Geographic Location and Concentration of Container Ports

Comparative Analysis

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1.1 Introduction

Big ports
important for international container transportation because of scale economics

Japan

Concentrated investment in Super Hub ports

⇕

Diversified investment in local ports

Concentration or De-concentration
is a key point in container port policy

1.2 Objective

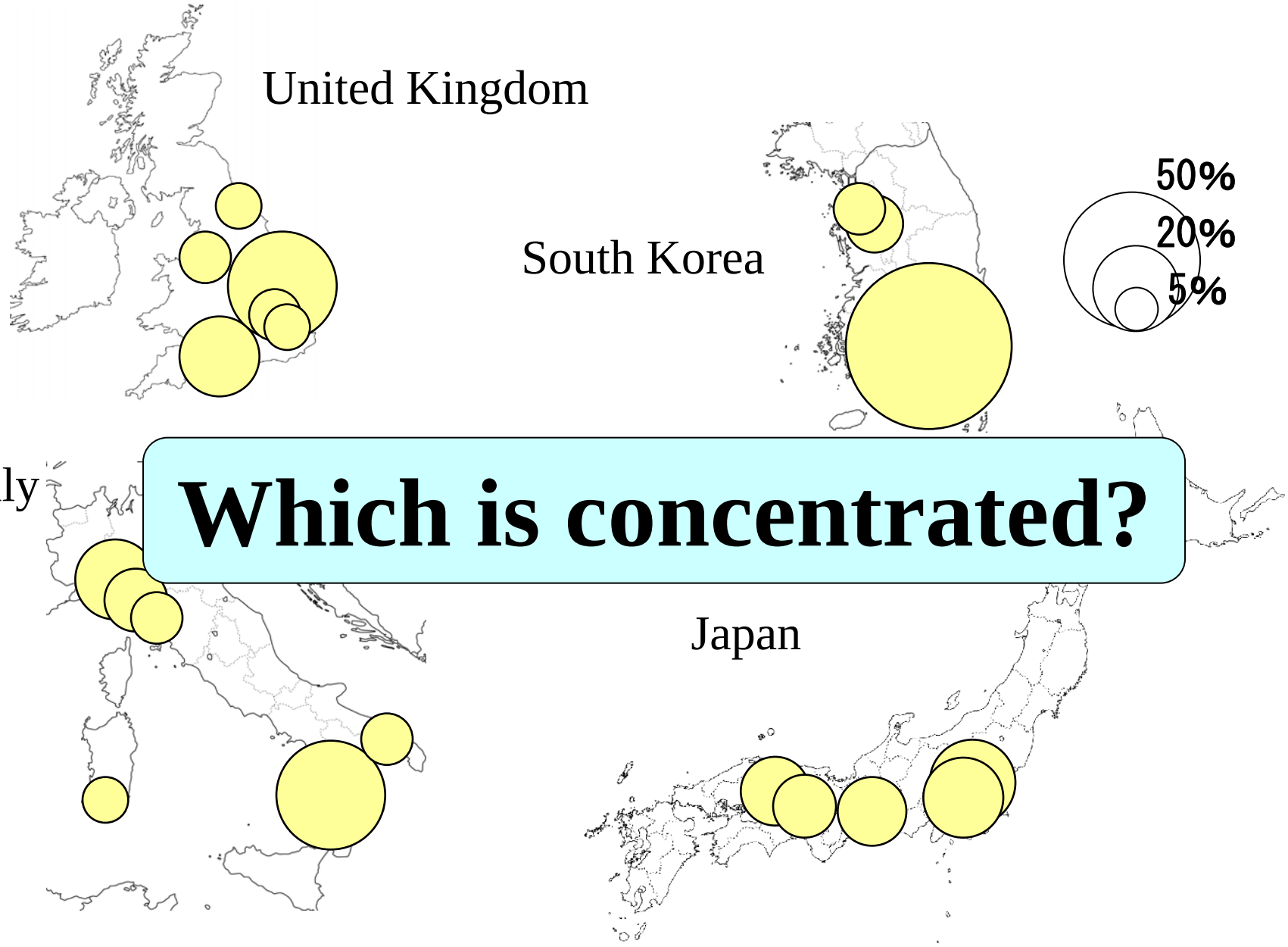
There are many qualitative evaluations
for container ports concentration and de-concentration

There is not confirmed method
to quantify the level of container ports concentration

1 . International comparison
of container ports concentration

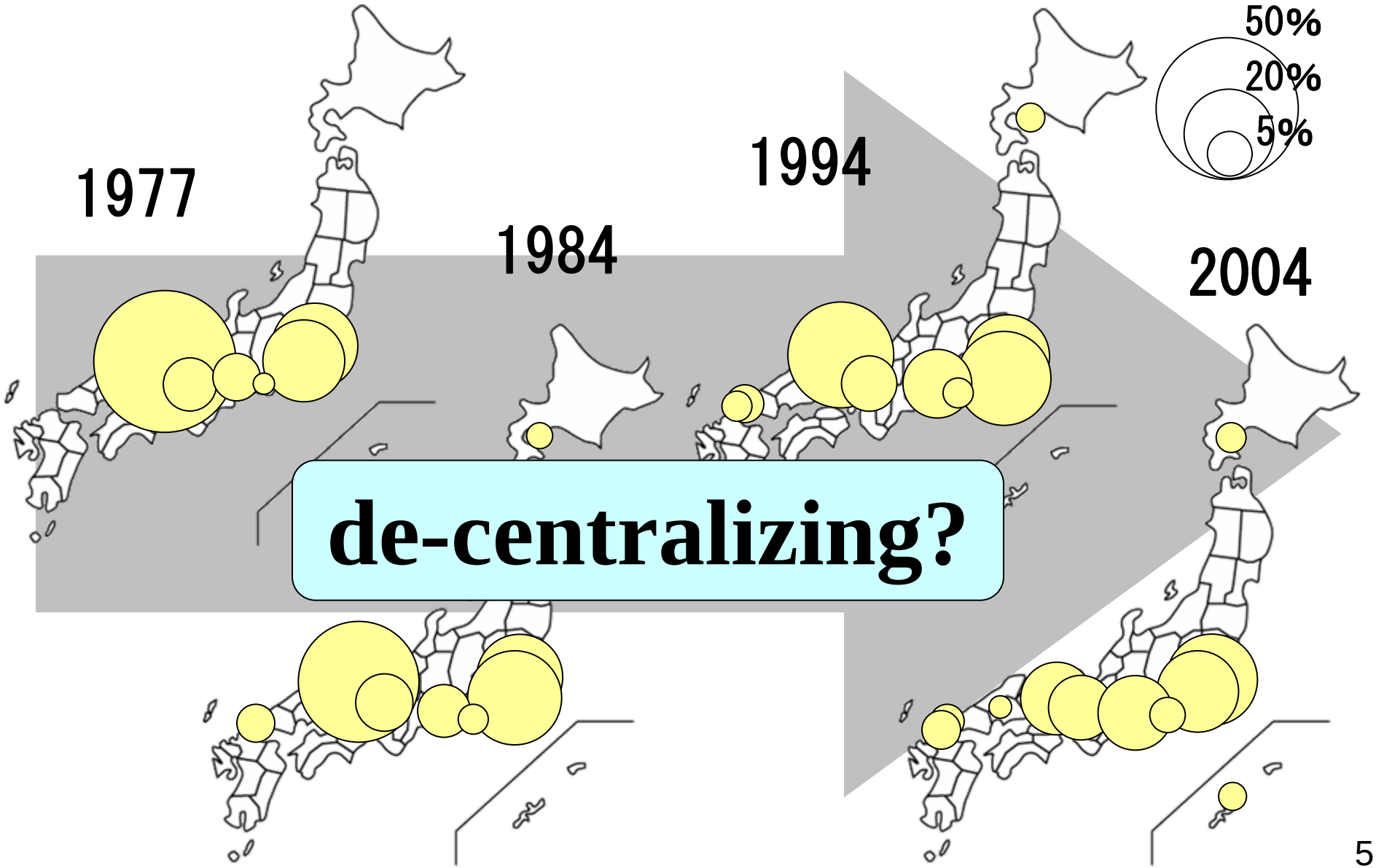
2. Clarifying the shift
of container ports concentration

