

Ishikawa, Toshiharu; Wall, Rickard

Conference Paper

A hypothesis and an inspection on location polarization of economic activity and population due to globalization

51st Congress of the European Regional Science Association: "New Challenges for European Regions and Urban Areas in a Globalised World", 30 August - 3 September 2011, Barcelona, Spain

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Ishikawa, Toshiharu; Wall, Rickard (2011) : A hypothesis and an inspection on location polarization of economic activity and population due to globalization, 51st Congress of the European Regional Science Association: "New Challenges for European Regions and Urban Areas in a Globalised World", 30 August - 3 September 2011, Barcelona, Spain, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<http://hdl.handle.net/10419/119992>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

A hypothesis and an inspection on location polarization of economic activity and population due to economic globalization

R.WALL

Department of Economics
Blekinge Institute of Technology
371 79 Karlskrona
Sweden
e-mail: rickard.wall@bth.se

T. Ishikawa

Faculty of Economics
Chuo University
Hachioji Tokyo 192-0393
Japan
e-mail: ishiy@tamacc.chuo-u.ac.jp

Abstract

In response to economic globalization many manufacturing firms fragment their production processes into small blocs. The fragmented blocs are scattered to the sites suitable to their production characteristics. These location changes alter not only economic composition of individual cities but also spatial organization in urban systems. This paper, first, proposes a theoretical hypothesis that sheds light on the influence of the globalization on altering urban systems. This hypothesis explains a mechanism that a few major cities attract more workers and consumers; some medium cities from which production processes and large retail stores outflow decrease in volume of economic activity; and many small cities entering the fragmented processes are characterized by a single manufacturing industry and small retailers. As a result of the globalization, the distribution of economic activity has been changed among cities so that many urban systems become composed of a large and diversified city and many small and simplified cities. Secondly, the present paper tests the hypothesis above by analyzing the distributions of the employees of manufacturing, retailing, finance sectors, and population of all cities in Japan and Sweden in 1990s. It is shown in this inspection that medium scale cities lose their vitality in the production and retail activity; due to these cities' decay, location distributions of economic activities are divided into a large city and many small cities. It is also elucidated in this analysis that the distribution of production activity in the urban systems in existing industrial area has a tendency to be relatively leveled, while the distribution in the urban systems in local area is relatively converged toward a large city. These results from the inspection seem to be consistent with the essence of the theoretical hypothesis.

Key words: Globalization, Fragmentation, Market area, Urban system, Spatial organization

JEL: R30

I Introduction

Tariff reduction, deregulation and declining transport costs have been promoting integration of many local markets to establish a large spatial market. The large market covers almost the entire continent so that the term of globalization has become a common word in the world. The globalization influences the economic activities of individual cities but also spatial economic organization of many countries: It induces a harsher price competition among manufacturing firms and raises in turn a cost competition between strong manufacturing firms survived the competition. To cope with the cost competition these firms fragment their production processes into small blocs to reduce total production costs. These processes are scattered from the existing industrial area to the sites suitable to their production nature. Meanwhile, these fragmented processes are governed by the supervising function in order for them to successfully operate in the firm's production chain. This function involves various kinds of the supporting facilities which are concerned with the information, logistics, and finance activity. These facilities concentrate at a few large cities in order to utilize various kinds of labors.

Similarly, in the retailing sector the locations of the sales facilities are rearranged in response to a new emerging sales environment and changing consumers' taste which have been accelerated by the globalization: Many large and medium scale retailing stores in a few major cities expand the selling area in order to cope with increasing consumers who attach importance to variety of goods. Contrarily, some of medium scale stores at the middle-sized cities reduce their goods assortment to deal with more daily commodities since these cities cannot attract adequate potential consumers from surrounding area. While small retailing firms in small cities keep their operations by providing daily goods in small market area in regions.

These changes in both the manufacturing and retailing sector contribute to alter the economic structure in urban systems: A few major cities become larger and more diversified in the economic organization. Some middle-sized cities from which production processes and relatively large retail stores outflow decline the volume and vitality in both production and retail industry. Many small cities dealing with daily commodities do keep status quo, and some small cities entering production processes are characterized by a single industry. The spatial economic structure of in the urban systems¹ is greatly changed by the globalization.

On the one hand, the globalization contributes to alleviate economic disparity among workers and cities by widely diffusing production processes across regions. Many of the cities entering production processes have an opportunity to vitalize their economic activity. On the other hand, it widens the disparity among workers and cities. Because the sorts of job are polarized into two groups, simple and complicated ones, the wage rates of the two groups become different. Thus,

¹ The importance of the urban system in regional economy is pointed out many scholars, for example, see Capello (2007).

the globalization makes the economic organization in the urban system complex and often creates a cause of social problems in the world. It is one of the important steps for the improving the regional society to clarify the mechanism in which the globalization changes the spatial economic structure in the urban systems.

The paper is organized as follows. Section II explains the location changes of manufacturing factories and the retail stores in response to the globalization, and it proposes a hypothesis that elucidates the mechanism in which the distribution of economic activities in an urban system is divided into a large city and many small cities. In Section III the attempts to test the hypothesis are conducted by the empirical analysis of cities in Japan and Sweden. The inspection reaches the evaluation that the results obtained from the tests are consistent with the essential contents of the hypothesis. Section IV summarizes discussion.

II A hypothesis of location changes of economic activities and population

1 Distribution of production activity in urban system

1-1 Location change of production processes due to globalization

When the economic barriers separating a local market from other markets are taken down, while manufacturing firms have a chance to sell their goods to other local markets, the firms are exposed to the risk that similar goods produced by the outside are sold in their own markets. Demolition of the barriers induces a mega-competition among the firms in the large market. This competition expels many frail firms from the market, and it raises a new harsher competition between the survived firms. Since the price of goods plays a crucial role in this competition, the manufacturing firms become to lay much more stress on the strategy to reduce the production costs. A primary strategy is to subdivide the production process into small blocs. Because this subdivision simplifies the operation of each production bloc, it becomes easy to enjoy economies of scale in the process by introducing machineries. And this subdivision facilitates the usage of a number of unskilled labors with low wage rates in factories. The manufacturing firms, therefore, fragment the production processes into small blocs to achieve the lower total production costs.

