DETERMINANTS OF TOURISM IN ASIA PACIFIC

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
ARDL	Autoregressive Distributed Lag
CAGR	Compounded Annual Growth Rate
CPI	Consumer Price Index
DOLS	Dynamic Ordinary Least Squares
EDTG	Economic-Driven Tourism Growth
EPU	Economic Policy Uncertainty
ER	Exchange Rate
FDI	Foreign Direct Investments
FMOLS	Fully Modified Ordinary Least Square
GDP	Gross Domestic Product
GMM	Generalized Method of Moment
INF	Inflation
IPI	Industrial Production Index
IPS	Im-Pesaran-Shin
LCU	Local Currency Unit
OLS	Ordinary Least Square
PSI	Political Stability

PST-VECM	Panel Smooth Transition Vector Error Correction Model
RM	Ringgit Malaysia
SAARC	South Asian Association for Regional Cooperation
SIC	Schwartz Information Criterion
TA	Tourist Arrivals
TLEG	Tourism-Led Economic Growth
TR	Tourism Receipts
UK	United Kingdom
UNWTO	United Nations World Tourism Organization
US	United States
USA	United States of America
USD	United States Dollar
VECM	Vector Error Correction Model
WDI	World Development Indicators
WTTC	World Travel & Tourism Council

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PREFACE

The topic of our study is “Determinants of Tourism in Asia Pacific”. Tourism is the activities of people travelling and staying in places outside their home or usual environment for not more than one consecutive year for business, leisure and other purposes. There are many factors that can influence the tourism such as macroeconomic factors and social factors.

There are many studies on the tourism in the country like Europe, US and Thailand. However, there are not many studies on the tourism in Asia Pacific and thus we hope to make some contribution by filling in this gap. By doing so, we hope to have a better understanding regarding the effect of some factors on the tourism in Asia Pacific and thus have a clearer picture about how those factors can affect the tourism.

There are two dependent variables in this study which are Tourist Arrivals (TA) and Tourism Receipts (TR), while the independent variables are Exchange Rate (ER), Gross Domestic Product (GDP), Inflation (INF) and Political Stability (PSI).

This research is able to give insightful knowledge to various parties, which is to researcher who are interested in studying the factors that will affect the tourism in Asia Pacific as well as policymakers and government who is responsible for implementing and adopting new policies in the tourism industry.

ABSTRACT

This paper investigates on how the macroeconomic factors (exchange rate, GDP, inflation and political stability) influence the tourism revenue (tourist arrivals and tourism receipts) in the top ten most visited Asia Pacific countries by employing several panel data approaches such as unit root test, co-integration test, long run estimates test and Dumitrescu-Hurlin Granger causality test with yearly time-series data from 2002 to 2016. We find that the exchange rate, GDP, inflation and political stability has long run relationship with tourist revenue but GDP has no causality (short run) relationship with tourist revenue in the ten countries that we conducted for the study. Also, policymaker can improve tourism growth and resolve the income inequality between developed and developing tourism-service dependent areas based on those macroeconomic factors.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

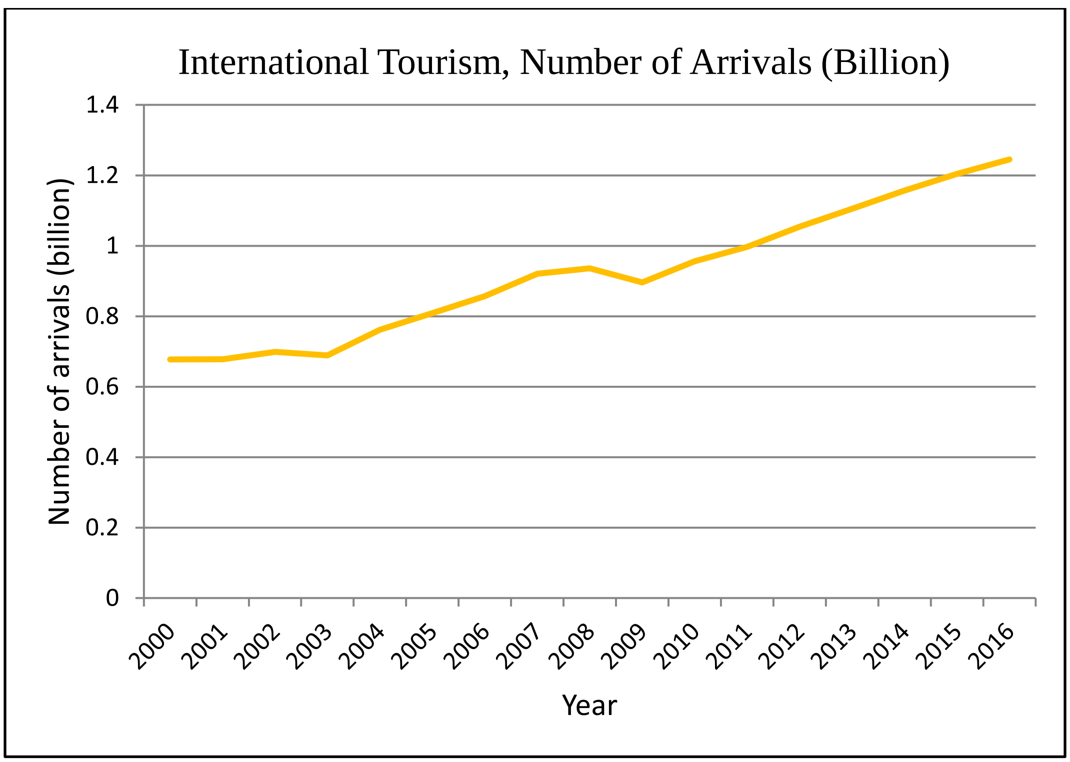
This study seeks to explore the impact of exchange rate, gross domestic product (GDP), inflation and political stability on Asia Pacific's tourism. A panel data that consists of top ten most visited Asia Pacific countries for the period of 2002 to 2016 has been collected for this research. This research employs several methodologies such as panel co-integration tests which are used to examine the long run co-integration among the variables. This chapter begins with an overview of the background that frames the study, then follows by the problem statement, research questions, research objectives and scope of study. The chapter concludes with a discussion of the significance of this research study.