2.1 Geographic Distribution in 2004



Which is concentrated?

2.2 **Geographic Distribution Shift in Japan**

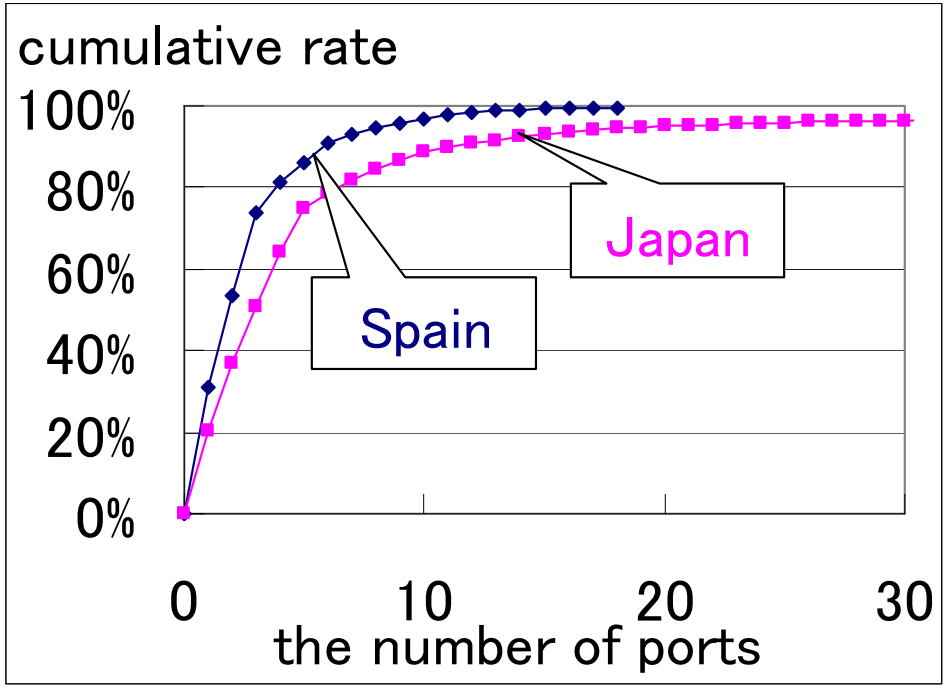


2.3 Quantifying Concentration

Quantifying method
to compare the level of concentration

Cumulative curve

is affected by
the number of ports…



2.4 Problems with quantification

Problem 1

We should consider country's scale

The length of coastal line

The amount of trade

The number of ports

Problem 2

We can’t get enough data

country

times

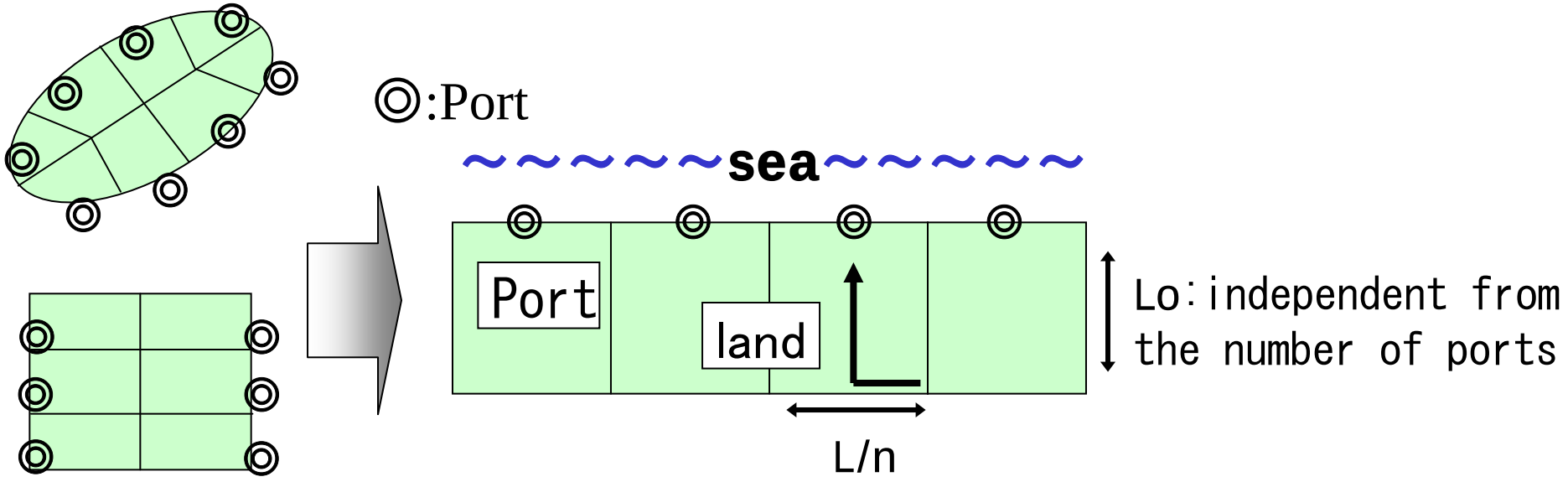
obtainable data of container ports

Adjust the number of ports for comparison

2.5 Quantifying method

calculate the number of ports which minimize the cost of container in a country

Land can be developed like below



2.5 Quantifying method

$Ct = Ca + Ch + Co$ cost per unit

