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## Intra-regional Disparity and Municipal Merger: Case Study in Fukuoka Prefecture

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# **Intra-regional Disparity and Municipal Merger: Case Study in Fukuoka Prefecture**

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# **Intra-regional Disparity and Municipal Merger:**

## **Case Study in Fukuoka Prefecture**

### **Abstract**

This study examines intra-regional disparity and municipal merger in Fukuoka Prefecture that is located on the west side of Japan, near the Korean peninsula. The history of the municipal merger is long and many municipal mergers and other self-governing bodies have so far been performed. Especially, after entering in the 21st century, it decreased about 1/3 times. Now, there are 60 municipalities (28 cities, 30 towns and two villages) including two government-designated major cities in Fukuoka Prefecture: the Fukuoka city, the central city in Fukuoka Prefecture, and the Kitakyushu city, a big city with a population of about one million. These 60 municipalities are classified into 15 bloc regions and these regions are classified into four areas. However, the possibility of municipal merger can be considered by the problem of a population side or financial aspects from now on.

In this study, the municipal merger is considered from a viewpoint of the regional disparity. First, the income disparity is analyzed. Theil index is adopted to interpret evidence. It can decompose samples and investigate the factor analysis of regional disparities. Second, same analysis is conducted from industrial structure.

JEL classification: O53, D39, R11, R12, R58

Keywords: Fukuoka Prefecture, Regional Disparity, Municipal Merger

## 1. Introduction

Fukuoka Prefecture (*Fukuoka-ken*) is a prefecture of Japan located on Kyushu Island. It faces the sea on three sides, bordering on Saga, Oita, and Kumamoto prefectures and facing Yamaguchi Prefecture across the Kanmon Straits. It is also located near the Korean peninsula. It includes two government-designated major cities: the Fukuoka city, the capital and central city in Fukuoka Prefecture, and the Kitakyushu city, a big city with a population of about one million. They include much of Kyushu's industry (Figure 1 and 2).

The history of the municipal merger is long and the municipal organization and municipality organization enforcement in Fukuoka Prefecture is started on April 1, 1889 (Meiji era). After enforcement, many municipal mergers and other self-governing bodies have so far been performed. Especially, after entering in the 21st century, it decreased about 1/3 times. Now, there are 60 municipalities (28 cities, 30 towns and two villages). These 60 municipalities are classified into 15 bloc regions (Fukuoka, Chikushi, Kasuya, Munakata, Itoshima, Asakura, Kitakyushu, Onga, Kyouchiku, Yame, Kurume, Ariake, Chikuhou, Iiduka, and Tagawa). Moreover, these bloc regions are classified into four areas (Kitakyushu, Fukuoka, Chikugo, and Chikuhou, see Table 1).<sup>1</sup> However, the possibility of municipal merger still can be considered. One of reason is the problem of low birthrate and longevity of population. The other reason is the problem of fiscal deficit. Furthermore, the federal system (*Dou-Shusei*)<sup>2</sup> aiming at wide area regional integration is also related.

In this study, the municipal merger is considered from a viewpoint of the regional disparity. First, the productivity and income disparity of 60 municipalities, 15 blocs, and four areas is analyzed. Theil index is adopted to interpret evidence. It can decompose samples and investigate the factor analysis of regional disparities. In this case, it can be analyzed two stages disparity such as municipality level and bloc level disparity and bloc level and area level disparity.

Second, same analysis is conducted from industrial structure. It is divided into eight industries (Agriculture, Manufacture, Construction, Trade, Service, Other private sector, Government sector, and Non-profit sector). For understanding the evidence, we suggest simple index which carried out indexation of the difference in a share for comparing the industrial structure between municipalities, blocs, and areas. Through these evidences, it is examined whether it should unify in the area.

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<sup>1</sup> About such geographic division, it does not have administrative body. Therefore, when considering the further municipal merger, it does not necessarily merge by such geographic division.

<sup>2</sup> Dou-Shusei is a proposal to organize Japan into one circuit of Hokkaido (*dou*) and several new states (*shu*) that are each a combination of several prefectures. The states and circuit are proposed to have greater regional autonomy. Although it has various discussions, it has not been embodied yet.

## 2. Methodology

This study adopts Theil index to interpret evidence of two types of disparity of productivity and income in Fukuoka Prefecture (Theil, 1967).

$$T = \sum_i \left( \frac{Y_i}{\sum_j Y_j} \right) \log \left( \frac{Y_i / \sum_j Y_j}{N_i / \sum_j N_j} \right) \quad (1)$$

where  $Y_i$  is the GRP or income of municipality  $i$  and  $N_i$  is the labor or population of municipality  $i$ .<sup>3</sup>