1.1 Research Background

According to World Travel & Tourism Council ([WTTC], 2017), tourism and travel is an essential economic activity in worldwide especially in Asia Pacific. Tourism has direct effect on the development of the country. A country with high level of distribution and development in tourism helps the country to perform well in the other sector such as improving investment and inflow of investment, employment, export trading, and development of country. Infrastructure development in a country will be encouraged and improved, such as the building of road and airports connectivity in order to place tourism in a better way (Agaraj & Murati, 2009). Culture of each different country will be exchanged through tourism. Moral values such as respect on other culture, love, sharing and tolerance will be learned and improved through tourism which may create a better and loving world (Paul, 2012). The most importance of tourism is to increase a country's income as the handicrafts and local souvenirs which can represent the culture of a place will be sold to tourists and those incomes will be categorized as part of country incomes.

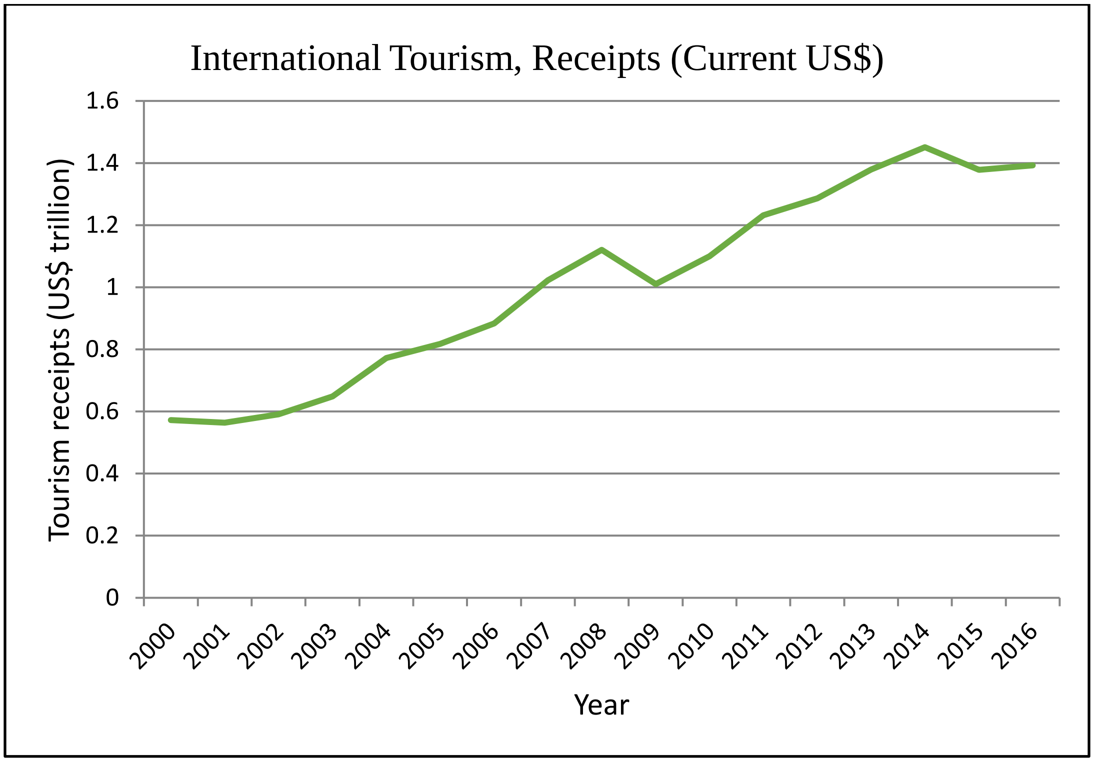
Tourism can be measured in four elements which are people, money, time and space (Song, Li, Witt, & Fei, 2010). Most of the researchers used the first two classes of measurement to examine the tourism and they can be named as tourism revenue when both measurements are combined. The tourism revenue can be categorized in two, that are tourist arrivals and tourism receipts. Tourist arrivals is measured by the number of tourists arrive at a country while the tourism receipts are measured by the tourism revenue in currency form.

Figure 1.1: International Tourism, Number of Arrivals (Billion)



Source: World Bank. (2018).

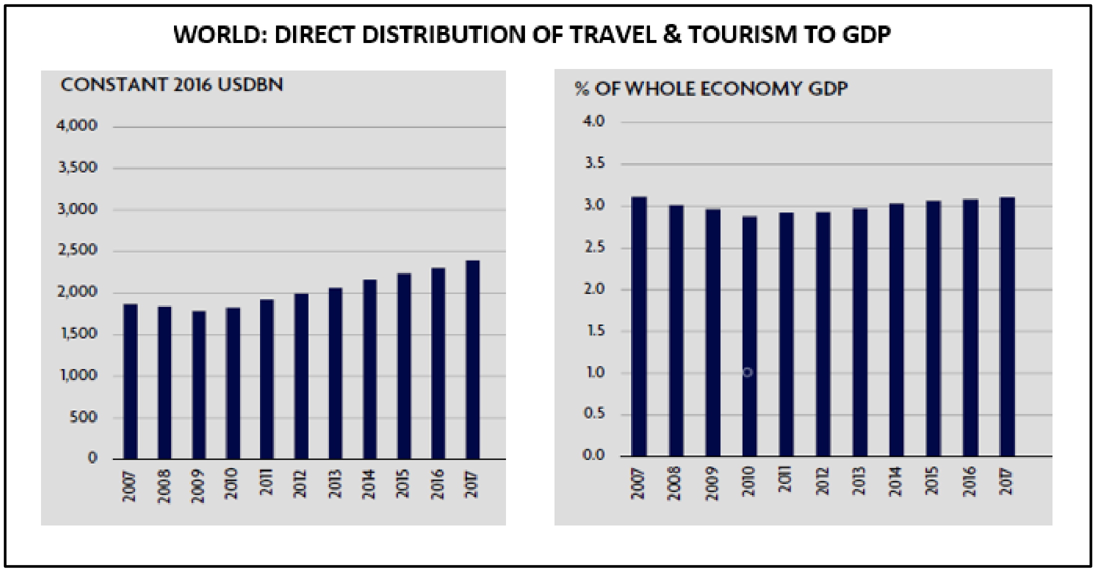
Figure 1.2: International Tourism, Receipts (Current US$)



Source: World Bank. (2018).

