



KEMENTERIAN EKONOMI
JABATAN PERANGKAAN MALAYSIA

SPATIAL PANEL MODEL ESTIMATION OF UNEMPLOYMENT RATE FOR SELECTED ASIAN COUNTRIES

Lim Bao Man

Dr. Nuzlinda Abdul Rahman

Dr. Zainuddin bin Arsad

PERSIDANGAN **STATISTIK**
MALAYSIA **KE-10**

“Looking Beyond GDP: Towards Social Well-being and Environmental Sustainability”

25-26 SEPTEMBER 2023

Dianjurkan oleh:



- ❖ Introduction
- ❖ Literature Review
- ❖ Data and Variables
- ❖ Methodology
- ❖ Results and Analysis
- ❖ Conclusion
- ❖ Limitation and Recommendation
- ❖ Reference

1.0 Introduction



Over the last 40 years, most of the countries has experienced tremendous economic transformation. Selected Asian countries' economy have transformed from agriculture-based in 1970s to manufacturing-based during the 1980s and 1990s. In 2000s, the economy has once again change....



1. The unemployment rate is always a concern in economic in Asian countries.

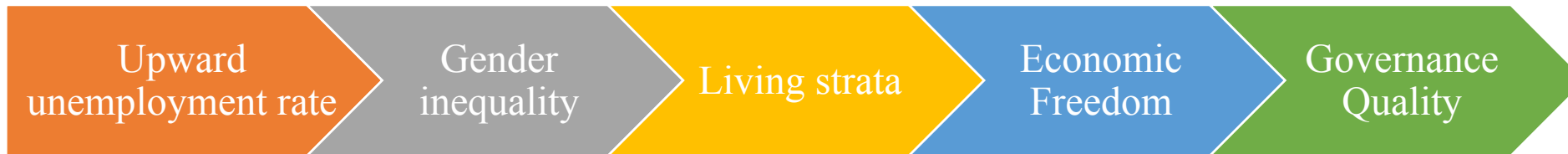
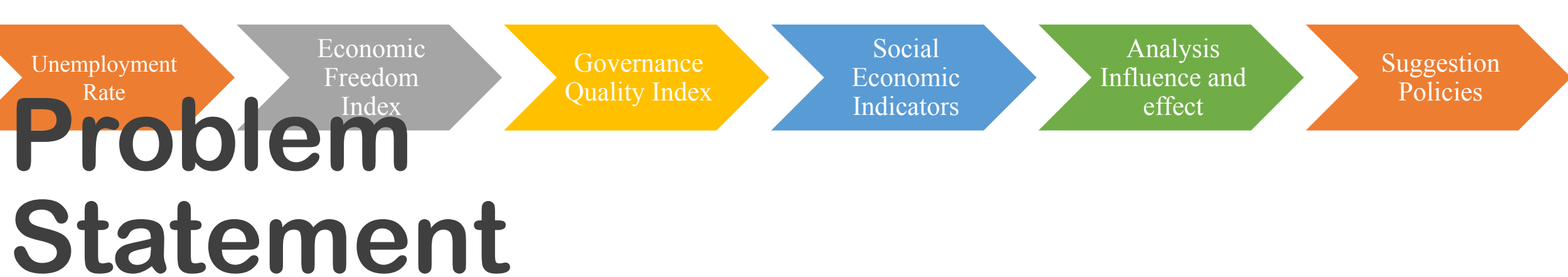
Countries	1995	1996	1997	1998	1999	2000	2001
Indonesia	7.2	4.9	4.7	5.5	6.4	6.1	8.1
Malaysia	3.1	2.5	2.4	3.2	3.4	3.1	3.6
Philippines	8.4	7.4	7.9	9.6	9.4	10.1	9.8
Republic of Korea	2.0	2.0	2.6	6.8	6.3	4.1	3.7
Thailand *	1.1	1.1	0.9	3.4	3.0	2.4	2.6

Year	Scenario
1997	economic crisis occurred in South-East and East Asian countries
2003	The Severe Acute Respiratory Syndromes (SARS) , The SARS brought a great harm to Asian countries, which was estimated loses of USD 12-18 billion as SARS crisis depressed retail sales, tourism, airports, transport, travel, business sectors.
2007	world downturn , leading to increase number of unemployment (16%)
2015	Chinese Stock Market Crash , There was millions of middle-class Chinese people lose their savings and also gave the negative impact for the third world countries
2011 & 2015	25,000 foreign fighters went to Iraq and Syrian Arab Republic for the civil war , Syria's unemployment rate increased to 14.90%, from the previously reported number of 8.60%
2017	Virus Subtypes H7N9 , loss of more than RMB 40 billion for the China's poultry industry.