Since fragmented processes become small and simple, they are easily moved in the long distance. The firms can shift many of processes from the existing site to other places with low-wage labor or low land rent. As a result, many fragmented production processes are scattered across regions. It implies that the globalization changes the existing location patterns of the factories by the subdivision of the production processes.

Meanwhile, the fragmented processes scattered across regions must be linked by the supervising function. This function is managed by many high-skilled workers able to

use advanced knowledge and familiar with the contents of the entire production processes. Because the supervising and management functions need various kinds of supporting businesses which employ many sorts of experts with high-wage rates, they are concentrated in the same large cities. In addition, it is worth to notice that since various kinds of workers are concentrated at a large city, the large city becomes not only a larger labor market but also a larger consumer-goods market: The large cities thus attract many diverse and market-oriented industries so that they become larger and more diversified.

1-2 Change of spatial production structure in urban system

Traditionally, the manufacturing firms located their factories in large and medium scale cities in the industrial area where the factories could enjoy a variety of scale economies. By the progressing globalization some fragmented production processes move out of the large and medium scale cities to small cities and/or to cities in local areas. Corresponding to this location change, urban systems are altered: Although large cities lose fragmented processes, it can maintain or increase in its economic volume and diversity since it attracts the supervising functions and the market-oriented industries. Meanwhile, the medium scale cities lose many fragmented processes to other areas, and they reduce the production activity if these cities do not have any attractiveness specific to them. Small cities in which the fragmented processes flow have an opportunity to vitalize their economy, and their industrial structure is characterized by almost a single industry. It is thus said that due to the globalization, the production activity in medium scale cities is reduced, while a few large cities and many small cities become to play a more important role in supporting the production activity in the urban systems.

2 Distribution change of the retail activity in urban system

2-1 Location change of the retail firms due to the globalization

In order to examine the effects of the globalization on the urban system from the viewpoint of the retailers' location, it is useful to classify the retailing stores into three groups according to the selling style and the nature of goods. The retailing firms can be classified into the convenience store, the supermarket store, and the medium scale department store. Each kind of store is characterized as follows. Convenience stores sell low-price goods, and they are primarily utilized by consumers for the convenience of them. Supermarket stores are available to consumers for the purpose of purchasing daily necessities where the criterion of purchases is the price as well as customary preferences. Middle-sized department stores attach importance to supplying full good assortments to

consumers who focus on the preference, quality and design of goods rather than the price level.

Now, the globalization makes it easy to move goods in the long distance so that much more diversified goods can be supplied to consumers. Naturally, consumers have a trend to choose a certain goods out of the wide selections. This trend affects the retail firms' inventory strategy. Especially, the medium scale department stores make efforts to increase in the level of variety of goods as much as possible. And the trend which consumers prefer to variety of goods leads consumers to a large city where consumers enjoy more variety in their shopping. The medium scale department stores in large cities easily expand their selling area in order to cope with the consumers' taste, while some of the medium scale stores in the middle-sized cities face the risk to reduce their retail functions to deal with daily commodities like supermarket stores. Because the middle-sized cities cannot absorb potential consumers which are needed to sustain the department store. While, many convenience stores continue to operate retail activity by providing consumers with daily goods². It is said that the globalization damages the not only manufacturing activities but the retailing ones at medium scale cities. As a result, many urban systems laid in regions are composed by a large diversified city and many small simplified cities.

2-2 Location change of the retail firms due to expanding market area

Decline of the transport costs, which is the strongest engine to progress the globalization, influence on the operation of the retail firms located at cities. This subsection thus analyzes the effects of the reduction of the transport costs on the equilibrium market area of the retailers in order to show the mechanism of the decline of tertiary industry of the middle-sized cities.

2-2-1 Framework of analysis of the retailer's market area size

A market area size of a retail firm under free-entry competition is firstly examined, and then, the examination will be expanded to cover three kinds of the retailers, convenience store, supermarket store, and medium sized department store.

The analysis of the retailers' markets is implemented under following assumptions.

(I) Consumers live evenly in area with density D . They have liner demand function:

$$q = a - p_f - tu \quad (1)$$

²² If consumer density in a market area falls, some stores in small cities also disappear since they cannot maintain the necessary market size.

where q is quantity demanded, a is the maximum reservation price. p_r is price of goods. t is the transportation cost per mile, u is distance from a consumer to a retailer.

(II) All consumers should be supplied with goods and the profits of the retailers should be equal. The retailers must have the same market area: Hexagonal market area is assumed. Under the assumptions of (I) and (II), quantity sold by a retailer in a market is expressed DQ_r , and Q_r is derived by equation (2),

$$Q_r = 12 \int_0^{\pi/6} \int_0^{U/\cos\theta^*} (a - p_r - tu) u du d\theta \quad (2)$$

where U is the radius of the inscribed circle of market in question. The value of θ^* is 30° . Then, equation (2) is rewritten as

$$Q_r = 12U^2 \left(\frac{1}{2 \cdot 3^{0.5}} \right) ((a - p_r) - 0.2027tU). \quad (3)$$

(III) Retailer's cost function is given by equation (9),

$$C = k DQ_r + F_r. \quad (4)$$

where C is total cost, k and F_r are marginal cost and fixed cost, respectively. Profit of a retailer Y_r , therefore, is given by equation (5),

$$Y_r = (p_r - k) DQ_r - F_r. \quad (5)$$

(IV) Retailer sets price to maximize its profit. The price is obtained by equation (6),

$$\frac{\partial Y_r}{\partial p_r} = (p_r - k) \left(\frac{d Q_r}{d p_r} + \frac{\partial Q_r}{\partial U} \cdot \frac{dU}{d p_r} \right) + Q_r = 0 \quad (6)$$