$Ca = a \times L/n + b$ inland transporting cost

$Ch = c$ handling cost

$Co = d \times (T/n)^{-\alpha}$ port operating cost

n : the number of ports L : length of coastline

T: the amount of trade α : scale economics parameter

a、b、c、d : parameter

$$n^* = \arg\min Ct$$

$$n^* \propto L^{1-\beta} \times T^{\beta}$$

$$\beta = \frac{\alpha}{\alpha + 1} \qquad 0 \le \beta \le 1$$

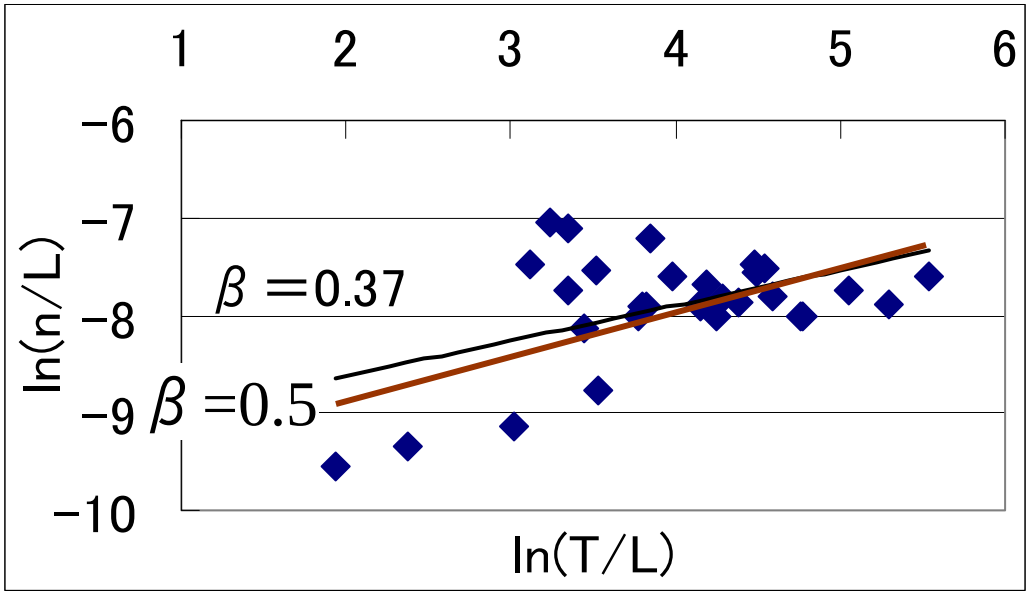
2.5 Quantifying method

How much is β ?

data in 8 countries during 4 years

least-squares method

β =0.37



This is from only 8 countries' data

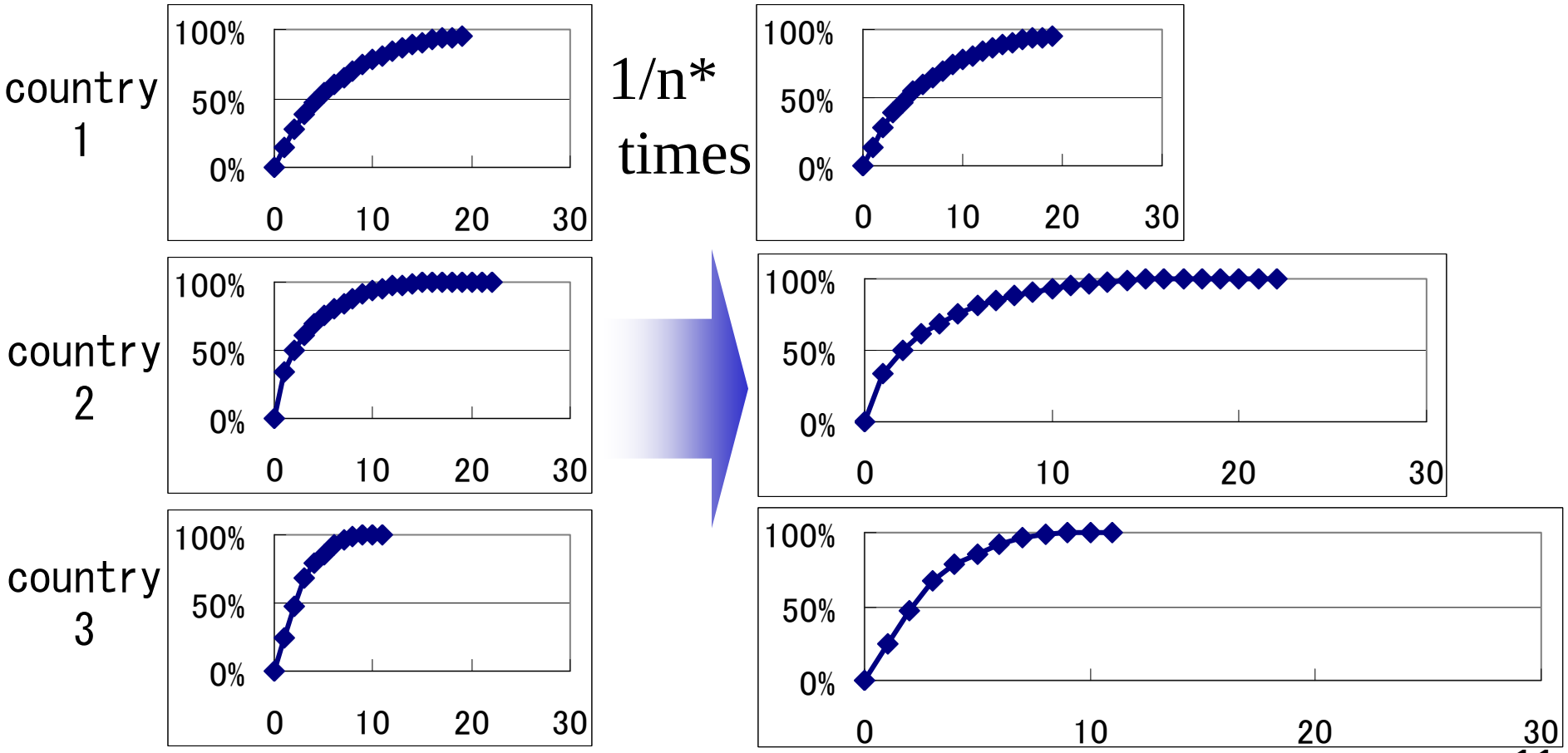
Results are not so different even if we use β =0.5

$$n^* \propto (L \times T)^{0.5}$$

2.5 Quantifying method

Coordination of horizontal axes by the value of 1/n*
→solution for problem 1: considering scale

