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Sector and Spatial-Specific Multipliers in Eastern Indonesia's Economy: An Inter-Island Input-Output Analysis

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Abstract: ***This paper aimed to provide the results of analysis on total and flow-on effects, sector-specific, and spatial-specific multipliers in Eastern Indonesia's Islands economy, mainly for planning and evaluation purposes. These Islands consist of thr ee groups of big Islands such as: Sulawesi (6 provinces), Maluku (2 provinces) and Papua (2 provinces). The model employed was Inter-Island Input-Output Model (IIIOM) developed using new hybrid procedures with special reference to Island economy. Data used for model were updated to Indonesian data for the year of 2015. The results show that firstly, the important sectors of Eastern Indonesia's Island economy could be based on total multipliers and flow-on effects of output, income and employment. Secondly, important economic sectors could be based on sector-specific multipliers of output, income and employment; multipliers that occurred in own sector and other sectors. Thirdly, important economic sectors could be based on spatial-specific multipliers of output, income and employment; multipliers that occurred both in own region and other regions.***

Keywords: Inter-Island Input-Output Model, Total and Flow-on Multipliers, Sector-Specific Multipliers, Spatial-Specific Multipliers

1. Introduction

Eastern Indonesia's island in this study focused on three big groups of Islands: Sulawesi, Maluku and Papua. Sulawesi is one of the country's mainn islands, which stands as the 11th largest island in the world. The Maluku Islands, also known as the Spice Islands, comprise 632 islands alone. Famous for their nutmeg, cloves, and mace, these mountainous forest-covered areas are largely unexplored and offer a wealth of complex, indigenous charm. Papua is widely considered one of the most remote places on earth and home to some of the most abundant biodiversiity in the world. Off Papua's coast are the 610 islands that make up the Raja Ampat islands. Spread over 50,000 kilometers, the Raja Ampat islands offer spectacular scenery with majestic limestone structures covered in orchids, craggy spires, and the greatest and healthiest coral reef biodiversity for its size in the world (Anonymous, 2016).

Administratively, Eastern Indonesia consists of ten provinces. In Sulawesi Island there are six provinces, namely: North Sulawesi, Gorontalo, Central Sulawesi, South-East Sulawesi, West Sulawesi and South Sulawesi. In Maluku Islands, there are two provinces: North Maluku and Maluku, and in Papua island there are two provinces: West Papua and Papua (Anonymous, 2014).

According to Prihawantoro (2013), the main economic activities in Sulawesi Island were Sector-1: Agriculture, livestock and fishery in North Sulawesi, Gorontalo, Central Sulawesi, South-East Sulawesi, West Sulawesi and South Sulawesi; Sector-5: Construction in North Sulawesi; Sector-6: Trade, hotel and restaurant in North Sulawesi and South Sulawesi; and Sector-9: Other services in North Sulawesi and South Sulawesi. The main economic activities in Maluku Islands were Sector-1: Agriculture, livestock and fishery in North Maluku mainly fishery and in Maluku mainly food-crops and estate, and Sector-6: Trade, hotel and restaurant. The main economic activities in Papua were Sector-1: Agriculture, livestock and fishery in West Papua and Sector-2: Mining and quarrying in Papua.

Based on 2013 data, Eastern Indonesia's contribution to Indonesia GDP was only about 7 per cent. Meanwhile Sumatra Island contributed about 23 per cent; Java's contribution was 58 per cent; Kalimantan contribution was about 9 per cent; Nusa Tenggara contribution was 3 per cent (Anonymous, 2015).

The objective of this paper is to report the research in developing and applying a model that provides information on multipliers: total, flow-on, sectoral-specific and spatial-specific, so they can be further used for planning and evaluating regional economic development in Eastern part of Indonesia.

2. Literature Survey

In macroeconomics, a multiplier is a factor of proportionality that measures how much an endogenous variable changes in response to a change in some exogenous variable (Dornbusch, R., & Stanley, F., 1994; McConnell, C., et. al, 2011; Pindyck, R & Rubinfeld, D., 2012). In monetary microeconomics and banking, the money multiplier measures how much the money supply increases in response to a change in the monetary base (Krugman & Wells 2009; Mankiw, 2008). Multipliers can be calculated to analyze the effects of fiscal policy, or other exogenous changes in spending, on aggregate output. Literature on the calculation of Keynesian multipliers traces back to Richard Kahn's (1931) description of an employment multiplier for government expenditure during a period of high unemployment. At this early stage, Kahn's calculations

recognize the importance of supply constraints and possible increases in the general price level resulting from additional spending in the national economy (Ahiakpor, J.C.W., 2000). Hall (2009) discusses the way that behavioural assumptions about employment and spending affect econometrically estimated Keynesian multipliers.

The literature on the calculation of I-O multipliers traces back to Leontief (1951), who developed a set of national level multipliers that could be used to estimate the economy wide effect that an initial change in final demand has on an economy. Isard (1951) then applied input-output analysis to a regional economy. According to Richardson (1985), the first attempt to create regional multipliers by adjusting national data with regional data was Moore & Peterson (1955) for the state of Utah. In a parallel development, Tiebout (1956) specified a model of regional economic growth that focuses on regional exports. His economic base multipliers are based on a model that separates production sold to consumers from outside the region to production sold to consumers in the region.