(V) Since market is under free-entry, new retailer enters the market until the retailer's profit becomes zero. Thus equation (7) should be satisfied in free-entry equilibrium,

$$Y_r = (p_r - k) Q_r - F_r / D = 0 \quad (7)$$

The free-entry equilibrium conditions are shown by equations (6) and (7). Solving simultaneous equations (6) and (7) with respect to U and p_r gives an equilibrium

market size and price. The value of dU/dp_r in equation (6) is depend on the relationship between the retailers: the value is determined by equation (8),

$$dU/dp = (dp'/dp - 1)/2tR_h, \quad R_h = 2/3^{0.5} \quad (8)$$

where p' is the price of the most distant firm among the neighboring rival firms. dp'/dp_r is the conjectural variation of price. When dp'/dp is equal to zero, the Nash equilibrium is derived, if the value is 1 and -1, the Lösch and Greenhut-Ohta equilibrium is obtained, respectively³. The competition styles greatly affect the equilibrium values.

2-2-2 Relationship between the retailers' forms and competition styles

The values of the conjectural variation of price can be linked with the competition styles among retailers: In the competition between the convenience stores, the difference in the retail prices is easy known to every retailer and the difference is quickly broken down by the retailers. Thus, this competition can be corresponded to the Lösch type. In the competition between the supermarket stores, it takes some time for them to arrange the price difference. Thus, when the retailers change their price, they usually infer that the rivals' price would remain the same level. This competition is linked to the Nash type. In the case of the medium scale department stores, they do not immediately response the price difference from the rivals since the customers of the departments are not sensitive to the price difference, but they relatively lay stress on preference and the brand of goods. If the department stores behave to seek for maximizing profits, it is consistent for them to infer that rivals raise the price by a unit when the store lowers its price by a unit. This completion is linked with the Greenhut-Ohta type⁴.

2-2-3 Change of the price and market area due to reducing transport costs

As shown by Ishikawa-Toda (1998), the market size of the retailers relies on the competition style when transport costs fall. Table 2 shows the changes of the equilibrium market sizes for the three competition styles by using the radius of the inscribed circle of the market area when the transport costs falls from 1.4 to 0.2, assuming that $F=0.05a^4$, $k=0$, $D=1$ for three styles. If the Lösch type prevails in the market, lower transport costs imply smaller market area. In the cases of the Nash and Greenhut-Ohta types lower transport costs imply, first, smaller market area before leading to larger market. If the Greenhut-Ohta competition established in the market, the

³ See Capozza and Van Order (1978) and Ishikawa-Toda (1990).

⁴ See Schöler(1993).

market area size is considerably larger than the initial size when the transport costs per mile is very low.

Because the fixed costs and the maximum reservation price are different between convenience store and department store, the differences between the prices and sizes become much larger than those shown in Table 1.

Table 1 Changes of market area size, U, due to reducing transport costs per mile

t	Lösch	Nash	Greenhut-Ohta
1.4	0.3891a	0.3945a	0.4095a
1.2	0.3346a	0.3499a	0.3798a
0.4	0.2591a	0.3633a	0.4382a
0.3	0.2539a	0.3878a	0.4723a
0.2	0.2490a	0.4304a	0.5293a

2-2-4 Characteristics of the competition styles

According to the above results of the market size changes, the characteristics of these competition styles are summarized as follows:

- (1) Lösch competition is the style to induce the new competitor to the market. Because this style makes the necessary market size smaller, it offers the market space to new retailers in the goods market area.
- (2) Greenhut-Ohta competition is the style to expel the existing competitor from the goods market. Because this style makes the necessary market size larger, it does not give the space for the existing retailers enough to survive in the goods market.
- (3) Nash competition style has the both characteristics which the Lösch and Greenhut-Ohta competition possesses, respectively.

2-2-5 Polarization of the location distribution of the retailing firms

As transport costs fall, the market areas of medium department stores, which belong to the Greenhut-Ohta competition style, become larger. The expansion of these market areas decisively alters the location pattern of these stores, and gives a crucially important impact on the retail structure of the urban system. If the market areas of these stores must be expanded to maintain their operation, the stores at large cities are relatively ease to enlarge their market area to the necessitated size since large cities have some ways to attract potential customers. But, since middle-sized cities do not have the same attraction power as large cities, department stores in the middle-sized cities do not easily secure necessary market area. Some of them then are forced to reduce the

retail function to deal with more daily commodities, and others disappear from these cities. Because medium scale department stores often have played a representative role in the tertiary sector of the cities, the decay of these stores seriously damages the retail activity in the cities, Due to this decline, the location distribution of the retail firms becomes divided into a few large city and many small cities. It thus can be said that the globalization generates many urban systems which are composed with a large city providing a variety of goods and many small cities dealing with daily goods.

3 A hypothesis on change of distribution of economic activity in urban system

It is possible to establish a hypothesis that the globalization weakens the manufacturing and the retailing activities in the medium-sized cities: Due to their decay, the distribution of economic actives and population in urban systems is divided into two parts, a large city and many small cities: As a result, a many urban systems are composed with a large and diversified city and many small and simple cities.

In this context, it is worth to notice the following facts: The globalization alters the locations of the production processes and the retail stores. The geographical removal distance of the production processes can be much longer than that of the retail facilities. Hence, while the effects of the change of the retail stores on the economic structure go in an urban system, those of the production processes go beyond the several urban systems. The globalization changes the economic organization in urban system in different ways.

III An inspection of the hypothesis

1 A test of the hypothesis by an empirical analysis

In order to test the above hypothesis, the following two issues are inquired by using the data of Japan and Sweden in 1990s.