$1/n^* = 1/(L \times T)^{0.5}$

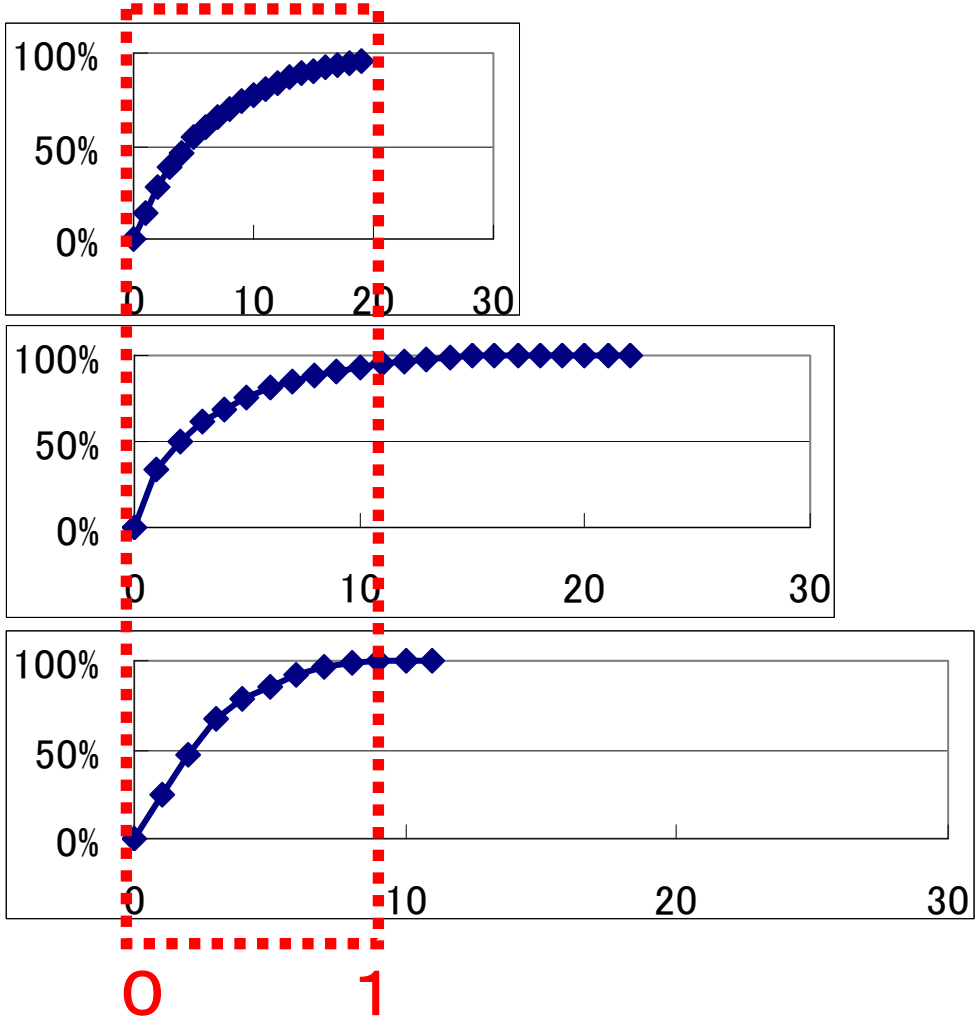


2.5 Quantifying method

The analysis subject is determined by the area which shows as many obtained data as possible

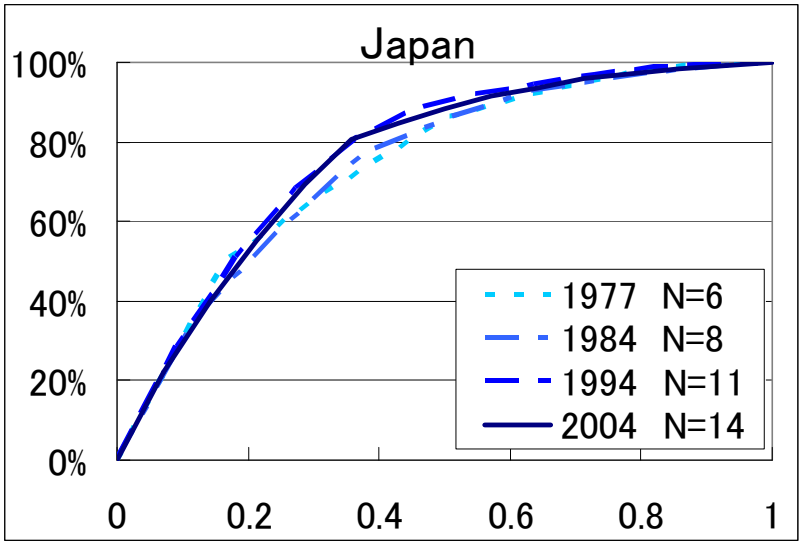
Comparative analysis by enclosed cumulative curve

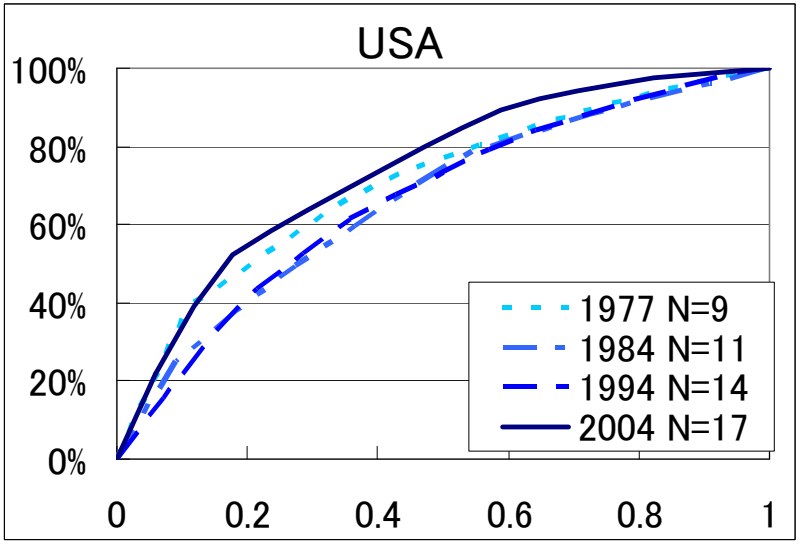
→solution for Problem2: Definition of analysis area

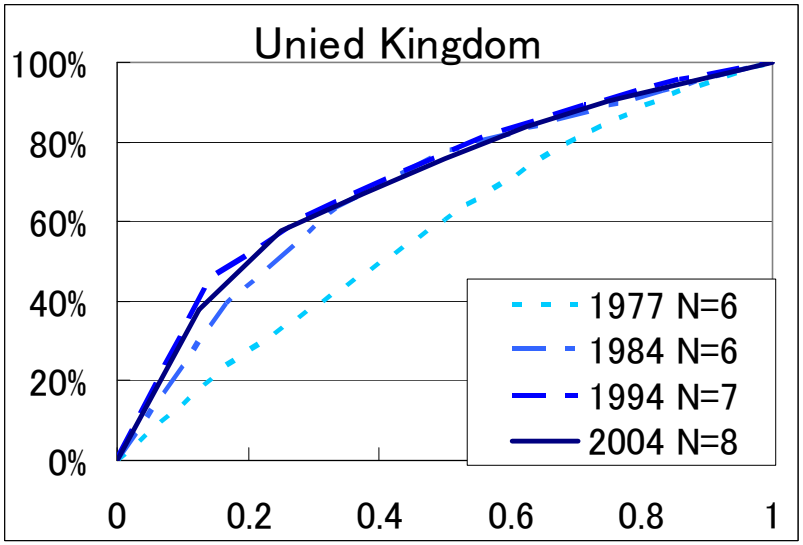


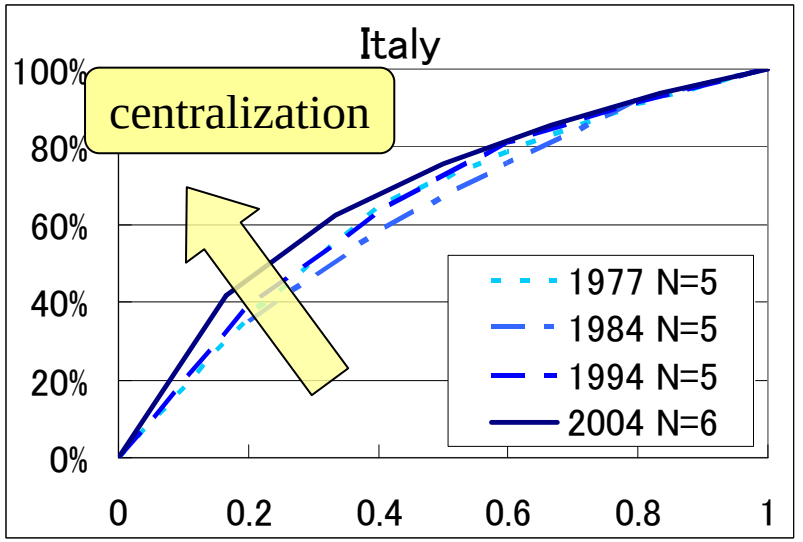
3.1 Normalized Cumulative Curve

considering countries scale









3.2 Indicator of Concentration

- Gini Coefficient: GC

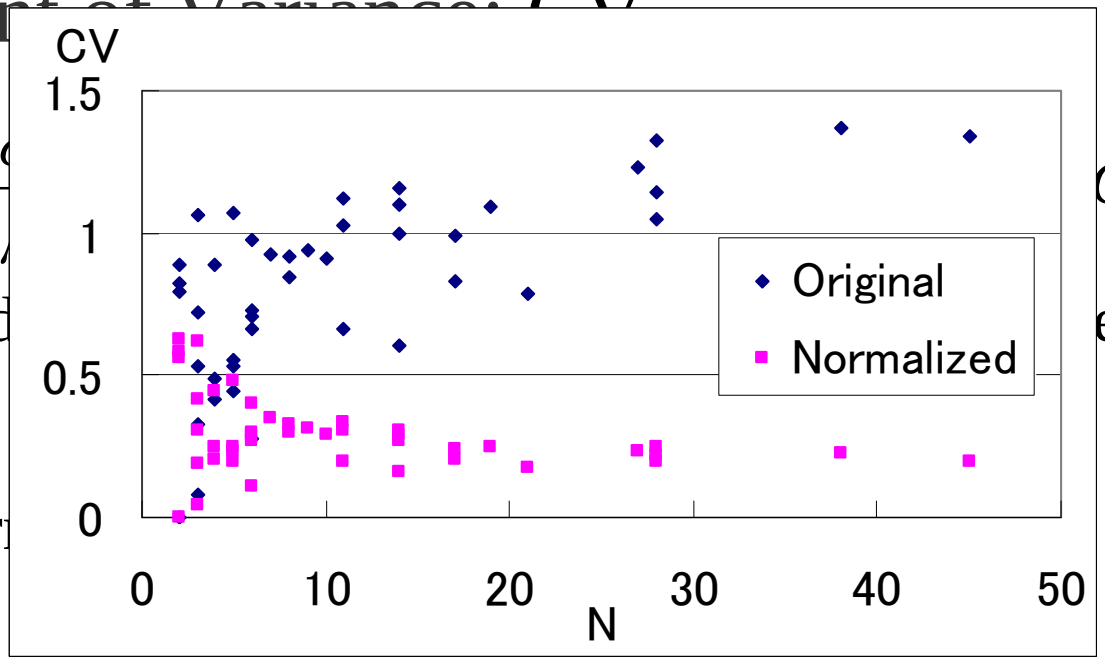
  0(de-concentration)≦ GC ≦1(concentration)

- Coefficient of Variance: CV

$CV = \frac{\sigma}{\mu}$ $O\left(\sqrt{N}\right)$

CV should e number of ports N

nor

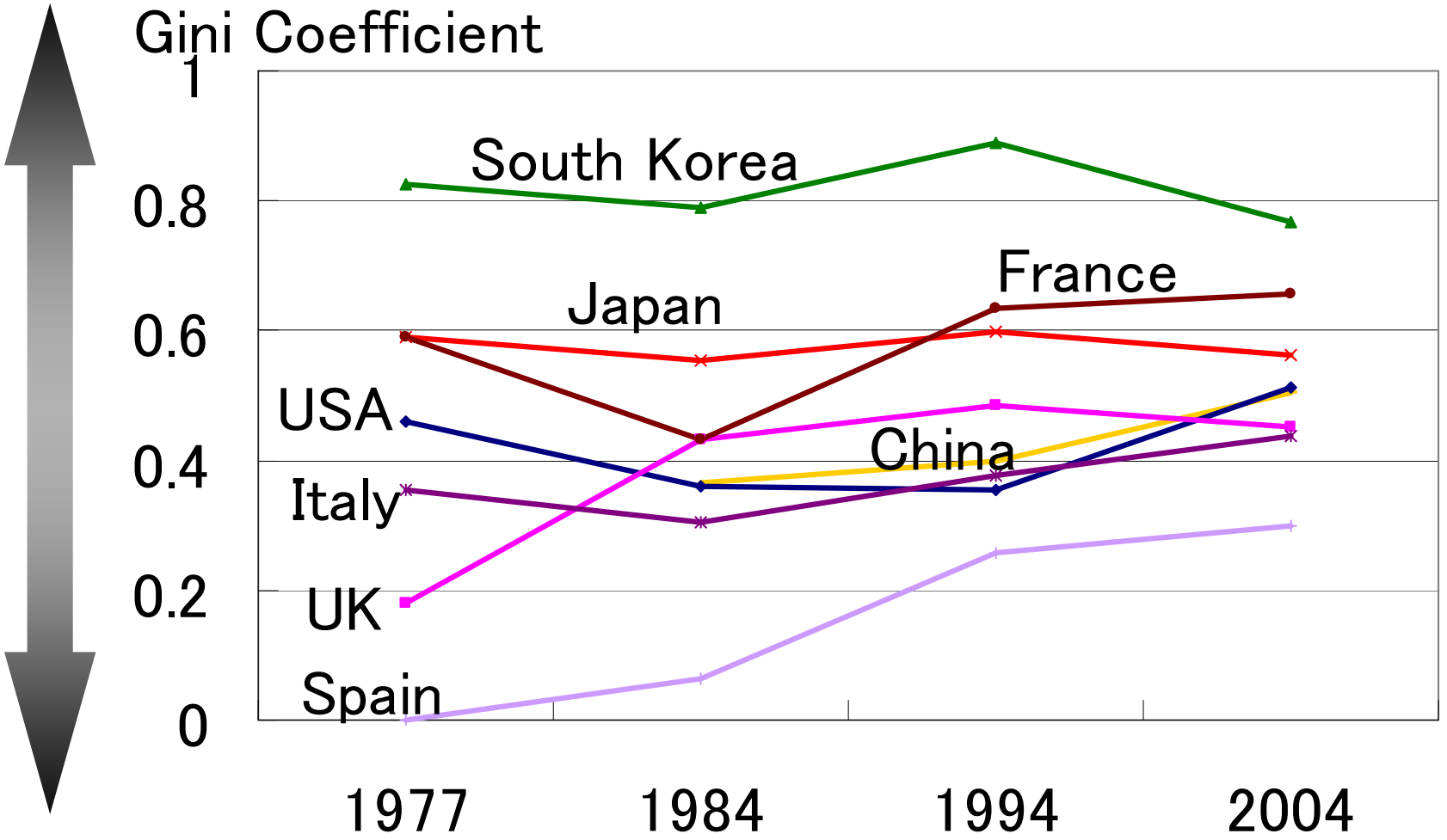


- HHI (Herfindahl Hirschman Index) : square sum of share

normalized HHI= HHI × N

3.3 Each Countries Shift by GC

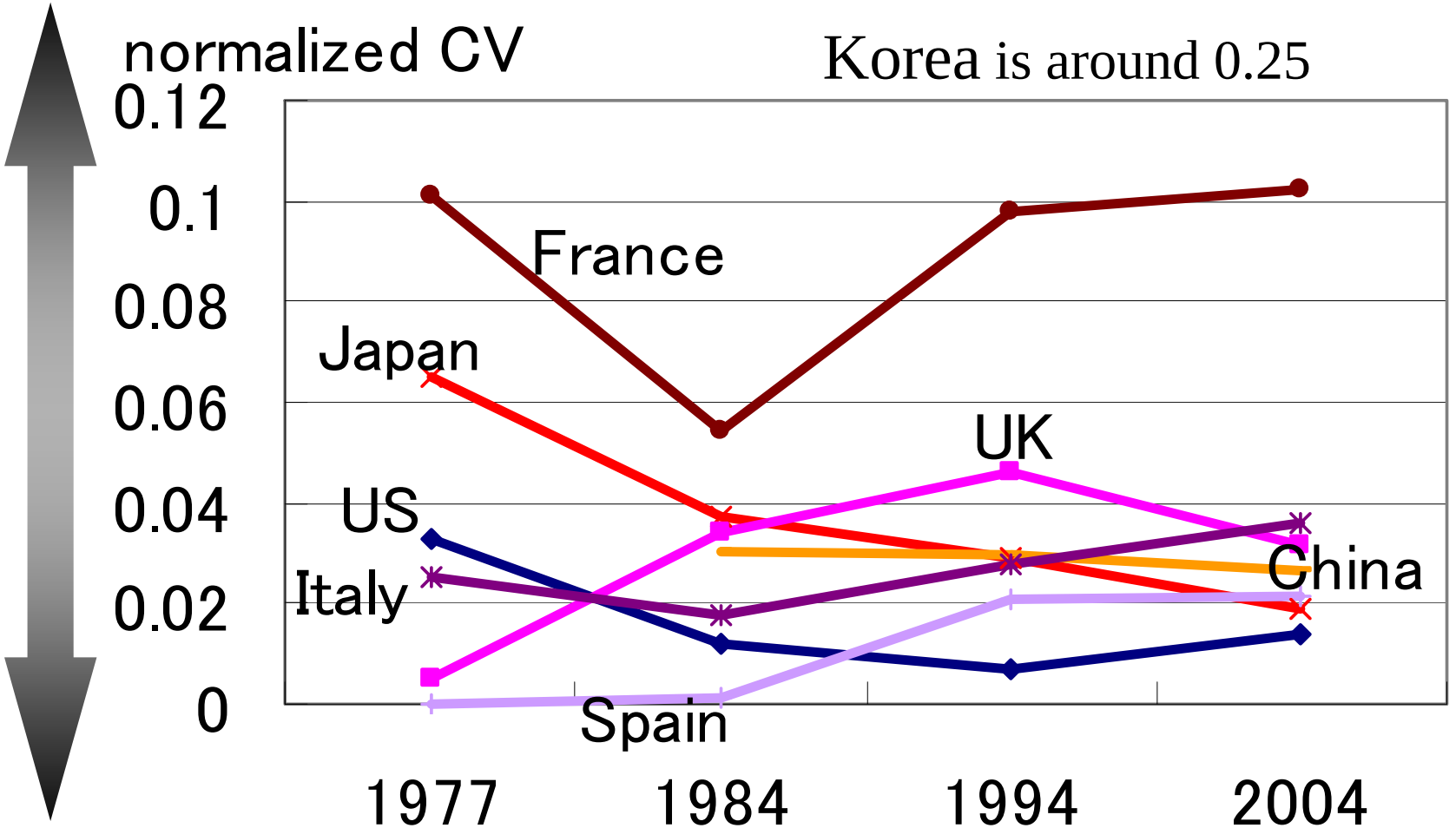
Concentration



De-concentration

3.4 Each Countries Shift by CV

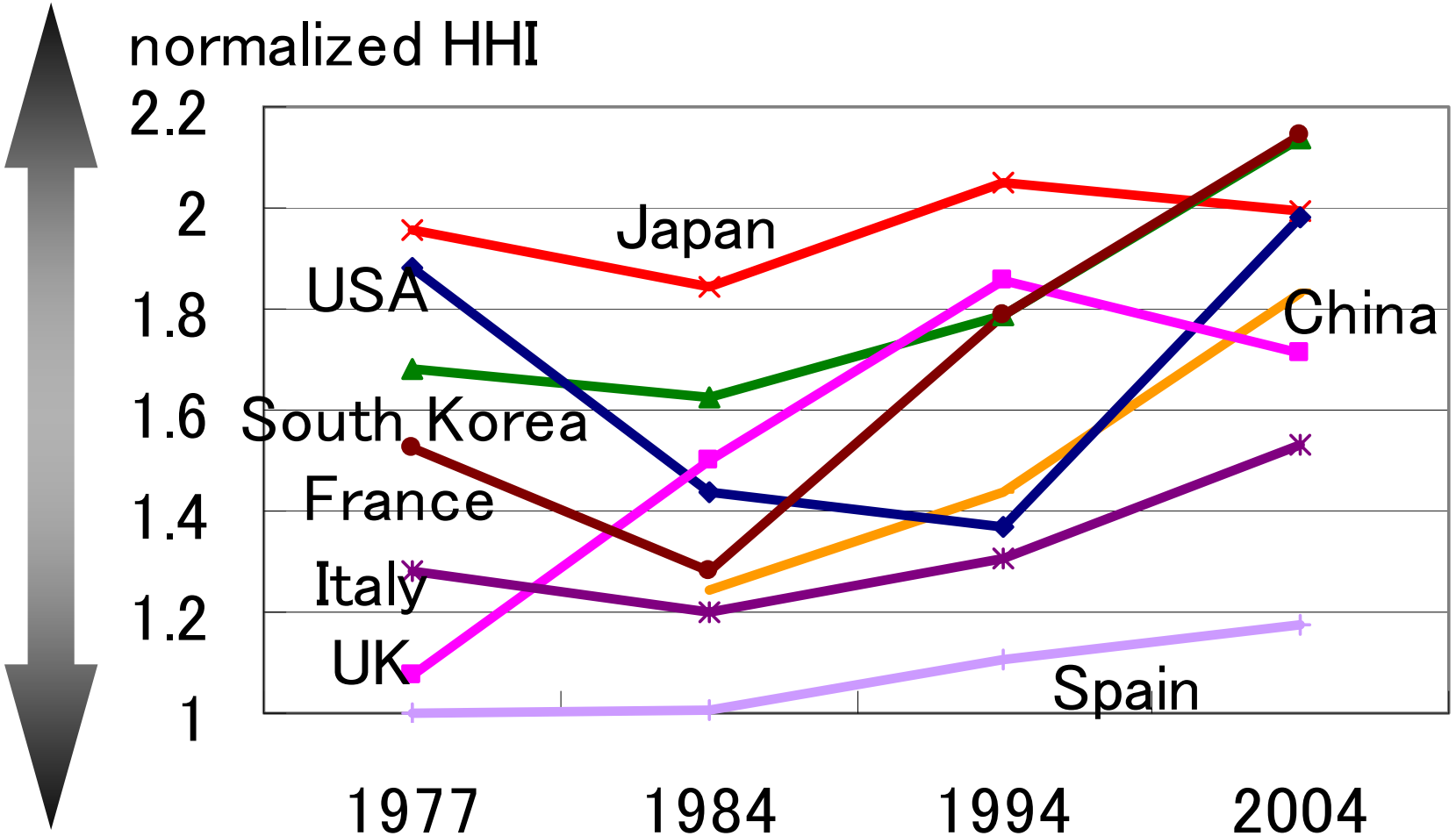
Concentration



De-concentration

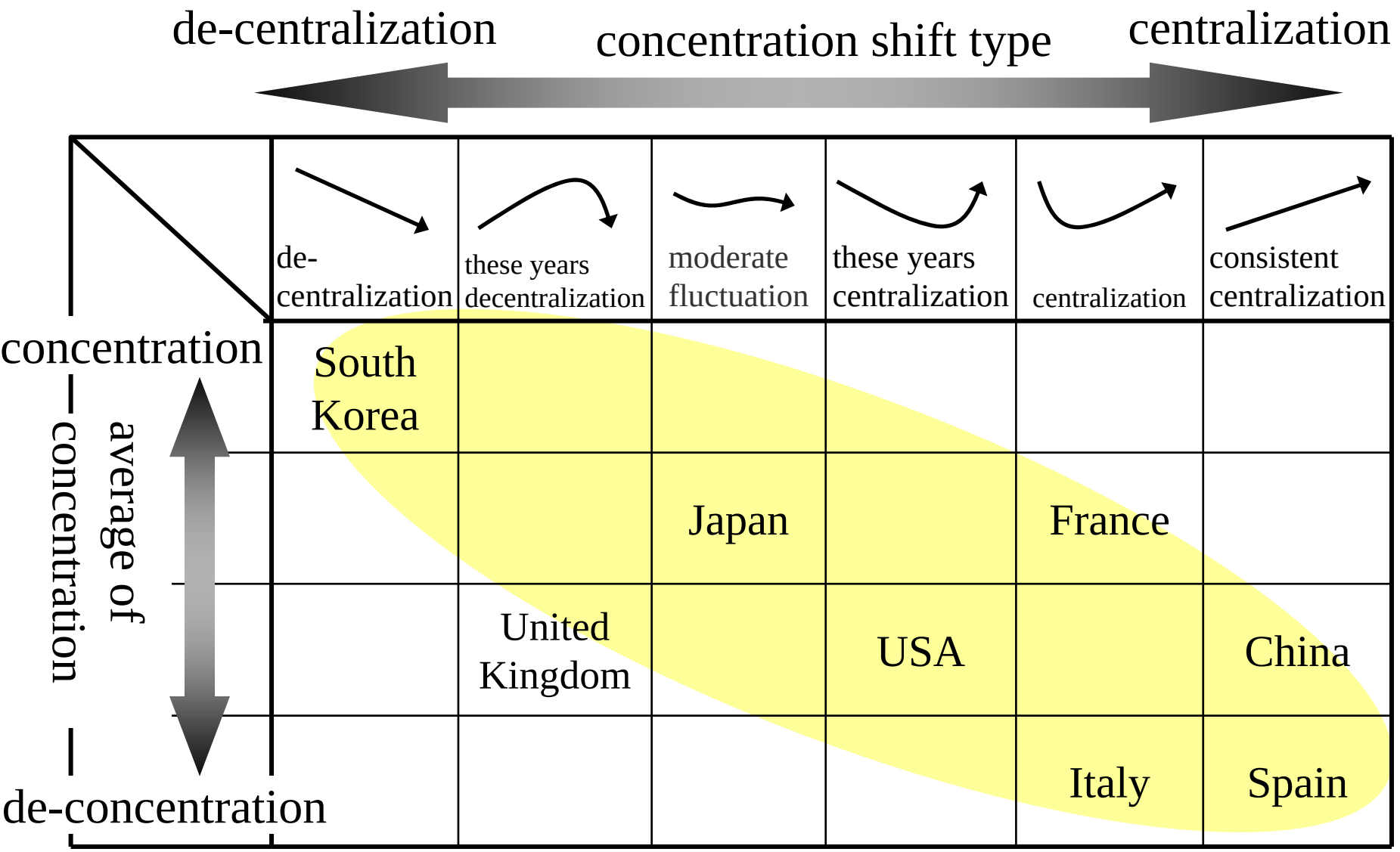
3.5 Each Countries Shift by HHI

Concentration

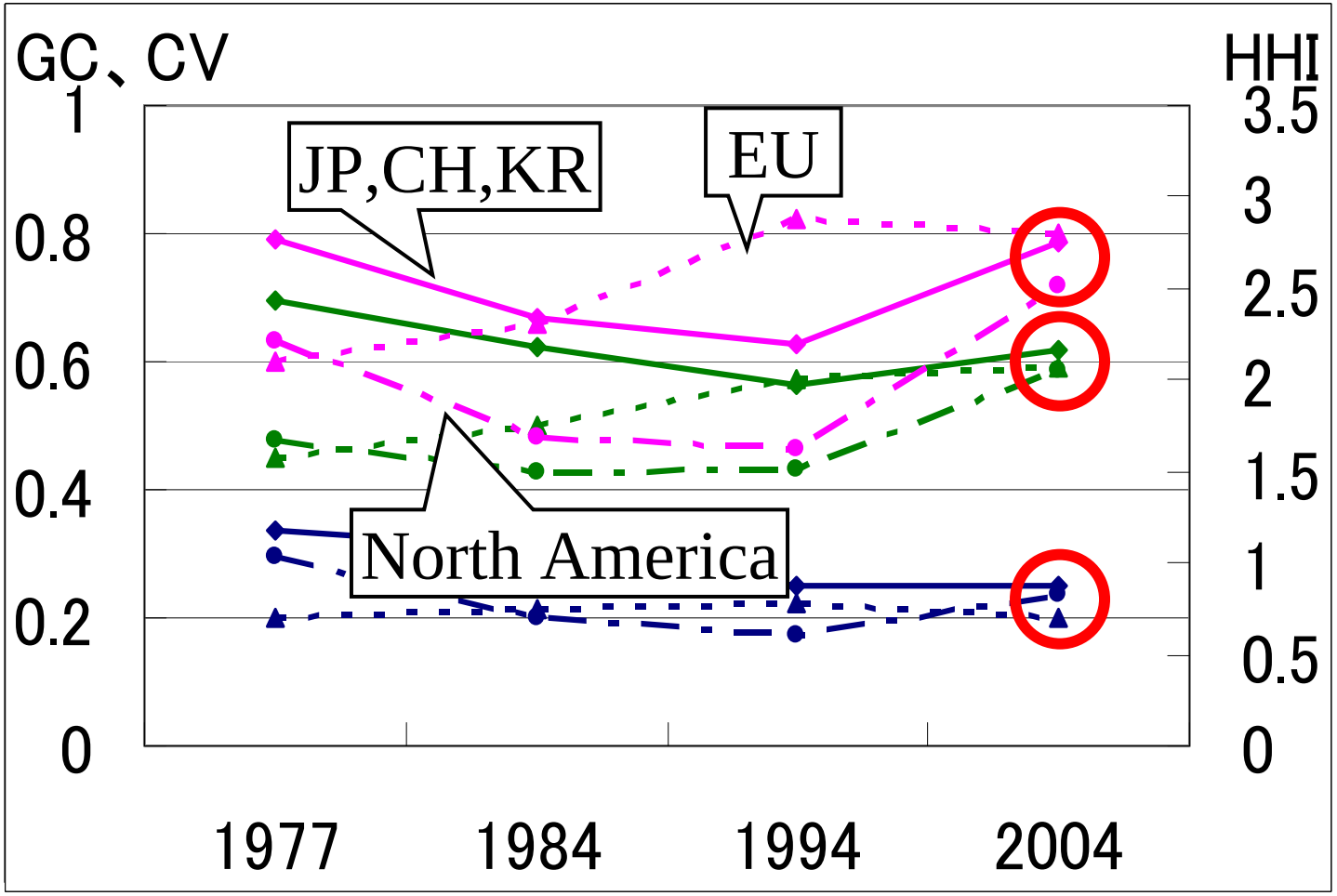


De-concentration

3.6 Classifying Countries by GC



3.7 Each Area's Shift



Globalization of the stock that is ports

4 Conclusion

1. Establishment of the method of quantifying the level of container ports concentration, considering country's scale

   →comparable internationally and temporally

2. Classification of countries on the basis of concentration shift type

3. Finding that the levels of concentration in each area are converging

   → Globalization of stock