The impact of the **financial crisis**, **outbreak of epidemic** and **pandemic issues** and **political issues** on the labour market need urgent concerns and attentions. In order to find out the trend and pattern of unemployment rate in Asian countries and how these countries coped with the unemployment problems. So, I established an explanatory framework for the analysis of the unemployment rate.



Background of Study



Objective

1. To examine the spatial autocorrelation for data of unemployment rate of selected Asian countries according to gender. If the spatial autocorrelation is exist, a more complicated model will be formulated.
2. To determine the spatial pattern of unemployment rate according to gender from one location to other.



2.0 Literature Review

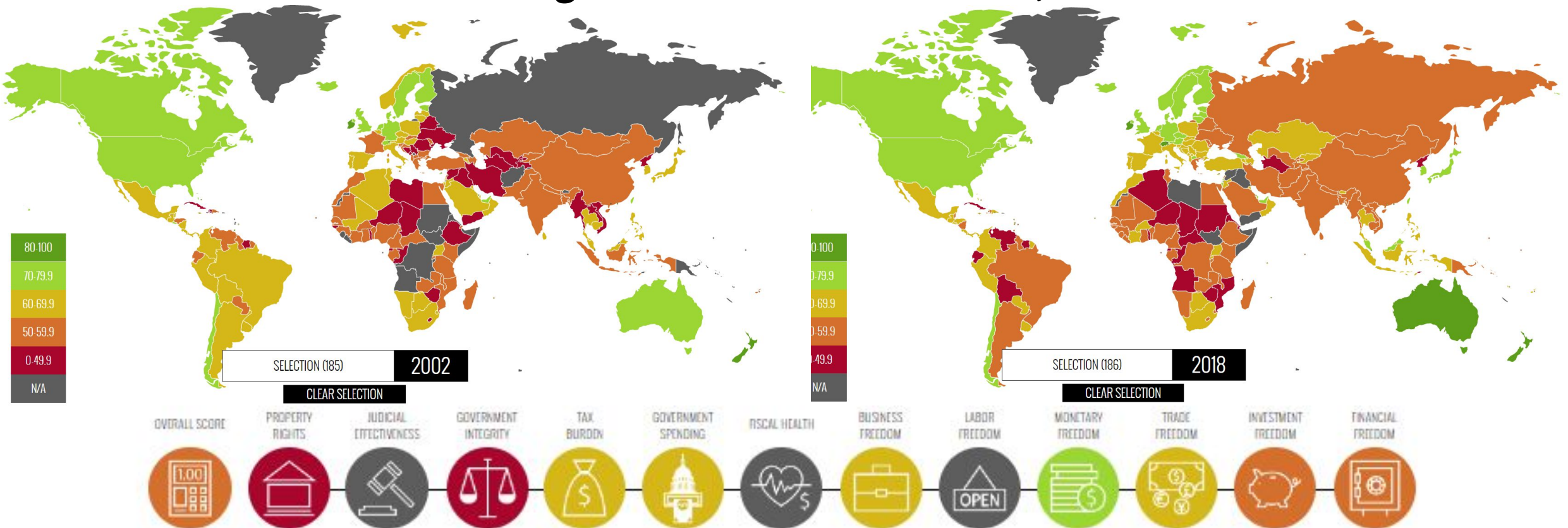
(A) Definition and Concept of Unemployment rate of Asian Countries

The unemployment rate is the percentage of the unemployed people to the overall labour force population. This rate calculates the proportion of the labour force that is unemployed. The following formula is used to calculate the unemployment rate:

$$\text{Unemployment rate} = \frac{\text{No. of unemployed persons}}{\text{No. of persons in the labour force}} \times 100$$

(B) Definition and Concept of Economic Freedom

Economic freedom refers to the internal liberalisation of economic rights, such as the “*freedom to participate in economic transactions without government intervention, but with*



(C) Definition and Concept of Governance Quality

- Kaufmann et al. (2009) developed subjective survey-based on governance metrics encompassing six aspects.

World Governance Indicator

1. Voice and Accountability
2. Political Stability & No Violence
3. Government Effectiveness
4. Regulatory Quality
5. Control of Corruption
6. Rule of Law

2.0 Literature Review

Study by	Method Used	Objective	Finding
Cracolici et al. (2007)	Spatial dependency, Static and Dynamic Spatial Panel	To investigate regional variations in German unemployment rates using district-level data on 24 potential explanatory factors from 1999 to 2007.	The spatial dynamic panel model is the ideal model for this study, and it reveals that German regional unemployment is out of equilibrium, which supports policy actions.
Oktafianto et al., (2019)	spatial Durbin models (SDM)	The determinants of Regional Unemployment in Indonesia from 2000 to 2017.	It shows that the higher education variable completed by an area's population has the greatest influence on both lowering unemployment in a region and neighbouring regions. As a result, the policy adopted should take this into account.
Díaz, (2016)	Spatial econometrics, spatial Durbin model.	To study the spatial differentials unemployment in Colombia between 1993 and 2005.	According to the results, the observed municipal unemployment inequalities are caused by variations in labour demand, immigration rates, and urbanisation.