1) Assuming that the country as a whole is covered by an urban system, it is inquired how the medium cities' shares of labor and population declined in ten years. The numbers of labors of three sorts of sectors, manufacturing, the retailing, and the finance/insurance are used in this examination⁵.

2) Even if the above inquiry clarified that medium cities lost the shares of labors and population, and the distributions of labors and population in regions were divided into a large city and many small scale cities. But there would be a question whether these

⁵ The data of Japan are provided by the data book (Toyo keizai, 2002) and the census of Japan (Statistics Bureau, Ministry of Public Management in Japan 1990 and 2000). The data of Sweden are cited from Statistics Sweden.

distributions in a region are biased to a large city or they are leveled between cities. This question is examined by using the quotient of convergence, QC (The derivation method of QC is shown in Appendix.).

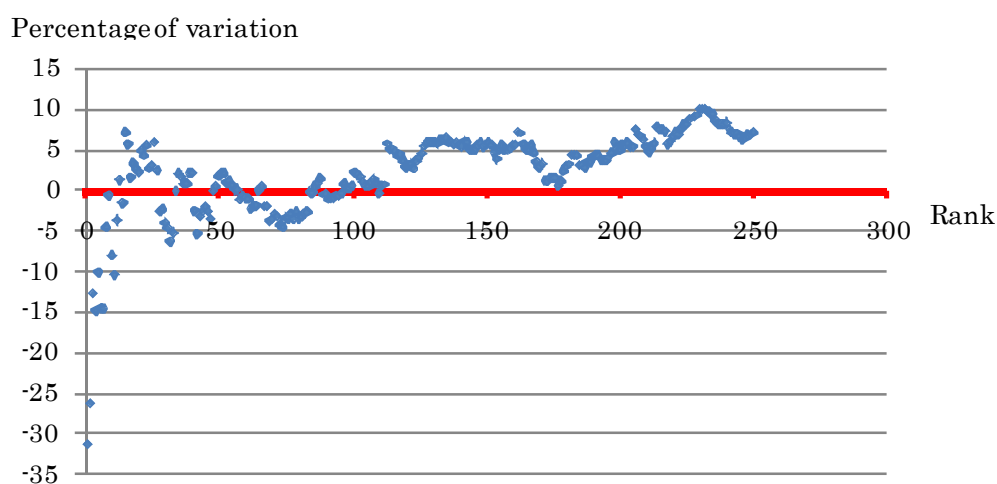
1-1 Decline of economic activity in medium cities in Japan

1-1-1 Reduction of medium cities' shares of manufacturing labors

The examination of the decline of the medium cities' shares of the manufacturing labors in Japan is conducted as follows. There are cities of 659 in Japan as of 1990. (1) The share of labors in the manufacturing sector is derived for each city. (2) The ranking of every city is carried out at order with large share. (3) The same procedures are taken as of 2002. (4) Each ranked city's share variation between 1990 and 2002 are derived. Note that the variation is not derived by the comparison of the two shares of the same city. But it is derived by the comparison of the two shares of the same ranked city.

Figure 2A illustrates the percentage of the share variation of each ranked city in the range from the 1st to the 250th. The range of cities which decrease their shares does not expand beyond the 97th. Although this figure does not cover all cities, every city ranked less than the 98th raises the share of labors of the manufacturing industry⁶. The medium cities decrease in the share of the manufacturing labors, while all small cities increase their shares.

Figure 2A Decrease in the medium cities' shares of manufacturing workers



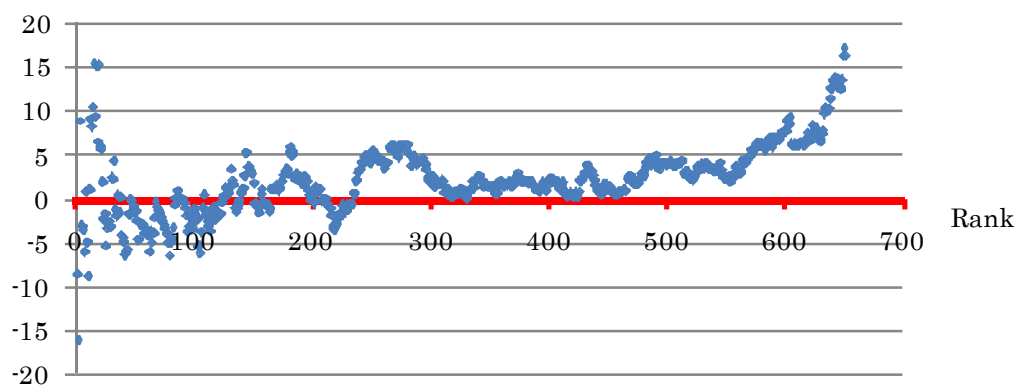
⁶ Herfindahl index of this share is derived as 0.0092 and 0.0061 for 1992 and 2002, respectively. The distribution of the share in Japan becomes to be leveled in 1990s.

1-1-2 Reduction of medium cities' shares of the retailing workers

The share variation percentage of the retailing workers for each ranked city is shown by Figure 2B. It illustrates that the many cities which decrease in their shares are in between the 23rd and the 120th, and there is no city which decreases its share in the range lower than the 238th. The medium cities lost the activity volume in the retail sector as well as the manufacturing in 1990s.