In a survey of input-output and economic base multipliers, Richardson (1985) notes the difficulty inherent in specifying the local share of spending. He notes the growth of survey-based regional input-output models in the 1960s and 1970s that allowed for more accurate estimation of local spending, though at a large cost in terms of resources. Beemiller (1990) of the BEA describes the use of primary data to improve the accuracy of regional multipliers. The literature on the use and misuse of regional multipliers and models is extensive. Coughlin & Mandelbaum (1991) provide an accessible introduction to regional IO multipliers. They note that key limitations of regional I-O multipliers include the accuracy of leakage measures, the emphasis on short-term effects, the absence of supply constraints, and the inability to fully capture interregional feedback effects. Grady & Muller (1988) argued that regional I-O models that include household spending should not be used and argue that cost-benefit analysis is the most appropriate tool for analyzing the benefits of particular programs. Mills (1993) noted the lack of budget constraints for governments and no role for government debt in regional IO models. As a result, in less than careful hands, regional I-O models can be interpreted to over-estimate the economic benefit of government spending projects. Hughes (2003) discussed the limitations of the application of multipliers and provides a checklist to consider when conducting regional impact studies. Harris (1997) discussed the application of regional multipliers in the context of tourism impact studies, one area where the multipliers are commonly misused. Siegfried, et al (2006) discussed the application of regional multipliers in the context of college and university impact studies, another area where the multipliers are commonly misused. Input-output analysis, also known as the inter-industry analysis, is the name given to an analytical work conducted by Leontief in the late 1930's. The fundamental purpose of the input-output framework is to analyze the interdependence of industries in an economy through market based transactions. Input-output analysis can provide important and timely information on the interrelationships in a regional economy and the impacts of changes on that economy.

The notion of multipliers rests upon the difference between the initial effect of an exogenous change and the total effects of a change. Direct effects measure the response for a given industry given a change in final demand for that same industry. Indirect effects represent the response by all local industries from a change in final demand for a specific industry. Induced effects represent the response by all local industries caused by increased (decreased) expenditures of new household income and inter-institutional transfers generated (lost) from the direct and indirect effects of the change in final demand for a specific industry. Total effects are the sum of direct, indirect, and induced effects. One of the major uses of input-output information is to assess the effect on an economy of changes in elements that are exogenous to the model of that economy. The capabilities and usefulness of the Leontief inverse matrix which is the source of analytical power of the model are well known. However, the meaning and interpretations are sometimes confusing. West & Jensen (1980) clarified the meaning of some of the components of the multipliers and suggested a multiplier format which is consistent and simpler to interpret but retains the essence of the conventional multipliers.

3. Model and Method of Analysis

An inter-regional input-output model divides a national economy not only into sectors but also regions (Hulu, 1990 and West et.al, 1982; 1989). An industry in the Leontief model is split into as many regional sub-industries as there are regions. The table consists of two types of matrices representing the two types of economic interdependence. The first are the intra-regional matrices, which are on the main diagonal showing the inter-sectoral transactions which occur within each region. The second are the trade matrices, termed inter-regional matrices, representing inter-industry trade flows between each pair of regions. These matrices show the specific inter-industry linkages between regions, allowing each economic activity to be identified by industry as well as by location.

The inter-regional model can be expressed similar to the equations for the national as well as the single region model. In the general case:

$$^{r}X_i = \sum_j \sum_s {}^{rs}X_{ij} + \sum_s {}^{rs}Y_i;\ (i,j = 1,2,...n) \text{ and } (r,s=1,2,.,m) \quad (1)$$

There are (m x n) equations of this type for each sector in each region showing that the output of each sector is equal to the sales to all intermediate sectors in all regions plus sales to final demand in all regions.

The spatial input coefficients are derived in the same way as the direct input coefficients in the national or the single-region model. For region s, the spatial input coefficients are expressed as:

$$^{rs}a_{ij} = {}^{rs}X_{ij}/{}^{s}X_j \quad (2)$$

Substituting (2) into (1):

$$^{r}X_i = \sum_j \sum_s {}^{rs}a_{ij}\,{}^{s}X_j + \sum_s {}^{rs}Y_i;\ (i,j=1,2,.,n) \text{ and } (r,s=1,2,.,m) \quad (3)$$

Since equations (1) to (3) refer to general case, it is more

convenient to refer specifically to each of the intra-regional and the inter-regional matrices:

$$ {}^{r}X_i = \sum_j {}^{rr}X_{ij} + \sum_j {}^{rs}X_{ij} + {}^{r}Y_i;\ (i, j = 1, 2,..n) \quad (4) $$

and

$$ {}^{s}X_i = \sum_j {}^{sr}X_{ij} + \sum_j {}^{ss}X_{ij} + {}^{s}Y_i;\ (i, j = 1, 2...n) \quad (5) $$

From (4) and (5), it is possible to determine regionally defined input coefficients, according to the relevant intra-regional and inter-regional trade matrices:

$$ {}^{rr}a_{ij} = {}^{rr}X_{ij}/{}^{r}X_j \quad (6) $$

$$ {}^{rs}a_{ij} = {}^{rs}X_{ij}/{}^{s}X_j \quad (7) $$

$$ {}^{sr}a_{ij} = {}^{sr}X_{ij}/{}^{r}X_j \quad (8) $$

$$ {}^{ss}a_{ij} = {}^{ss}X_{ij}/{}^{s}X_j \quad (9) $$

Equations (6) and (9) present the familiar intra-regional direct input coefficients, while equations (7 and (8 represent inter-regional trade coefficients.

Equations (6) to (9) can be substituted into equation (4) and (5) resulting the traditional input-output equations:

$$ {}^{r}X_i = \sum_j {}^{rr}a_{ij}\ {}^{r}X_j + \sum_j {}^{rs}a_{ij}\ {}^{s}X_j + {}^{r}Y_i;\ (i, j = 1,2,...n) \quad (10) $$

and

$$ {}^{s}X_i = \sum_j {}^{sr}a_{ij}\ {}^{r}X_j + \sum_j {}^{ss}a_{ij}\ {}^{s}X_j + {}^{s}Y_i;\ (i, j = 1,2,...n) \quad (11) $$

The equations outlined above can be extended in parallel to the national or single region input-output system.