The Theil index can decompose samples and investigate the factor analysis of regional disparities. For example, 60 municipalities of Fukuoka Prefecture are classified into 15 bloc regions and four areas. In this case, we redefine the index to adopt two stages from Eq. (1).<sup>4</sup>

$$T = \sum_t \sum_k \sum_i \left( \frac{Y_{t,k,i}}{\sum_s \sum_r \sum_j Y_{s,r,j}} \right) \log \left( \frac{Y_{t,k,i} / \sum_s \sum_r \sum_j Y_{s,r,j}}{N_{t,k,i} / \sum_s \sum_r \sum_j N_{s,r,j}} \right) \quad (2)$$

where  $k$  ( $r$ ) is bloc region and  $t$  ( $s$ ) is area region. Then the Theil index of each bloc region is defined as

$$T_k = \sum_i \left( \frac{Y_{t,k,i}}{\sum_j Y_{t,k,j}} \right) \log \left( \frac{Y_{t,k,i} / \sum_j Y_{t,k,j}}{N_{t,k,i} / \sum_j N_{t,k,j}} \right) \quad (3)$$

In that case, the Theil index is decomposed as

$$T = \sum_k \left( \frac{\sum_j Y_{t,k,j}}{\sum_r \sum_j Y_{t,r,j}} \right) T_k + \sum_k \left( \frac{\sum_j Y_{t,k,j}}{\sum_r \sum_j Y_{t,r,j}} \right) \log \left( \frac{\sum_j Y_{t,k,j} / \sum_r \sum_j Y_{t,r,j}}{\sum_j N_{t,k,j} / \sum_r \sum_j N_{t,r,j}} \right) \quad (4)$$

The right-hand side of Eq. (4) indicates the Theil index between bloc regions.

$$T_{\text{interbloc}} = \sum_k \left( \frac{\sum_j Y_{t,k,j}}{\sum_r \sum_j Y_{t,r,j}} \right) \log \left( \frac{\sum_j Y_{t,k,j} / \sum_r \sum_j Y_{t,r,j}}{\sum_j N_{t,k,j} / \sum_r \sum_j N_{t,r,j}} \right) \quad (5)$$

<sup>3</sup> In the case of the mean log deviation (MLD),  $Y$  and  $N$  are reversed.

<sup>4</sup> Akita and Alisjahbana (2002) and Akita (2003) are representative of studies that use two-stage nested Theil decomposition to analyze regional disparity.

Next, the Theil index of each area region is defined as

$$T_t = \sum_k \left( \frac{\sum_j Y_{t,k,j}}{\sum_r \sum_j Y_{t,r,j}} \right) \log \left( \frac{\sum_j Y_{t,k,j} / \sum_r \sum_j Y_{t,r,j}}{\sum_j N_{t,k,j} / \sum_r \sum_j N_{t,r,j}} \right) \quad (6)$$

In that case, the Theil index between bloc regions is decomposed as

$$\begin{aligned} T_{interbloc} &= \sum_t \left( \frac{\sum_r \sum_j Y_{t,r,j}}{\sum_s \sum_r \sum_j Y_{s,r,j}} \right) T_t \\ &+ \sum_t \left( \frac{\sum_r \sum_j Y_{t,r,j}}{\sum_s \sum_r \sum_j Y_{s,r,j}} \right) \log \left( \frac{\sum_r \sum_j Y_{t,r,j} / \sum_s \sum_r \sum_j Y_{s,r,j}}{\sum_r \sum_j N_{t,r,j} / \sum_s \sum_r \sum_j N_{s,r,j}} \right) \end{aligned} \quad (7)$$

The right-hand side of Eq. (7) indicates the Theil index between area regions.

$$T_{interarea} = \sum_t \left( \frac{\sum_r \sum_j Y_{t,r,j}}{\sum_s \sum_r \sum_j Y_{s,r,j}} \right) \log \left( \frac{\sum_r \sum_j Y_{t,r,j} / \sum_s \sum_r \sum_j Y_{s,r,j}}{\sum_r \sum_j N_{t,r,j} / \sum_s \sum_r \sum_j N_{s,r,j}} \right) \quad (8)$$

Therefore, overall disparity can be decomposed into intra-municipality disparities for each bloc region ( $T_k$ ), intra-bloc disparities for each area region ( $T_t$ ), and inter-area disparities between area regions ( $T_{interarea}$ ).

$$T = \sum_s T_k + \sum_s T_t + T_{interarea} \quad (9)$$

Second, for understanding the changes of industrial structure, this study adopts simple index which carried out indexation of the difference in a share for comparing the industrial structure between municipalities, blocs, and areas (Sakamoto, 2011).

$$SD_{ij} = \sqrt{\frac{\sum_z (S_z^i - S_z^j)^2}{2}} \quad (10)$$

$SD_{ij}$  is the sum total of the squared difference between the any kind of shares in each industry  $z$ . Moreover, some adjustment is given for this result in a range from 0 to 100 (%). For example, if the shares of two are quite similar in each industry, the index shows 0, and if the shares vary greatly, it shows 100. Therefore, the comparison with a base year shows the rate of change of industrial structure, and comparison with base structure such as average

shows the rate of deviation from base structure.