3.0 Data and Variables

- Dependent variables:

Total, Male and Female Unemployment Rate

- Independent variables:
- Property Right , Government Integrity, Tax Burden, Government Spending, Business Freedom, Labour Freedom, Monetary Freedom, Trade Freedom , Investment Freedom , Financial Freedom , Political Stability No Violence, Government Effectiveness , Regulatory Quality , Rule of Law, Control of Corruption , Voice and Accountability

Variables	Description
Year	2002 until 2018
Country	Azerbaijan, Bangladesh, Bahrain, China, Cyprus, Georgia, Hong Kong, Indonesia, India, Iran, Israel, Jordan, Japan, Kazakhstan, Kyrgyz Republic, Cambodia, Korea Republic, Kuwait, Lao PDR, Lebanon, Sri Lanka, Myanmar, Mongolia, Malaysia, Nepal, Pakistan, Philippines, Korea Democratic People Republic, Qatar, Saudi Arabia, Singapore, Syrian Arab Republic, Thailand, Tajikistan, Turkmenistan, Turkey, Uzbekistan, Vietnam.

4.0 METHODOLOGY : Spatial dependency

Global Moran's I

$$I = \left(\frac{n}{\sum_i \sum_j w_{ij}} \right) \times \left(\frac{\sum_i \sum_j w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2} \right)$$

The method computes the Moran's I value, and the index value's significance is determined by a Z score value. Moran's I evaluates whether the pattern expressed is clustered, dispersed, or random. When the Z score indicates statistical significance, a Moran's I value near +1.0 indicates clustering while a value near -1.0 indicates dispersion

Results for Spatial Dependency

Total Unemployment rate			Male Unemployment rate			Female Unemployment rate		
Moran'I	z	p-value	Moran'I	z	p-value	Moran'I	z	p-value
0.272	77.475	<0.001	0.272	77.577	<0.001	0.316	89.793	<0.001

Based on the p -values of the reported Moran's I shown in table above, the null hypothesis of zero spatial autocorrelation is rejected. Furthermore, the Z scores indicate positive autocorrelation for total, male and female unemployment rate in selected Asian countries. Therefore, countries close to each other tend to have similar unemployment rate.