In matrix terms they can be expressed as:

$$ {}^{r}x = {}^{rr}A\ {}^{r}x + {}^{r}y \quad \text{or} \quad {}^{r}x = (I - {}^{rr}A)^{-1}\ {}^{r}y \quad (12) $$

and

$$ {}^{s}x = {}^{ss}A\ {}^{s}x + {}^{s}y \quad \text{or} \quad {}^{s}x = (I - {}^{ss}A)^{-1}\ {}^{s}y \quad (13) $$

where (I - rrA)-1 and (I - ssA)-1 are the inverse of the open inter-regional model. In general term, equation (12) and (13) can be written as:

$$ x = A\,x + y \quad \text{or} \quad x = (I - A)^{-1}\ y \quad (14) $$

Since the regional input coefficients of equations (6) to (9) or the A matrix in equation (13) contains both technical and trade characteristics, Hartwick (1971) separated these input coefficients (${}^{rs}a_{ij}$) into trade coefficients (${}^{rs}t_{ij}$) and technical coefficients (${}^{s}a_{ij}$). This separation is essentially the same as one that has been done for the single region model. Equation (13) can then be rewritten as:

$$ x = T\,(A\,x + y) \quad \text{or} \quad x = (I - T\,A)^{-1}\ y \quad (15) $$

Method employed for constructing Indonesian Inter-regional Input-Output model was hybrid method that specified for studying Island economy of Indonesia. In this model, the regions were disaggregated into 5 regions, namely 5 big-group of Island, namely SUM for Sumatera Island, JAV for Java Island, KAL for Kalimantan Island, NUS for Nusa Tenggara Island and OTH for Other Island which includes Sulawesi, Maluku and Papua Islands. Meanwhile, economic activities were disaggregated into 9 economic sectors, namely: Sec-1 for Agriculture, livestock and fishery, Sec-2 for Mining and quarrying, Sec-3 for Manufacturing, Sec-4 for Electricity, water and gas, Sec-5 for Construction, Sec-6 for Trade, hotels and restaurants, Sec-7 for Transportation and communication, Sec-8 for Banking and other finance, and Sec-9: Other services.

The GIRIOT (Generation Inter-Regional Input-Output Tables) procedures proposed and developed by Muchdie (1998) and have been applied using Indonesian data for the year 1990 (Muchdie, 1998; 2011). The GIRIOT procedure consists of three stages, seven phases and twenty four steps. Stage I: Estimation of Regional Technical Coefficients, consists of two phases, namely Phase 1: Derivation of National Technical Coefficients and Phase 2: Adjustment for Regional Technology. Stage II: Estimation of Regional Input Coefficients, consists of two phases, namely Phase 3: Estimation of Intra-regional Input Coefficients, and Phase 4: Estimation of Inter-regional Input Coefficients, and Stage III: Derivation Transaction Tables, consists of three phases, namely Phase 5: Derivation of Initial Transaction Tables, Phase 6: Sectoral Aggregation, and Phase 7: Derivation of Final Transaction Tables. These procedures have been revisited, evaluated and up-dated using Indonesian data for the year 2015.

One of the major uses of input-output information is to assess the effect on an economy of changes in elements that are exogenous to the model of that economy. The capabilities and usefulness of the Leontief inverse matrix which is the source of analytical power of the model are well known. However, the meaning and interpretations are sometimes confusing. West and Jensen (1980) clarified the meaning of some of the components of the multipliers and suggested a multiplier format which is consistent and simpler to interpret but retains the essence of the conventional multipliers.

As a measurement of response to an economic stimulus, a multiplier expresses a cause and effect line of causality. In input-output analysis the stimulus is a change (increase or decrease) in sales to final demand. Similar to those in the single-region model, in the inter-regional model West et.al, (1982; 1989) defined the major categories of response as: initial, first-round, industrial-support, consumption-induced, total and flow-on effects. Formulas of such effects are provided in Table1.

Table 1: Component Effects of Output, Income and Employment Multipliers

Effects	Output	Income	Employment
Initial	1	h_j	e_j
First-round	$\sum a_{ij}$	$\sum a_{ij} h_i$	$\sum a_{ij} e_i$
Industrial-support	$\sum b_{ij} - 1 - \sum a_{ij}$	$\sum b_{ij} h_i - h_i - \sum a_{ij} h_i$	$\sum b_{ij} e_i - e_i - \sum a_{ij} e_i$
Consumption-induced	$\sum (b^*_{ij} - b_{ij})$	$\sum (b^*_{ij} h_i - b_{ij} h_i)$	$\sum (b^*_{ij} e_i - b_{ij} e_i)$

Total	$\sum b^*_{ij}$	$\sum b^*_{ij}\ h_i$	$\sum b^*_{ij}\ e_i$
Flow-on	$\sum b^*_{ij} - 1$	$\sum b^*_{ij}\ h_i - h_j$	$\sum b^*_{ij}\ e_i - e_j$

Source: West, *et, al* (1982; 1989).

Note: h_j is household income coefficient, e_j is employment output ratio, a_{ij} is direct input coefficients, b_{ij} is the element of open inverse of Leontief matrix, and b^*_{ij} is the element of closed inverse Leontief matrix.

