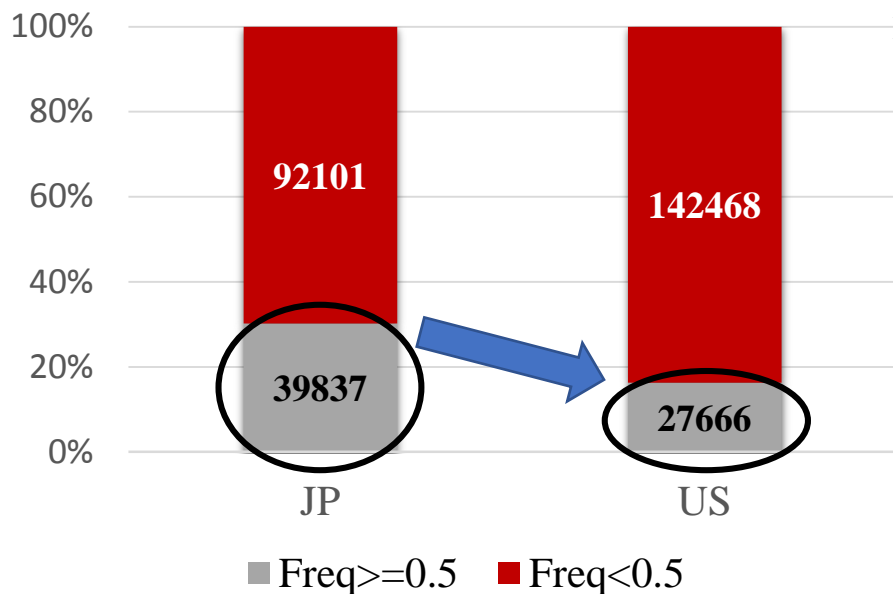
# Background

Not in published

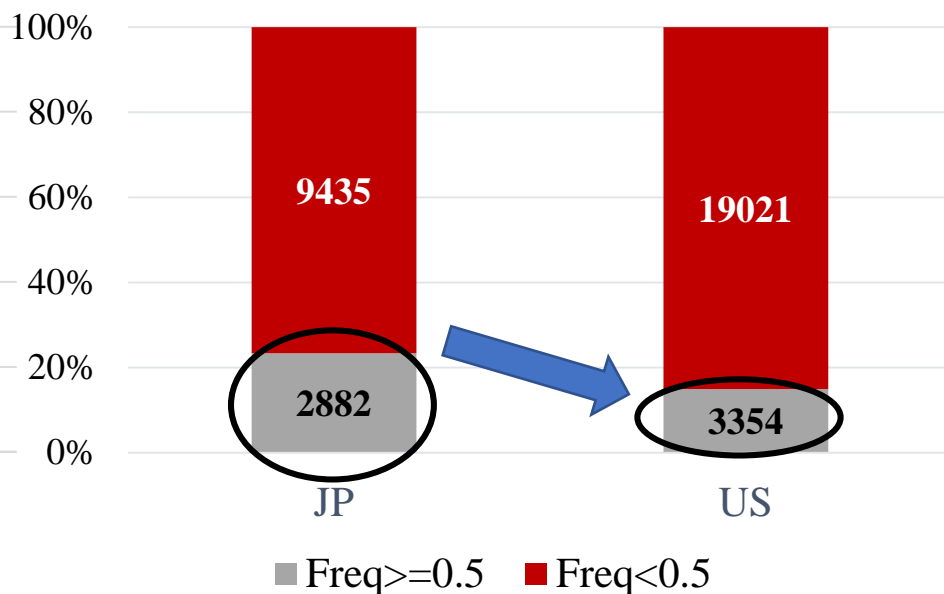
Entities in U.S. system are less likely to rely on previous partner in collaborative R&D, but JPs' more likely to collaborate with historical partners.

## US vs JP

Co-patenting frequency  
(Motor-vehicle, 2001~2010)



Co-patenting frequency  
(IT, 2001~2010)