Results for Spatial Dependency

Year 2002 Global Moran's I

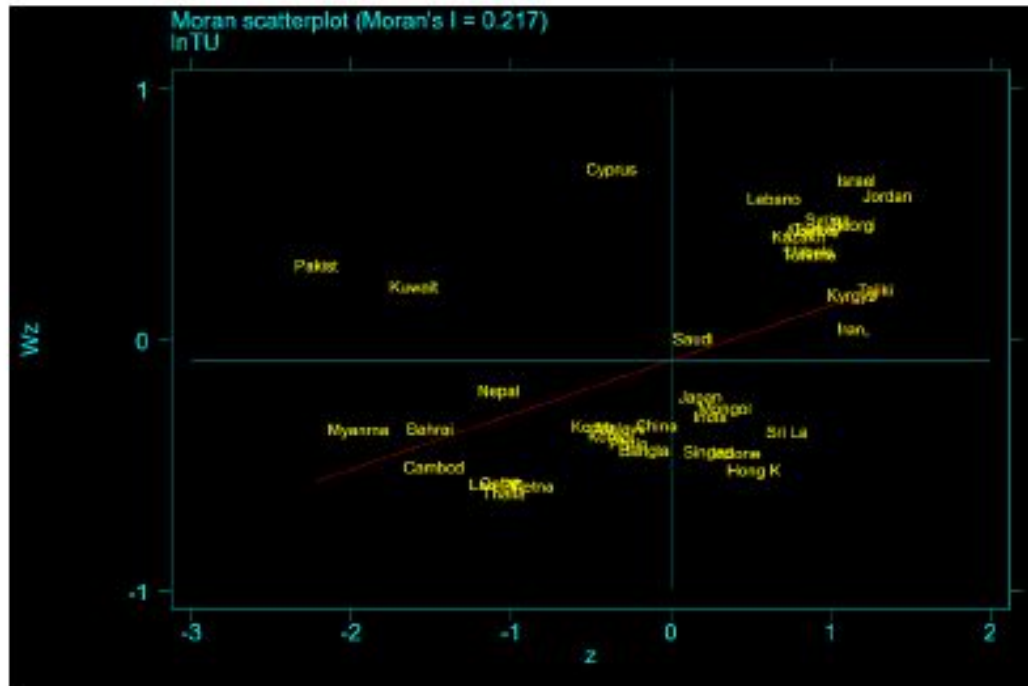


Figure 6.2: Global Moran's I of Total unemployment rate Year 2002

Year 2018 Global Moran's I

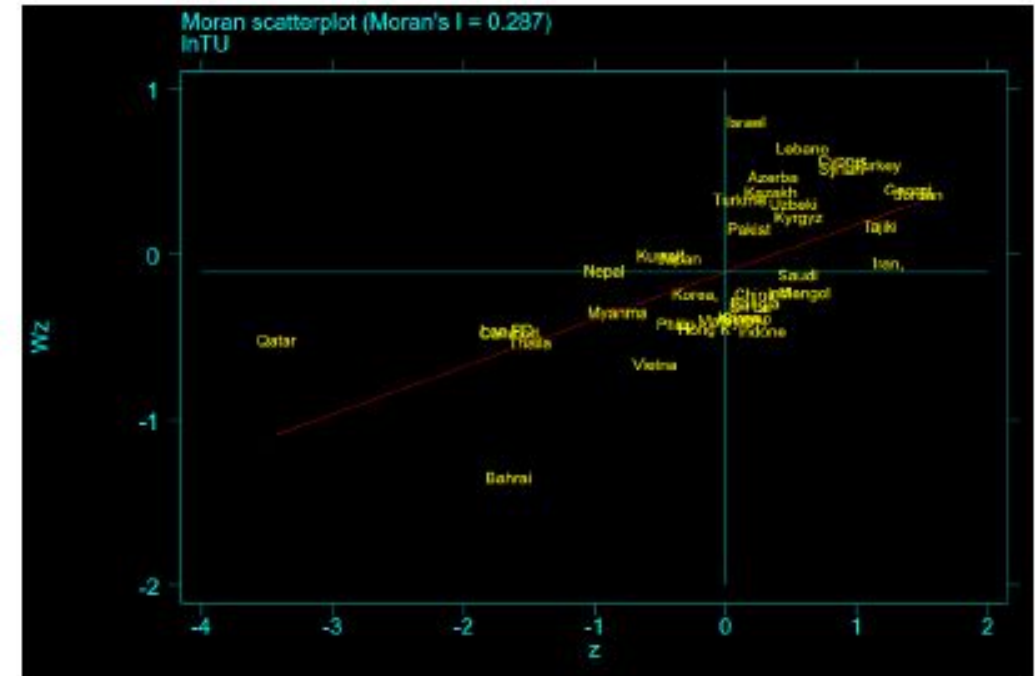
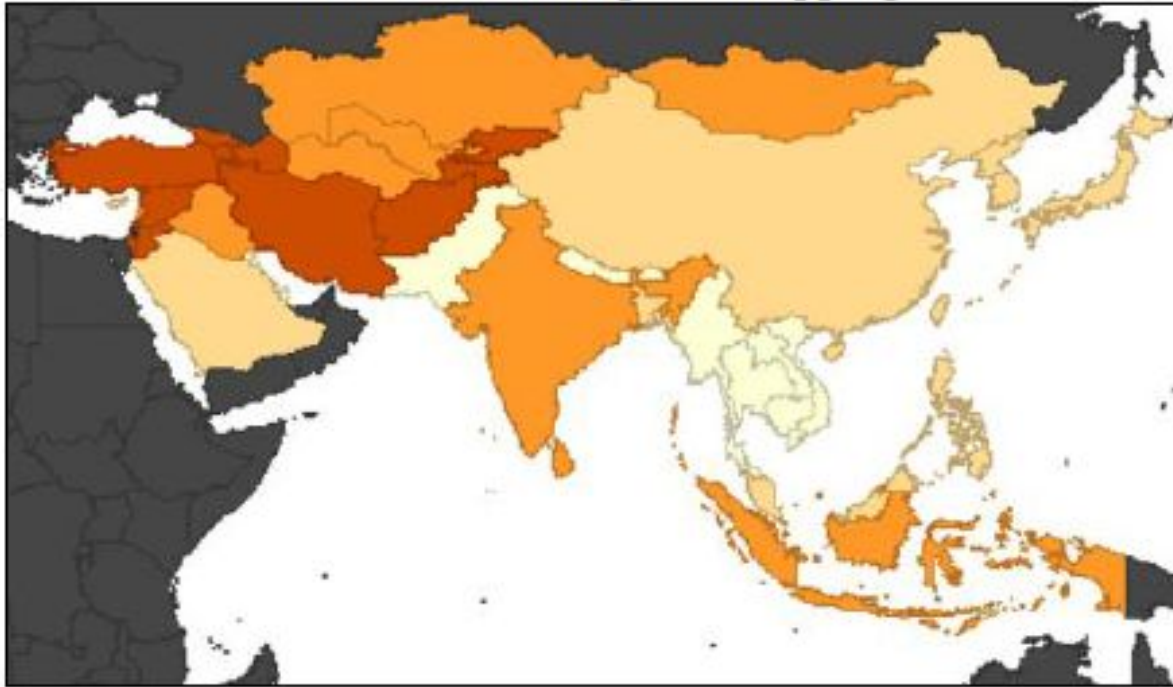


