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A Simple Indicator of Local Government's Economic Policy:

Example from Japan's New Local Revitalization Policy

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Abstract

Japan's new local revitalization plan is unique in that the national government has asked local governments to form their own initiatives; and we can expect that there will be various ideas from the perspectives of local residents. However, it is important to note that not all local governments considered the actions of their competitors and neighboring governments. Currently, Japanese industries are so interconnected that we cannot ignore the actions of others. In this paper, we propose a simple indicator that policy makers can use to determine the focus for the local economy.

Keywords: Local Revitalization Plan, Local Government, Local Economy
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1. Introduction

Most developed countries are facing a rapidly aging society due to stagnating population growth. According to the United Nations Population Division (2015), Germany experienced negative population growth rates during 2000-2005 and 2005-2010, while Japan marked its first decrease of population during 2010–2015. The decrease in working-age population not only affects production but also shrinks consumption in the region, because in the working-age population, the mean household size is larger. In addition to the household being larger, in most cases, the mean age is lower; thus, a smaller working-age population means fewer people living in or entering downtown areas. This causes a series of social problems; one of the major problems is decreased use of public transportation, which often leads to a reduction in services, and another is an increase in crime due to a lack of other people on the street.

One of the largest problems associated with a decreasing working-age population is the subsequent reduction in local tax revenue. A

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fall in revenue forces local governments to cut services, and this, in turn, makes the community less attractive. As a result, fewer new residents enter the community, further reducing the population growth rate. This is a vicious circle, and once a local government has entered into one, it is very difficult to get out. For this reason, it is very important that local governments are able to increase (or at least maintain) the population level. There are many management approaches that a town can take to avoid this tragic situation. Establishing a special district is a common approach for revitalizing a local community. For example, New York City created 74 Business Improvement Districts (BIDs) within the city[1]. A BID is essentially a partnership between public and private sectors. The stakeholders, for example, business owners, cooperate with each other to maintain common areas and promote their commercial district. Another example of a special district is the Community Development District (CDD), in which the objective is to improve the quality of life for the residents within the district. There are 116 CDDs in Florida and 76 in Georgia. Although not all of them are successful, these special districts have attracted attention from local governments around the world.

In order to revitalize a region, it is important to design a framework for cooperation, such as a BID. However, it is even more important to determine which industry should be the focus of each district. Without a proper business plan, the framework will not function well. In this paper, we propose a simple indicator that policy makers can use to determine the focus for the local economy. Sometimes, policy makers do not consider the actions of their neighbors but only consider how to accomplish their own objectives. We are motivated to consider this issue because of the local revitalization plan currently being implemented by the Japanese government. It seems that most municipalities are unlikely to take into account neighboring cities when they formulate their action plans. As a result, some of these plans seem to be in a race to the bottom. Currently, Japanese industries are so interconnected that we cannot ignore the actions of others. In this paper, we will provide an indicator that assists with this type of decision making.

In the next section, we will explain the new local revitalization policy being implemented in Japan. In Section 3, we will show the results of competition when the plans of other cities are not considered, and we will propose a simple indicator to assist with decision making. Section 4 provides a short conclusion to this paper.

2. The New Local Revitalization Policy in Japan

2.1 Brief Summary

Since his inauguration in December 2012, Japanese Prime Minister Shinzo Abe has based his economic policy upon the “three arrows.” The first arrow is a bold monetary policy intended to boost inflation, while the second is a dynamic fiscal policy. Thanks to these policies, some of Japan’s largest companies have seen record profits. The third arrow is the revitalization strategy, which is aimed at reversing the economic stagnation, especially

1) For more details, see http://www.nyc.gov/html/sbs/html/neighborhood/bid.shtml (accessed: March 5, 2016).

in local economies.

The new local revitalization plan is at the heart of the third arrow. In November 2014, the *Law of Towns, People, and Job Opportunities*[2] was passed through both chambers of the Diet and Office for Promotion of Regional Revitalization was launched by the Cabinet Office of the Japanese government.