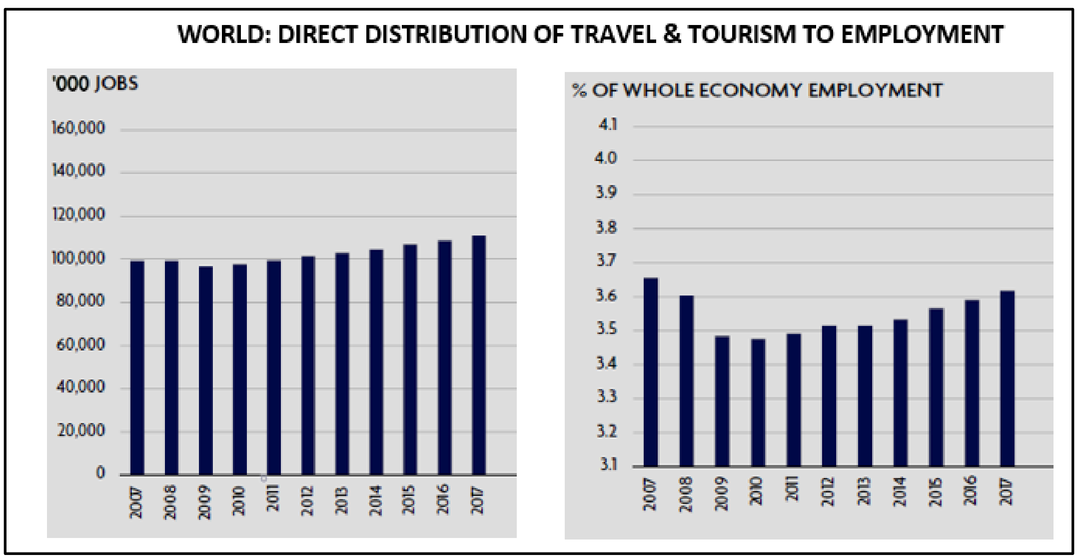
The graphs in Figure 1.1 and Figure 1.2 illustrated that both tourist arrivals and tourism receipts experience same trend. When tourist arrivals increase, tourism receipts will also increase. The tourism arrivals that kept rising from year 2000 had affected many sectors and industries in a positive way. However, the Asian Financial Crisis occurred in year 2008 had led to a decline in year 2009, as well as the investment inflow, employment and GDP were to be reduced in large portion.

Figure 1.3: Direct Contribution of Travel & Tourism to GDP



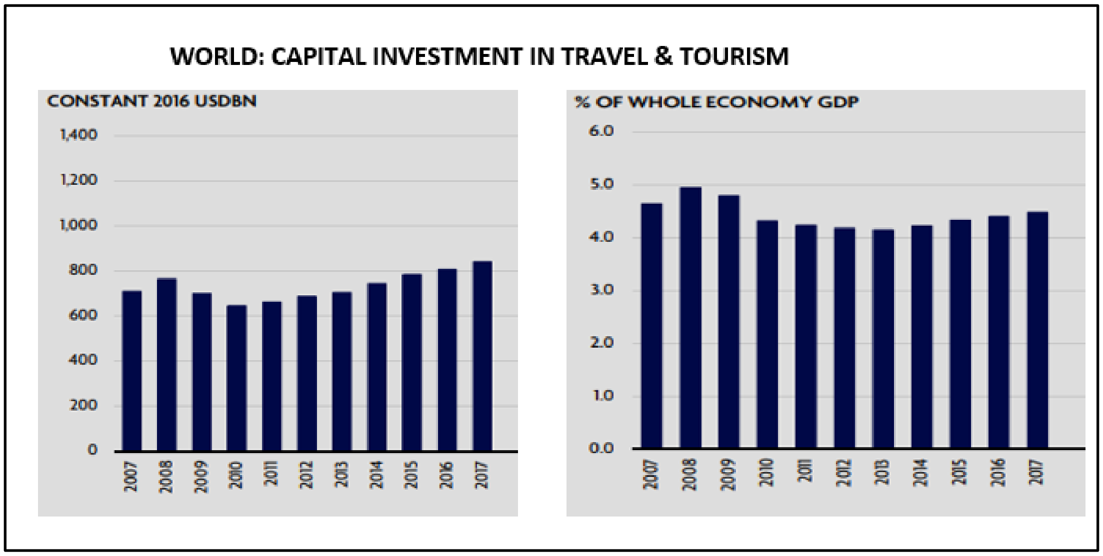
Source: World Travel & Tourism Council. (2017).

Figure 1.4: Direct Contribution of Travel & Tourism to Employment



Source: World Travel & Tourism Council. (2017).

Figure 1.5: Capital Investment in Travel & Tourism

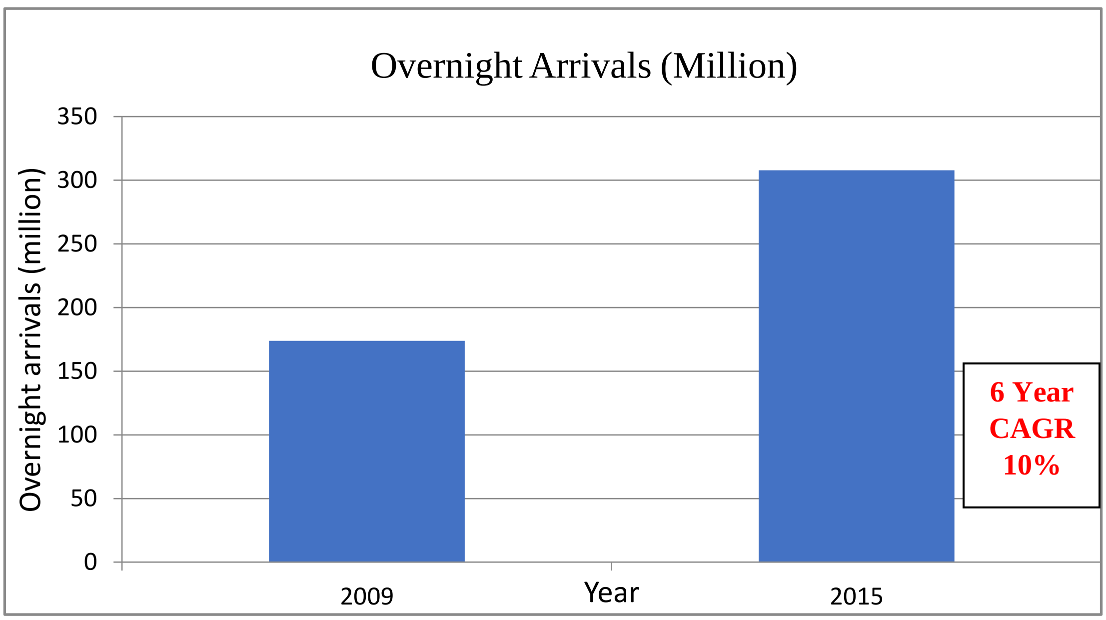


Source: World Travel &Tourism Council. (2017).