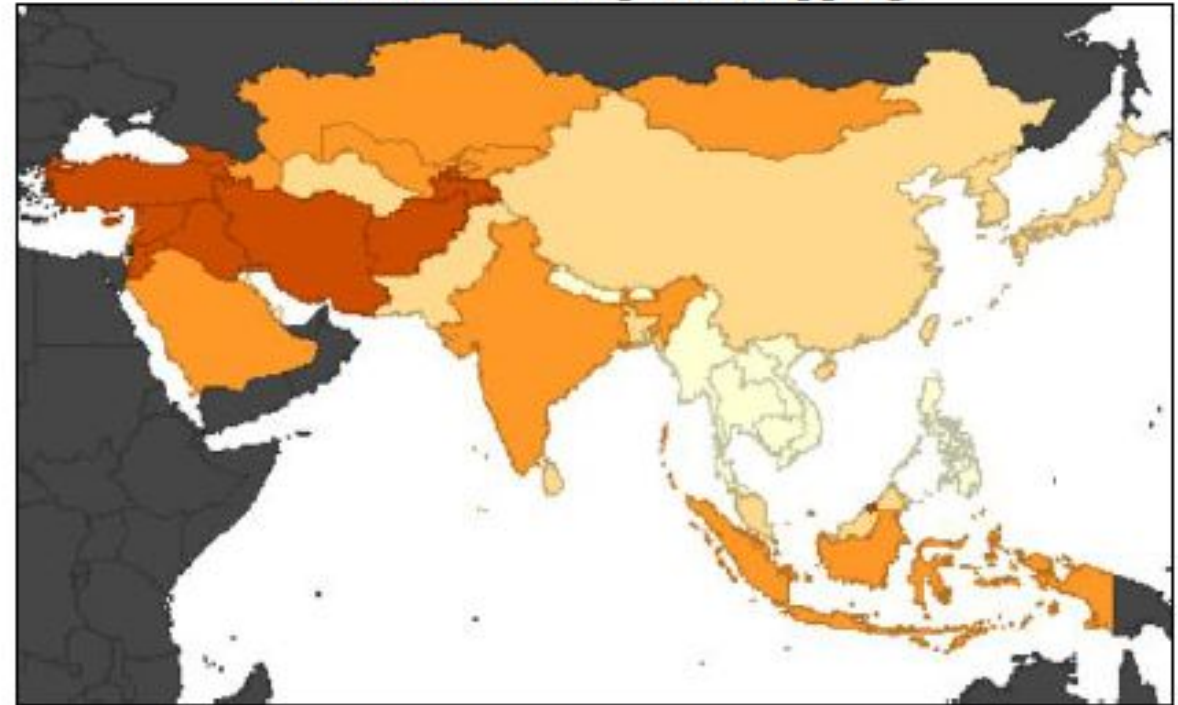
Figure 6.5: Global Moran's I of Total unemployment rate Year 2018

