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Spatial Disparity of Municipalities' Financial Capability

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1 Introduction

Since the 1990s, Japanese economy has been in the progress of a prolonged recession. Both the central and municipal government suffered from the regression with their revenue declining. On the other hand, municipal expenditure have increased due to the financial policy in order to revitalize the economy. This research is aimed to investigate the pattern of spatial disparity of municipalities' financial capability, whether it is becoming more polarized or not, and put our attention onto the impact that industries impose to the overall distribution, in order to provide possible suggestions to the policy making in the future.

2 Spatial disparity of municipalities' financial capability

The objects of investigation are the municipalities that have existed in both the year 2001 and 2010, with population restricted as ranging from 50 thousand to 500 thousand, in total number of 464. The three indices that we use in this research to describe a municipality's financial capability are: The ratio of Independent Revenue(rIR), Municipal Taxes(MT) and the Financial Capability Index(FCI). The last one will be used as the main index of investigation in this research.

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We then plotted the histogram of each index for each year, and discovered that the pattern of distribution of Municipal Taxes has not changed significantly between 2001 and 2010. While the distribution of other indices, for example the Financial Capability Index, we observed a decline in the medium level area and an increase at the two ends of the distribution.



Fig. 1: Frequency distribution of FCI of 2001



Fig. 2: Frequency distribution of FCI of 2010

Next, we depicted the spatial disparity of all the three indices. It is obvious that the disparity reveals a concentration of municipalities with high level of financial capability over the Pacific coastal area, and those municipalities with low level financial capability in other areas. We applied the indices to the model of polarization to clarify the situation.

3 The measurement of polarization

The model of polarization, initially introduced by Esteban and $\operatorname{Ray}[1]$, is different from the classic measurement of inequality. The concept of polarization is made up by the intergroup homogeneity and the intra-group heterogeneity. Homogeneity is being defined as identification felt by individuals with those in the same group on account of certain characteristic. Heterogeneity, is the alienation that individuals feel toward other individuals in other groups. The concept of homogeneity, or identification is not depicted by the measurement of inequality. The model of polarization takes the form $P(\pi, y) = K \sum_{i=1}^{n} \sum_{j=1}^{n} \pi_i^{1+\alpha} \pi_j |y_i - y_j|$, where parameter α , regarded as the degree of "polarization sensitivity", must lie between 0 and 1.6. Constant K is another degree of freedom which is used for population normalization. We discovered that polarization increased for the ratio of Independent Revenue and the Financial Capability Index. This result accords with the pattern of distribution we observed previously and can be explained by the shift of municipalities in each index. Yet the model of polarization alone can not describe the reason or attributes that contribute to the increase of polarization, nor the maldistribution of municipalities' financial capability. Therefore, we put our attention to the impact casted by industries, automobile and its related industries, especially.

表 1: Results of calculation

	alpha=1	
year	2001	2010
rIR	4.2×10^{-2}	4.3×10^{-2}
MT	3.2×10^{-3}	3.2×10^{-3}
FCI	7.0×10^{-4}	8.5×10^{-4}

4 Influence of automobile and its related industries

We selected the top 3 industries from the input coefficient table of the industry of machinery for transportation, and calculated the share of the manufactured goods of those industries from the total of each municipality. Those with more than 10% of manufactured goods in the automobile and its related industries are extracted. And those that have less than 10%belongs to the rest group. We observed that the percentage of the impact of automobile and its related industries increased from 2001 to 2010, while that of the rest group decreases by using the Atkinson Index. This result shows that the automobile and its related industries are weighing in more and more to the overall maldistribution.

5 Conclusion and future research

In summary, we have observed that the pattern of spatial disparity of municipalities' financial capability manifests a concentration over the pacific coastal area, and the polarization of the whole has increased. The impact imposed by automobile and its related industries have increased also, from 2001 to 2010, and we are able to suggest that automobile and its related industries, being the leading industries in Japan, may contribute to the overall maldistribution of municipalities' financial capability. For future research, we would like to examine whether the model of polarization is sub-group decomposable and to investigate about other industries' impact to the whole.

References

 Esteban, J.-M. and Ray, D.: On the measurement of polarization, Econometrica: Journal of the Econometric Society, pp. 819-851, 1994.