Figure 1.3, Figure 1.4 and Figure 1.5 illustrated the relationships of world travel and tourism with GDP, employment, and capital investment. Figure 1.3 showed the changes in trend of GDP with changes in trend in travel and tourism. GDP can contribute to a country's economy which can indicate the economic condition of a country. If there is a rising of GDP, it means that the country is in a good economic condition. It can be clearly shown from Figure 1.3 that the rising in the world's travel and tourism can lead to a rise in world GDP. Hence, the overall world economy condition is in an average condition. Next, Figure 1.4 showed the contribution relationship between travel and tourism with employment. It can be clearly seen that there is a positive relationship between world travel and tourism with world employment. It can be concluded that an increase in travel and tourism can increase the employment which means there is an increasing job opportunity for people. Lastly, Figure 1.5 reflected the boosting up of capital investment, which is the inflow of investment or the investment attracts due to the rising tourism. It can be said that a rise in world travel and tourism can increase the world foreign direct investments (FDIs), exports and imports.

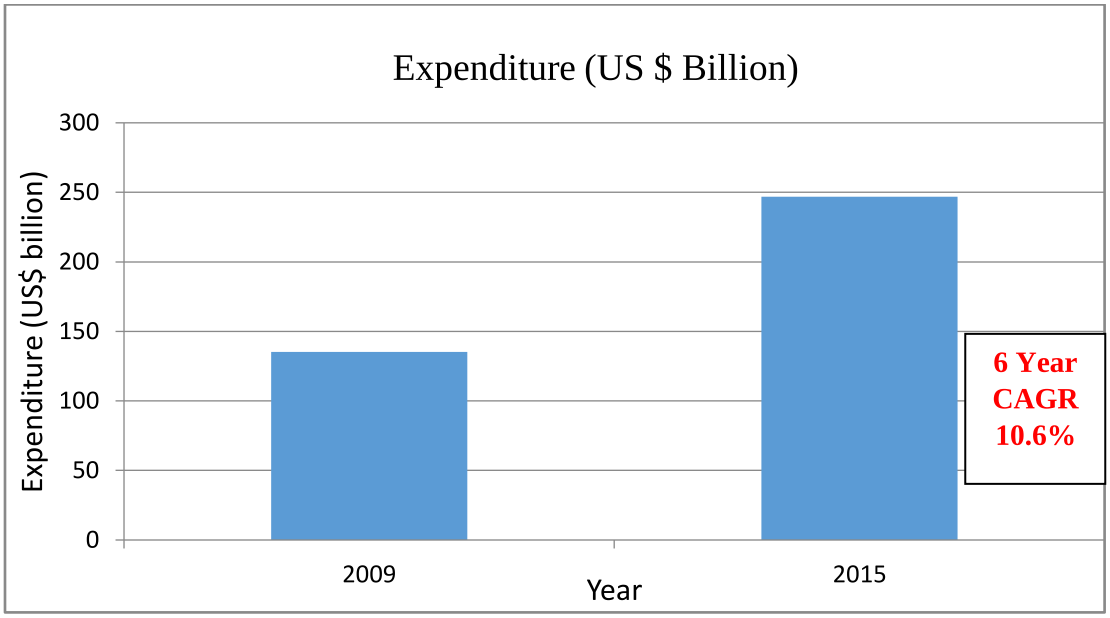
Asia Pacific, which includes Northeast Asia, South Asia, Oceania and Southeast Asia acts as one of the powerhouses in travel and tourism growth (WTTC, 2017). According to the Mastercard (2016), the data had proven that the 22 countries in the Asia Pacific represented almost 90.1% of all international overnight arrivals in year 2015 and made up 23% of the world's international overnight arrivals in year 2014. The tourism revenue especially in China and Japan had contributed almost 50% of the travel and tourism GDP in Asia Pacific, and 30% of the jobs were contributed by India (WTTC, 2017).

Figure 1.6: Growth of Tourism in Asia Pacific, Overnight Arrivals (Million)



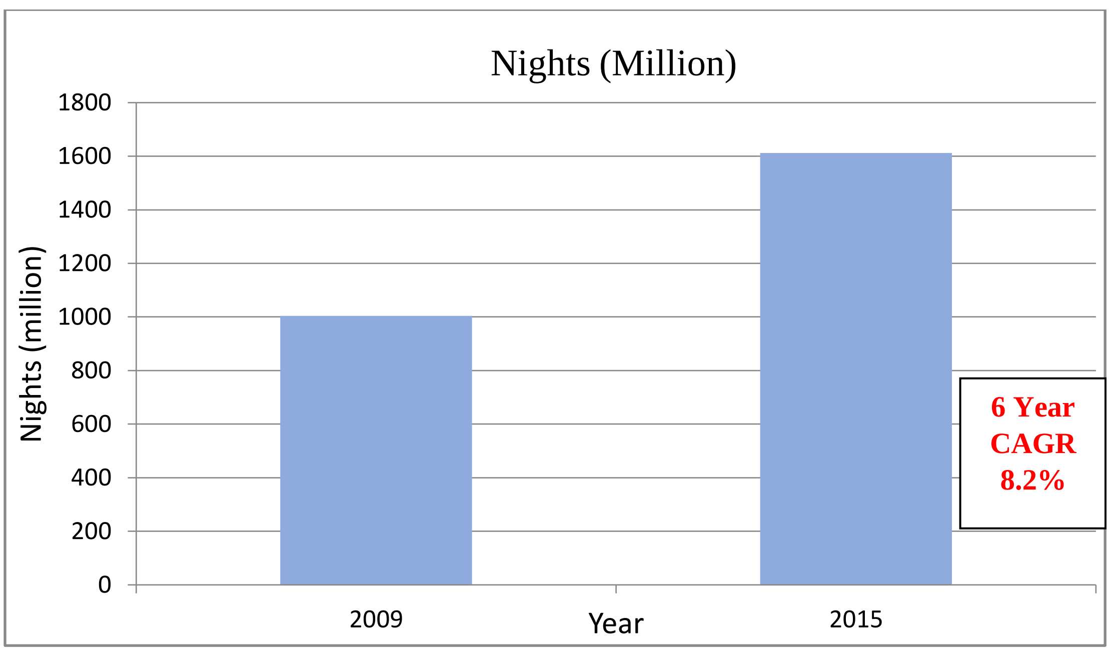
Source: Mastercard. (2016).