Table 2: Inter-regional Sector-Specific and Region-Specific Multipliers

	Output	Income	Employment
Sector-Specific	$\sum {}^{rs}b^*_{ij};\ r = 1,..m$	$\sum {}^{rs}b^*_{ij}\ {}^{s}h_i;\ r = 1,..m$	$\sum {}^{rs}b^*_{ij}\ {}^{s}e_i;\ r = 1,..m$
Region-Specific	$\sum {}^{rs}b^*_{ij};\ i = 1,..n$	$\sum {}^{rs}b^*_{ij}\ {}^{s}h_i;\ i = 1,...n$	$\sum {}^{rs}b^*_{ij}\ {}^{s}e_i;\ i = 1,..n$

Source: DiPasquale & Polenske (1980).
Note : *r* and *s* are the *m* origin and destination regions, *i* and *j* are the n producing and purchasing sectors, ${}^{rs}b^*_{ij}$ is the element of closed inverse of Leontief matrix, m is the number of regions and n is the number of sectors.

DiPasquale & Polenske (1980) specify four types of multipliers, in which two of them are relevant in the context of the inter-regional input-output model; sector-specific and region-specific multipliers. Table 2 provides formula for the calculation of both sector-specific and region-specific multipliers for output, income and employment. The inter-regional sector-specific multiplier expresses the inputs required from the whole economy to satisfy a unit expansion of a named sector's exogenously determined final demand. The inter-regional region-specific multiplier quantifies the inputs required from all sectors in a specified region to satisfy the unit demand expansion in a given region. Formula provided in Table 1 and Table 2 were used to calculate total and flow-on multipliers, sector-specific multipliers and spatial-specific multipliers.

4. Results and Discussion

4.1. Multipliers and Flow-on

Table 3 and Figure 1 present total output, income and employment multipliers and flow-on effects of output, income and employment in Eastern Indonesia's Island. In term of output, the highest output multipliers was EIR-4 (Electricity, water and gas), 2.647. It means that an increase of final demand of the sector by 1.000 would increase total output by 2.647 including the initial increase of 1.000. It was followed by EIR-5 (Construction), 2.551 meaning that an increase of final demand of that sector by 1.000 would increase total output by 2.551 including the initial increase of 1.000. The lowest total multipliers was in EIR-1 (Agriculture, livestock and fishery), 1.585. An increase of final demand of that sector by 1.000 units would increase total output by 1.585 including the initial increase of 1.000. The flow-on effects of output were the difference between total increase and initial increase. Flow-on effect is summation of direct, indirect and induced effects of an economic activity. In other word, it is the different between total and initial effects. In case of highest total multipliers (EIR-4) the flow-on effect was 1.647, meaning the impact of increase of final demand of EIR-4 (Electricity, water and gas) to total output was 1.647 as the initial effect was not included. The rank of total output multipliers might be different than that of output flow-on effects. The evidence from Eastern Indonesia's Island economy showed that the rank of total multipliers were the same as the rank of flow-on effects where EIR-4 (Electricity, water and gas) had the highest output flow-on effects, followed by EIR-5 (Construction) and EIR-9 (Other services) and the lowest value of output flow-on effects was EIR-1 (Agriculture, livestock and fishery).

Table 3: Total Multipliers and Flow-on Effects: Output, Income and Employment

SECTOR	Initial	Output Flow-on	Total	Initial	Income Flow-on	Total	Initial	Employment Flow-on	Total
EIR-1	1.000	0.585	1.585	0.207	0.115	0.322	0.396	0.166	0.562
EIR-2	1.000	0.608	1.608	0.207	0.120	0.327	0.385	0.143	0.528
EIR-3	1.000	1.542	2.542	0.117	0.308	0.425	0.205	0.515	0.720
EIR-4	1.000	1.647	2.647	0.091	0.252	0.343	0.161	0.282	0.443
EIR-5	1.000	1.551	2.551	0.165	0.292	0.457	0.422	0.351	0.773
EIR-6	1.000	0.818	1.818	0.189	0.159	0.348	0.104	0.208	0.312
EIR-7	1.000	1.036	2.036	0.196	0.224	0.420	0.081	0.224	0.305
EIR-8	1.000	0.888	1.888	0.263	0.179	0.442	0.161	0.216	0.377
EIR-9	1.000	1.547	2.547	0.580	0.303	0.883	0.223	0.390	0.613