Figure 2B Decrease in the medium cities' shares of the retailing workers

Percentage of variation

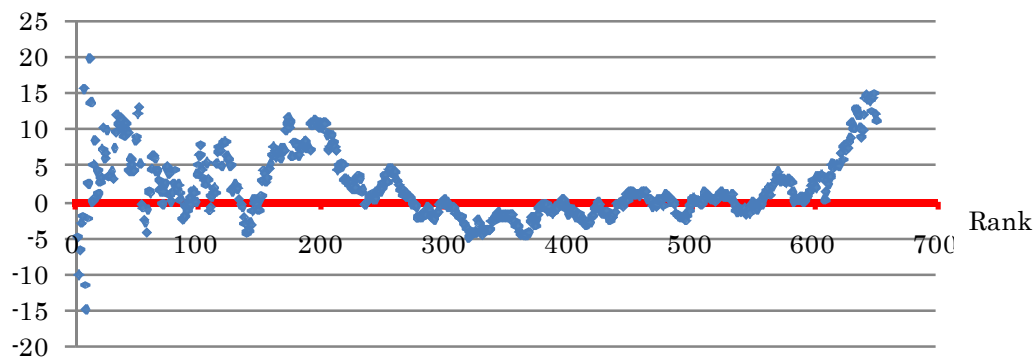


1-1-3 Reduction of the medium cities' shares of the finance/insurance workers

Figure 2C shows the percentage of the increase and decrease of the share of the cities. As shown in this figure, the cities which decrease in the shares are converged to between the 273rd and the 445th. There are 33 cities of which shares decrease in between the 15th to the 150th. The cities which decrease in their share of the finance/insurance workers are almost confined to the middle part of the ranking range.

Figure 2C Decrease in the middle cities' shares of finance/insurance workers

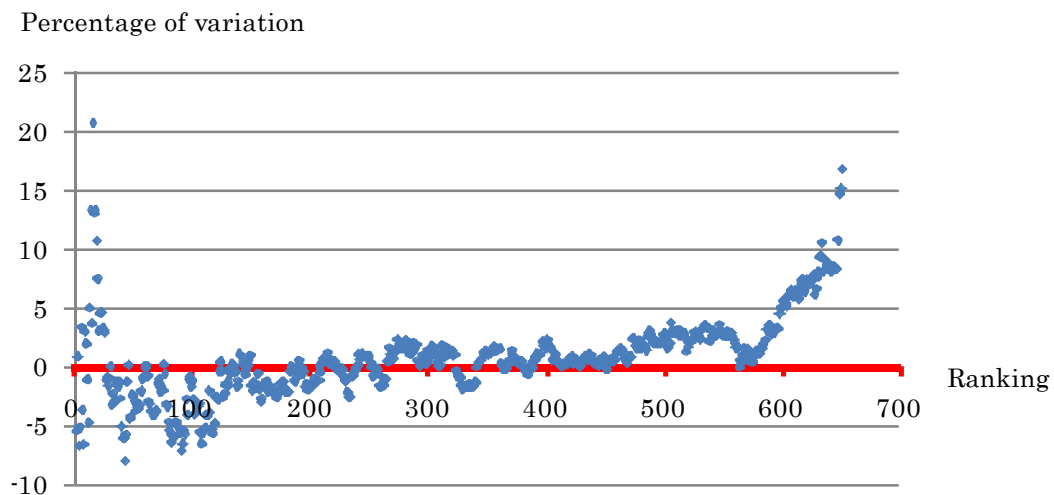
Percentage



1-1-4 Reduction of medium cities' shares of population

Figure 2D shows the share variation percentage of population for every city. Between the 15th to the 250th there are 191 cities of which shares decrease. In the range lower than the 388th there is no city which decreases its population share. The medium cities decreased in the population share as well as the labor shares in 1990s.

Figure 2D Decrease in the middle cities' shares of population



1-2 Distributions of economic activity and population in urban systems

Then, let us examine whether the change of the cities' shares of labors and population makes their distributions converge to a large city or level among cities in urban system. In Japan there are 47 prefectures, and an urban system is laid in each prefecture. And it is possible to classify 24 prefectures into the industrial area and 22 ones to the local area (since Okinawa prefecture is an isolated island, it is excluded from the examination). The 24 industrial prefectures are shown by the black painted area in Figure 3. Thus, it is suitable that the distribution change of the labors and population is examined for the industrial area and the local one.

The changes of the distributions are indicated by quotient of convergence, QC. Lower quotient implies that the distribution is more converged to a large city, higher quotient means it becomes level between cities in an urban system. Table 2 illustrates the average values of QC in the existing industrial area and local area. In addition, Table 2 shows the direction of the distribution changes in the two areas in 1990s, and it indicates the number of prefectures of which the distribution becomes converging to a large city and the number of prefectures of which distribution becomes level among cities.

Figure 3 Existing industrial regions and rural regions in Japan



Table 2 Change of distributions of economic activities and population in Japan

	Existing industrial area	Local area
Manufacturing sector		
Average QC in 1992	0.6096	0.6327
Average QC in 2002	0.6355	0.6305
Variation of Av. QC	+ 0.0258	-0.0022
Number of prefecture, leveling	20	9
Number of prefecture, converging	4	13
Retailing sector		
Average QC in 1991	0.5363	0.5298
Average QC in 2002	0.5426	0.5374
Variation of Av. QC	+ 0.0063	+ 0.0077
Number of prefecture, leveling	16	10
Number of prefecture, converging	8	12
Finance/insurance sector		
Average QC in 1990	0.3761	0.3565
Average QC in 2000	0.3788	0.3569
Variation of Av. QC	+ 0.0028	+ 0.0005
Number of prefecture, leveling	13	10
Number of prefecture, converging	11	12
Population		
Average QC in 1991	0.5531	0.5569
Average QC in 2002	0.5605	0.5543
Variation of Av. QC	+ 0.007	-0.003
Number of prefecture, leveling	18	9
Number of prefecture, converging	6	13

From Table 2, the followings are founded for the three industry sectors and population.

(1) The manufacturing processes diffuse from large cities in the existing industrial area to small cities in this area and disperse to relatively large cities in the local area. As a result, the distribution of the manufacturing labors is leveled in many urban systems in the industrial area. While in many urban systems in the local area the distribution converges to a large city. It is also interesting that the value of QC in local area becomes higher than that of the industrial area in 1990s.