Following the passing of this law, the Cabinet Office (2015) released the actual strategy, which contains four policy measures for accelerating Japan's revitalization. One of these is a regional revitalization, regional economic structural reform measure.[3] To achieve this aim, it is necessary to provide attractive employment opportunities, especially for younger workers. The central government notes that such policies would be unsuccessful without the enthusiastic support of regional communities.[4]

For this reason, the national government urges local governments to propose their own ideas for revitalizing their region, and promises that they will support the initiatives of motivated regional communities. Most local governments will launch their own revitalization plan in FY 2016.

Japan's new local revitalization plan is unique in that the national government has asked local governments to form their own initiatives; and we can expect that there will be various ideas from the perspectives of local residents. However, there is an issue with the schedule. All the revitalization plans for more than 1,700 local governments are scheduled to begin in April 2016. The plans were made only about a year after the release of the Japan Revitalization Plan by the Cabinet Office last year. In the language of game theory, this is a simultaneous-move game being played among local governments. It is important to note that not all local governments considered the actions of their competitors. Instead, most of them assumed that their neighbors would do nothing while they implemented a revitalization package; clearly, this is not realistic. In the following section, we will show why it is important to consider the actions of neighbors, and we will introduce a simple indicator that can be used by policy makers to ensure that this is done.

3. Analysis

3.1 Equilibrium of spatial competition

In the previous section, we reviewed Japan's new local revitalization plan. From an economic viewpoint, it is stimulus package with spatial competition. We will begin by showing the results of spatial competition between firms with different levels of productivity.

Suppose there are two regions, and that one region is more competitive than the other, whereby *competitive*, we mean that it is has a lower marginal cost of production. The products of the different regions are not identical, due to the transportation cost. In order to understand the product differentiation in our setting, we used the well-known Hotelling linear city model, and the model we use here is based on the two-stage game proposed by

2) The authors could not find an official English translation of this law; in Japanese, it is known as "Machi, Hito, Shigoto Soseihou."

3) Other measures include increasing productivity of firms; developing aggressive agriculture, forestry, and fisheries policies; and promoting the social participation of women

4) See http://www.japantimes.co.jp/opinion/2014/11/26/editorials/revitalizing-local-economies/ (accessed March 8, 2016).

d'Aspremont et. al. (1979), as follows. Suppose there is a linear city in [0, 1] with uniformly distributed customers. There are also two firms, one is located at *a* in [0, 1], and the other is located at *b* and has a smaller marginal cost. Each customer has one unit of demand to be used at one of the firms. The payoff function for a customer who buys a product at price of P_i is as follows:

$$U = r - ty - P_i, \quad (1)$$

where *r* is the reservation price for that customer, *y* is the distance between the customer's residence and firm *a*, and *t* is the unit transportation cost. Assume that there exists a customer who is indifferent about the choice of buying from firm *a* or firm *b*. This customer can be defined as follows:

$$r - t\hat{x} - p_a = r - t(1 - \hat{x}) - p_b$$
$$\rightarrow \hat{x} = \frac{1}{2} + \frac{p_b - p_a}{2t} \quad (2)$$

Let us denote C_i as a marginal cost of firm *i*. Without loss of generality, we assume $C_b < C_a$. Then, firms *a* and *b* wish to maximize their profits, which are defined as follows:

$$\Pi_a = (p_a - c_a)\left(\frac{1}{2} + \frac{p_b - p_a}{2t}\right) \quad (3)$$

$$\Pi_b = (p_a - c_a)(1 - \hat{x})$$
$$= (p_a - c_a)\left(\frac{1}{2} - \frac{p_b - p_a}{2t}\right) \quad (4)$$

We can derive the equilibrium price for each firm by using the above equations. Substituting it into (2), we obtain

$$\hat{x} = \frac{1}{2} + \frac{1}{2t}\left(\frac{c_b - c_a}{3}\right) \quad (5)$$

Two firms have the same market share if there is no difference in their marginal cost of production. We assumed, however, that firm *a* has a larger marginal cost of production. Thus, the sign of the second term in (5) is negative, which means that the two firms have different market shares; at equilibrium, the more efficient firm (firm *b*) has a larger market share and larger profit.