Figure 1.7: Growth of Tourism in Asia Pacific, Expenditure (US$ Billion)



Source: Mastercard. (2016).

Figure 1.8: Growth of Tourism in Asia Pacific, Nights (Million)



Source: Mastercard. (2016).

The growth of tourism in Asia Pacific are illustrated in Figure 1.6, Figure 1.7 and Figure 1.8. They clearly showed the trend comparison in year 2015 had increased the section of overnight arrivals, expenditure and nights for the tourism in Asia Pacific compared to past few years since 2009. The 6 years Compounded Annual Growth Rate (CAGR) are stated in the Figure 1.6, Figure 1.7 and Figure 1.8. It can be said that there was a rapid increase in tourism in Asia Pacific between 2009 and 2015.

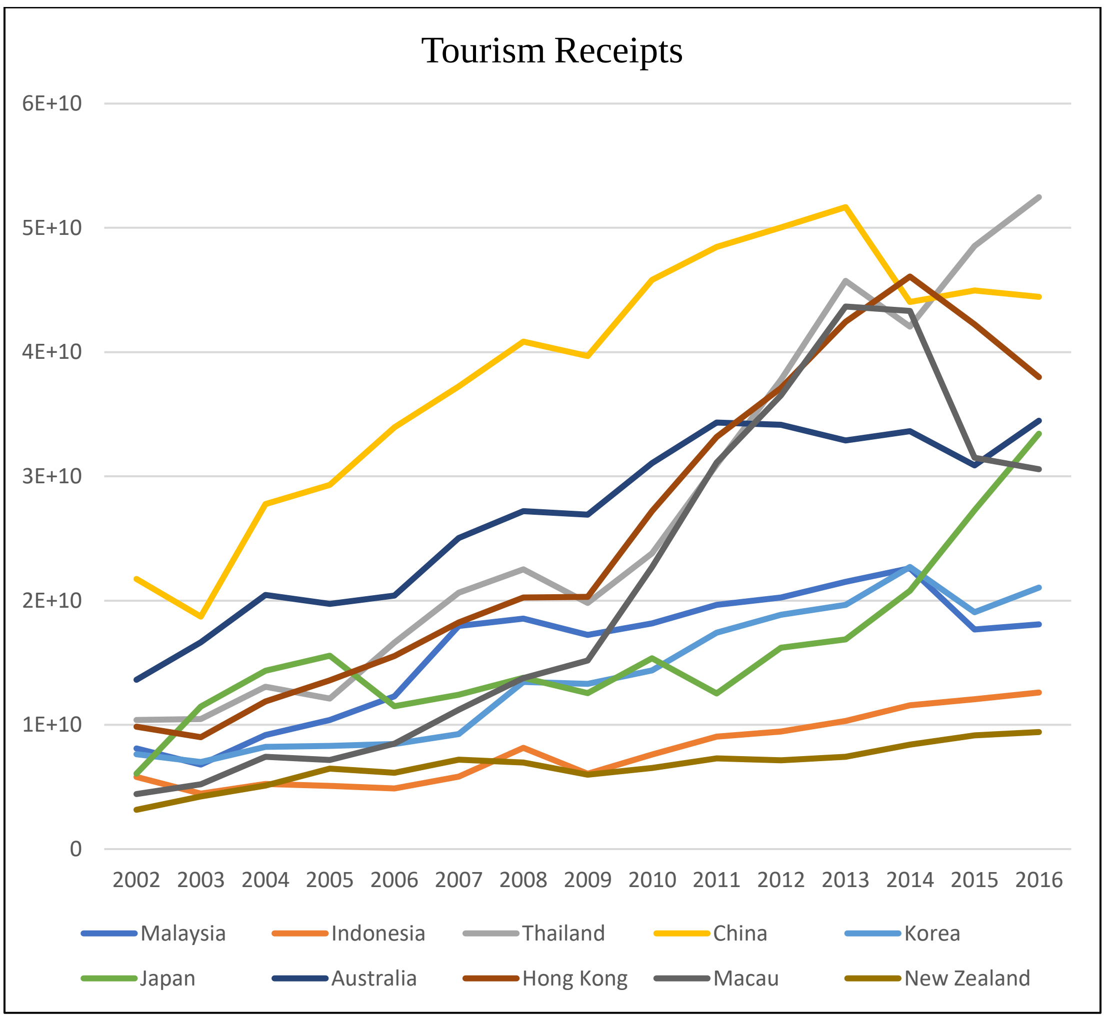
Table 1.1: Tourism Asia Pacific City Destination for 2016

No.	Tourism Market Size (Tourism GDP, US $ bn)		Share of City GDP (City Tourism GDP % of total city GDP)		Share of Country GDP (City Tourism GDP % of Country Tourism GDP)	
1	Shanghai	30.2	Macau	27.3	Hong Kong	100.0
2	Beijing	28.7	Bangkok	9.8	Singapore	100.0
3	Tokyo	20.2	Beijing	7.5	Macau	100.0
4	Shenzhen	18.8	Ho Chi Minh City	6.8	Bangkok	49.6
5	Bangkok	18.2	Shenzhen	6.7	Kuala Lumpur	41.8
6	Guangzhou	15.3	Shanghai	6.6	Jakarta	40.7
7	Hong Kong	14.6	Kuala Lumpur	6.1	Auckland	40.1
8	Singapore	12.4	Auckland	5.8	Ho Chi Minh City	26.8
9	Macau	12.2	Manila	5.7	Manila	26.7
10	Chongqing	9.5	Guangzhou	5.1	Seoul	26.0
11	Sydney	8.9	Hong Kong	4.6	Sydney	24.1
12	Osaka	7.1	Singapore	4.3	Tokyo	18.3
13	Jakarta	6.9	Chongqing	4.1	Shanghai	11.0
14	Manila	6.7	Delhi	3.6	Beijing	10.4
15	Seoul	6.5	Sydney	3.3	Shenzhen	6.8
16	Kuala Lumpur	5.8	Mumbai	3.2	Osaka	6.4
17	Chengdu	4.8	Jakarta	3.0	Guangzhou	5.5
18	Mumbai	3.9	Chengdu	2.8	Mumbai	5.4
19	Auckland	3.8	Tokyo	2.3	Delhi	4.4
20	Delhi	3.2	Osaka	2.1	Chongqing	3.4
21	Ho Chi Minh City	2.5	Seoul	2.1	Chengdu	1.7

Source: World Travel & Tourism Council. (2017).