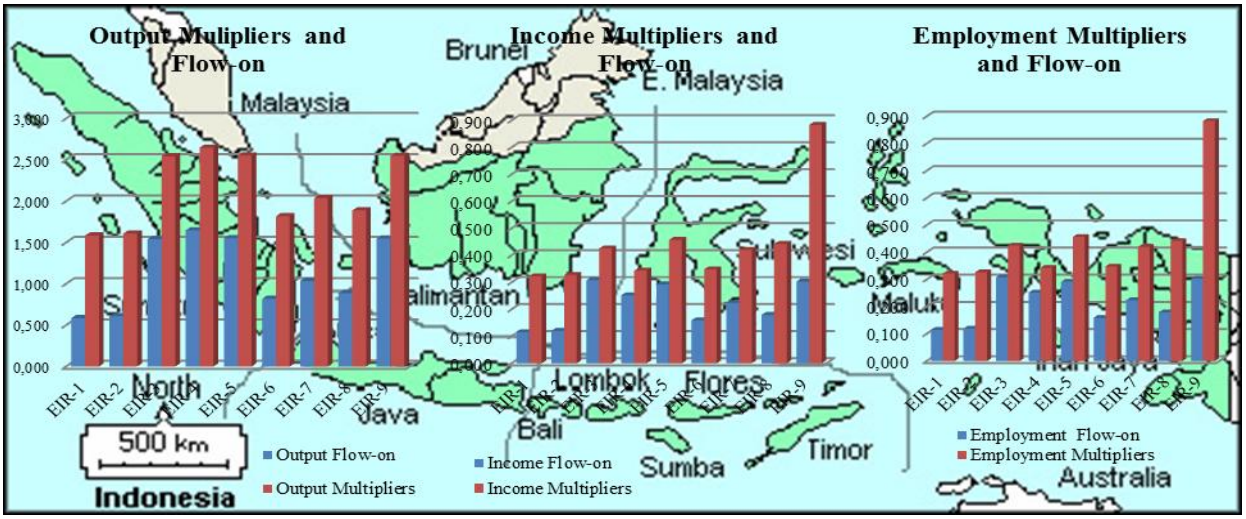

Figure 1: Total Multipliers and Flow-on Effects: Output, Income and Employment

In term of household income, the highest total income multiplier was in EIR-9 (Other services), 0.883. It means that an increase of final demand of EIR-9 (Other services) by 1.000 units would increase initial household income by 0.580 and then would increase total income by 0.883. It was followed by EIR-5 (Construction) with total income multipliers of 0.457. The lowest total income multiplier was in EIR-1 (Agriculture, livestock and fishery) with total income multipliers of 0.322. Income flow-on effects were the difference between total income multipliers and initial income effects from the increase of final demand in that sector. It is the summation of direct, indirect and induced effects of an economic activity. For instance, in EIR-9 (Other services), the increase of final demand by 1.000 would have initial income effects by 0.580, resulting total income of 0.883. The income flow-on effect of EIR-9 (Other services) was 0.292. The highest income flow-on effect was in EIR-3 (Manufacturing), followed by EIR-9 (Other services). The lowest income flow-on effect was in, again, EIR-1 (Agriculture, livestock and fishery).

In term of employment, the highest total employment multiplier was in EIR-5 (Construction), 0.773. It means that an increase of final demand of in EIR-5 (Construction) by 1.000 units would increase initial employment of in EIR-5 (Construction) by 0.422 and then would increase total employment by 0.773. It was followed by EIR-3 (Manufacturing) with total employment multipliers of 0.720. The lowest total employment multiplier was in EIR-7 (Transportation and communication) with total employment multipliers of 0.305. Employment flow-on effects were the difference between total employment multipliers and initial employment effects from the increase of final demand in that sector. It is the summation of direct, indirect and induced effects on employment from an economic activity. The highest employment flow-on was in EIR-3 (Manufacturing), followed by EIR-9 (Other services). The lowest income flow-on effect was in EIR-2 (Mining and quarrying).

Table 4: Sector-Specific Multipliers: Output, Income and Employment

SECTOR		Output			Income		Employment		
	Own Sector	Other Sector	Total	Own Sector	Other Sector	Total	Own Sector	Other Sector	Total
EIR-1	1.260	0.325	1.585	0.260	0.062	0.322	0.510	0.052	0.562
EIR-2	1.042	0.566	1.608	0.213	0.114	0.327	0.390	0.138	0.528
EIR-3	1.161	1.381	2.542	0.134	0.291	0.425	0.236	0.484	0.720
EIR-4	1.232	1.415	2.647	0.112	0.231	0.343	0.189	0.254	0.443
EIR-5	1.017	1.534	2.551	0.167	0.290	0.457	0.425	0.348	0.773
EIR-6	1.105	0.713	1.818	0.209	0.139	0.348	0.116	0.196	0.312
EIR-7	1.211	0.825	2.036	0.237	0.183	0.420	0.099	0.206	0.305
EIR-8	1.187	0.701	1.888	0.312	0.130	0.442	0.190	0.187	0.377
EIR-9	1.070	1.477	2.547	0.619	0.264	0.883	0.239	0.374	0.613

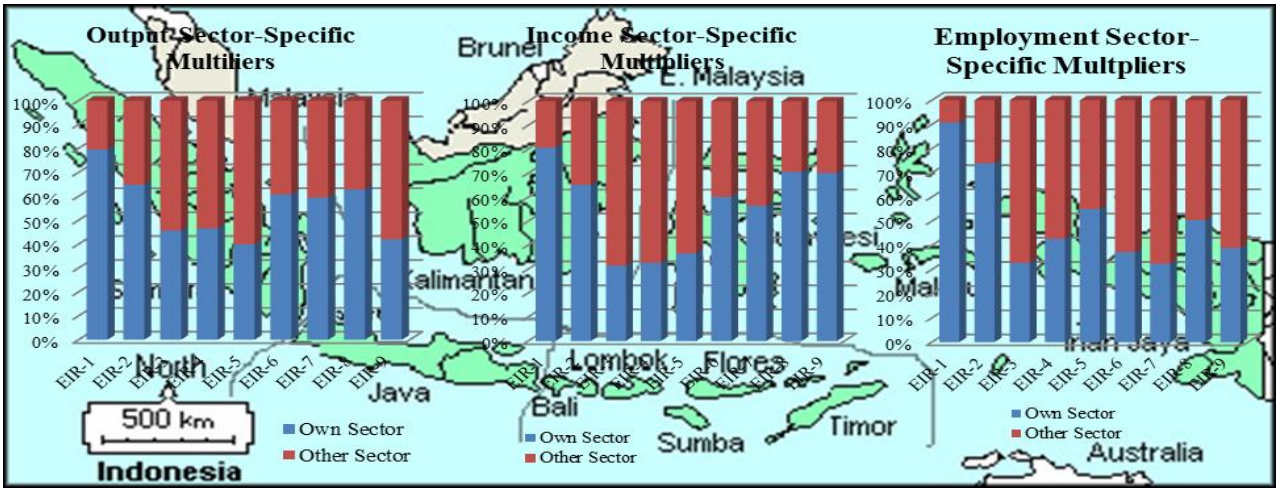

Figure 2: Sector-Specific Multipliers: Output, Income and Employment

4.2. Sector-Specific Multipliers

Table 4 and also Figure 2 provide sector-specific multipliers for output, income and employment in Eastern Indonesia's Island economy. In term of output, there were 4 sectors in which multipliers occurred in own sector were less than 50 per cent, namely EIR-3 (Manufacturing), EIR-4 (Electricity, water and gas), EIR-5 (Construction), and EIR-9 (Other services). Meanwhile, other 5 sectors in which multipliers occurred in own region were more than 50 per cent. These were: EIR-1 (Agriculture, livestock, forestry and fishery), EIR-2 (Mining and quarrying), EIR-6 (Trade, hotel and restaurant), EIR-7 (Transportation and Communication) and EIR-8 (Banking and other finance).

