A Comparison of Human Capital and Productivity across Prefectures: Studies Based on Japan's Prefecture-level KLEMS Data

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-We estimate and compare the quantity and quality of human resources across regions.

-And we search the cause of its difference.

-Especially we focus on the migration of young people across regions.

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2. Factor Decompositions of Regional Difference in Labor Quality
3. Does Migration of Young Workers Generate Regional Difference in Labor Quality?

1. Regional Difference of Labor Quality, its Change, and its Correlation with Labor Productivity

Measuring method(1)

- Regional Labor Input is measured by the method a la Caves, Christensen and Diewert (1982):

$$\log H_r = \sum_{n}^{N} \left\{ \frac{1}{2}\omega_{rn} + \frac{1}{2}\overline{\omega_n} \right\} \left[\log L_{rn} - \overline{\log L_n} \right]$$

ω_{rn}=cost shares of labor inputs in region r for the respective characteristic n relative to the total labor cost in region r

L_{rn}=man-hour in region r for characteristic n

Over-Bars indicate taking average over all regions.

Labor characteristic n is cross-classified by industries × genders × educational attainments × ages

Measuring method(2)

・Labor Input in region r relative to region s can be obtained as follows:

$$\log H_{rs} = \log H_r - \log H_s$$

Let region s be Tokyo and use it as the basis of comparison.

・The aggregate labor input, H, can be decomposed into man-hour input L, and labor quality Q, given H=L·Q. Hence, we have:

$$\log Q_{rs} = \log H_{rs} - \log L_{rs}$$

Figure 1: Regional Comparison of Labor Quality, 1970

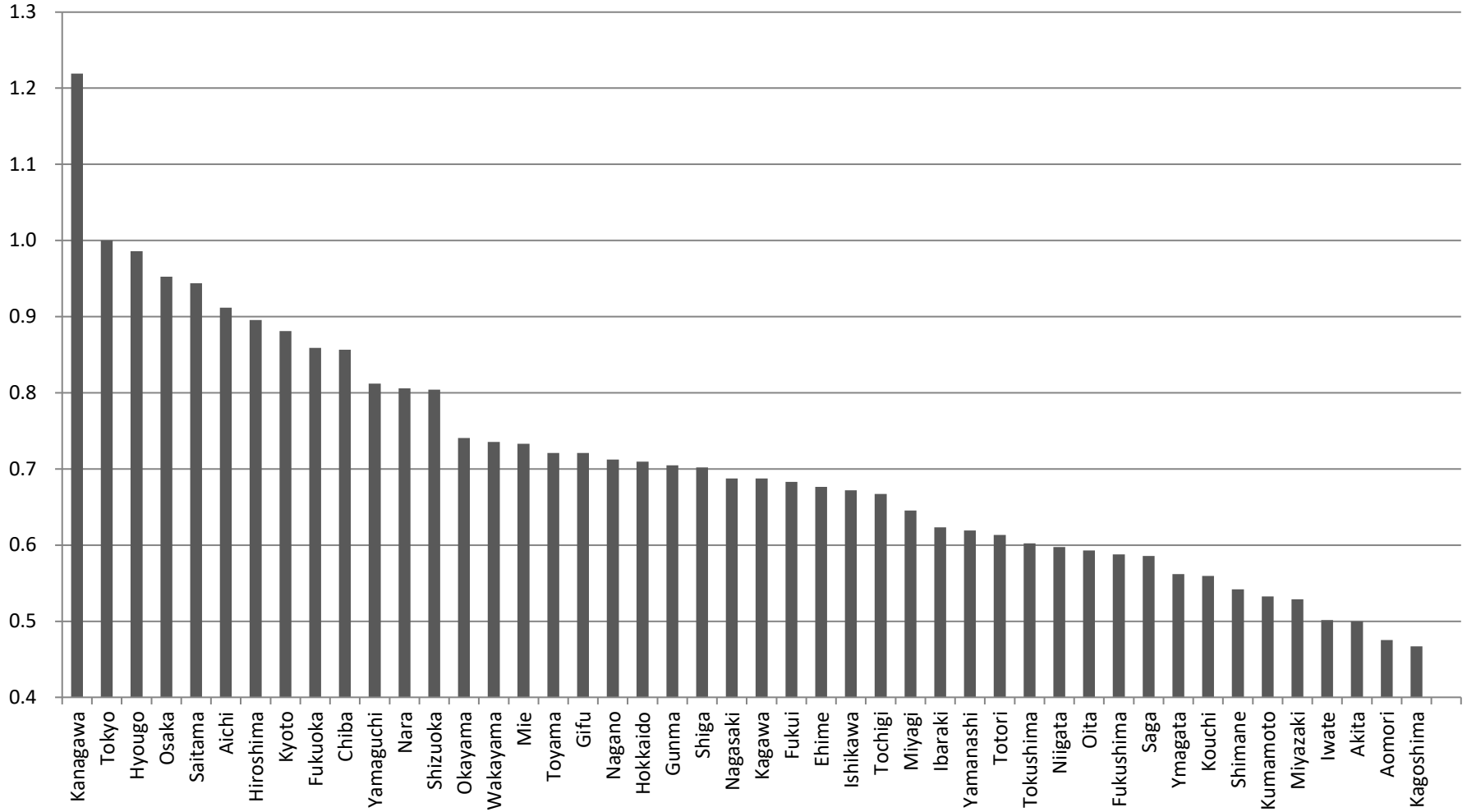


Figure 2: Regional Comparison of Labor Quality, 2010

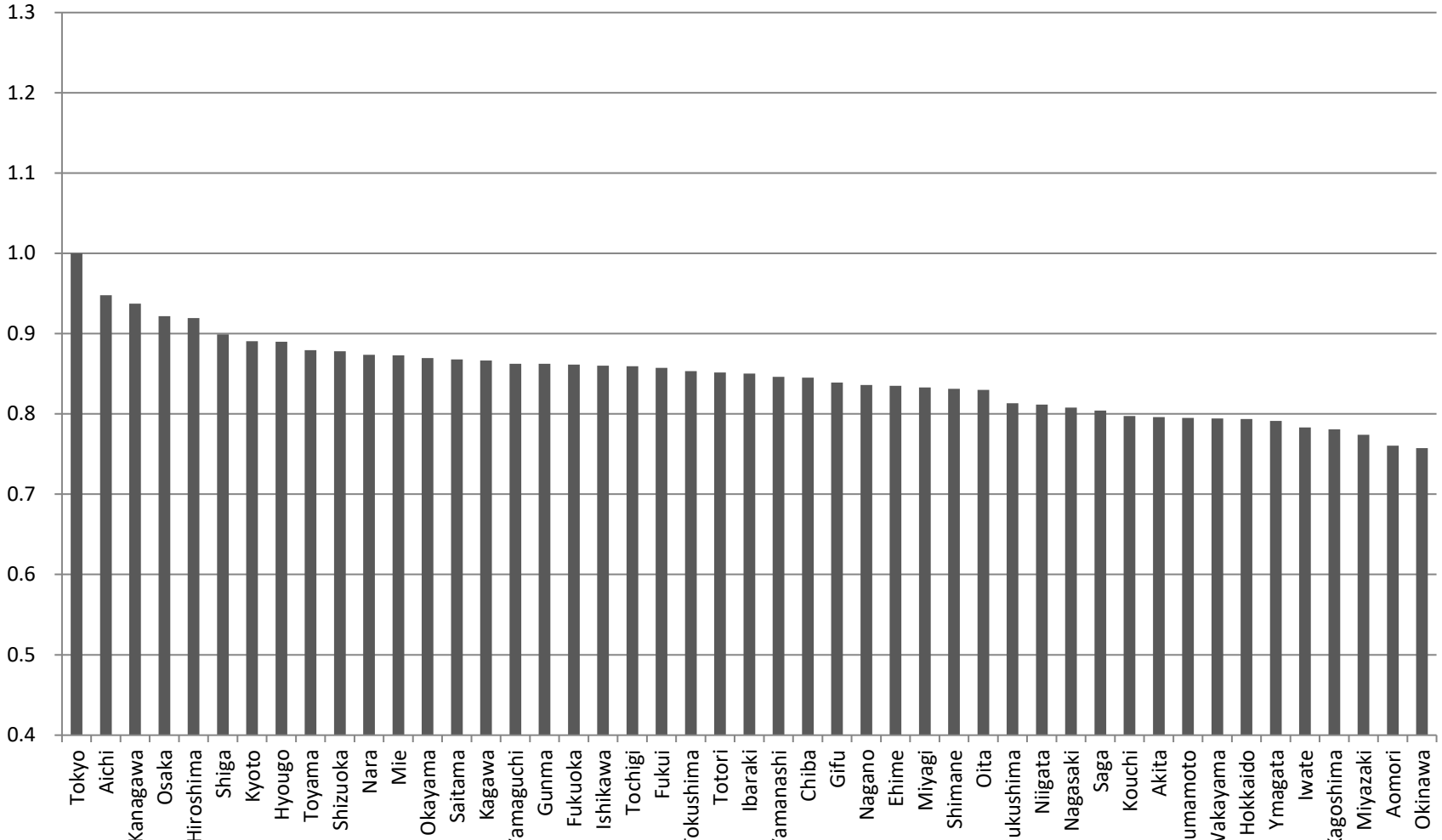


Figure 3: Correlation between Regional Labor Quality and Labor Productivity, 1970