We use *Shi-Cho-Sonmin Keizaikeisan* (the national accounting of cities, towns and villages people) of Fukuoka Prefecture as the data in this study.<sup>5</sup> Measurement period is from the 1996 fiscal year to the 2009 fiscal year. Fiscal year in Japan is from April till next year March. The disparity of productivity is using GRP of cities, towns and villages, and the number of workers calculated from GRP per worker. Income disparity is using the income (what mainly deducted the depreciation expense and the tax from GRP) of cities, towns and villages, and the number of population calculated from per capita income. Industrial classifications are eight industries described previously, and change of industrial structure is calculated the deviation from the 1996 fiscal year, and the deviation with the prefectural average of each fiscal year.

### 3. Calculation Result

Figure 3 shows the trend of disparity of labor productivity by Theil index. Although there is some change, the disparity is an expansion tendency in general. Moreover, the sum total of intra bloc disparity is the main factor of the disparity comparatively. In addition, the sum total of intra bloc disparity is the sum total of the disparity in 12 blocs excluding Kitakyushu, Fukuoka, and Itoshima bloc where consists of only one municipality. Table 2 shows the contribution of the disparity at 12 blocs, four areas, and inter-area, respectively. Moreover, in the table after this, the correlation of each index over time is investigated and the tendency is tested by the t-statistics. In the disparity of labor productivity, the contribution of Kyouchiku bloc and Chikushi bloc are large and rising. This is because the auto factory is being located at these blocs (Kanda town in Kyouchiku bloc and Chikushino city in Chikushi bloc).<sup>6</sup> On the other hand, the disparity between areas (inter-area) is decreasing gradually. That is, plant location with high productivity is mentioned as a factor which the disparity of labor productivity expands.

Figure 4 shows the change of income disparity by Theil index. It can be said income disparity is a narrowing trend or is seldom changing. Moreover, the contribution of the disparity between areas is large. However, as long as Table 3 is seen, it is a narrowing trend. If it says by bloc, the income disparity of Kyouchiku bloc is large with an expansion tendency. Fukuoka area also has a large disparity. It is because Fukuoka city which is the greatest commercial town in a prefecture is included in the Fukuoka area. It is thought that income disparity expansion of Kyouchiku bloc has relation of the disparity of productivity. The contribution of the disparity in Chikushi bloc is an expansion tendency despite it is small.

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<sup>5</sup> Since no reliable data for real growth rates exist, nominal GRP and income data are used.

<sup>6</sup> Yoshitomi town in Kyouchiku bloc developed as a company town of old Yoshitomi Pharmaceutical Industries. However, this company was merged into Mitsubishi Tanabe Pharma factory. From April 1, 2005, the Yoshitomi factory is belonged one of the factory of Mitsubishi Pharma Company. Therefore, GRP of Yoshitomi town is decreasing greatly.

According to Table 4, about the change from the base year (1996 fiscal year) of industrial structure, industrial structure is tending to change except Kyouchiku bloc. The areas where industrial structure is not changing by the Kyouchiku bloc are only Kanda and Koge town (see Appendix Table 1). Since the economic strength of Kanda town is high, the impression from which industrial structure is not changing in a bloc has been given.

When industrial structure is compared with a prefectural average, it is shown if correlation is positive, industrial structure is approaching the prefectural average through time and if correlation is negative and, industrial structure is separating from the average. As long as Table 5 is seen, except for the part, correlation is negative in general. Positive correlation is only Kyouchiku and Chikushino bloc. About these two blocs, it can be said that industrial structure is unique.<sup>7</sup>

#### **4. Discussion**

A municipal merger has a merit by improvement in the convenience of a resident life; the increase in efficiency of administration and finance; advancement, specialization of administration, and so on. On the other hand, the area of some parts may become desolate or administrative services may fall. In the municipal merger of Japan in the 21st century, the hospitable financial support by the Government of Japan is the main factors, and very many mergers were performed. For example, Fukuoka Prefecture is decreasing in number now in 60 municipalities (28 cities, 30 towns, two villages) from 97 municipalities (24 cities, 65 towns, eight villages) in 1999. However, since merger promotion movement led by the government is not performed now, the movement toward a merger has stopped mostly.

If it advocates the necessity of merger, it will come out from the demand on the economic management in municipalities. For example, the merger may be needed in the meaning which decreases the regional disparity like this study. In the disparity of productivity, since a big disparity is seen by specific local bloc such as Kyouchiku and Chikushino, if the municipalities in the bloc merge, the disparity on appearance will be lost. Since the disparity between areas is large in the case of income disparity, even if it merges, the income disparity problem may remain.

#### **5. Conclusion**

This study argued briefly about the possibility of the further future merger, after observing the actual condition of regional disparity in Fukuoka Prefecture. In the case of Fukuoka Prefecture, other than two government-designated major cities: the Fukuoka city and the Kitakyushu city, Kyouchiku bloc and Chikushi bloc are extremely different from the

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<sup>7</sup> If it investigates in more detail, the industrial structures of the Kanda town and Chikushino city are more unique by Appendix Table 2.



prefectural average in industrial structure, and the disparity of productivity accompanying it is seen. Therefore, if these blocs take the lead in the next merger, the regional disparity on appearance will be lost. Income disparity is considered that there is the disparity between areas where Fukuoka city and Kitakyushu city are included, and others (Chikugo area and Chikuhou area). Advancement of the industrial structure in these areas is one of the solutions of the disparity reduction.