(2) The retail industry in small cities in the industrial area raises the activity standard, while that of the large cities relatively falls. Thus, the distribution of retailing workers in many urban systems in the industrial area has a tendency to become level. While the distribution change of the retailing workers in the local area is evenly divided into the two ways, to converging and to leveling.

(3) The distribution of the finance/insurance activity primarily has a tendency to centralize at the large cities in the nation and the central cities in regions. There is not a remarkable difference in the change of the distribution between the existing industrial area and the local one.

(4) Population distribution of many urban systems in the local area converges to a large city, while in the existing industrial area the distribution has a tendency to be leveled. These trends are almost same with those of the manufacturing industry.

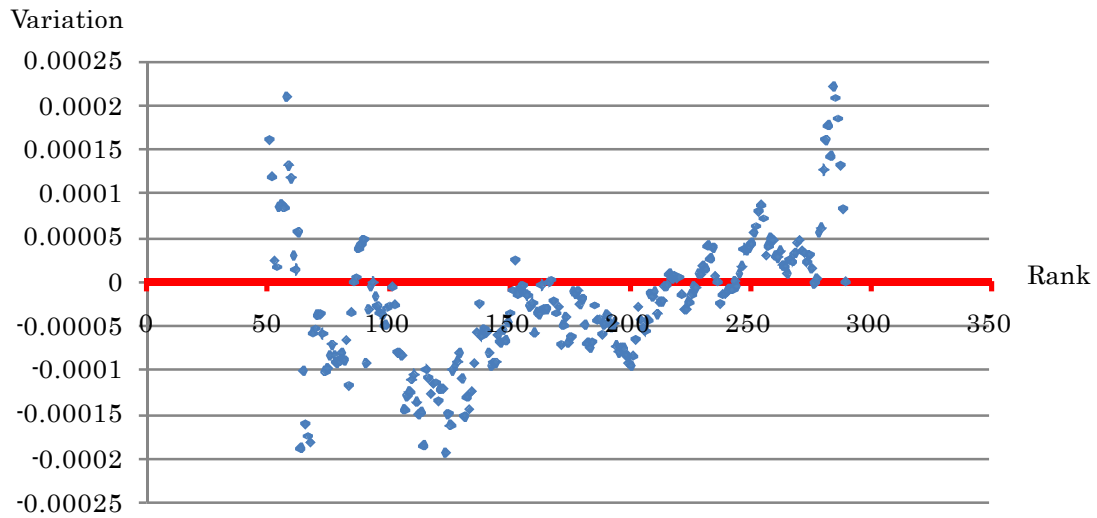
2 A test of the hypothesis by using Swedish data

2-1 Decline of economic activity and population in medium cities

2-1-1 Reduction of medium cities' shares of labors in production sector

Let us examine the reduction of the medium municipalities' shares of the labors in production sector in Sweden. Figure 4A illustrates the share variation of each ranked municipality from the 50th to 289th (Since the share variations are not large, the share variation percentage is not used in this section.). Many of the municipalities which decrease in their shares are in between the 70th and the 228th. Especially, the municipalities from the 100th to the 150th greatly decrease in their shares. While there are 24 municipalities which increase in their shares in the ranking range higher than the 29th and small municipalities ranked lower than the 230th also raise their shares. The medium municipalities greatly decrease in the share of the production workers.

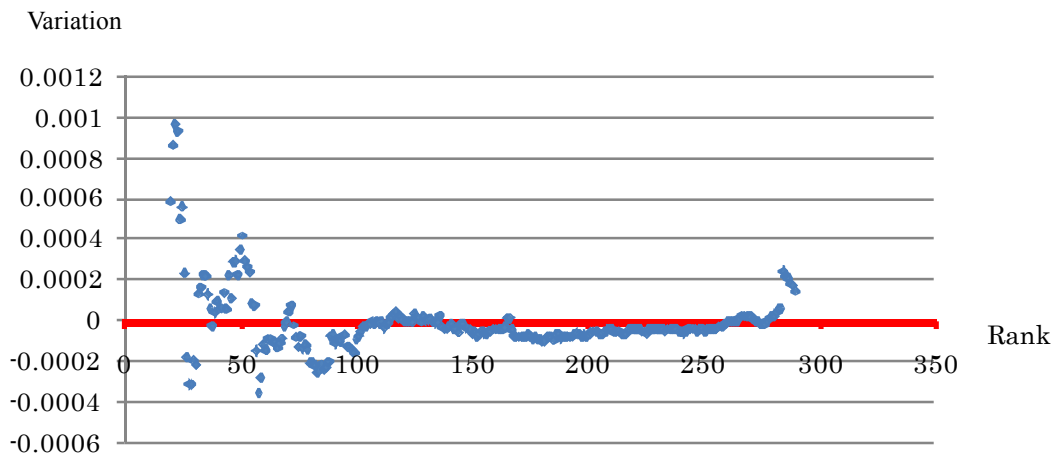
Figure 4A Decrease in medium cities' shares of labors in the secondary sector



2-1-2 Reduction of medium cities' shares of workers in the tertiary sector

Figure 4B, which covers the rank range from the 20th to the 289th, illustrates the variation of each municipality's share of the workers in the tertiary sector. The municipalities which decrease in their share are in between the 60th and the 240th. The decrease of the shares of the municipalities ranked from the 57th to 110th are relatively large compared with others. Many large municipalities increase in their shares, and some of the municipalities between the 115th and the 132nd also increase in their shares. It can be said that the medium municipalities lost the activity volume in the tertiary. But, the variation trend of the tertiary sector in the range from the 100th to the 150th is the opposite to that of the production sector.