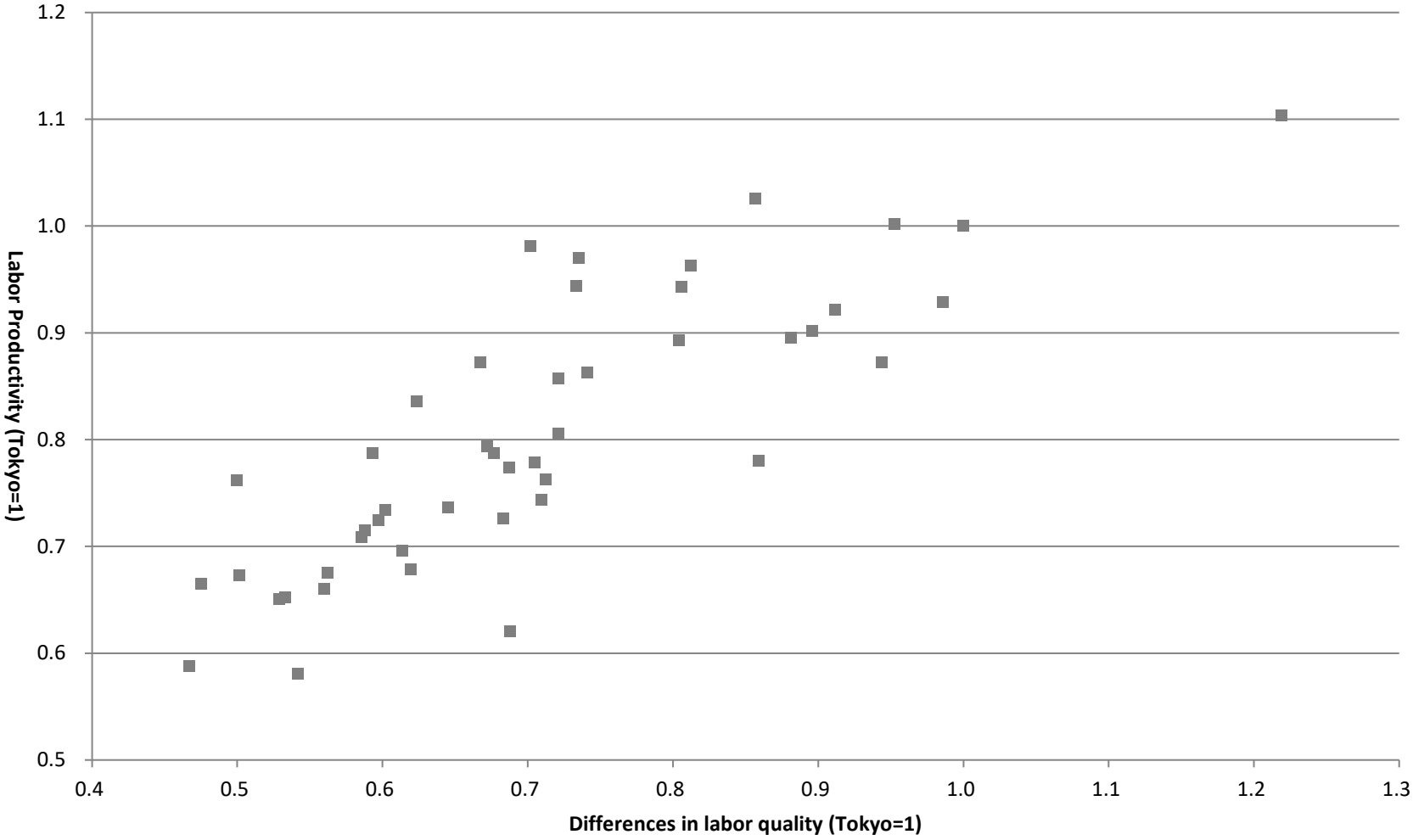
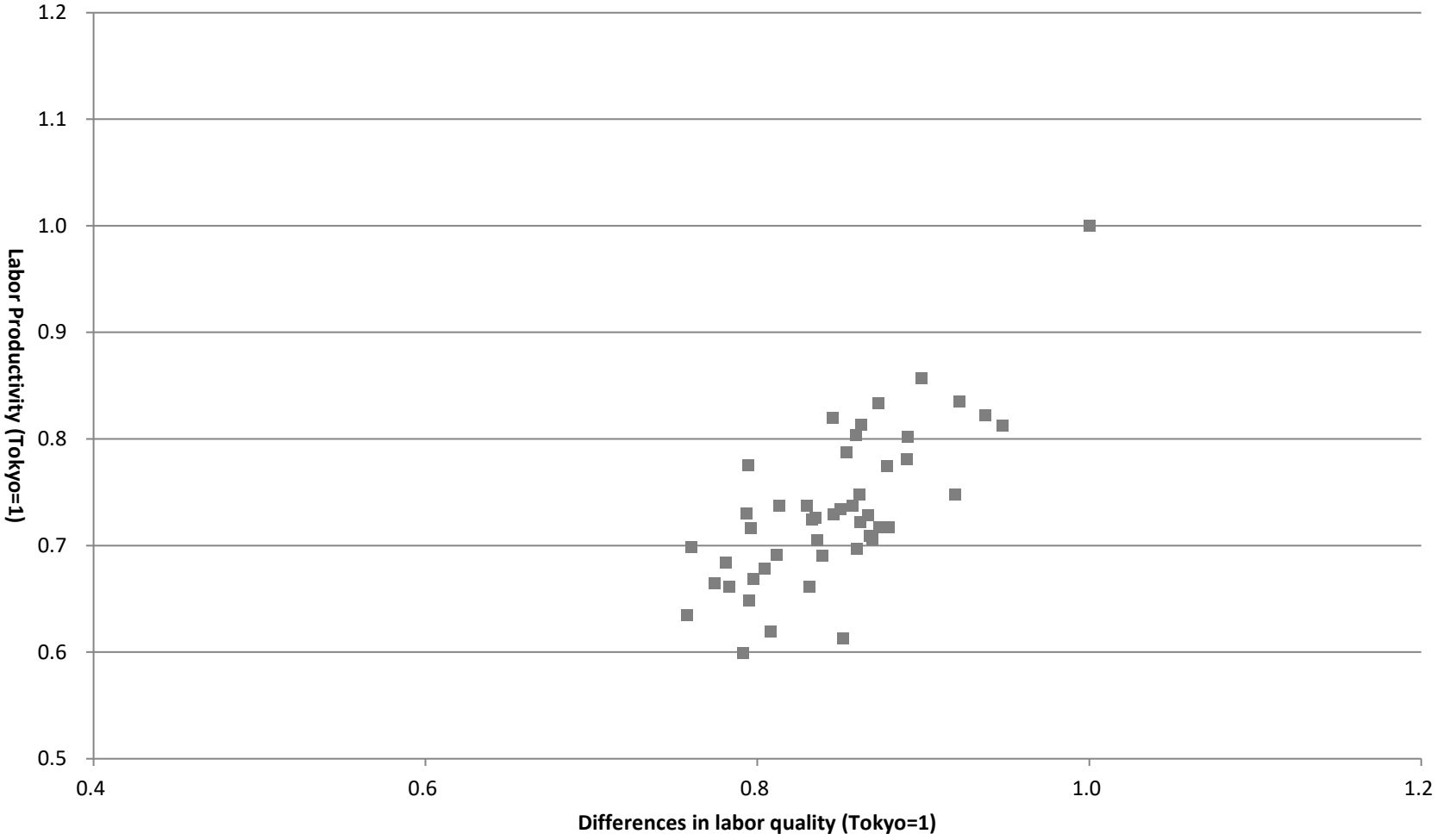


Figure 4: Correlation between Regional Labor Quality and Labor Productivity, 2010



- Although gaps in labor quality among regions in Japan have shrunk over the 40 years from 1970, around 30 percent of them still remains now.
- There is clearly a positive correlation between such cross-regional gap in labor quality and the gap in labor productivity, and the relationship between the two has been even getting stronger lately.

2. Factor Decompositions of Regional Difference in Labor Quality

Method of Fsctor Decompositions (1)

- Since our quality index is Törnqvist type, we can use the method of factor decomposition a la Jorgenson, Gollop and Fraumeni (1987).
- After confirming that the first-order effects largely account for the labor-quality index, we focus on the first-order effects of factor decomposition.

Figure 5: First-order Factor Decomposition of Regional Difference Index of Labor Quality, 1970

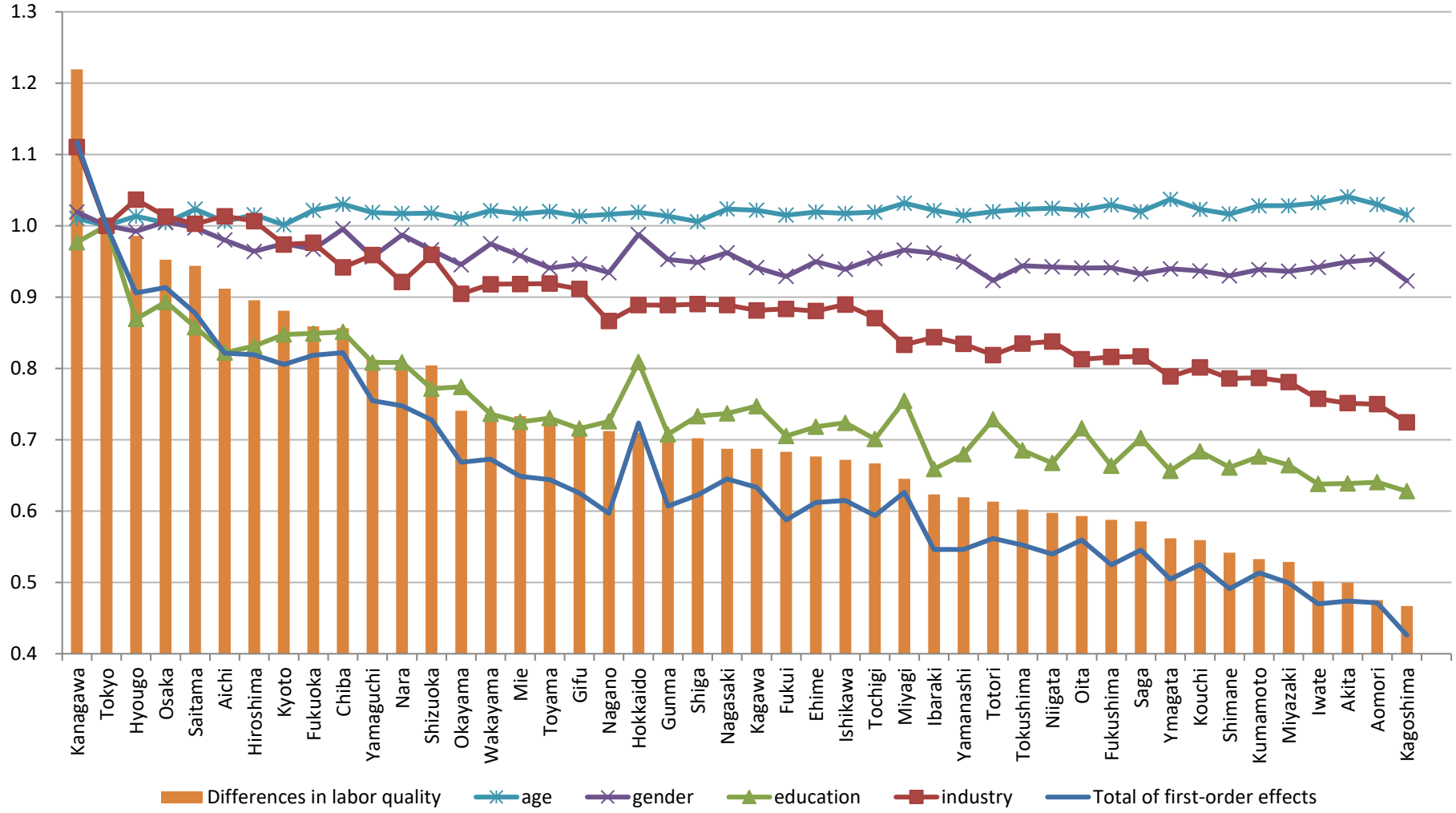
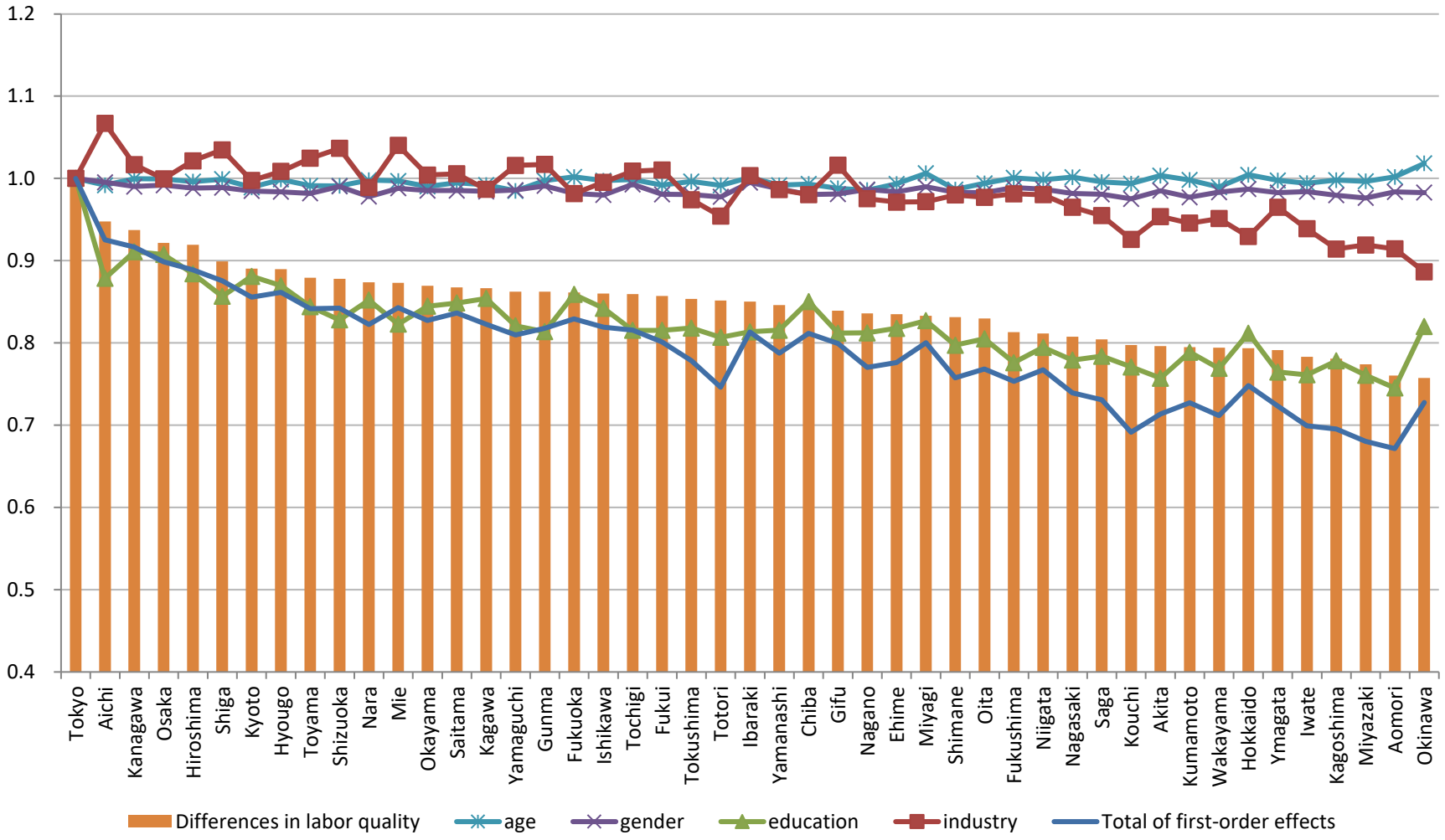


Figure 6: First-order Factor Decomposition of Regional Difference Index of Labor Quality, 2010



- As of 1970, the industrial-location as well as the educational-attainment of workers were the two important causes of regional gaps in labor quality.
- But, over the subsequent 40 years, the industrial-location factor faded out, making the educational-attainment factor the major cause of the remaining regional gaps in labor quality.

3. Does Migration of Young Workers Generate Regional Difference in Quantity and Quality of Labor?

Method of Calculation (1)

- We also focus on groups aged between 30 and 34, by the time they reach these ages, most of them would have completed school education, and settled down in their place of work.
- We go back 20 years to obtain their populations by prefecture and gender when they were between 10 and 14 years old, still young and before graduating from junior high schools.
- And we trace their educational-attainment and employment of each gender group in each prefecture.
- If there would be no migration across prefectural borders of these young workers, hypothetical labor input of each prefecture of this generation could be calculated.

Method of Calculation (2)

- The index numbers obtained as below show that, had there been no transfers of labor across prefectures, how many times larger or smaller the aggregate labor input in each prefecture would be.

$$\log H_{30-34,r}^{p/a} = \sum_{n=1}^{6} \left\{ \frac{1}{2}\omega_{30-34,rn}^{p} + \frac{1}{2}\omega_{30-34,rn}^{a} \right\} \left[\log L_{30-34,rn}^{p} - \log L_{30-34,rn}^{a} \right]$$

p=hypothetical

a=actual

・Hence, if the index number is greater than one, the region experienced labor outflow, and if less than one, labor inflow.

Figure 7: Quantitative Impact on Regional Labor Input by Migration of Young Workers

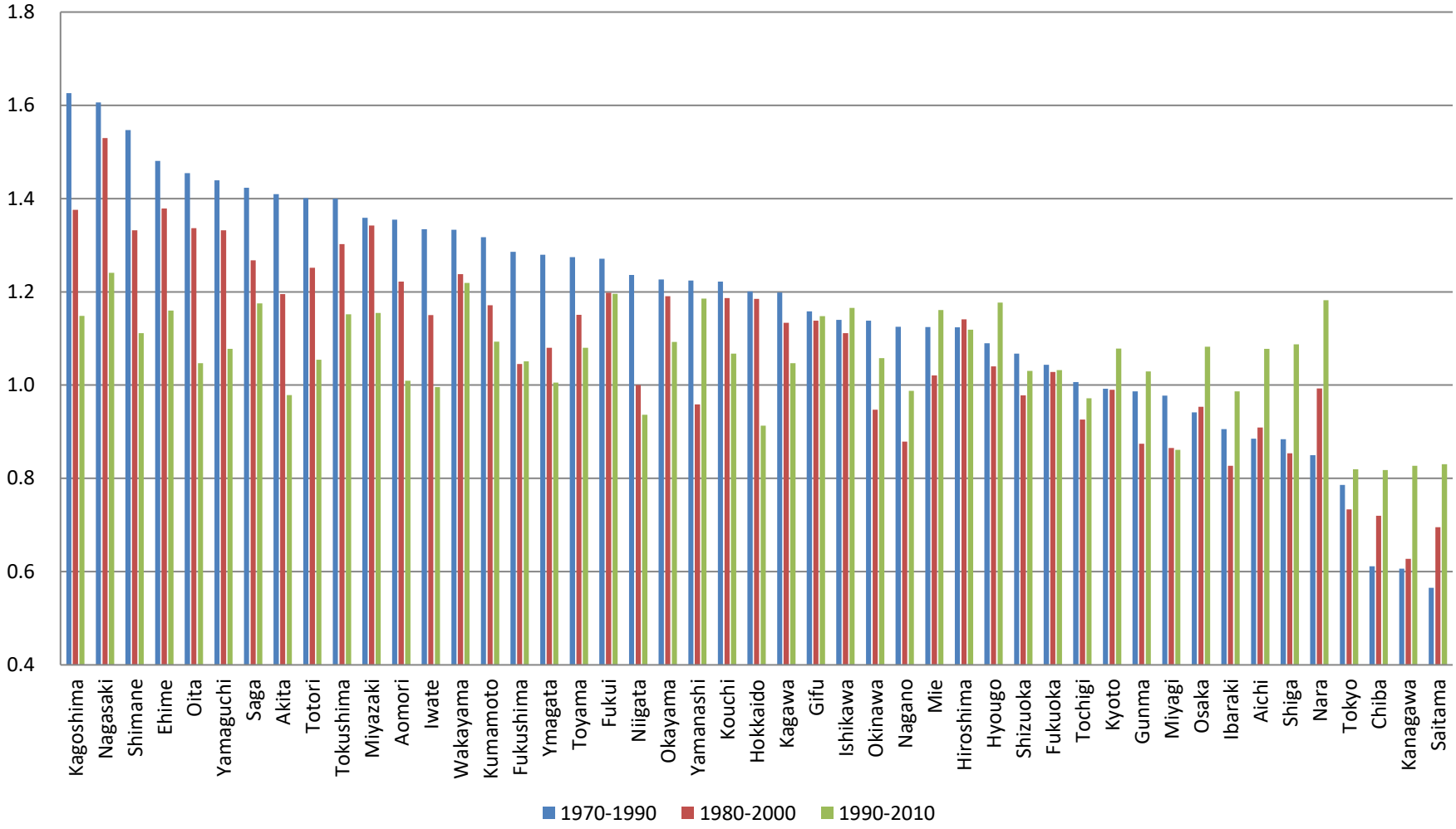


Figure 8: Qualitative Impact on Labor Input by Migration of Young Workers

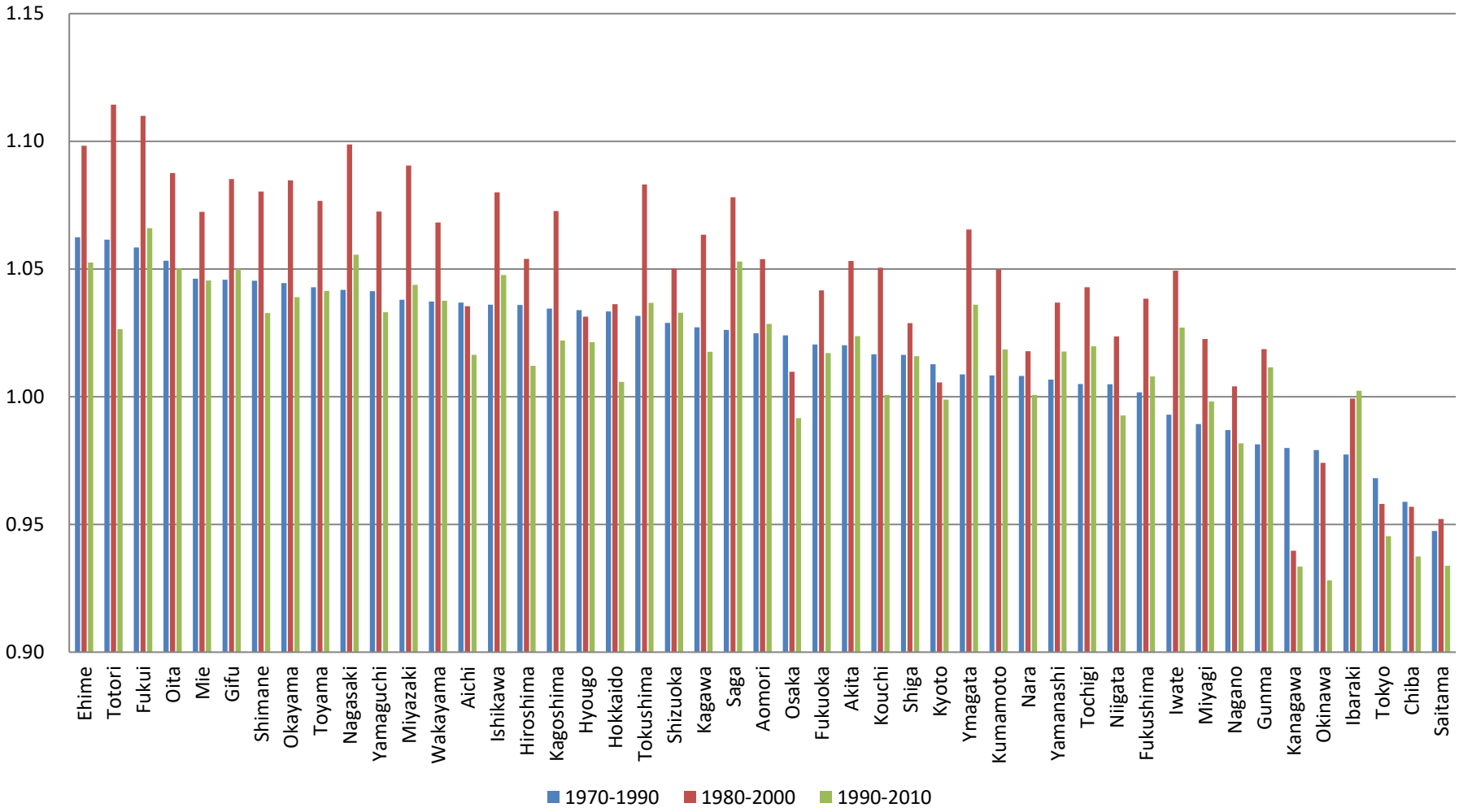


Figure 9: There is Agglomeration Effect on the Quantity of Labor Input by Migration of Young Workers.