Results for Spatial Dependency

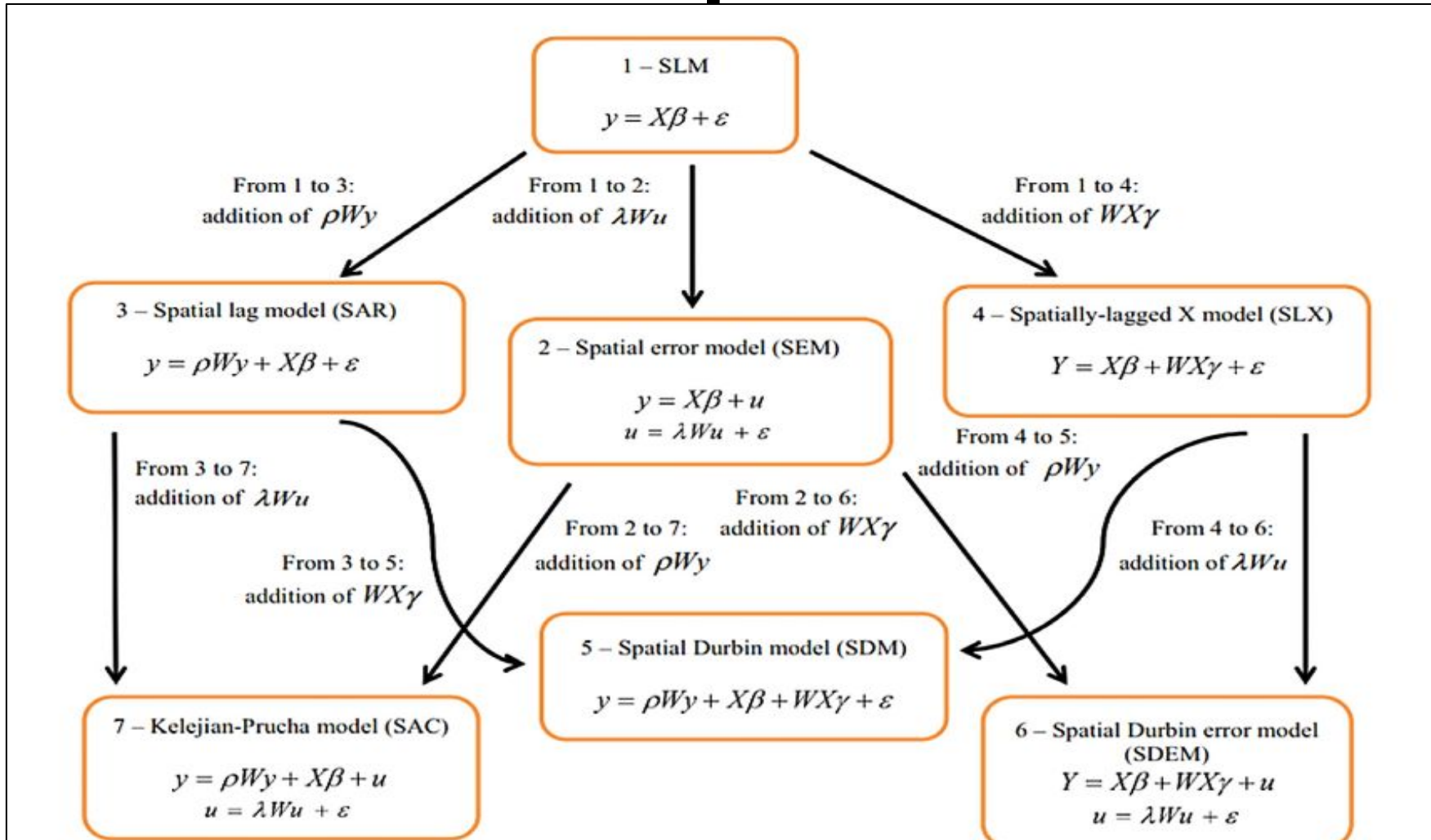
Year 2002 Choropleth Mapping



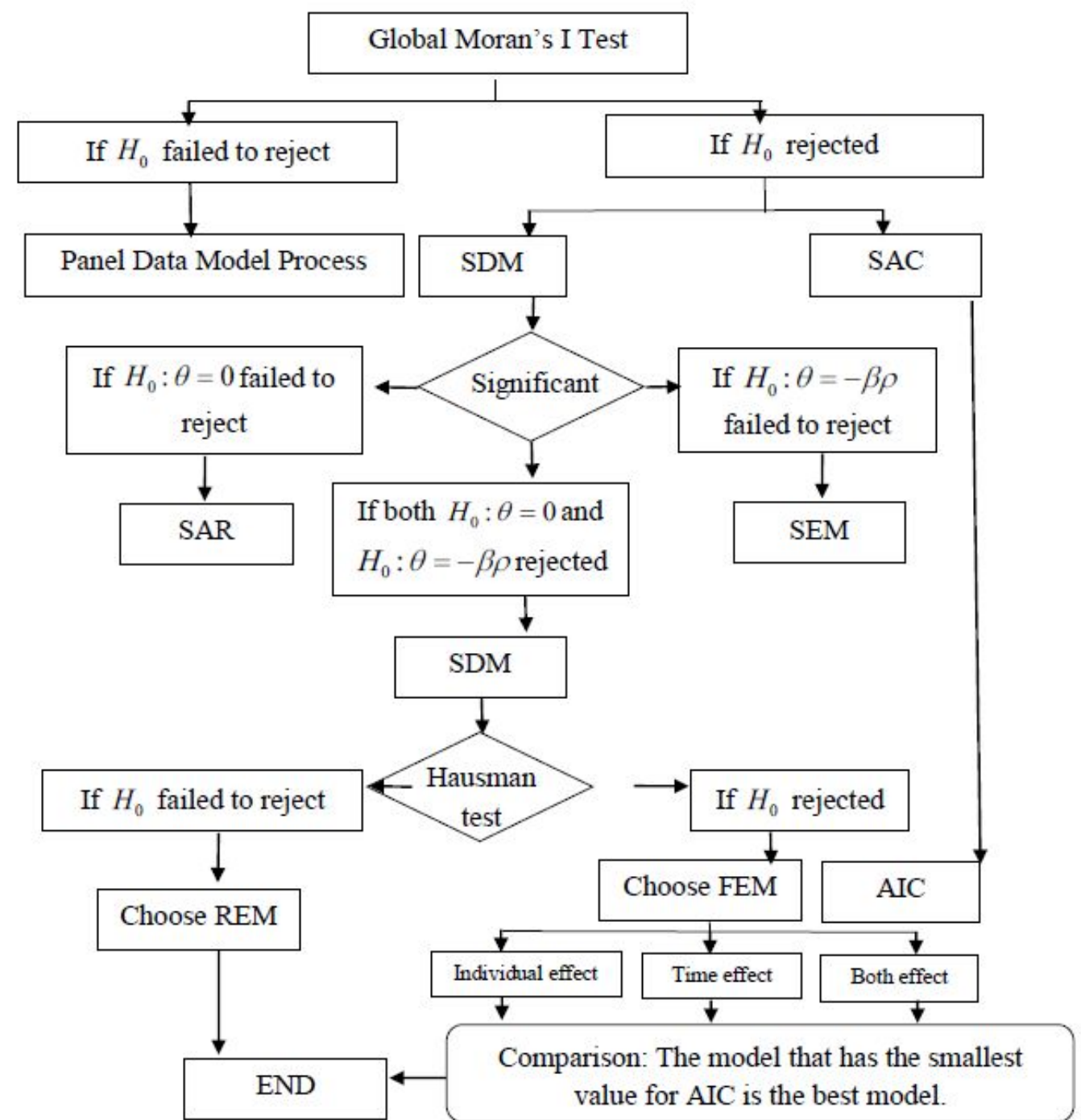
Year 2018 Choropleth Mapping



METHODOLOGY : Spatial Panel



Spatial Panel



Spatial Error Autocorrelation Test, $H_0 : \theta + \rho\beta = 0$

Unemployment rate	Spatial Error	Statistic	p-value
Total	Moran's I	65.883	<0.001
	LM Error (Burridge)	1540.012	<0.001
	Robust Lagrange Multiplier	375.135	<0.001
Male	Moran's I	71.512	<0.001
	LM Error (Burridge)	1818.100	<0.001
	Robust Lagrange Multiplier	250.470	<0.001
Female	Moran's I	60.121	<0.001
	LM Error (Burridge)	1379.261	<0.001
	LM Error (Robust)	639.834	<0.001

The all hypothesis for LM and LM (robust) of total, male and female unemployment rate's p-value are less than 0.0001. Since the p-value is smaller than significance level, the null hypotheses of LM and LM (robust) test are rejected and it can be concluded that SDM is selected.

Spatial Lag Autocorrelation Test, $H_0 : \theta = 0$

Unemployment rate	Spatial Lag	Statistic	p-value
Total	Moran's I	1391.706	<0.001
	LM Lag (Robust)	226.829	<0.001
Male	Moran's I	1873.094	<0.001
	LM Lag (Robust)	305.465	<0.001
Female	Moran's I	797.959	<0.001
	LM Lag (Robust)	158.531	<0.001