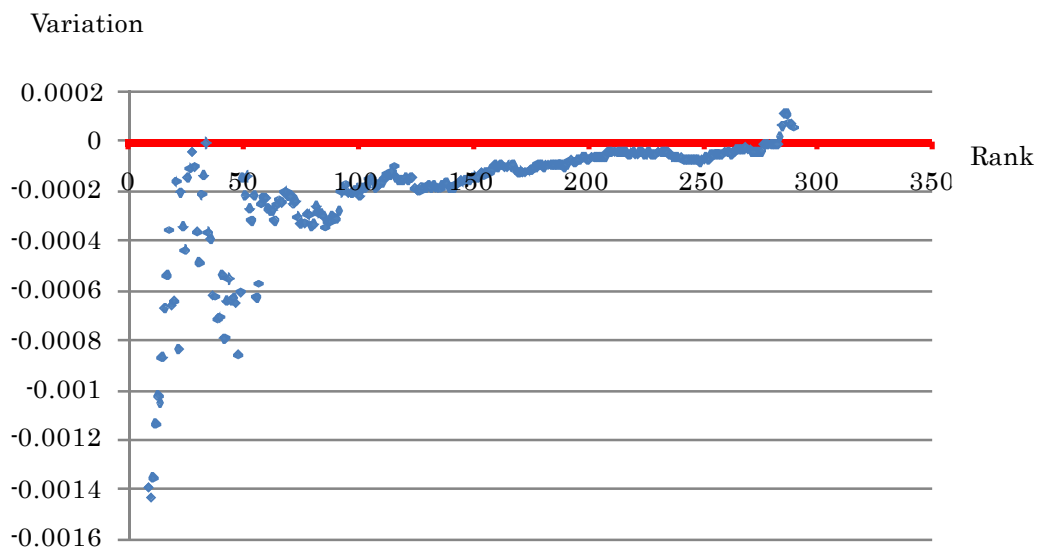
Figure 4B Decrease in the medium cities' shares of workers in the tertiary sector



2-1-3 Reduction of the middle cities' shares of finance/business workers

Figure 4C shows the share variation of municipalities ranked from the 8th to 289th. Between the 8th and the 282th there is no city of which share increases. On the contrary, there is no city of which share decreases in between the 1st and the 7th. As the rank becomes lower, the variation of the municipality's share becomes smaller in the range from the 8th to the 282nd. The reduction of finance/business activity of the medium municipalities is large compared with the large municipalities and small ones⁷.

Figure 4C Decrease in the medium cities' shares of the finance/business workers

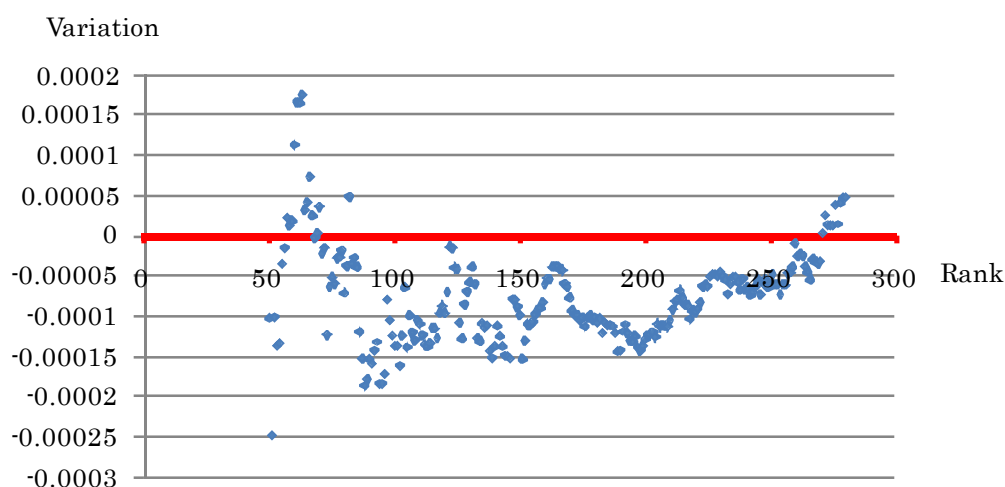


4-1-4 Reduction of the medium cities' shares of population

Finally, Figure 4D shows the share variation of the municipalities which are in between the 50th and 289th. All municipalities from the 71st to the 270th reduce in their shares. Especially, the municipalities in the range between the 71st and the 117th largely decrease in their population shares compared with other municipalities. There are 28 municipalities which increase in the share in the rank larger than the 50th. All municipalities lower than the 271st increase in the share. It is clarified from the examination of the population share variations that the medium municipalities reduce the share of population.

⁷ Herfindahl index of the finance/ businesses is 0.078 and 0.102 for 1990 and 2000, respectively. The value of 0.102 is the highest of all indexes.

Figure 4D Decrease in the medium cities' shares of population



2-2 Distributions of economic activity and population in urban systems

Let us inquire whether the change of municipalities' shares of the number of labors and population in 1990s in Sweden makes their distributions converge to a large city or level among cities in urban systems. There are 21 counties in Sweden. An urban system is laid in each county. Of all counties 13 are classified into the industrial area and 7 counties to the local area (since Gotland is an isolated island, it is excluded in this examination). The industrial counties are located in the southern part of Sweden.

Table 3 illustrates the average values of QC in the industrial area and local one as well as the directions of the distribution changes in the two areas.

The followings are founded for each of the three industries and population.

(1) The production activities diffuse from large municipalities in the existing industrial area to the small municipalities in this area or disperse to relatively large cities in the local area. This trend is the same as that of Japan. In addition, production activities in Sweden are more concentrated at large municipalities than Japanese ones

(2) The tertiary industry in the urban systems in the local area becomes more concentrated at large municipalities, while that of the existing industrial area does not change, it maintains the status quo.

(3) The distribution of the finance/business activity in the industrial area becomes remarkably converged to the large municipalities. Although the average QC in the local area rises, as shown by the number of the counties in the rural area, the finance/businesses sector has a trend to concentrate at large municipalities. These trends are different from that of Japan.