**US: relies more on liberal market, JP : relies more on previous partners**

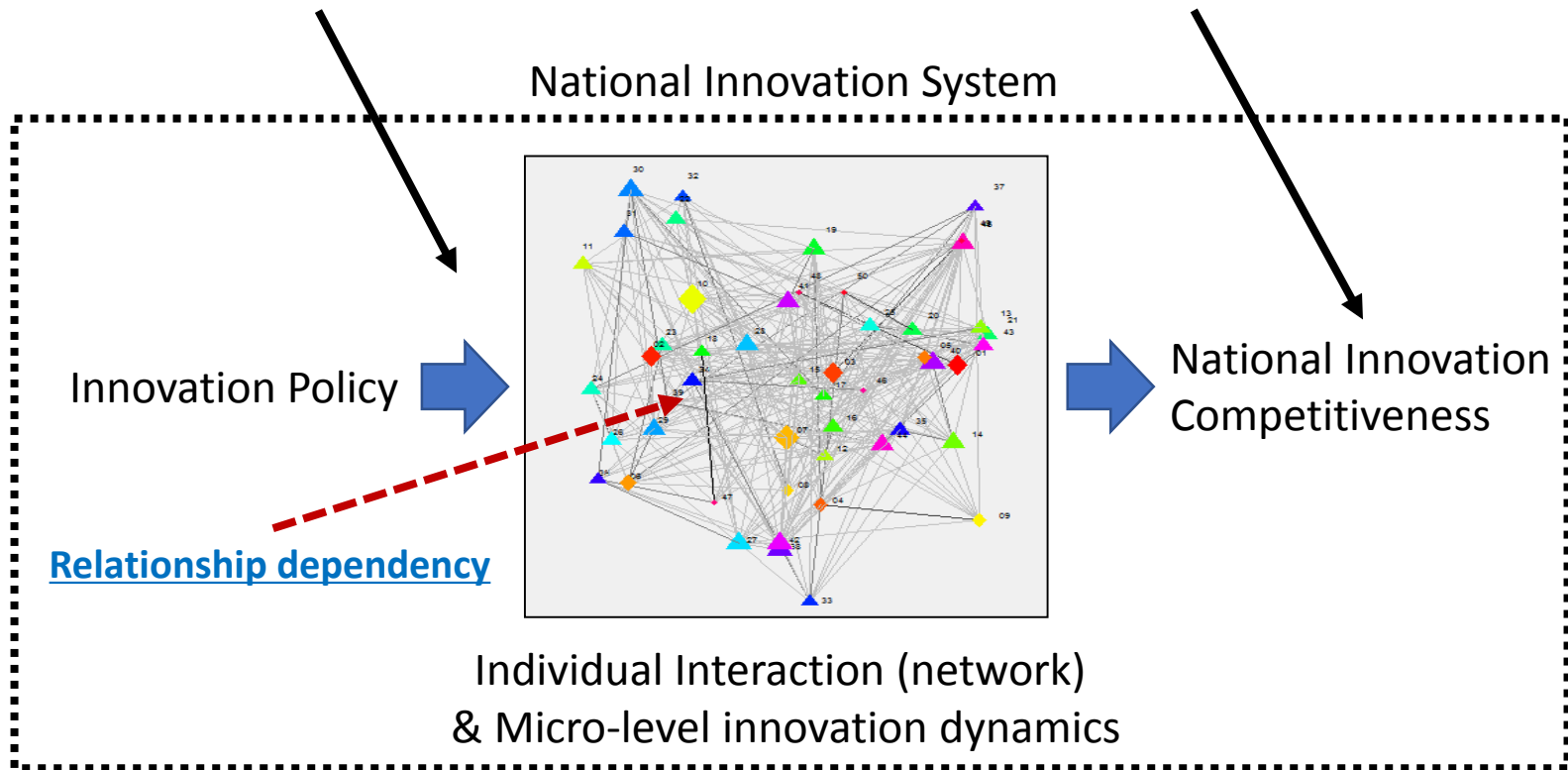
\* Extracted from PATSTAT2012 Sept

# Research Question & Objective

National Innovation Policy to enhance innovation capability in fast / broadly - changing industrial environment

Innovation Network Dynamics

Technological & industrial convergence?



How the difference affects to the individual level innovation performance?

# Research Question & Objective

National Innovation Policy to enhance innovation capability in fast / broadly - changing industrial environment

How the relationship dependency affects to the national innovation competitiveness? What is the underlying dynamisms?

## Question1

relatedness affects to the national-level sectoral specialization?

- (1) Relatedness and national innovation performance
- (2) Innovation Collaboration Network and Knowledge diffusion

## Question2

National innovation policy to enhance the national innovation competency regard to the relatedness?

- (1) strong relatedness in incremental innovation? stress the market mechanism in disruptive innovation?
- (2) What kind of policy should be considered regard to the relatedness In converging field of technology / industry?