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Figure 1 Fukuoka Prefecture in Japan



Figure 2 Map of Fukuoka Prefecture (bloc level)

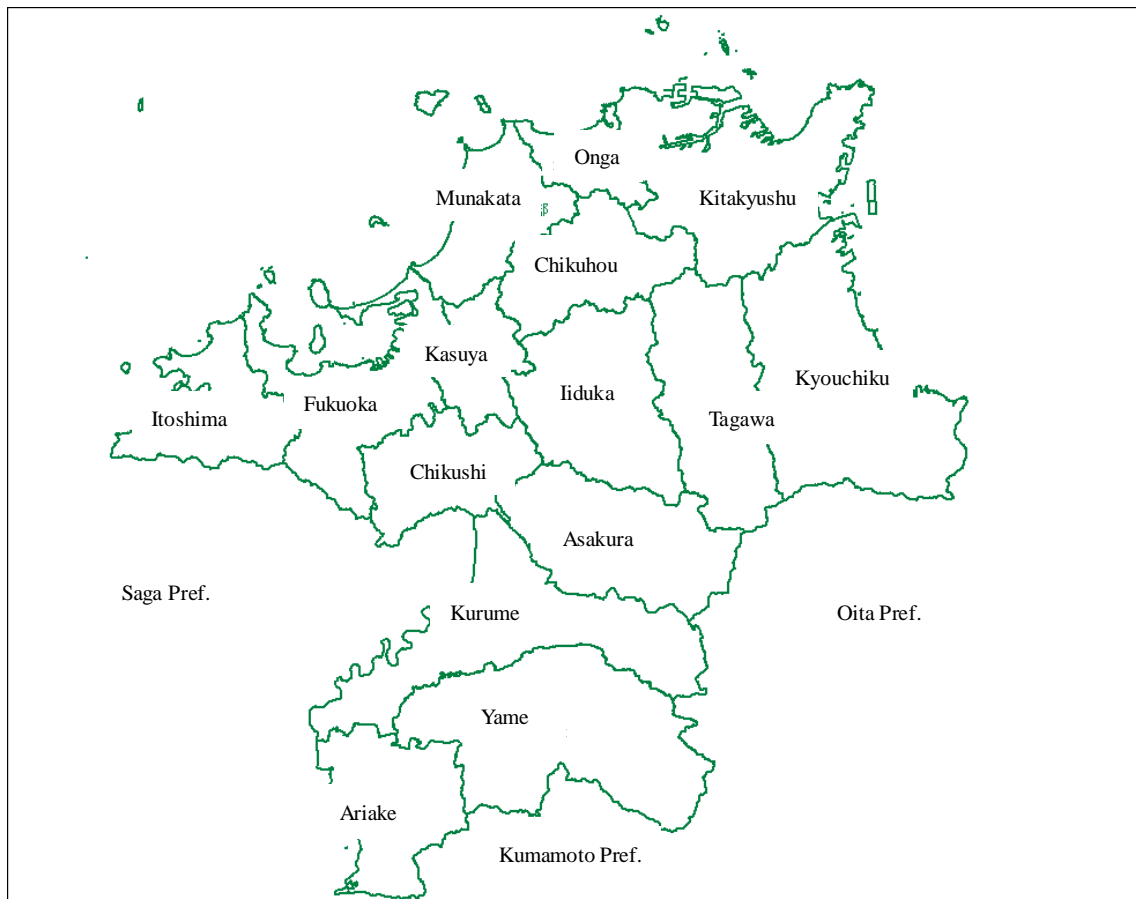


Table 1 All Municipalities in Fukuoka Prefecture

Area	Bloc	Municipality
Kitakyushu	Kitakyushu	Kitakyushu C
	Onga	Nakama C, Ashiya T, Mizumaki T, Okagaki T, Onga T
	Kyouchiku	Yukuhashi C, Buzen C, Kanda T, Miyako T, Yoshitomi T, Koge T, Chikujo T
Fukuoka	Fukuoka	Fukuoka C
	Chikushi	Chikushino C, Kasuga C, Onojo C, Dazaifu C, Nakagawa T
	Kasuya	Umi T, Sasaguri T, Shime T, Sue T, Hisayama T, Kasuya T
	Munakata	Munakata C, Koga C, Fukutsu C, Shingu T
	Itoshima	Itoshima C
	Asakura	Asakura C, Chikuzen T, Toho V
	Chikugo	Yame C, Chikugo C, Hirokawa T
Chikuhou	Kurume	Kurume C, Okawa C, Ogori C, Ukiha C, Tachiarai T, Oki T
	Ariake	Omuta C, Yanagawa C, Miyama C
	Chikuhou	Nogata C, Miyawaka C, Kotake T, Kurate T
Tagawa	Iiduka	Iiduka C, Kama C, Keisen T
	Tagawa	Tagawa C, Kawara T, Soeda T, Itoda T, Kawasaki T, Oto T, Aka V, Fukuchi T