Hausman test for SDM FEM and REM

Unemployment rate	Chi-square	P-value
Total	500.82	<0.001
Male	234.53	<0.001
Female	818.23	<0.001

AIC Test for SDM Fixed effect and SAC Models

Unemployment rate	AIC for SDM FEM Time effect	AIC for SDM FEM Spatial effect	AIC for SDM FEM Both effect	AIC for SAC Time effect	AIC for SAC Spatial effect	AIC for SAC Both effect
Total	185.8119	1390.455	159.2425	1543.64	196.9865	163.478
Male	342.5187	1575.43	311.1615	1717.352	358.3058	320.4756
Female	262.1413	1358.03	239.3443	1535.352	262.7316	245.1992

ANALYSIS AND FINDING(Static Spatial Panel) :

Unemployment Rate

Positive

Negative

Total

Government Spending, Political Stability No Violence, WX_Tax burden, WX_Regulatory Quality

Male

Control of Corruption

Political Stability No Violence, WX_Tax burden, WX_Political Stability No Violence, WX_Regulatory Quality

Female

Control of Corruption, WX_Government Integrity, WX_Trade Freedom

Government Spending, Political Stability No Violence, WX_Tax burden, WX_Regulatory Quality

5.0 Conclusion

The findings in this study have contributed to the understanding of unemployment rate for selected Asian countries. It is reflected by their value in labour market system for the economic growth of a nation.