In term of income, there were 3 sectors in which multipliers occurred in own region were less than 50 per cent, EIR-3 (Manufacturing), EIR-4 (Electricity, water and gas), and EIR-5 (Construction). Meanwhile, other 6 sectors in which multipliers occurred in own region were more than 50 per cent. These sectors were: EIR-1 (Agriculture, livestock and fishery), EIR-2 (Mining and quarrying), EIR-6 (Trade, hotel and restaurant), EIR-7 (Transportation and communication), EIR-8 (Banking and other finance) and EIR-9 (Other services).

In term of employment, there were 5 sectors in which multipliers occurred in own sector were less than 50 per cent, namely EIR-3 (Manufacturing), EIR-4 (Electricity, water and gas), EIR-6 (Trade, hotel and restaurant), EIR-7 (Transportation and communication), and EIR-9 (Other services). Meanwhile, 4 sectors in which multipliers occurred in own sectors were more 50 per cent multipliers, namely EIR-1 (Agriculture, livestock, forestry and fishery), EIR-2 (Mining and quarrying), EIR-5 (Construction), and EIR-8 (Banking and other finance).

4.3. Spatial-Specific Multipliers

Table 5 and Figure 3 provide spatial-specific multipliers of output, income and employment multipliers in Eastern Indonesia's Island. In term of output, all sectors had more than 50 per cent of multipliers that occurred in own region; in Eastern Indonesia's Kalimantan Island. All sectors had less than 50 per cent of multipliers that occurred in other regions; the rest of Indonesia. It applied for income. Almost all sectors, except EIR-4 (Electricity, water and gas) had more than 50 per cent of multipliers that occurred in own region; Eastern Indonesia's Island. Almost all sectors, except EIR-4 (Electricity, water and gas) had less than 50 per cent of multipliers occurred in other regions; the rest of Indonesia. In term of employment, all sectors had more than 50 per cent of multipliers that occurred in own region; Eastern Indonesia's Island. Again, all sectors had less than 50 per cent of multipliers that occurred in other regions; the rest of Indonesia.

Table 5: Spatial-Specific Multipliers: Output, Income and Employment

SECTOR		Output			Income		Employment		
	Own Region	Other Region	Total	Own Region	Other Region	Total	Own Region	Other Region	Total
EIR-1	1.373	0.212	1.585	0.286	0.036	0.322	0.499	0.063	0.562
EIR-2	1.310	0.298	1.608	0.273	0.054	0.327	0.455	0.073	0.528
EIR-3	2.145	0.397	2.542	0.356	0.069	0.425	0.598	0.122	0.720
EIR-4	1.372	1.275	2.647	0.160	0.183	0.343	0.246	0.197	0.443
EIR-5	1.566	0.985	2.551	0.279	0.178	0.457	0.566	0.207	0.773
EIR-6	1.464	0.354	1.818	0.286	0.062	0.348	0.228	0.084	0.312
EIR-7	1.736	0.300	2.036	0.368	0.052	0.420	0.221	0.084	0.305
EIR-8	1.568	0.320	1.888	0.387	0.055	0.442	0.288	0.089	0.377
EIR-9	1.937	0.610	2.547	0.778	0.105	0.883	0.438	0.175	0.613

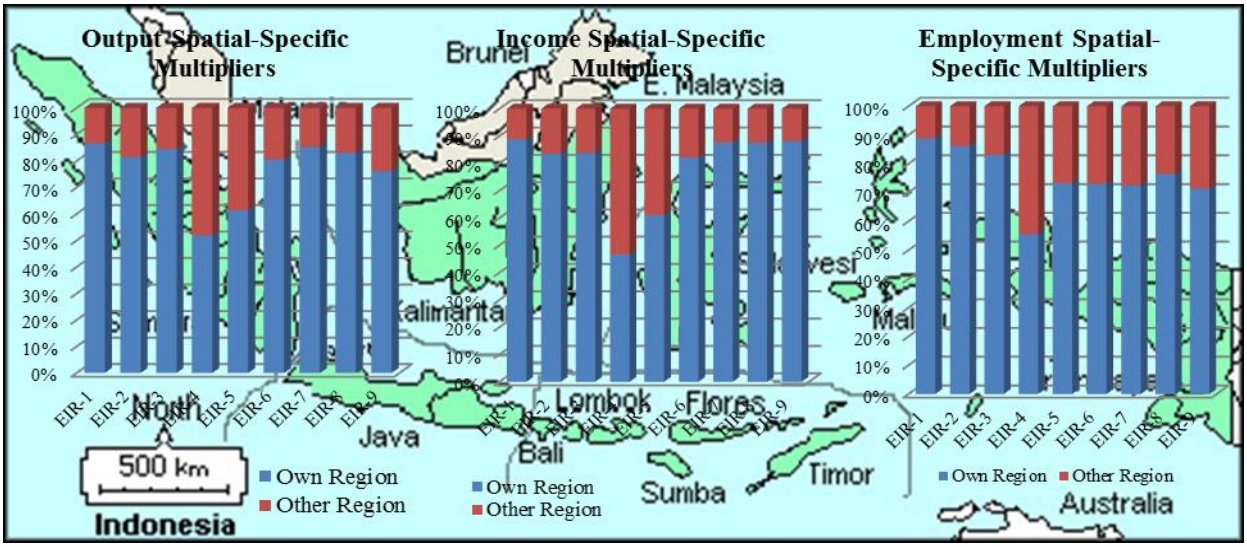

Figure 3: Spatial-Specific Multipliers: Output, Income and Employment

5. Conclusion

The conclusions could be drawn were: firstly, the important sectors of Eastern Indonesia's Island economy could be based on total multipliers of output, income and employment. Based on total output multipliers, three important sectors were EIR-4 (Electricity, water and gas), EIR-5 (Construction) and EIR-9 (Other services). Based on total income multipliers, three important sectors in Kalimantan Island economy were EIR-9 (Other services), EIR-5 (Construction) and EIR-8 (Banking and other finance). Based on total employment multipliers, three important sectors in Kalimantan Island economy were EIR-5 (Construction), EIR-3 (Manufacturing) and EIR-9 (Other services). Based on output flow-on effects, three important sectors were EIR-4 (Electricity, water and gas), EIR-5 (Construction) and EIR-9 (Other services). Based on income flow-on effects, three important sectors were EIR-3 (Manufacturing), EIR-9 (Other services), and EIR-5 (Construction). Based on employment flow-on effects, three important sectors were EIR-3 (Manufacturing), EIR-9 (Other services), and EIR-5 (Construction).

Secondly, important economic sectors could be based on sector-specific multipliers. It could be based on the highest multipliers that occurred in own sectors. Based on output sector-specific multipliers that occurred in own sector, three important sectors were EIR-1(Agriculture, livestock, and fishery), EIR-2 (Mining and quarrying), and EIR-8 (Banking and other finance). Based on income sector-specific multipliers that occurred in own sectors, three important sectors were KAL-9 (Other services), KAL-1 (Agriculture, livestock and fishery), and KAL-2 (Mining and quarrying. Based on employment sector-specific multipliers that occurred in own sector, three important sectors were EIR-1 (Agriculture, livestock and fishery), EIR-8 (Banking and other finance), and EIR-9 (Other services).

Thirdly, important economic sectors could be based on spatial-specific multipliers. It could be based on the highest multipliers that occurred in own regions; in Eastern Indonesia. Based on output spatial-specific multipliers that occurred in own region, three important sectors were), EIR-1 (Agriculture, livestock and fishery), EIR-7 (Transportation and communication and EIR-3 (Manufacturing). Based on income sector-specific multipliers that occurred in own region, four important sectors were EIR-1 (Agriculture, livestock and fishery), EIR-7 (Transportation and communication), EIR-8 (Banking and other finance) and EIR-9 (Other services). Based on employment spatial-specific multipliers that occurred in own region, three important sectors were EIR-1 (Agriculture, livestock and fishery), EIR-2 (Mining and quarrying), and EIR-3 (Manufacturing).

References

[1] Anonymous, "Eastern Indonesia", 2016, http://kerdowney.com/destinations/indonesia/eastern-indonesia/

[2] Anonymous, "Statistik Indonesia 2014", Jakarta: Badan Pusat Statistik, 2014. http://www.bps.go.id/index.php/publikasi/326

[3] Anonymous, "Regional Contribution to GDP Growth". 2015 http://www.indonesia-investments.com /news/todays-headlines/indonesias-most-populous-island-of-java-continues-to-dominate-the-economy/item972

[4] Ahiakpor, J.C.W., "Hawtrey on the Keynesian Multiplier: A Question of Cognitive Dissonance?" History of Political Economy, 32 (4): 889-908, 2000. https://muse.jhu.edu/article/13245/pdf

[5] Beemiller, R.M., "Improving Accuracy by Combining Primary Data with RIMS: Comment on Bourque". International Regional Science Review, 13 (1-2): 99-101, 1990. http://journals.sagepub.com/doi /abs/10.1177/016001769001300107

[6] Coughlin, C. and Mandelbaum, T.B., "A Consumer's Guide to Regional Economic Multipliers", Federal Reserve Bank of St. Louis Review. January/February 1991.19-32.