Let us define the equilibrium profits as follows:

$$\overline{\Pi}_a = (p_a - c_a)\left(\frac{1}{2} + \frac{t}{2}\left(\frac{c_b - c_a}{3}\right)\right) \quad (6)$$

$$\overline{\Pi}_b = (p_b - c_b)\left(\frac{1}{2} - \frac{t}{2}\left(\frac{c_b - c_a}{3}\right)\right) \quad (7)$$

Comparing the equilibrium prices, we see that the net profit $(P_i - C_i)$ is larger for firm *b*. Combining this and (5), we conclude $\overline{\Pi_a} < \overline{\Pi_b}$.

The implication of the above analysis is that when there is spatial competition from neighbors, policy makers should not try to stimulate an industry that is not competitive. A subsidy might temporarily increase the profits of local firms, but eventually, the competition will fight back by introducing a similar subsidy. This is a typical example of a "race to the bottom" scenario.

3.2 A simple indicator to determine competitiveness

Our aim in this paper is to provide a simple indicator that can be used by most local governments. Among policy makers, the Leontief input-output table is one of the most

popular economic statistics. More importantly, it is widely available even at the regional level in most of the developed countries. For example, in Japan, tables are currently available for all 47 prefectures. Our proposed indicator is thus based on the information available in these tables.

3.2.1 The model behind the table

Suppose there are n industries in a region. In the input-output table, this region's output level ($X=[x_1, \cdots, x_n]'$) is defined as

$$X = (I-A)^{-1}(D+E-M) \quad (8)$$

where $(I-A)^{-1}$ is the well-known Leontief inverse matrix, where $D=[d_1, \cdots, d_n]'$, $E=[e_1, \cdots, e_n]'$, and $M=[m_1, \cdots, m_n]'$ are the final domestic demand, exports, and imports, respectively. If we let

$$X_D \equiv (I-A)^{-1}D, \quad X_E \equiv (I-A)^{-1}E, \quad \text{and} \quad X_M \equiv (I-A)^{-1}M, \quad (9)$$

then (8) can be rewritten as

$$X_D = X + X_M - X_E \quad (10)$$

Here, $XD(=[x^d, \cdots, x^d]')$ means that the output level meets the final demand under a hypothetical situation in which there are neither exports nor imports. The same definition applies to X_E for export demand and to X_M for import demand. Using the same process, we define each element of $X_k (k \in \{D, E, M\})$, and we have the following identity:

$$S_i^d + S_i^m - S_i^e = 1 \quad (11)$$

where

$$S_i^k \equiv \frac{x_i^k}{x_i^d}. \quad (12)$$

This indicator is the same as the one proposed in Leontief (1963) to determine the "self-sufficiency" of a country. If $S_i^d>1$ then industry i has net exports, and this corresponds to $S_i^m>S_i^e$. Calculating the market share, for each industry, we can determine which industries have a signicant presence in neighboring regions.

3.2.2 Area introduction

As stated, our purpose is to propose a simple indicator that can assist policy makers' decisions. Because we are motivated by Japan's new local revitalization plan, we use as an example the input-output tables of two prefectures (Ishikawa and Toyama) in the Hokuriku Region of Japan (see Figure 1, below, for a map. It takes approximately two hours to travel to Hokuriku from Tokyo.).

The centers of these two prefectures are very close (only 20 minutes on the super-express "bullet train"), and their economic activities are strongly related. Table 1 summarizes some basic statistics of the two prefectures. The economic activity in Toyama is a little bit higher, and Ishikawa has a larger population, but overall, their numbers are very similar. The residents travel ratio is defined to be the ratio of the number of residents who travel (on weekdays) to the other prefecture (by any means) to the number of residents who travel (on weekdays). For example, 51.2% of the residents of Toyama who travel on weekdays, travel to Ishikawa. Note that for both prefectures, about half of the weekday travel is towards the other prefecture. This is evidence of strong economic connections

Fig. 1. Map of Japan Showing the Location of Ishikawa (left) and Toyama (right) Prefectures