(Note) C: city, T: town, V: village

Figure 3 Theil Index of Labor Productivity

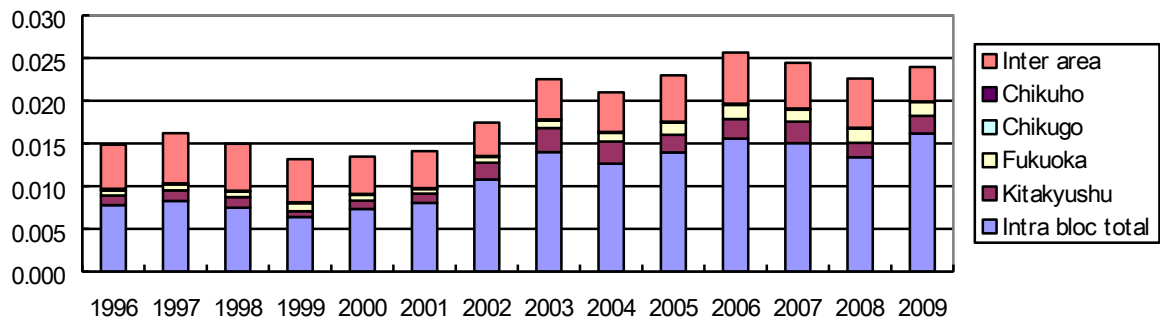


Figure 4 Theil Index of Income Distribution

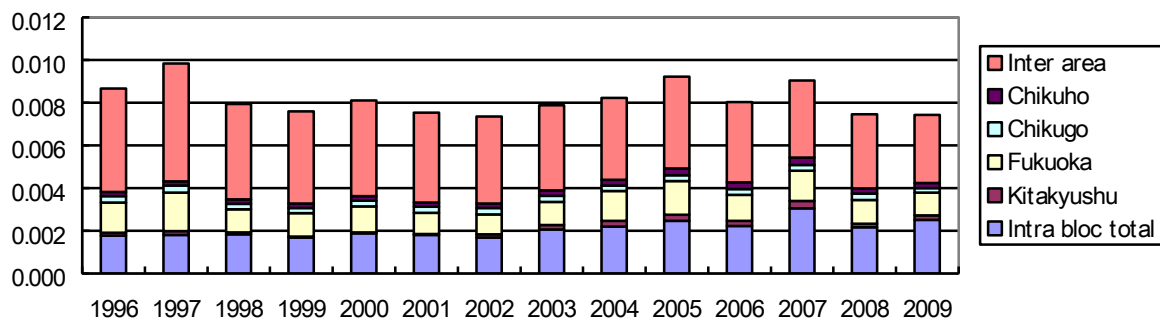


Table 2 Theil Decomposition of Labor Productivity

		1996	2000	2005	2009	correlation	t-stat	
Bloc	Onga	0.30	0.24	0.19	0.05	-0.85	-5.48	
	Kyouchiku	27.26	33.94	36.38	34.51	0.57	2.41	
	Chikushi	15.22	10.43	20.47	29.15	0.80	4.64	
	Kasuya	0.49	0.38	0.17	0.41	-0.63	-2.82	
	Munakata	0.77	0.34	0.11	0.20	-0.74	-3.80	
	Asakura	1.10	1.00	0.53	0.47	-0.60	-2.62	
	Yame	2.87	3.43	1.18	1.41	-0.78	-4.34	
	Kurume	2.04	2.54	1.01	0.82	-0.81	-4.81	
	Ariake	0.50	0.54	0.24	0.28	-0.72	-3.57	
	Chikuhou	1.17	1.13	0.18	0.05	-0.50	-1.99	
	Iiduka	0.21	0.06	0.13	0.03	-0.37	-1.37	
	Tagawa	0.55	0.48	0.23	0.10	-0.89	-6.70	
	Area	Kitakyushu	7.66	7.24	8.95	8.68	0.36	1.33
		Fukuoka	4.06	5.12	6.23	6.66	0.58	2.49
Chikugo		0.20	0.00	0.21	0.31	0.50	2.00	
Chikuhou		1.00	0.73	0.21	0.00	-0.86	-5.88	
Inter area		34.61	32.42	23.59	16.86	-0.86	-5.85	

(Note) statistical test was carried out using the following formula:

$$t = r\sqrt{n-2} / \sqrt{1-r^2}$$

in which  $r$  is correlation,  $n$  is number of samples (14 or 13). The yellow highlighted cell means statistically insignificant ( $-2.00 < t < 2.00$ ).

