Hasilian Research Snapshot

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STRUCTURAL ANALYSIS AND REGIONAL DIFFERENCES IN MALAYSIAN ECONOMY: AN INPUT-OUTPUT APPROACH

Abstract

- Malaysia has gained significant achievement in economic development, mainly caused by the reorientation of industrialization strategies. The economy had been transformed from agriculture to manufacturing-based economy that heavily relied on manufacturing products for exports.
- This study focuses on the differences that arose across the regions by employing structural analysis based on Input-Output approach.
- The essence of input-output model and linkages analysis is able to identify and quantify the key sectors and spill over effects to the other sectors or regions which are important for even distribution of economic.
- In an economy, sectors that can generate larger backward linkages and forward linkages are considered important to generate economic growth, because they can generate growth in other input supplying sectors.
- The main contribution of this study is the construction of multiregional input-output tables (MRIOT) because it includes the details of transactions (trades) among sectors in each region and enable to investigate how a sector in one region is connected to different sector in another region.
- It can be one of powerful tools to trace regional differences and to derive regional policy recommendations by addressing according to the uniqueness of each region's economic structure.

Problem Statement

In spite of continuing economic and political stability, Malaysian government committed to restructure the society in order to rectify the imbalance income distribution, employment, ownership and control the wealth equitably distributed among the races, economic activities, and subsequently between states and regions. For example, the rich states experienced a higher degree of convergence rather than the poor states.

Research Questions

1. Whether the manufacturing sectors are the main contribution to the sustainable economic growth?
2. Which economic activity or key sector is the engine of growth and shape regional structure in each region of Malaysia?

Objectives

1. To examine the viscosity of manufacturing sectors as main contribution to the sustainable economic growth.
2. To examine which economic activity is the engine of growth and shape regional structure in each region of Malaysia.

Framework

Leontief Input-Output Framework (Leontief, 1930s)

This study applies Leontief demand-driven model : aimed to study the degree of interindustry linkages among the industries.

		Intermediate Demand	Final Demand	Total Output
		Sector j ($j = 1,....,n$)		
Intermediate Input	Sector i ($i = 1,.,n$)	z_{ij}	Y_i	X_i
Primary Input		V_j		
Total Input		X_j		

Notes:
X_i: Total output sector i
Z_{ij}: The intermediate input of sector from i to j
Y_i: Final demand

$$X_i = \sum_{j=1}^{n} z_{ij} + Y_i$$

This equation can be expressed in the matrix form $X = AX + Y$, and can be re-written as $(I-A)^{-1}$.

The $(I-A)^{-1}$ is known as the Leontief inverse matrix, which shows the total production of each sector required to satisfy the final demand in the economy.

Estimated Multiregional Input-Output Table (MRIOT) for Malaysia (Sargento, 2009; Kronenberg, 2007; Okamoto et al.,2005)

- MRIOT examines the economic interactions between sectors across regions when there are changes in demand in one region that may result from changes in intermediate demand in another region.
- Figure 1 shows the framework of inter industry, interregional input-output table. Each row represents the amount of goods and services sold to all sectors in both regions. Each column represents the amount of goods and services that are bought from all sectors to both regions.

			Intermediate						Final Demand				
			Region 1			...	Region m		Region 1	...	Region m	Export	Total Output
			Sector 1	...	Sector n		Sector 1	...	Sector n				
Intermediate Input	Region 1	Sector 1	z_{11}^{11}	...	z_{n1}^{11}		z_{11}^{1m}	...	z_{1n}^{1m}	F_1^{11}	...	F_1^{1m}	E_1^1	X_1^1
		Sector n	z_{1n}^{11}	...	z_{nn}^{11}		z_{n1}^{1m}	...	z_{1n}^{1m}	F_n^{11}	...	F_n^{1m}	E_n^1	X_n^1
	Region m	Sector 1	z_{11}^{m1}	...	z_{1n}^{m1}		z_{11}^{mm}	...	z_{1n}^{mm}	F_1^{m1}	...	F_k^{m1}	E_1^m	X_1^m
		Sector n	z_{n1}^{m1}	...	z_{nn}^{m1}		z_{n1}^{mm}	...	z_{nn}^{mm}	F_n^{m1}	...	F_n^{ml}	E_n^m	X_n^m
Import			M_1^1	...	M_n^1		M_1^m	...	M_n^m	FM^1	...	FM^m		
Value Added			V_1^1	...	V_n^1		V_1^m	...	V_n^m					
Total Input			X_1^1	...	X_n^1		X_1^m	...	X_n^m					