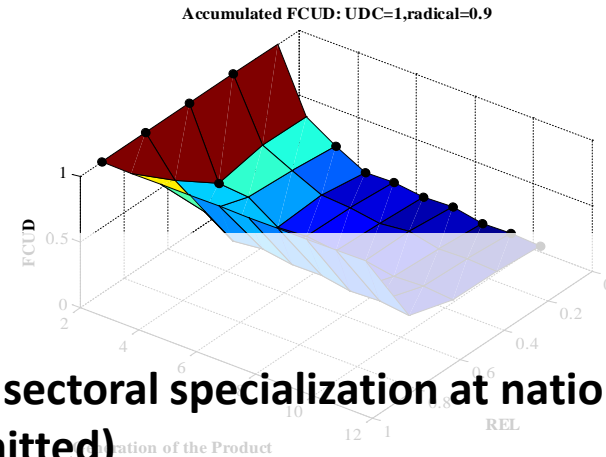
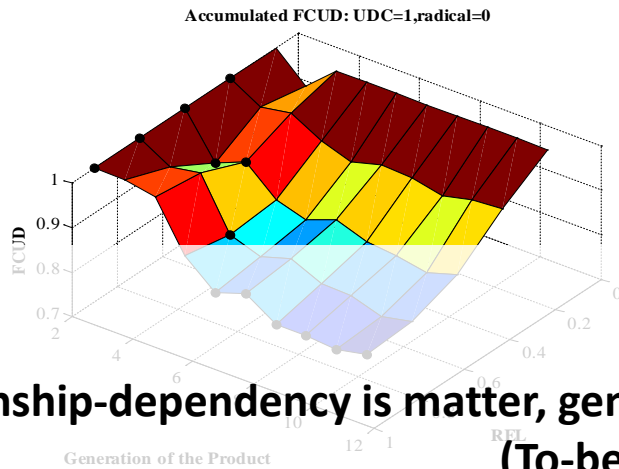


# Research Plan & Methodology

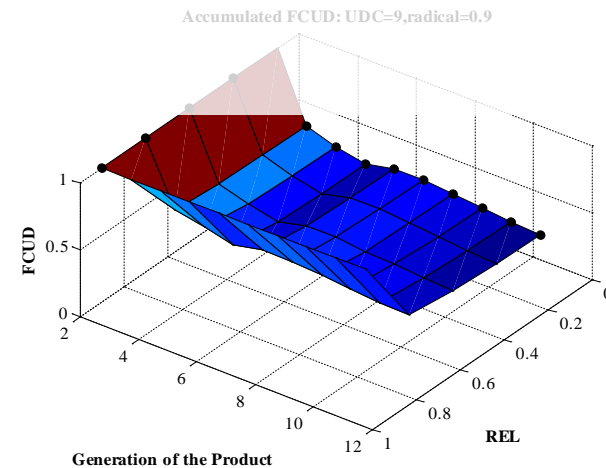
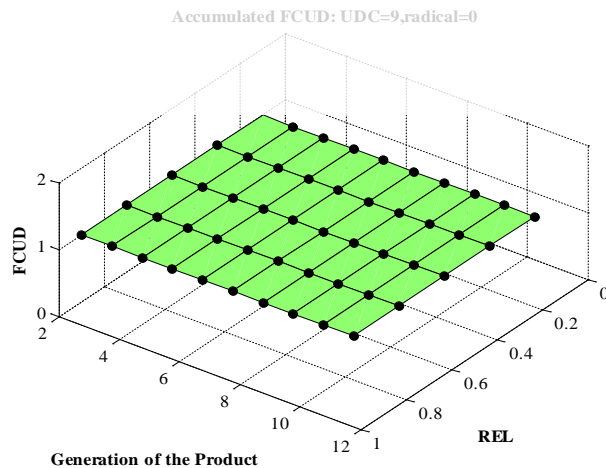
Combination of various quantitative approach for policy assessment and technology mining: through Patent Analysis, and computational modeling & simulation