Table 3 Theil Decomposition of Income Distribution

		1996	2000	2005	2009	correlation	t-stat	
Bloc	Onga	3.07	6.09	2.07	3.66	-0.19	-0.66	
	Kyouchiku	7.10	6.20	13.10	13.82	0.82	4.95	
	Chikushi	1.15	0.86	2.55	5.33	0.89	6.66	
	Kasuya	0.28	0.14	0.45	0.44	0.65	2.98	
	Munakata	0.98	0.85	1.40	1.59	0.91	7.76	
	Asakura	0.37	0.38	0.40	0.41	0.29	1.04	
	Yame	1.48	1.51	0.66	0.58	-0.94	-9.23	
	Kurume	1.55	2.33	2.27	3.66	0.83	5.12	
	Ariake	0.51	0.77	0.31	0.41	-0.69	-3.31	
	Chikuhou	0.13	0.08	0.18	0.30	0.79	4.47	
	Iiduka	1.93	2.33	2.25	1.84	-0.03	-0.09	
	Tagawa	1.91	1.61	1.11	1.76	-0.41	-1.56	
	Area	Kitakyushu	1.57	0.64	3.17	2.76	0.70	3.39
		Fukuoka	16.39	15.03	17.12	14.49	-0.08	-0.29
Chikugo		3.38	3.31	2.87	2.90	-0.06	-0.20	
Chikuhou		2.25	2.53	3.39	3.12	0.82	4.98	
Inter area		55.94	55.33	46.70	42.94	-0.90	-7.15	

Table 4 Structural Change Ratio (Base Share is 1996 year)

		1997	2000	2005	2009	correlation	t-stat
Kitakyushu	Kitakyushu	0.23	4.21	6.01	7.79	0.90	6.87
	Onga	1.17	2.40	4.72	6.44	0.98	18.43
	Kyouchiku	1.06	3.79	2.73	2.60	0.05	0.16
Fukuoka	Fukuoka	0.38	3.58	6.25	9.41	0.96	11.03
	Chikushi	0.66	3.74	5.16	7.59	0.94	9.38
	Kasuya	1.17	3.35	7.03	7.27	0.96	10.77
	Munakata	1.64	2.76	5.35	6.34	0.97	12.30
	Itoshima	0.59	2.05	4.68	4.34	0.94	9.42
	Asakura	1.40	2.31	4.32	4.72	0.93	8.20
	Chikugo	Yame	0.69	2.42	4.94	4.98	0.84
Chikuhou	Kurume	0.98	4.25	5.84	6.33	0.90	6.94
	Ariake	2.02	3.44	5.53	6.14	0.89	6.62
	Chikuhou	0.90	2.83	5.78	7.59	0.86	5.69
	Iiduka	0.44	2.67	4.27	6.47	0.97	12.91
	Tagawa	1.32	4.77	7.57	8.11	0.95	10.41
	Kitakyushu	0.19	3.96	4.40	6.05	0.80	4.46
	Fukuoka	0.32	2.93	5.08	7.53	0.96	11.21
	Chikugo	1.10	3.44	5.53	5.91	0.90	6.97
	Chikuhou	0.74	3.11	5.01	6.88	0.94	9.11

Table 5 Structural Change Ratio (Base Share is Prefectural Average)

		1996	2000	2005	2009	correlation	t-stat
Kitakyushu	Kitakyushu	7.49	5.78	4.71	4.15	-0.87	-6.17
	Onga	9.58	8.27	8.65	8.03	-0.62	-2.73
	Kyouchiku	26.59	25.03	29.93	29.17	0.70	3.43
Fukuoka	Fukuoka	13.55	11.11	10.66	10.24	-0.84	-5.41
	Chikushi	5.20	3.87	8.72	11.30	0.86	5.87
	Kasuya	6.15	4.06	2.24	3.04	-0.85	-5.62
	Munakata	8.99	7.65	6.45	5.65	-0.92	-8.37
	Itoshima	14.76	12.36	10.72	11.09	-0.83	-5.25
	Asakura	21.45	22.21	20.67	19.78	-0.42	-1.61
	Chikugo	Yame	11.34	12.15	9.87	10.34	-0.59
Chikuhou	Kurume	4.59	4.89	5.01	4.17	-0.17	-0.59
	Ariake	7.11	6.38	5.86	5.11	-0.82	-4.97
	Chikuhou	15.77	15.55	13.93	12.99	-0.61	-2.64
	Iiduka	6.53	6.22	6.69	6.10	-0.09	-0.31
	Tagawa	8.77	8.63	8.62	7.61	-0.63	-2.81
	Kitakyushu	9.92	8.36	8.40	7.64	-0.70	-3.36
	Fukuoka	7.78	6.33	5.60	4.93	-0.89	-6.81
	Chikugo	5.81	5.31	4.87	4.18	-0.91	-7.58
	Chikuhou	8.15	7.82	7.50	6.24	-0.82	-4.97

Appendix Table 1 Structural Change Ratio (All Municipalities, Base Share is 1996 year)