1. Good governance, stability of the governance and transparent practices are a key priority for the effective implementation of policies at the decentralised level
2. increasing the quality of the labour market has a favourable impact on economic growth and reduces unemployment.
3. political instability stems from a high level of uncertainty, which may reduce labour demand and hence raise unemployment
4. In a highly competitive market, the performance of both foreign rivals and domestic companies might be negatively impacted, resulting in poorer economic growth.

This study has yielded findings and give an indication that unemployment rate is an important issue that should be focus for all countries. The findings support previous research and have theoretical and practical consequences for all those involved in the labour market, particularly educators and policymakers.

The following are the contribution of this study.

1. to provide knowledge and allow more people to understand the pattern and trend of unemployment rate in Asian countries and the factors affecting the unemployment rate in Asian countries. Most of the previously conducted studies on unemployment rate had focused on other fields, but none of these studies investigated the Economic Freedoms Index and Quality of Governance Index on the unemployment rate of selected Asian countries
2. this study contributes to the theory by providing a methodological for panel data analysis and flowchart for spatial panel data analysis to help new researchers to save their time by using clear steps to analysis of panel data models and choosing the best model. theoretical contribution to future research by establishing a geographical weight matrix that could be useful in Asian countries' labour markets.

3. This study's potential to shed light on panel and spatial panel analysis methods in Asia's labour market. The deep insight provided by the case studies is one of the research's practical contributions.
4. The case studies show that unemployment rate-related initiatives should be linked to Economic freedom and Governance quality of a nation. This indicates that, for effective implementation, the importance of knowing the social circumstances of the labour market and the labour force organisation should be emphasised.
5. this research contributes to the practice by confirming the appropriate model to explain the case studies. This research also created a queen contiguity matrix by using STATA software commands to determine the locations of chosen Asian countries based on longitude and latitude. To this end, the due process model can be used as a practical tool.

6. 0 Limitation of this Study

Limitation	
Data	this study was limited to a subset of the used geographical units (locations) and time periods.
Theoretical framework	The theoretical framework's drawback is that existing academic research does not support the spatial panel effect of unemployment rate of selected Asian countries. This lack of support is due to the lack of studies that focus on establishing the spatial effect of Asian countries' unemployment rates.

6.0 Recommendation for Future Research

Further research should be conducted on this issue using a sampling approach that covers a broader time period and demography, such as using the districts or states levels of each country, which are well-versed in the pattern and trend of Asian unemployment rates.

It is important to recognize the relationship of the explanatory variables with the unemployment rate of Asian countries, involving in the application of the data. These limitations should be addressed sooner rather than later to avoid any unfavourable outcomes during the research.

- # 7.0 Reference
1. Özele, R. A., Fındıklı, S., & Topkaya, Ö. (2013). Investigation of Economic Growth and Unemployment Relationship for G7 Countries Using Panel Regression Analysis. *International Journal of Business and Social Science* 4(6), 163–171. Available from World Wide Web: www.ijbssnet.com
 2. Drake, S. (2018). *Determinants of Regional Unemployment Rate Differentials : An Empirical Analysis of Swedish Municipalities 2008-2017*. Bachelor Thesis in Economics, 1–63.
 3. Matuzeviciute, K., Butkus, M., & Karaliute, A. (2017). Do technological innovations affect unemployment? Some empirical evidence from European countries. *Journal of Economies MDPI* 5(4), 1–19. Available from World Wide Web: <https://doi.org/10.3390/economies5040048>
 4. Cracolici, M. F., Cuffaro, M., & Nijkamp, P. (2007). Geographical distribution of unemployment: An analysis of provincial differences in Italy. *Growth and Change* 38(4), 649–670. Available from World Wide Web: <https://doi.org/10.1111/j.1468-2257.2007.00391.x>
 5. Oktafianto, E. K., Achsani, N. A., & Irawan, T. (2019). The Determinant of Regional Unemployment in Indonesia: The Spatial Durbin Models. *Signifikan: Jurnal Ilmu Ekonomi* 8(2), 179–194. Available from World Wide Web: <https://doi.org/10.15408/sjie.v8i2.10124>
 6. Díaz, A. M. (2016). Spatial Unemployment Differentials in Colombia Diferenciales espaciales en la tasa de desempleo en Colombia. *Revista Desarrollo y Sociedad* 123(76), 123–163. Available from World Wide Web: <https://doi.org/10.13043/DYS.76.3>

TERIMA KASIH



@StatsMalaysia



PERSIDANGAN STATISTIK MALAYSIA KE-10



“Looking Beyond GDP: Towards Social Well-being and Environmental Sustainability”

25-26 SEPTEMBER 2023

Dianjurkan oleh:

