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Calculating Single Regional Input-Output Tables Using a New Combined FLQ-RAS Method and Employment Multipliers; a Case Study of Kohgiluyeh and Boyer-Ahmad Province

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Abstract

Regional Input-Output Tables (RIOTs) are the most important tool for regional planning, but the construction of the survey-based RIOTs can be complex, expensive and time consuming. From the mid 20th Century to present, many types of non-survey methods were introduced for the estimation of Regional Input-Output Coefficients (RIOCs) and (RIOTs) by regional input-output economists. On the one side, there are different kinds of location quotient methods which have focused on estimating RIOCs and balancing RIOTs requires acceptance of two types of residuals. The first type is the exports of a region to other regions and the rest of the world, and the second type is regional sectoral value added. On the other side, there are Commodity Balance (CB) and Cross-Hauling Adjusted Regionalization Method (CHARM) which concentrate on estimating RIOTs and the regional sectoral value added plays a key role in balancing RIOTs. In this paper, we show that sectoral value added in regional accounts of Iran is adjusted unwantedly due to using LQ methods for estimation of RIOTs. To tackle this problem, we used a new mixed FLQ-RAS method for estimating Kohgiluyeh and Boyer-Ahmad Province's RIOT in 1390 and calculated the regional and national employment multipliers for 60 economic sectors. The results indicate that there are no similarities between the quantities and ranking of regional employment multipliers and national employment multipliers. This shows that neglecting the dimensions of space and ignoring regional differences leads to the development of misleading development strategies.

Keywords: Single Regional Input-Output Table, Employment Multipliers, New Mixed FLQ-RAS Method.

JEL Classification: R15, R23, R11, D57, J21.

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1. Introduction

The focus on studies conducted in the research and policy centers of the country shows that these studies focus exclusively on the national economy, and the implicit assumption in all these reports is that if the problem of unemployment is resolved across the country, it will also be resolved automatically in the lower layers, such as provinces, cities, and villages. In other words, in these reports there is no trace of 31 provinces of the country as if all provinces were homogeneous and there was no difference in terms of space dimensions.

The above observation brings up a question into the mind of the authors of this article, that regardless of the dimensions of the space and the central capabilities of each province, can the unemployment problem be addressed by using top-down policy versions? In other words, are the same economic sectors that are more productive at the national level exactly in line with the sectors that are regionally at the top levels of job creativity?

This article follows three main goals; first, calculation of the Regional input-Output Table for Kohgiluyeh and Boyerahmad Province using the New Combined Method FLQ-RAS; second, it calculates Employment Multipliers in the province; and finally, it compares national and regional employment opportunities in order to reflect the need to pay attention to the spatial dimensional differences in employment design planning.

In light of the above, the paper is organized in four sections. In the second section, theoretical and empirical background has been investigated and in the second section, the methodology and the statistical basis have been presented. In section four, the results of the calculations and the related conclusions are presented.

2. Theoretical and empirical foundations of research

2-1. Theoretical Foundations

In the absence of regional input-output tables in which all the statistics and information at the region level are collected, processed and organized, researchers were forced to save time and money by using other methods to calculate regional input-output tables and their coefficients. One of these methods includes a variety of Location Quotients methods (SLQ_i SLQ_j ، $CILQ_{ij}$ ، $ACILQ_{ij}$ ، RLQ_{ij} ، $MRLQ_{ij}$ ، FLQ_{ij} ، $AFLQ_{ij}$). Obviously, the use of these methods requires less time, resources and statistics in comparison with survey methods.

Theoretically, Location Quotients methods are rooted in the economic based model. In the economic based model, theoretically, the region's economy is divided into two parts; based activity and non-based activity. Based activities are activities that export goods and services outside the community of economics, or deliver goods and services to people who have come from outside the country's economic boundaries. Non-based activities are those which provide the needs of residents within the economic range of the community. Non-based activities do not export any goods, and are domestic in terms of production and the market.

The Location Quotients is the proportion of the total share of the output of each sector in the region to the total output of that sector in the country. If this ratio is greater than one, then that section is considered to be the base, and if it is smaller than one, it is considred as a non-basic activity and if it is equal to one, then that section will be self-sufficient.

2-2. Empirical research background

In the 1950s, the thought of adjusting the regional input-outputs, regional economics and space economics, and its quantitative analysis in the framework of general equilibrium was first made by Leontief for a region, and then by Walter Isard for two regions, and ultimately by Polanski for multi regions. By reviewing the research background, a few general observations can be found:

First, in all the foreign studies, this point is explicitly or implicitly made that the statistical basis needed to calculate input-output tables based on a variety of Location Quotients methods involves the national internal output table not the conventional table (See Kronenberg, 2009 and 2012, Flegg et al. 1995, Flegg and Webber, 1997, Flegg and Tohmo, 2013). However, this has been neglected in most of the studies conducted since 1380.

Secondly, in none of the domestic studies, the "irrationality of the consideration of value added vector as a residual" has been mentioned.

Accordingly, in this paper, an attempt was made to calculate the input-output table of Kohgiluyeh and Boyer Ahmad in 60 economic sectors using a new combined FLQ-RAS method and provide a basis for estimating the employment Multipliers of economic sectors in this province.

3. Method of Table calculation using FLQ-RAS method and statistical basis

In general, the Non Survey method is based on the assumption of the maximum use of statistical bases at the national and minimum level across a region. The assumption may be justified for countries without regional accounts, but it is unrealistic for Iran. The new compound method attempts to resolve the hypothesis.

The logic of the new combined method is that the value-added vectors and intermediate cost of economic sectors, which the Center of Statistics has provided in the form of 72 economic sectors since 1379, is to be used. To do this, after the input-output table is calculated using the FLQ method, the following modifications are made to the computational table:

- ✓ First, the region's value added vector, calculated by the Statistics Center, replaces the value added vector of the FLQ method.
- ✓ Second, the vector of the intermediate cost of the region calculated by the Statistics Center should replace the vector of the calculated interfaces calculated by the FLQ method.
- ✓ Third: The total value vector of the internal intermediate cost obtained in the previous step replaces the total value vector of the internal intermediate cost calculated by the FLQ method.

✓ Fourth: The ratio of the total aggregate demand for internal intermediate demand, which is issued by the Center of Statistics to the total aggregate demand for internal intermediaries of the FLQ method is calculated and the calculated ratio is multiplied by internal intermediate vector which is calculated by the FLQ method.

✓ Fifth: The intermediate transaction is calculated using the RAS method.

In order to calculate the employment potential, three steps are taken. Initially, the internal technical coefficients of the region are calculated using the FLQ-RAS methodology based on the regional input-output table. In the following section, the direct coefficients of employment are obtained using the employment and output statistics of each economic sector in the region and, finally, the direct and indirect coefficients of employment are calculated.

In order to take the above processes, the national input-output table was updated by the Center for Parliamentary Research and Regional Accounts of Kohgiluyeh and Boyer Ahmad in 1390 as 72 economic sectors based on calculations. Statistics on employment of various economic sectors at the provincial and national levels have been obtained from the 7th Population and Housing Census and the 4th Population and Housing Census of the Islamic Republic of Iran.

4. Analysis of results and conclusions

The study of the economic structure of Kohgiluyeh and Boyer Ahmad province shows its serious difference with the structure of the national economy. The share of extraction of crude oil and natural gas from the province's output in 1390 was more than 73 percent, while the other 71 economic sectors in the province account for less than 27 percent. While the share of crude oil and natural gas sector in the country forms about 10% of the total national output, the other 71 sectors account for 90% of the country's output.

There is also a different picture of the employment potential of economic sectors at the national and regional levels, as well as their ranking. The results indicate that the clothing manufacturing, dressing and dyeing sector has the highest direct and indirect employment at the national and regional levels, but in the next ranks, a different mix of sectors at the national and regional levels was observed. Public sector, tannery and leather and other leather goods, wood and wood products, tobacco and tobacco products, adult education, and horticulture have the highest levels of national employment capability.

Across the region, making motor vehicles, trailers and semi-trailers, tanning and leather and other leather goods, wood and wood products, tobacco and tobacco products, other transport and publishing, printing and reproduction of recorded media have the highest ratings in the regional employment capability, respectively.

Direct and indirect employment of economic sectors at the national and regional levels in exchange for a one -million Rials increase in final demand

Economic sectors	Region		National	
	Rank	Increasing employment rates	Rank	Increasing employment rates
Agriculture and horticulture	9	0.0084	6	0.0076
Animal husbandry, poultry, breeding silkworm and honey bee and hunting	18	0.0044	13	0.0052
Forestry	33	0.0022	24	0.0038
Fishing	55	0.0004	30	0.0029
Crude oil and natural gas	60	0.0001	60	0.0002
Other mines	50	0.0011	49	0.0017
Manufacture of food products and beverages	29	0.0029	15	0.0049
Making textiles	35	0.0020	8	0.0073
Garment, processing and dyeing of fur	1	0.0802	1	0.0383
Tanning and polishing of leather and other leather goods	3	0.0289	3	0.0104
Manufacture of wood and wood products , manufacture of tobacco products	4	0.0138	4	0.0093
Manufacture of paper and paper products	45	0.0015	22	0.0039
Publishing, printing and reproduction of recorded media	6	0.0109	10	0.0060
Manufacture of coke, refined petroleum products and nuclear fuel,, production of chemicals and chemical products	43	0.0017	52	0.0010
Manufacturing of products from rubber and plastic	54	0.0007	39	0.0024
Production of other mineral non-metal products	46	0.0014	29	0.0031
Manufacture of basic metals	37	0.0020	48	0.0018
Production of metal products except machine fabric machinery and equipment	12	0.0066	12	0.0053
Manufacture of machinery and equipment not elsewhere classified	10	0.0070	40	0.0023

Economic sectors	Region		National	
	Rank	Increasing employment rates	Rank	Increasing employment rates
Manufacture of electrical machinery and apparatus not elsewhere classified	48	0.0012	34	0.0026
Making medical instruments, optical instruments, precision instruments and clock types	34	0.0021	31	0.0028
Manufacture of motor vehicles, trailer and semitrailer	2	0.0324	46	0.0020
Manufacture of other transport equipment	51	0.0009	28	0.0034
Manufacture of furniture, artifacts unclassified elsewhere and recycling	31	0.0028	16	0.0047
Electricity	27	0.0032	51	0.0011
Natural gas distribution	41	0.0019	59	0.0002
Water	21	0.0040	18	0.0047
Residential buildings	23	0.0036	20	0.0046
Other buildings	24	0.0035	17	0.0047
Wholesale, retail, repair of vehicles and goods.	38	0.0019	32	0.0028
Hotel and hostel	42	0.0018	37	0.0025
Restaurant	28	0.0031	23	0.0039
Transportation	11	0.0070	19th	0.0044
Other transports	5	0.0129	33	0.0027
Support and warehousing services	13	0.0066	43	0.0021
Post and Telecommunications	8	0.0088	41	0.0023
Bank	22	0.0040	44	0.0020
Other financial intermediations and their subsidiary activities	17	0.0046	47	0.0019
Insurance	44	0.0017	50	0.0016
Services of residential units	52	0.0009	56	0.0006
Services of residential units	53	0.0008	57	0.0005
Service units of non Ruskin	57	0.0003	53	0.0010
Real estate brokers	56	0.0004	58	0.0003
Rental and business services	32	0.0022	35	0.0026
Public affairs	7	0.0109	2	0.0125

Economic sectors	Region		National	
	Rank	Increasing employment rates	Rank	Increasing employment rates
Urban services	58	0.0003	54	0.0007
Defense affairs	14	0.0057	14	0.0051
Police Affairs	59	0.0001	55	0.0006
Compulsory social security	25	0.0034	26	0.0036
Elementary education	16	0.0054	11	0.0059
General secondary and secondary vocational education	15	0.0055	9	0.0062
Higher Education	26	0.0033	25	0.0036
Adult Education	19th	0.0041	5	0.0079
Governmental healthcare	40	0.0019	38	0.0025
Private health care	36	0.0020	36	0.0026
Veterinary	49	0.0012	42	0.0022
Social work	39	0.0019	27	0.0034
Recreational, cultural, and sports	47	0.0013	45	0.0020
Religious and political	30	0.0029	21	0.0042
Other services	20	0.0041	7	0.0073

Reference

Flegg, A. T., Tohmo, T. (2013). "Regional Input-Output Tables and the FLQ Formula: A Case Study of Finland", *Regional Studies*, 47, 703-721

Flegg, A., Webber, C., Elliott, M. (1995). "On the Appropriate Use of Location Quotients in Generating Regional Input−Output Tables". *Regional Studies*, 31, 547-561.

Flegg, A. T., Webber, C. D. (1997). "On the Appropriate Use of Location Quotients in Generating Regional Input-Output Tables: Reply", *Regional Studies*, 31, 795-805.

Kronenberg, T. (2009). "Construction of Regional Input-Output Tables Using Non-survey Methods The Role of Cross-Hauling", *Regional Studies*, 32, 40-64.

Kronenberg, T. (2012). "Regional input-output models and the treatment of imports in the European System of Accounts (ESA)". *Regional Studies*, 32, 175-191.

Ziari, K. (1378), "Principals and Methods of Regional Planning", Yazd, Yazd University Publications.