		1997	2000	2005	2009	correlation	t-stat
Kitakyushu	Kitakyushu C	0.23	4.21	6.01	7.79	0.90	6.87
Onga	Nakama C	1.82	4.98	5.73	7.28	0.84	5.18
	Ashiya T	4.33	3.03	4.92	9.06	0.81	4.57
	Mizumaki T	1.80	5.09	8.04	8.92	0.94	9.58
	Okagaki T	1.41	2.25	3.52	6.36	0.94	8.98
	Onga T	2.71	1.83	4.55	6.11	0.92	7.80
Kyouchiku	Yukuhashi C	1.78	5.44	12.40	14.14	0.84	5.21
	Buzen C	2.00	5.38	6.55	8.30	0.92	7.52
	Kanda T	0.97	4.45	2.61	3.24	0.08	0.27
	Miyako T	2.79	3.86	4.84	4.51	0.70	3.24
	Yoshitomi T	2.15	1.49	2.00	38.34	0.73	3.57
	Koge T	2.07	19.83	13.41	14.80	0.39	1.40
	Chikujo T	4.16	2.57	5.26	5.62	0.76	3.91
Fukuoka	Fukuoka C	0.38	3.58	6.25	9.41	0.96	11.03
Chikushi	Chikushino C	0.70	5.64	8.98	12.01	0.92	7.52
	Kasuga C	0.56	3.31	5.56	5.75	0.93	8.25
	Onojo C	0.86	2.43	4.97	7.56	0.96	11.53
	Dazaifu C	0.77	3.58	4.74	5.50	0.76	3.90
	Nakagawa T	1.42	3.33	6.29	7.33	0.97	13.42
Kasuya	Umi T	2.22	5.72	8.29	8.86	0.71	3.38
	Sasaguri T	0.95	3.32	8.43	9.22	0.91	7.34
	Shime T	0.95	3.81	6.82	6.40	0.91	7.49
	Sue T	2.15	2.70	5.81	5.48	0.92	7.99
	Hisayama T	6.09	11.29	13.20	11.68	0.74	3.68
	Kasuya T	2.94	3.68	8.41	10.45	0.93	8.31
Munakata	Munakata C	0.96	2.54	7.72	9.95	0.98	14.76
	Koga C	4.15	3.74	5.83	7.53	0.81	4.61
	Fukutsu C	0.54	1.98	2.43	3.18	0.94	9.30
	Shingu T	0.79	6.77	5.34	5.83	0.67	2.98
Itoshima	Itoshima C	0.59	2.05	4.68	4.34	0.94	9.42

Continues

		1997	2000	2005	2009	correlation	t-stat
Asakura	Asakura C	1.24	2.18	3.60	3.94	0.85	5.29
	Chikuzen T	2.83	3.61	6.97	6.38	0.80	4.41
	Toho V	3.61	6.70	10.52	14.91	0.94	8.77
Yame	Yame C	1.20	3.44	4.58	5.61	0.92	7.88
	Chikugo C	0.67	2.00	8.61	7.46	0.76	3.82
	Hirokawa T	2.08	1.97	6.37	7.89	0.96	11.62
Kurume	Kurume C	1.10	4.50	5.18	5.08	0.80	4.38
	Okawa C	1.05	6.13	12.68	14.59	0.96	11.72
	Ogori C	1.60	1.35	3.64	6.06	0.92	7.66
	Ukiha C	0.80	2.09	3.45	4.52	0.98	17.80
	Tachiarai T	4.32	6.19	10.40	26.12	0.89	6.57
	Oki T	1.25	4.19	9.81	13.17	0.96	12.03
Ariake	Omuta C	1.99	3.53	5.26	5.78	0.85	5.26
	Yanagawa C	1.56	3.55	6.56	7.44	0.92	7.72
	Miyama C	3.68	4.50	5.83	7.57	0.99	19.58
Chikuhou	Nogata C	1.45	3.36	4.90	6.12	0.79	4.27
	Miyawaka C	3.62	4.81	8.52	10.53	0.76	3.82
	Kotake T	1.86	3.73	8.30	8.72	0.83	4.94
	Kurate T	5.19	4.13	6.44	7.45	0.19	0.63
Iduka	Iduka C	0.68	2.63	4.30	7.08	0.97	12.88
	Kama C	0.75	2.87	5.21	7.91	0.98	17.50
	Keisen T	4.25	7.59	21.72	15.47	0.74	3.64
Tagawa	Tagawa C	2.66	5.69	9.95	8.57	0.91	7.23
	Kawara T	2.41	11.51	14.41	16.31	0.85	5.46
	Soeda T	3.03	2.58	6.76	7.46	0.94	8.86
	Itoda T	0.59	6.22	8.64	6.96	0.71	3.36
	Kawasaki T	0.96	3.09	4.70	8.16	0.95	10.64
	Oto T	1.13	4.33	10.67	6.28	0.62	2.63
	Aka V	3.90	6.17	12.41	14.46	0.85	5.34
Fukuchi T	1.16	4.24	4.84	7.43	0.93	8.45	

Appendix Table 2 Structural Change Ratio (All Municipalities, Base Share is Prefectural Average)