## Question 1 -1

Relatedness and national innovation performance



**Relationship-dependency is matter, generate sectoral specialization at national level  
(To-be-submitted)**

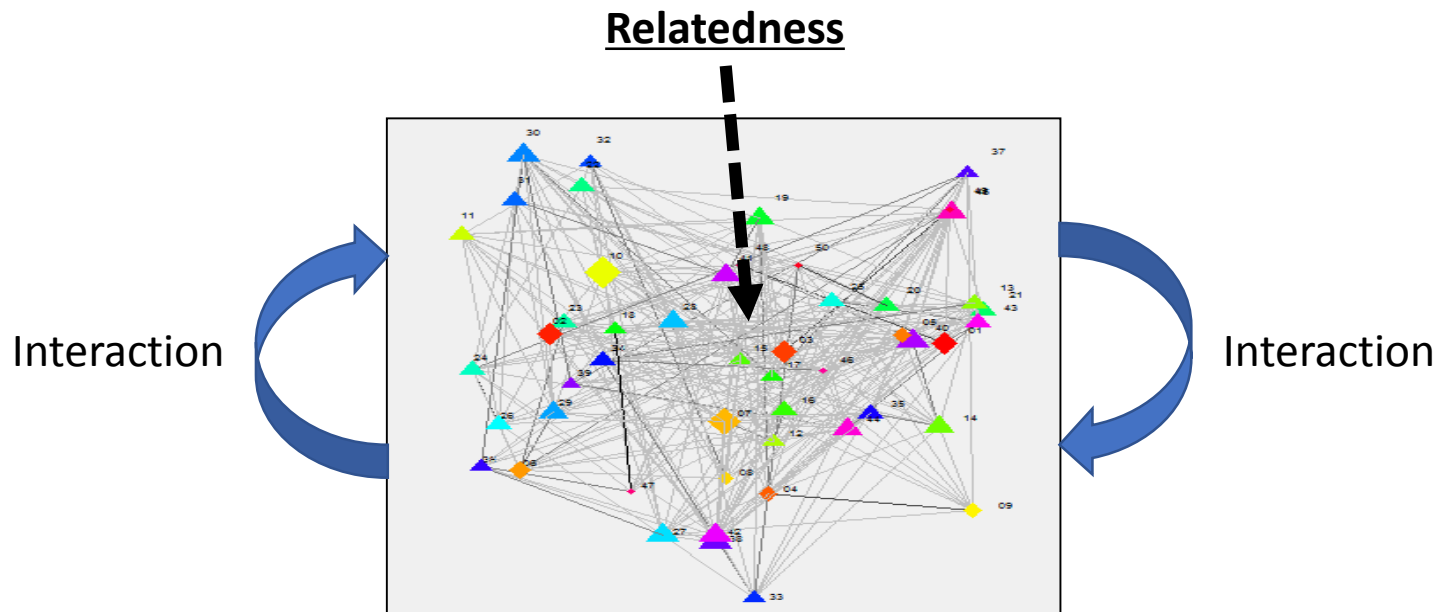


# Research Plan & Methodology

Combination of various quantitative approach for policy assessment and technology mining: through Patent Analysis, and computational modeling & simulation

## Question 1 -2

Innovation Collaboration Network and Knowledge diffusion



Relationship dependency and informal network structure over the NIS

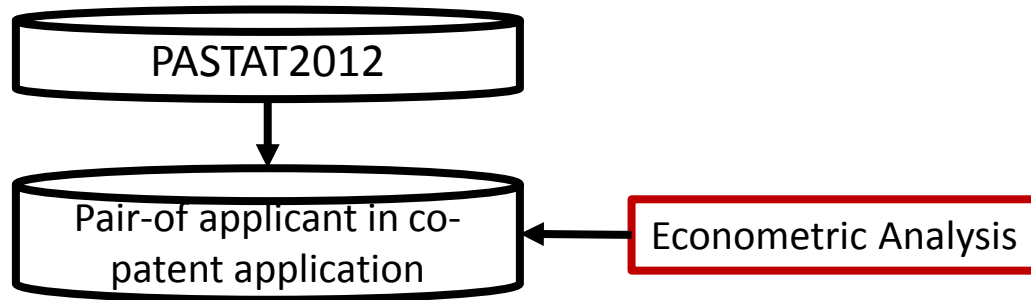


# Research Plan & Methodology

Combination of various quantitative approach for policy assessment and technology mining: through Patent Analysis, and computational modeling & simulation

## Question 2 -1

strong relatedness in incremental innovation,  
stress the market mechanism in disruptive innovation?



- Dependent variable
  - Firm-level granted **patent generality** and **originality**
- Independent variable
  - **Relationship dependency**
- Control variable
  - Size
  - Industrial sector Dummy
  - Technological Diversity of owning patent portfolio
  - ETC..