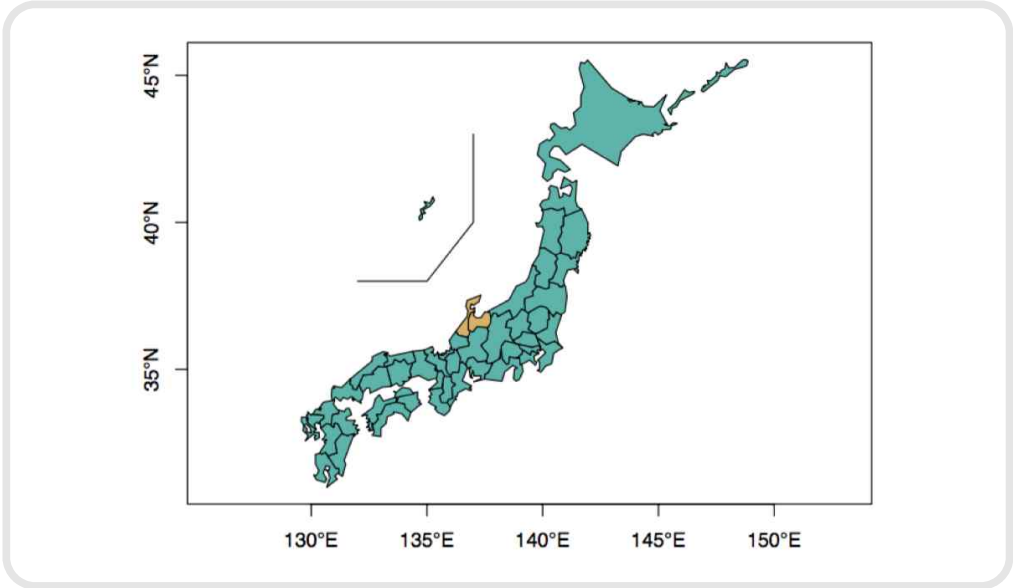


Table 1. Summary Statistics for the Toyama and Ishikawa Prefectures

	Ishikawa	Toyama
Population	1,169,788	1,093,247
Number of Households	441,170	383,439
Production in Region (million Yen)	8,321,841	8,906,924
Unemployment	2.5%	2.3%
Residents travel ratio (weekday)	50.0%	51.2%

Sources: the population and number of households are based on the National Census (2015). The production level is taken from the input-output table for each prefecture (2005), and the unemployment rate is from the Labor Force Survey (2015). The residents travel ratio is from the Japanese Ministry of Land, Infrastructure, Transport, and Tourism (MLIT).

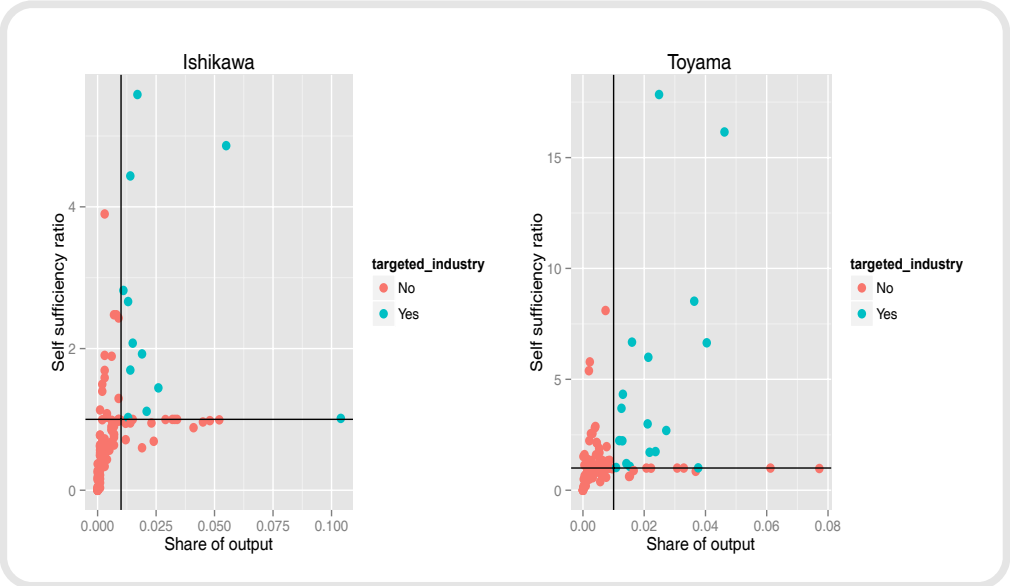
between these two prefectures. We believe these two locations provide a useful case study of the connections existing between neighboring prefectures.

3.2.3 The indicator

In Section 3.1, we showed that the more effi cient a firm is, the larger the share of the firm is. A series of the shares, S_i^d for all n industries, is easily calculated by using the input-output table. Figure 2 shows the results for the Ishikawa and Toyama prefectures. The vertical axis is S_i^d, the self-sufficiency rate. Following Leontief's method for self-suffi ciency analysis, the horizontal axis is the share of the given industry against the prefecture's total output.

In an appropriate revitalization plan, the

Fig. 2. Relation between the Industrial Share and the Self-sufficiency Ratio



Note: The data is based on the input-output table of each prefecture (2005).

"target industries", that is, the ones the local government should assist, should be the industries indicated by blue dots in Figure 2. We used the following two criteria to determine which industries to target:

1. The self-sufficiency rate is greater than 1.0.
2. The share of the industry output is greater than 1% (based on $1/n = 1/107$).

The first criterion determines if a given industry is efficient enough to export its product outside of the local border. The second one determines if the given industry is important within a region. An industry that meets only the first criterion could be one that is very strong but that has less potential in terms of job creation within the region. Alternatively, one that meets only the second criterion could potentially create jobs but not be sufficiently competitive to prevent imports. Thus, our simple indicator determines the competitiveness of each industry.

In addition to the competitiveness of an industry, the amount of value added is also important. Here, we compare the level of value added by calculating the ratio of the value in a given prefecture against the national average, that is,

value-added ratio = % of value added in a prefecture / national average of % of value added (13)

This value-added ratio allows us to ignore industry-specific issues when making comparisons. We found that, on average, the value-added ratio for Toyama is higher than that for Ishikawa. We also compared the value-added ratio between the target industries of the two

Table 2. List of Target Industries

	code	Toyama-ken	code	Ishikawa-ken
1	017	Pulp, paper, paperboard, building paper	012	Tobacco
2	026	Medicaments	013	Textile products
3	028	Petroleum refinery products	045	General industrial machinery
4	030	Plastic products	046	Special industrial machinery
5	041	Non-ferrous metals	054	Electronic computing equipment and accessories
6	042	Non-ferrous metal products	056	Other electronic components
7	043	Metal products for construction and architecture	059	Motor vehicle parts and accessories
8	046	Special industrial machinery	069	Electricity
9	047	Other general machines	073	Commerce
10	055	Semiconductor devices and integrated circuits	079	Road transport (except transport by private cars)
11	056	Other electronic components	098	Goods rental and leasing services
12	059	Motor vehicle parts and accessories	103	Accommodations
13	063	Miscellaneous manufacturing products		
14	069	Electricity		
15	079	Road transport (except transport by private cars)		
16	090	Public administration		
17	092	Research		
18	099	Repair of motor vehicles and machines		

Notes: Industries that met both criteria for both prefectures are underlined.