		1996	2000	2005	2009	correlation	t-stat
Kitakyushu	Kitakyushu C	7.49	5.78	4.71	4.15	-0.87	-6.17
Onga	Nakama C	7.82	7.12	6.69	5.64	-0.91	-7.42
	Ashiya T	26.35	25.76	24.93	23.69	-0.86	-5.92
	Mizumaki T	3.79	3.49	5.40	4.85	0.79	4.49
	Okagaki T	15.45	13.83	14.43	15.30	0.10	0.36
	Onga T	8.57	6.29	6.90	6.94	-0.04	-0.14
Kyouchiku	Yukuhashi C	8.93	6.78	6.75	6.88	-0.64	-2.92
	Buzen C	13.14	12.63	13.44	14.83	0.54	2.24
	Kanda T	44.97	42.68	49.47	50.11	0.78	4.28
	Miyako T	15.75	14.57	15.26	15.03	-0.03	-0.12
	Yoshitomi T	53.67	54.64	54.60	19.20	-0.69	-3.27
	Koge T	27.22	16.32	18.22	16.81	-0.60	-2.61
	Chikujo T	25.98	26.67	27.01	24.82	-0.39	-1.48
Fukuoka	Fukuoka C	13.55	11.11	10.66	10.24	-0.84	-5.41
Chikushi	Chikushino C	21.04	17.89	30.92	34.29	0.89	6.89
	Kasuga C	17.01	15.07	15.01	14.46	-0.76	-4.09
	Onojo C	7.89	6.89	7.57	6.86	-0.40	-1.51
	Dazaifu C	11.49	10.85	11.83	11.85	0.11	0.40
	Nakagawa T	10.16	8.16	10.42	10.64	0.53	2.14
Kasuya	Umi T	11.23	8.70	7.49	7.71	-0.47	-1.86
	Sasaguri T	10.64	9.98	9.78	9.16	-0.41	-1.57
	Shime T	3.40	5.16	8.16	8.06	0.92	7.98
	Sue T	14.08	12.74	8.89	8.81	-0.96	-11.62
	Hisayama T	11.89	5.37	3.80	5.02	-0.77	-4.15
	Kasuya T	7.77	5.57	6.19	7.76	0.08	0.29
Munakata	Munakata C	13.54	9.81	9.92	8.74	-0.60	-2.63
	Koga C	23.85	21.94	20.81	18.91	-0.87	-6.03
	Fukutsu C	12.42	10.38	10.04	9.87	-0.62	-2.77
	Shingu T	12.91	10.19	12.83	13.87	-0.03	-0.11
Itoshima	Itoshima C	14.76	12.36	10.72	11.09	-0.83	-5.25



Continues

		1996	2000	2005	2009	correlation	t-stat
Asakura	Asakura C	25.18	26.52	24.93	24.36	-0.29	-1.03
	Chikuzen T	10.80	9.84	8.18	8.28	-0.88	-6.33
	Toho V	20.56	18.22	16.53	17.15	-0.71	-3.44
Yame	Yame C	11.08	9.74	8.95	8.54	-0.90	-7.15
	Chikugo C	19.29	20.31	13.95	15.57	-0.63	-2.81
	Hirokawa T	15.98	17.46	13.05	11.77	-0.90	-7.29
Kurume	Kurume C	5.64	6.85	6.40	5.04	-0.32	-1.16
	Okawa C	13.09	9.55	4.37	3.49	-0.96	-11.62
	Ogori C	15.05	13.28	12.96	12.84	-0.67	-3.14
	Ukiha C	9.69	9.83	10.14	8.24	-0.21	-0.74
	Tachiarai T	24.29	20.81	16.87	9.10	-0.94	-9.84
	Oki T	13.47	12.94	9.72	17.73	0.28	1.00
Ariake	Omuta C	7.41	7.77	6.72	6.10	-0.73	-3.75
	Yanagawa C	8.08	7.11	7.65	8.16	-0.03	-0.09
	Miyama C	11.99	10.92	10.62	10.63	-0.67	-3.11
Chikuhou	Nogata C	7.73	9.43	7.74	6.89	-0.34	-1.25
	Miyawaka C	24.57	21.49	20.22	19.99	-0.51	-2.07
	Kotake T	19.17	19.83	17.10	15.12	-0.71	-3.53
	Kurate T	22.97	21.95	21.37	18.88	-0.43	-1.65
Iiduka	Iiduka C	5.77	5.55	6.40	6.70	0.82	5.05
	Kama C	11.58	10.77	10.34	10.26	-0.85	-5.63
	Keisen T	13.06	9.14	12.63	8.32	-0.46	-1.81
Tagawa	Tagawa C	9.03	8.94	9.05	7.43	-0.53	-2.18
	Kawara T	17.50	12.76	11.12	9.68	-0.92	-8.05
	Soeda T	19.13	18.19	17.95	17.70	-0.62	-2.76
	Itoda T	15.81	14.34	14.96	14.43	-0.34	-1.25
	Kawasaki T	11.30	10.06	9.68	10.10	-0.40	-1.51
	Oto T	19.26	16.19	12.12	18.05	-0.52	-2.10
	Aka V	18.89	16.96	18.57	17.25	-0.49	-1.97
	Fukuchi T	11.47	9.72	8.19	6.79	-0.96	-12.35