(4) Population distributions converge to a large city in many urban systems in both the

industrial area and the local area. The trend that the distribution of population in the existing industrial area converges to large municipalities is different from Japanese one.

Table 3 Change of distributions of economic activities and population in Sweden

Secondary sector	Existing industrial area	Local area
Average QC in 1990	0.6012	0.5847
Average QC in 2000	0.6078	0.5815
Variation of Av. QC	+ 0.0066	- 0.0032
Number of county, leveling	9	2
Number of county, converging	4	5
Tertiary sector		
Average QC in 1990	0.4596	0.4932
Average QC in 2000	0.4596	0.4828
Variation of Av. QC	0	-0.0104
Number of county, leveling	7	1
Number of county, converging	6	6
Finance/Business sector		
Average QC in 1990	0.3763	0.3983
Average QC in 2000	0.3605	0.4017
Variation of Av. QC	-0.0158	+ 0.0034
Number of county, leveling	4	2
Number of county, converging	9	5
Population		
Average QC in 1990	0.5722	0.6800
Average QC in 2000	0.5640	0.6017
Variation of Av. QC	-0.0082	- 0.078
Number of county, leveling	3	2
Number of county converging	10	5

3 Results of the inspection of the hypothesis

An empirical analysis of the distributions of the labors and population in Japan and Sweden shows that (1) the economic activities of the medium cities are largely depressed, while many large cities and some of small cities relatively raise their activity level. It is, therefore, said that due to the economic decay of the medium cities, the distribution of the economic activity and population in a region becomes divided into two parts, a large city and many small cities. (2) The distributions of the production

activities and population become relatively converged to a large city in the local areas in both Japan and Sweden. On the other hand, the distribution change of population in the existing industrial area is different between Japan and Sweden. The population distribution in the industrial area in Japan becomes leveled among cities, while that of Sweden becomes converged to large cities. In addition, the distribution of the finance activity is different between the two countries. The finance activity in the industrial area in Sweden trends to concentrate at large cities, while the activity is leveled among cities in both areas in Japan.

Although there are some different changes in the distributions patterns between the two countries, the results from the empirical analysis may second the hypothesis that as the globalization makes progress, the distributions of economic activity and population become polarized into a few of large cities and many small cities.

IV Concluding remarks

One of the important economic changes that the globalization raises in regions is to divide the location distributions of the economic activity and population into a few large cities and many small cities. This division causes two different social economic phenomena; on the one hand, it contributes to alleviate the economic disparity between cities since the production processes scattered across regions, on the other hands, it widens the economic disparity between cities as well as workers because the economic activities distributed between the cities are divided into the sophisticated activity and the simple one. As a result, the globalization makes the spatial economic organization in regions complex and often creates a cause of social problems.

In order to solve and alleviate the social problems which concern with cities and workers, it is one of the important steps to clarify and understand the mechanism in which the globalization alters the spatial distributions of the economic activities in regions. This paper proposes a hypothesis from the perspective of the industry's location that explains how the globalization makes the location distributions of production and retail facilities bipolar to a large city and many small cities.

The first inspection of the hypothesis by analyzing the data of Japan and Sweden shows that many medium cities decrease in the number of workers of production, retail, and finance sector compared with large and small cities. While there are some differences between two countries in the distribution change of economic activities and population in the existing industrial area and local area, the results from this inspection are not inconsistent with the essential contents of the theoretical hypothesis.

Appendix Derivation of quotient of convergence (QC)

Coefficient of the divergence (CD) which indicates the divergence of the population distribution to the primary city in a region is derived according to Sheppard (1982).

Assuming there are N cities in a region. Let p_i denote the population share of a city, i for all urban population in the region. Then, equation (A₁) is established,

$$1 = \sum_{i=1}^N p_i \quad (A_1)$$

If there is no *a priori* information on the cities, it is rational to infer that the every city has the same share, $p_i = 1/N$. This inference is derived by maximizing equation (A₂) in the subject to the equation (A₁),

$$H = - \sum_{i=1}^N p_i L_N(i) . \quad (A_2)$$

In the real world there is *a priori* information on the cities. Thus, let i indicates the rank of a city according to its population size, and multiplying i by its share as a weigh and then summing up these values. Dividing it by N gives equation (A₃). The value of K_1 obtained by equation (A₃) is considered as the coefficient of divergence of the population distribution to the primary city in the region.

$$K_1 = (1/N) \sum_{i=1}^N p_i L_N(i) \quad (A_3)$$

If population of the region is distributed equally between cities, the coefficient of divergence is given by the equation (A₄), and the value of this case is notified by K_2 ,

$$K_2 = N^{-2} \sum_{r=1}^N L_N(r) \quad (A_4)$$

In this paper the value which is given by equation (A₅) is named as the quotient of convergence, QC.

$$QC = K_1 / k_2 \quad (A_5)$$

The QC is used as an index which shows the characteristic of the distribution of economic activities between the cities in an urban system.

References

- Capello, R. (2007) *Regional Economics*, Routledge.
- Capozza, D., and Van Order, R. (1978) A Generalized Model of Spatial Competition, *American Economic Review*, 68, pp.896-908.
- Ishikawa, T., and Toda, M. (1990) Spatial configurations, competition and welfare, *Annals of Regional Science*, 24, pp.1-12.
- Ishikawa, T., and Toda, M. (1998) An application of the frontier price concept in spatial equilibrium analysis, *Urban Studies*, pp.1345-1358.
- Schöler, K. (1993) Consistent conjectural variations in a two-dimensional spatial market, *Regional Science and Urban Economics*, 23, pp.765-778.
- Sheppard, E. (1982) City size distributions and spatial economic change, *International Regional Science Review*, 7, 2, pp.127-151.
- Statistics Sweden, <http://www.scb.se>.
- Statistics Bureau (1990, 2000) Census of Japan.
- Toyo Keizai (2002) *Chiikikeizai Soran* (Data Book, in Japanese). Tokyo.