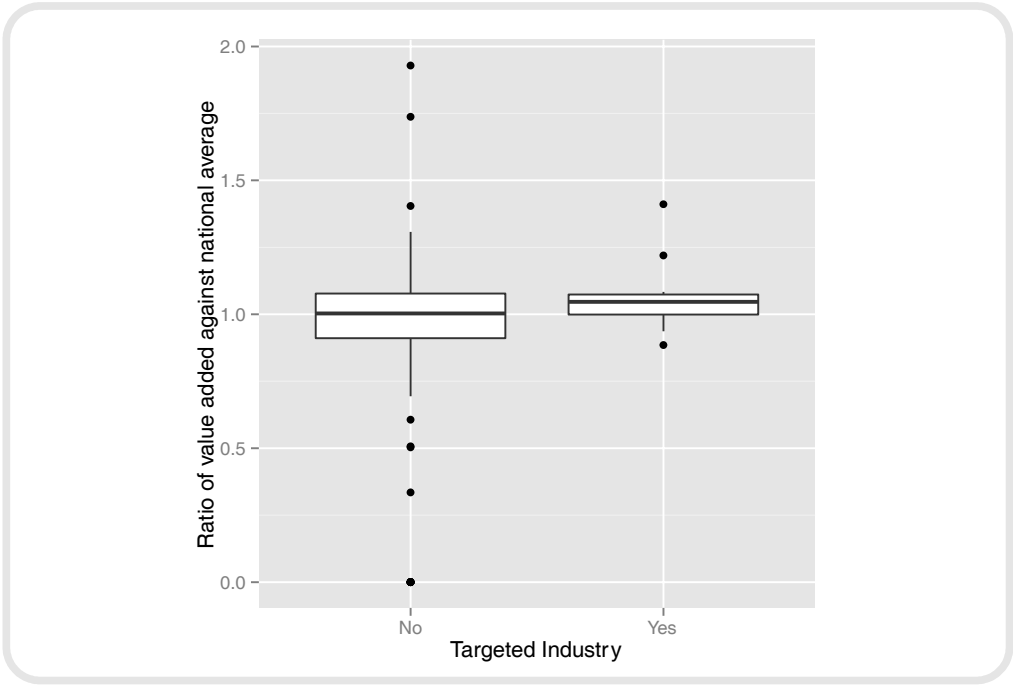
prefectures. Table 2 lists the target industries derived from Figure 2. Note that there are a few industries that are listed as targets for both prefectures (underlined in the table). We used Welch's two-sample *t*-test to determine if there is a difference between the mean value-added ratios for Ishikawa and Toyama. The null hypothesis was rejected at the 10% significance level with a *p*-value of 0.092.

Figure 3 compares the value-added ratio of target industries to that of nontarget industries in Ishikawa prefecture. Although the average value-added ratio was lower than that of Toyama, the value for the target industries in Ishikawa was higher than that of the nontarget industries in the region (5% significance level; *p*-value of 0.0151). This is consistent with our discussion in the previous section, where we showed that an industry that has a larger spatial share is more efficient and is likely to be more profitable. These finding suggest that when considering a local economic plan, such as Japan's new local revitalization plan, using our method to determine the target industries will provide very useful information for policy makers. Without information about how well each industry performs in a spatial competition with neighboring area, it is not possible to determine which industries to target.

4. Conclusion

In this paper, we considered what information is important for policy makers when they are attempting to revitalize a region by intervening in the market. It is vitally impor-

Fig. 3. Comparison of Value-added Ratios of Different Industries in Ishikawa Prefecture



tant to consider the intended actions of neighboring governments. One of the key pieces of information is the self-sufficiency ratio of the neighboring areas. The indicator that we introduced in Figure 2 will assist with decision making. Avoiding unnecessary competition with neighbors will optimize revitalization plans.

References

Cabinet Office, Government of Japan (2015), *Japan Revitalization Plan: Japan's Challenge for the Future*.

d'Aspremont, C., Gabszewicz, J. and Thisse, J. (1979), "On Hotelling's Stability in Competition," *Econometrica*, 47, 1145-1150.

Fukuda, Shinichi (2015), "Abenomics: Why was it so successful in changing market expectations?" *Journal of The Japanese and International Economies*, vol. 37, pp.1-20.

Leotief, W. (1963), "The Structure of Development," in Leontief (1966), *Input Output Economics*. United Nations Population Division (2015), *World Population Prospects: The 2015 Revision*, Vol.I, ST/ESA/SER.A/379.

Shibamoto, Nasagujim Tsutsui, Yoshihiko, Chisako Yamane (2016), "Understanding regional growth dynamics in Japan: Panel co-integration approach utilizing the PANIC method," *Journal of The Japanese and International Economies*, vol. 40, pp.17-30.

Yamamoto, Masashi (2016), "The effect of cost

fluctuation on waste trade and recycling in East Asia", in Yamamoto and Hosoda eds. The Economics of Waste Management in East Asia, Routledge, pp.191-208.