*No. of copatents by collaborators who have 1*

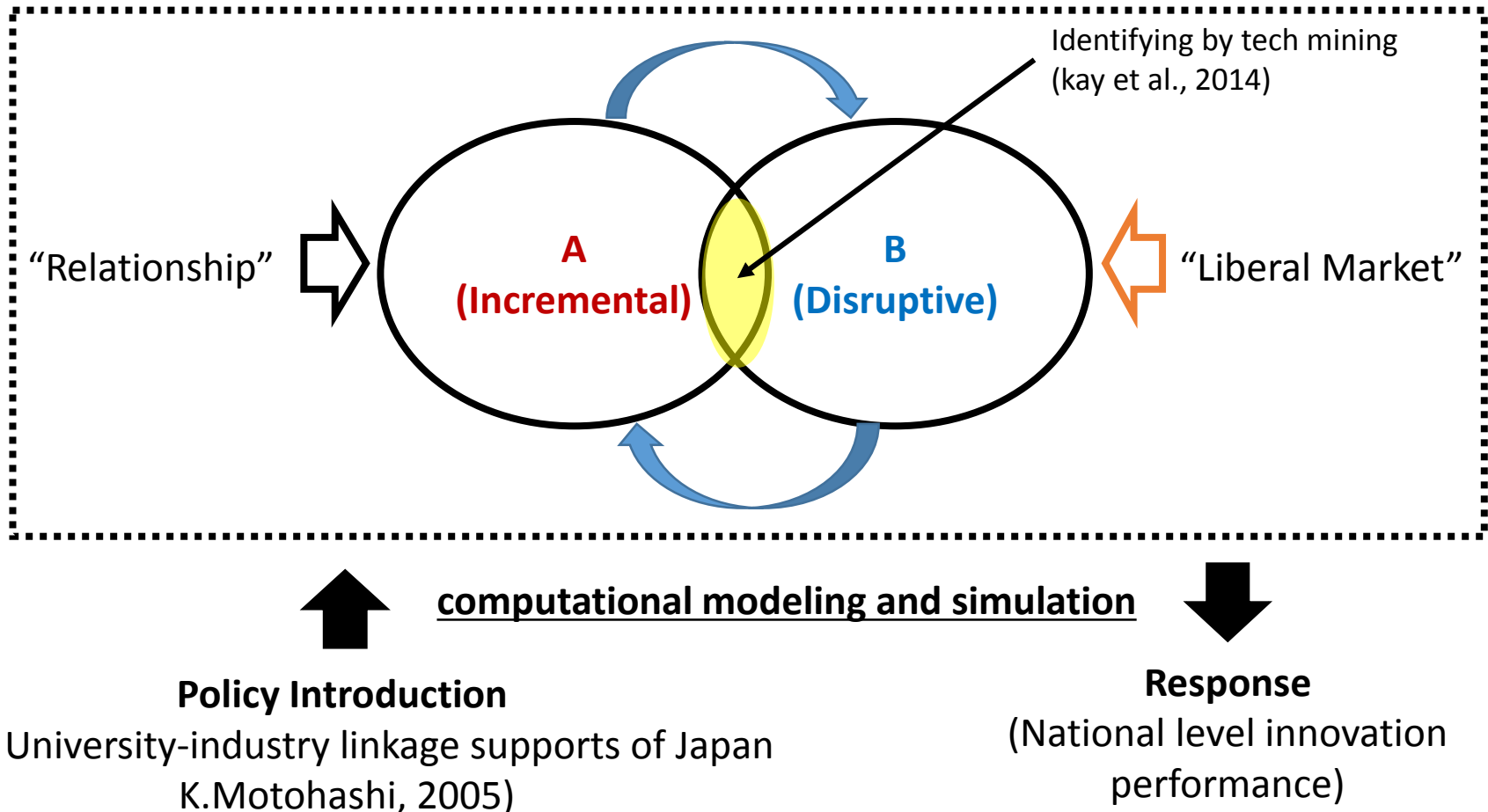
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# Research Plan & Methodology

Combination of various quantitative approach for policy assessment and technology mining: through Patent Analysis, and computational modeling & simulation

## Question 2 -2

Technology Convergence / fast-changing industrial structure,  
What policy need to be considered?



# Summary

Innovation Dynamics at national level and industrial competitiveness focuses on the “relationship dependency” in collaborative innovation

- Difference over the countries (or capitalism) in relationship dependency
  - Hall & Soskice (1997;2001)
- The difference affects to the structure of Innovation Network
- The network structure is matter in Innovation (Oerlemans et al. 1998)
  
- The relationship-dependency affects to the national level sectoral specialization and spectrum in industrial competitiveness
  - Confirmed by computational simulation (Kwon in RIETI project)

The remained questions are

- 1) Innovation network structure and knowledge diffusion efficiency over the network
- 2) Effect of the degree of relationship dependency on firm-level innovation performance.
- 3) Which policy should be considered to obtain better innovation outcome in the converging industrial / technological field

**Thank you!**

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