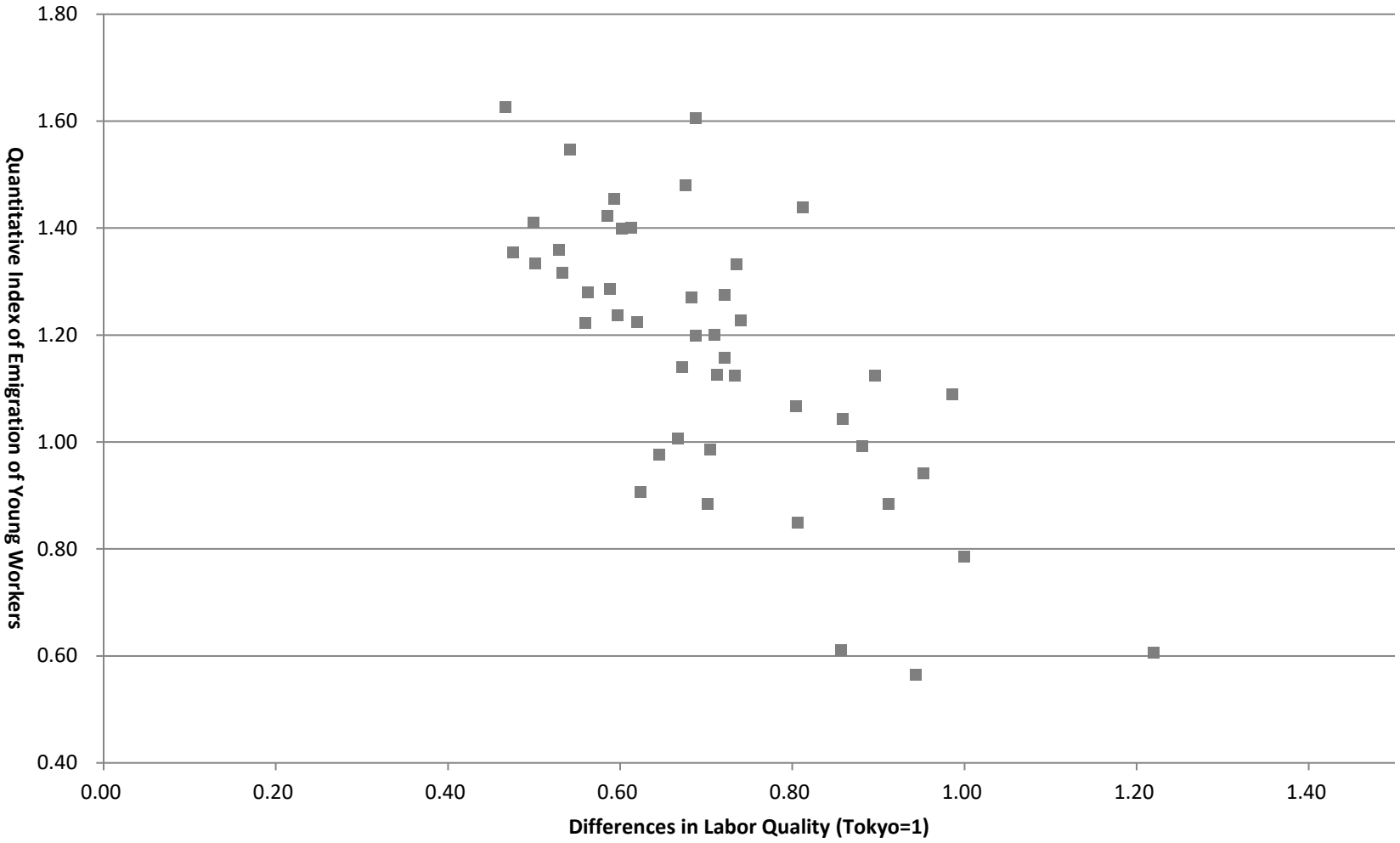
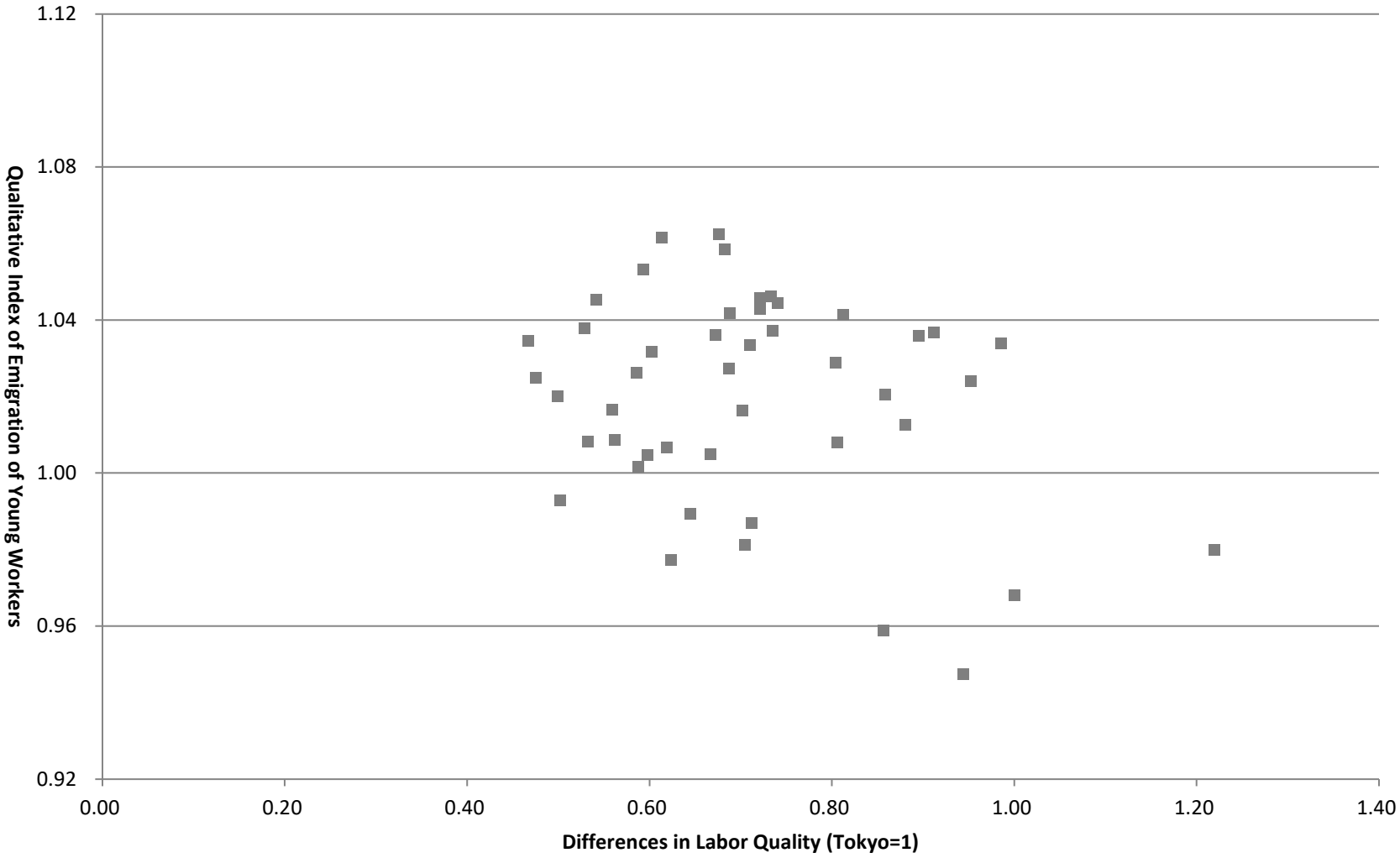


Figure 9: Is there Agglomeration Effect on the Quality of Labor Input by Migration of Young Workers??



- Our results confirmed that migration of young workers significantly impacts regional quantity of Labor Input, causing uneven distributions of human resources across regions.
- When it comes to labor quality, however, there is only week tendency, and the effect is not so evident.

Thank you.