Figure 1: Layout of the Multi-regional Input-Output Model for Malaysia

- This study applied 2005 Malaysia Input-Output Tables published by the Department of Statistics in March, 2010, which consists of 120 sectors, 12 Sectors of classified activities and aggregated into 5 sectors; agriculture, mining and quarrying, construction, manufacturing and services. The input-output table is usually developed for every 5 years rather than annually as it incurred higher cost to prepare.

Methodology

Methods for Structural Analysis

- This study used **structural analysis** which examines the Fundamental Economic Structure (FES) of a nation and region using the data from input-output table. It provides fundamental snapshot of the structure of interindustry linkages in an economy.
- It used **linkage analysis; Chenery-Watanabe and Rasmussen methods** which are able to examine how the internal structure of the economy behaved and changed without taking into consideration of the level and structure of production in each sector. This study applied both normalized and weighted linkage to examine the relative strength and consistency among the sectors when making inter industry comparisons.

Methods to Construct MRIOT

This study employs the **non-survey method** with **Location Quotients (LQ)** and **RAS techniques** to estimate the construction of the multiregional input-output table for Malaysia:

- **LQ technique** measures the relative importance of an industry in a region compared with its importance at the national level.
- **RAS technique** estimates intermediate trade flow matrices because of the unavailable regional data. R refers to a diagonal matrix of elements modifying rows, the A to the coefficient matrix being modified, and the S to a diagonal matrix of column modifiers.
- **Test the RAS Procedure**: In this study, the tolerance level is arbitrarily set 0.005, thus, the matrix adjustment is to continue until all the elements in both column margin and row margin are ≤ 0.005 . At k=139 (70 row and 70 column adjustments; equals to 140 iterations to converge completely) all the differences are less than 0.005 in absolute value for the first time and hence, the RAS adjustments is terminated.

Findings

- Based on the verification of the estimated MRIOT, the linkage analysis results show that the manufacturing sector has the strong backward and forward linkages in all the regions.
- Based on Chenery-Watanabe and Rasmussen methods, the key sectors for the Northern and Central regions are manufacturing and services sectors. Agricultural sector is the key sector for Sabah region. The key sector for the Southern region is the services sector with normalized indicator using Rasmussen method and has stronger backward and forward linkages.
- All sectors in Sarawak region have strong backward and forward linkages. The service sector is the core sector in Sarawak region. Agriculture and service sectors in Eastern region have a potential to be developed as a key sector because these sectors show strong backward and forward linkages.

Conclusion

- The linkages analysis revealed that, manufacturing and services sectors are the key sectors for Malaysia and act as a significant contributor for the economic growth. Manufacturing sector which is depends on the export of electronic and electrical goods, not the only main contributor but service sector also plays an important role in sustaining the economic growth for the future.
- Based on the linkages analysis done on the estimated MRIOT, the government is able to identify the uniqueness of each region's economic structure and hence, regional economic policies can be addressed accordingly.
- The financial fund and investments can be channelled appropriately and wisely for the benefit of national government and other agencies to make progress in their endeavour that promise to yield the greatest return.

Research Gap

- This research is a success to certain extent, considering it is a pioneering study to develop an interregional Input-Output table for Malaysian economy.
- For future research, better results can be obtained if time series data is available. The hypothesis extraction method can be used to examine the overtime structural changes. The presence MRIOT could be improved by applying the hybrid method.