https://research.stlouisfed.org/publications/review/1991/01/01/a-consumers-guide-toregional-economic-multipliers/
[7] DiPasquale, D. and Polenske, K.R., "Output, Income and Employment Input-Output Multipliers" in S. Pleeter. (Ed). Economic Impact Analysis: Methodology and Applications. Studies in Applied Regional Science. Boston: Martinus Nijhoff Publishing: 85-113, 1980. http://www.springer.com/gp/book/9789401174077
[8] Dornbusch, R. and Stanley, F. (1994). Macroeconomics. Sixth Edition. International Edition. McGraw-Hill.
[9] Grady, P. and Muller, R., A., "On the use and misuse of input-output based impact analysis in evaluation", The Canadian Journal of Program Evaluation. 2 (3): 49-61, 1988. https://www.researchgate.net/publication/43126426_On_The_Use_and_Misuse_of_InputOutput_Based_Impact_Analysis_in_Evaluation
[10] Hall, R. E., "By How Much Does GDP Rise if the Government Buys More Output?" NBER Working Paper 15496. National Bureau of Economic Research, 2009. www.nber.org/papers/w15496.pdf?new_window=1
[11] Harris, P, "Limitations on the use of regional economic impact multipliers by practitioners: An application to the tourism industry", The Journal of Tourism Studies. 8(2): 1-12, 1997. http://docplayer.net/14498955-Limitations-on-the-use-of-regional-economic-impactmultipliers-by-practitioners.html
[12] Hartwick, "Notes on the Isard and Chenery-Moses Inter-regional Input-Output Models", Journal of Regional Science, 11(1):73-86, 1971. http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9787.1971.tb00241.x/full
[13] Hughes, D. W, "Policy uses of economic multipliers and impact analysis", Choices Publication of the American Agricultural Economics Association, Second Quarter, 2003. http://www.choicesmagazine.org/2003-2/2003-2-06.htm
[14] Hulu, E, "Model Input-Output: Teori dan Applikasinya (Input-Output Model: Theory and Its Applications)", Pusat Antar Universitas-Studi Ekonomi (Inter-University Centre-Economics) Jakarta: Universitas Indonesia (the University of Indonesia), 1990.
[15] Isard, W, "Inter-regional and Regional Input-Output Analysis: A Model of a Space Economy", Review of Economics and Statistics. 33(4): 318-328, 1951. http://www.jstor.org/stable/1926459
[16] Kahn, R, "The Relation of Home Investment to Unemployment", Economic Journal. 41(162):173-198, 1931. http://dx.doi.org/10.2307/2223697
[17] Krugman, P., and Wells, R, "Economics", Worth Publisher, p: 1200, Chapter 14: Money, Banking, and the Federal Reserve System: Reserves, Bank Deposits, and the Money Multiplier: 393–396, 2009. http://bcs.worthpublishers.com/webpub/economics/krugmanwellsmacro3/Solutions%20Manual/KrugWellsECPS3e_Macro_CH14.pdf
[18] Leontief, W.W. "The Structure of American Economy 1919-1939", Second Edition, Cambridge: Harvard University Press, 1951. http://www.wleontief.ru/eng/40.html
[19] Mankiw, N.G. "Macroeconomics", Eight Edition, South-Western Publishing, Part VI: Money and Prices in the Long Run: The Money Multiplier: 347–349, 2008. https://www.academia.edu/15354353/Mankiw_macroeconomics_8th_edition
[20] McConnell, C, Brue, S, and Flynn, S., "Macroeconomics". McGraw-Hill Series Economics, 19th Edition. ISBN-13: 978-0077337728, ISBN-10: 0077337727, 2001. https://www.amazon.com/Macroeconomics-McGraw-Hill-EconomicsCampbellMcConnell/dp/007733772
[21] Mills, E. C., "The Misuse of Regional Economic Models", Cato Journal, 13(1): 29-39, 1993. https://ideas.repec.org/a/cto/journl/v13y1993i1p29-39.html
[22] Moore, F.T, and Petersen, J., "Regional Analysis: An Inter-industry Model of Utah", Review of Economics and Statistics, 37: 368-383, 1955. http://www.jstor.org/stable/1925851?seq=1#page_scan_tab_contents
[23] Muchdie, "Spatial Structure of Island Economy of Indonesia: An Inter-Regional Input-Output Study", unpublished PhD Thesis, Department of Economics, the University of Queensland, Australia, 1988 http://espace.library.uq.edu.au/view/UQ:218710
[24] Muchdie, "Spatial Structure of Island Economy of Indonesia: A New Hybrid for Generation Inter-regional Input-Output Tables", Lambert Academic Publishing, Germany, ISBN 978-3-8454-1847-6, 2011. http://repository.uhamka.ac.id/139/
[25] Pindyck, R. and Rubinfeld, D., "Macroeconomics". The Pearson Series in Economics, 8th Edition, ISBN-13:978-0132857123, ISBN-10: 013285712X, 2012. https://www.amazon.com/Microeconomics-Student-Value-PearsonEconomics/dp/0132870436
[26] Prihawantoro, S., Irawan Suryawijaya, Ramos Hutapea, Ugay Sugarmansyah, Alkadri, Wawan Rusiawan, dan Muhammad Yorga Permana, "Peranan Teknologi Dalam Pertumbuhan Koridor-Koridor Ekonomi Indonesia: Pendekatan Total Factor Productivity (The Role of Technology in Economic Growth in Indonesian Economic Corridors: Total Factor Productivity Approach)". Jakarta: Badan Pengkajian dan Penerapan Teknologi, 2013.
[27] Richardson, H.W, "Input-Output and Economic Base Multipliers: Looking Backward and Forward", Journal of Regional Science, 25 (4): 607-661, 1985. http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9787.1985.tb00325.x/abstract
[28] Siegfried, J, Allen R., Sanderson, A.R., and McHenry, P, "The Economic Impact of Colleges and Universities", Working Paper No. 06-W12, 2006. http://www.accessecon.com/pubs/VUECON/vu06-w12.pdf
[29] Tiebout, C.M, "A Pure Theory of Local Expenditures", The Journal of Political Economy. 64(5): 416-424, 1956. http://www.jstor.org/stable/1826343
[30] West, G.R, and Jensen, R. C., "Some Reflections on Input-Output Multipliers", Annals of Regional Science. 14 (2): 77-89, 1980.

https://www.researchgate.net/publication/226244596_Some_Reflections_on_InputOutput_Multipliers
[31] West, G.R., and Jensen, R.C., Cheeseman, W.E., Bayne, B.A., Robinson, J.J., Jancic, H., and Garhart, R.E., "Regional and Inter-regional Input-Output Tables for Queensland 1985/86", Report to the Queensland Treasury Department, Department of Economics, University of Queensland, St. Lucia, 1989. https://www.library.ohiou.edu/indopubs/2001/08/25/0033.html
[32] West, G.R., Morison, J.B. and Jensen, R.C., "An Inter-regional Input-Output Table for Queensland 1978/79: GRIT III", Report to the Department of Commercial and Industrial Development, Department of Economics, University of Queensland, St. Lucia, 1982.

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