The expand in the tourism market size can result in the rising of GDP for that city and country, which thus can lead to the growth of other sectors development in that country. In Table 1.1, the market size for the Asia Pacific cities is arranged from highest to lowest. It can be seen that the city at the first ranking, Shanghai contributed the largest market size (US$ 30.2 billion) which had contributed 6.6% of tourism GDP of total city GDP but only 11% of the city tourism GDP for the country. Consequently, Shanghai becomes one of the largest and modern cities in China because of the increasing in market size which resulted in the rapid city development.

Figure 1.9: Tourism Receipts for Top Ten Countries in Asia Pacific



Source: World Bank. (2018).

Figure 1.10: Tourist Arrivals for Top Ten Countries in Asia Pacific

Source: World Bank. (2018).

Many new tourist attractions and destinations had been developed in Asia Pacific in recent years. Consequently, there is an increasing in tourist arrivals to Asia Pacific every year. Thus, Asia Pacific outperformed all world regions in terms of tourism growth. Therefore, the Asia Pacific's tourism had been chosen in order to investigate on the reasons of Asia Pacific became the second region where most visited by tourists in year 2017 (United Nations World Tourism Organization [UNWTO], 2018). According to countries' tourism revenue in Asia Pacific from past few years, ten countries with the highest tourism revenue were selected and chosen as the target in this research. Figure 1.9 and Figure 1.10 illustrated the trending of the top ten countries which has the highest tourism revenue in Asia Pacific from 2002 to 2016. The ten countries are Malaysia, Indonesia, Thailand, China, Korea, Japan, Australia, Hong Kong, Macau and New Zealand. Some of these countries chosen are developed countries but some are not and this is another reason where these countries are chosen.

1.2 Problem Statement

Currently, tourism is one of the largest and fastest world's growth industry. UNWTO (2018) reported that Asia Pacific is one of the top three regions most visited by tourists and it accounted for 30% of the world's international tourism receipts in 2017 where the share was almost doubled up since 2000. Asia Pacific has outstanding performance in terms of growth in the world regions where the international tourist arrivals increased an average 7% per year compared to the world average of 4% for the period of 2005 to 2016. Because of the increasing of tourism revenue, Asia Pacific has focused on the shift from industrial to technological age over the last two decades. It also leads to rapid infrastructure development to serve hotels and tourist facilities as the people recognized that tourism is important to economy. However, not every areas of the countries are well-developed for tourism purpose. The well-developed tourism-service dependent areas usually are in urban area while the developing tourism-service dependent areas usually are in rural area.

Table 1.2: Example of Developed Area and Developing Area in Top Ten Most Visited Countries

Country	Example of developed area in the country	Example of developing area in the country
Japan	Tokyo	Shimane
Korea	Seoul	Sejong
China	Shanghai	Guilin
Malaysia	Kuala Lumpur	Sabah
Thailand	Bangkok Metropolis	North Region
Indonesia	Bali	Papua New Guinea
Australia	New South Wales	Tasmania
New Zealand	Queenstown	Taupo
Hong Kong	Victoria Peak	Lamma Island
Macau	-	-

Table 1.2 shows the example of developed area and developing area in top ten most visited countries. Tokyo as a developed area had contributed about one quarter of Japan tourism but Shimane only contributed about 0.1% in 2017 tourist arrivals growth rate (Japan Tourism Statistics, 2017). Seoul consisted about 12 million visitors and Sejong, central administrative capital city for South Korea, consisted of only 0.33 million tourist arrivals in 2015 ("Korea National Tourism Survey", 2015). According to Travel China Guide (2018), 8.54 million visitors had visited Shanghai in year 2016 but there were only 2.20 million tourists visited Guilin in year 2016. In Malaysia, Kuala Lumpur had visited by 12.29 million of international tourists (Ram, 2017) while Sabah had visited by 1.13 million of international tourists (Sabah Tourism Research Division, 2017). According to Hays (2014), Bangkok Metropolis has the highest percentage of

international tourists visited which is 32.12% while the north region of Thailand has the lowest percentage of international tourists visited which is 18.22%. Besides, Bali Statistics Agency (as cited in Subadra, 2019) stated that around 4 million of international tourists had visited Bali while there was only 184,000 of tourists visited Papua New Guinea in year 2015 (Index Mundi, 2017). Moreover, in year 2017, there were a total number of 4.2 million international visitors to New South Wales but Tasmania had a total of 279,000 international visitors only (Budget Direct, 2019). In year 2016, Queenstown lakes hosted 1.17 million international visitors but Taupo had around 500,000 of international visitors (Jenkins, 2018). In year 2011, Victoria Peak contributed to 15.1% of the total tourist arrivals in Hong Kong but Lamma Island only accounted for 0.5% ("Traffic Habit Survey", 2011). Lastly, as a well-developed area, the tourist arrivals in Macau including same-day visitors and overnight stay visitors is nearly 36 million in 2018 (Macao Government Tourism Office, 2019).

Since the developed areas have more tourist arrivals than the developing area, it can be seen that the developed areas have better infrastructure development and well-developed transportation system in order to serve tourists as tourists prefer to visit those regions with a good infrastructure and convenient transportation system. Nevertheless, this have caused the inequality and income distribution gap between developed area and developing area in terms of income distribution as there are more rich people in developed area compared to developing area. Moreover, the inequality has increased faster especially in those tourism service-dependent areas that are well-developed and this will eventually decrease the standard of living for the middle-income and low-income group in those areas (Lee, 2009).

Tourism service-dependent areas that are well developed are usually politically stable as tourists are sensitive to political violence during their vacations and they will become more anxious about the security and safety when they are in the countries which they do not familiar with. When the areas are politically stable, the tourist arrivals will increase and thus tourism revenue increases. Furthermore, those areas can create employment for country and contribute to GDP as tourism can account for over

25% of GDP in some developing countries (UNWTO, 2015). On the contrary, the economic growth will adversely affect economy and results in inflation. The growth of tourism sector can be disadvantageous as it may cause inflation (Shaari, Ahmand & Razali, 2017). When the country faced inflation, local citizens will demand more foreign goods because it is relatively cheaper than domestic good. Consequently, they will demand for foreign currency and the local currency will depreciate.

Since there are not many studies on Asia Pacific’s tourism, so this study wants to concentrate on the impact of four main concerns which are exchange rate, GDP, inflation and political stability on Asia Pacific’s tourism where the tourism will generate both positive and negative impacts.

1.3 Research Objectives

1.3.1 General Objective

The general objective of the research is to investigate the relationship between exchange rate, GDP, inflation, and political stability and tourism revenue (tourism receipts and tourist arrivals) of top ten most visited Asia Pacific countries for the period of 2002 to 2016.

1.3.2 Specific Objective

The research aims to:

a) Investigate the relationship between exchange rate, GDP, inflation, and political stability and tourism revenue in the long run.
b) Examine the causal relationship between exchange rate, GDP, inflation, and political stability and tourism revenue.

1.4 Research Questions

1.4.1 General Question

What is the relationship between exchange rate, GDP, inflation, and political stability and tourism revenue (tourist arrivals and tourism receipts) of top ten most visited Asia Pacific countries for the period of 2002 to 2016?

1.4.2 Specific Question

a) What is the relationship between exchange rate, GDP, inflation, and political stability and tourism revenue in long run?

c) What is the causal relationship between exchange rate, GDP, inflation, and political stability and tourism revenue?

1.5 Significance of Study

The result of this study may clarify about the tourist arrivals and tourism receipts when there are changes in inflation, GDP, exchange rate and political stability. Next, the findings could help to determine the co-movement and the causality for Asia Pacific's tourism which may provide a clear information whether these variables having long run relationship with bidirectional causality or having long run relationship with unidirectional causality.

Moreover, this can help the policy maker and public sector to develop a suitable policy based on the results of this research to attract tourists in term of number or revenue in order to spur rapid economic growth and resolve income inequality. Thus, this research can be a handy guideline for the policymakers to concentrate on the economic sectors that can be influenced by the tourist arrivals and tourism receipts.

Future researchers can have further understanding on the Asia Pacific countries and able to gain some helpful information to conduct their studies.

1.6 Conclusion

Chapter 1 provides a synopsis of the research topic. This chapter begins with a short introduction and an overview of the explanation on research background. Problem statement, research objectives and research questions have explained how the research will be conducted. It is then followed by the significance of the study, which determined the contribution of this study to the different parties. With the brief information, reader is able to understand information in Chapter 1 and it would become the foundation for the advanced statistics discussed in the following chapter.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

According to Chapter 1 focuses on elaborating the research background which attached with related issues with the research, research questions, research objectives and significance on the study on tourist arrivals and tourism receipts in the top ten most visited countries in Asia Pacific. In this chapter, we will review on the works of past researchers that related to tourist arrivals, tourism receipts, political stability, inflation, exchange rate and GDP. Therefore, by referring to above information, relevant past studies and theoretical framework will be discussed for further support and understanding of the study.

In Chapter 2, variety of past researchers' studies focuses on the dependent variables, tourist arrivals and tourism receipts. It is followed by four independent variables that are political stability, inflation, exchange rate, and GDP. The method used by the previous researchers in carrying out their studies will be further explained. This chapter also explains the relationship between the exogenous variables with endogenous variables. The theoretical framework which explained the theory in this research will be discussed in this chapter. Towards the end of this chapter, we will summarize what had been discussed.

2.1 Review of the Literature

2.1.1 Tourist Arrivals and Tourism Receipts

International trade acts as one of the major concerns in every country among these few years. The condition of international trade will directly influence that country's revenue and economic condition. Among the international trade activities, tourism is the most efficient form, such as banking and financial market (Popescu, 2016). Tourism can be said as an important criterion for a country since it acts as the industry that has the most influencing in the world, which may improve the country's earning and development. This is due to the earnings from the tourism industry will become parts of the revenue, which is the source of foreign exchange earnings for a country.

On the earning side, tourism revenue can be determined through two categories, which are tourist arrivals and tourism receipts. Tourist arrivals can be defined as the data where the arrivals in a country, not referred to the number of tourists travel to a country (European Environment Agency, 2015). However, according to World Tourism Organization (2018), tourism receipts is defined as the expenditure paid by the inbound tourists which consists of the expenditure such as food and beverages, transportation cost, entertainment cost and others. The difference between tourist arrivals and tourism receipts is that tourist arrivals refer to number of visitors while tourism receipts is noted in currency form, such as Ringgit Malaysia (RM) and United States Dollar (USD).

Despite the difference, tourist arrivals and tourism receipts move in the same trend and direction since both have similar meaning in terms of measuring the tourism revenue for a country.

2.1.2 Relationship between Tourist Arrivals, Tourism Receipts and Exchange Rate

Exchange rate or foreign exchange rate, is referring to the rate where one individual or institution exchanges currency for another country's currency (Rodrick, 2008). Exchange rate is normally defined in foreign exchange market and open in wide range for the purpose of buying and selling of currency (Bank Exam Today, 2017). Real exchange rate and nominal exchange rate are categorized under exchange rate. According to Treadwell (2018), real exchange rate indicates the amount of foreign goods and services that can be exchanged by using one unit of domestic goods and services. However, nominal exchange rate is referred to the amount of foreign currency that can be purchased by using one unit of domestic currency (Eichenbaum, Johannsen & Rebelo, 2017). Czech National Bank (2018) suggested that it was more suitable to monitor the changes of real exchange rate since it reflected the goods and services amount that can be exchanged when there were changes in currency.

Jayaraman, Lin, Haron, and Ong (2011) evidenced a negative relationship by using Malaysia data from year 2002 to 2008. It was significantly related since international tourists will spend more in Malaysia if Malaysia currency is weaker. Weak currency of Malaysia showed that goods and services will be cheaper in Malaysia. Thus, a decrease in exchange rate will cause depreciation of a destination country and boost up tourist arrivals.

Furthermore, Martins, Yi, and Ferreira-Lopes (2017) explained the negative causal relationship by using data of 218 countries from year 1995 until 2012. They noted that a depreciation of country currency helped in boosting the number of arrivals, which evidenced by the reduction in the exchange rate or vice versa.

Next, a study conducted by Yazdi and Khanalizadeh (2016) utilized autoregressive distributed lag methods to measure negative and significant relationship between real exchange rate and international tourism demand in USA. It stated that 1% US$ depreciation leads tourist arrivals in USA rose by 0.68%. This implied that US$ depreciation lower the cost of living acted as one of the factors demand for tourists travel to USA.

On the other hand, Tavares and Leitão (2017) noticed the exchange rate in Brazil had a negative relationship with own country tourist arrivals by implanting pooled Ordinary Least Squares (OLS) estimators. The appreciation of origin currency caused an increase in Brazil's tourist arrivals due to Brazil's cheaper goods and services compared to origin country. Thus, an occurrence of negative relationship between exchange rate and tourism revenue in Brazil was proven.

However, there are some debates regarding the relationship. According to Borhan and Arsad (2016), the estimated long run coefficients result showed the exchange rate for most of the countries had a significant positive impact on tourist arrivals in Malaysia by using Autoregressive Distributed Lag (ARDL) co-integration test. The positive estimated coefficient indicated the countries will continue travel to Malaysia regardless the EURO crisis.

This relationship is also supported by Zidana (2015), who evidenced the significant and positive relationship between nominal exchange rate and international tourism receipts by using Melawi data from 1980 to 2013. The relationship between variables was proven by the low amount of R^2 (0.37), which means only 37% of relationship of tourism arrivals can be explained by exchange rate, since there were different sets of factors affected tourism such as for short run, people will continue to travel regardless the exchange rate as they already made their travel plans. In long run, people continue to travel because there will be other factors affecting their travel decisions such as countries' economy and development.

On the other hand, Yi (2015) also analysed the existence of positive relationship between exchange rate and tourist arrivals by using of 218 countries. The study proved that when domestic currency value depreciated, the exchange rate dropped and led to a decrease in tourist arrivals, which against the common theory of past studies which showing negative relationship. The reasons such as safety of country, performance of domestic country and status of economic system will cause the coefficient of this study different from others.

2.1.3 Relationship between Tourist Arrivals, Tourism Receipts and Inflation

Inflation, is referring to the rising in price level of goods and services for a given time period (Oner, 2010). The rising of inflation caused the rise of a country's cost of living. Inflation and deflation normally measured by using Consumer Price Index (CPI), average prices of a baskets of goods and services (Amadeo, 2018a). Rising of inflation in origin country or destination country always proposes opposite relationship to tourist arrivals for destination country. This theory can be proven by several studies.

Previous researchers Wang and Xi (2016) carried out a recent study related inbound tourism for China by using 178 origins countries between the period of 1995 to 2012. They investigated the relationship by using relative purchasing power parity. According to the research, high purchasing power parity indicated high inflation in origin country and currency depreciation. Thus, the outbound of tourism of the origin country to China and inbound of China had been decreased.

Besides, there is also a similar result in the past studies between inflation in tourism revenue in Malaysia by using multi regression model (Jayaraman et al., 2011). The study showed the rising in the price of products or services in the destination country will cut down the interest of tourists to purchase and affect tourism revenue.

Other than that, regarding to inflation, some studies also found that inflation which occurred in destination country will cut the tourist arrivals (Martins et al., 2017). The researchers proved that the decline in relative domestic prices will help to rise the number of arrivals by using 218 countries data from 1995 to 2012.

Demir and Gozgor (2018) used EPU indexes for 15 countries to examine the effects of rising of price level on tourist arrivals. As stated in past study, the sign of coefficient showed that the domestic rising in inflation caused the tourism outbound to decline, and hence tourist arrivals for other countries dropped.

In Taiwan, Wang (2009) generated a research and proved negative relationship of the changes in price in destination and the inbound tourism. The past study related that the rising in the prices in Taiwan reduced the purchasing power of incoming tourists. As a result, it reduced the interest of tourists in buying and hence reduced the number of tourist arrivals. Thus, the negative relationship evidenced.

Additionally, Yong (2014) examined the relation of changes in price index and tourism by using panel data of 14 European countries. The methodology, Feasible Generalized Least Squares, proved similar sign of relationship between the two variables. As the cost of travelling and price level rose, the tourism demand for European countries dropped, which equal to the reduction in other countries' tourism revenue. However, upon the ending of the research, Yong (2014) argued that the negative effects of both variables can be offset. Therefore, the relationship can convert to positive relationship.

2.1.4 Relationship between Tourist Arrivals, Tourism Receipts and Political Stability

Generally, political stability refers to a good and stable political situation in a country whereby promote and attract investments. Political stability is a vital indicator to measure the economic growth of a country. If a country is politically stable, it can bring a positive impact on economic development (Ramadhan, Jian, Henry, & Pacific, 2016). The political stability index is in between +2.5 (strong stability) to -2.5 (weak stability).

There is a study that carried out by Mushtaq and Zaman (2014) to investigate the relationship between political instability, terrorism and tourism in nominated SAARC nations in the long run such as Pakistan, Srilanka, India and Bangladesh over a period of 1995 to 2012. In order to achieve the objective, panel Dynamic Ordinary Least Squares (DOLS) is used. The empirical results suggested that a significant negative relationship was shown between political instability and tourism receipts in the region. The negative coefficient of political instability indicated that an increase in political instability in a particular region will decrease tourism receipts in that region as well. Tourists are responsive to the case of political instability in their vacations because such event endangered a relaxed and undisturbed holiday. However, surprisingly, the findings also suggested that there was a high significant positive relationship between terrorism and tourism receipts in the region.

Besides, there is another study that conducted by Habibi (2016) using the Generalized Method of Moment (GMM) to explore the non-economic and economic sources of international tourist flows to Malaysia. The study was carried out by using annual panel data set that included 33 countries during 2000 to 2012. A significant positive relationship between tourist arrivals to Malaysia and political stability in Malaysia was shown by the empirical results. The positive sign of the estimated coefficient indicated that international tourists tend to visit tourist destination which can give them a high level of security.

In addition, there is a research that carried out by Zidana (2015) which aim at investigating the macroeconomic determinants of the performance of tourism industry in Malawi from 1980 to 2013. OLS method was employed to analyse the relationship between political instability and international tourist receipts. The results showed that political instability had a negative relationship to tourist receipts, though weakly significant. However, in the long run, political instability had a significant negative impact on tourist receipts. The negative sign of the estimated coefficient indicated that political instability in Malawi's neighbouring states was predicted for leading a decline of tourism receipts in Malawi which was consistent with the study conducted by Mushtaq and Zaman (2014).

Unlike other researchers who carried out study on the individual effect of terrorism political instability on tourist arrivals, Saha and Yap (2014) conducted a study on analysing the effects of interaction between terrorism and political stability on tourist arrivals using the moderation effect. Moderation effects measured the collective impacts of exogenous variables on an endogenous variable instead of emphasising on the effects of an only exogeneous variable. The study was conducted using panel data for the period 1999 to 2009 from 139 countries and the results showed that political instability and terrorism together had a substantial destructive effect on tourist arrivals in a country.

2.1.5 Relationship between Tourist Arrivals, Tourism Receipts and Gross Domestic Product (GDP)

GDP refers to the market value of goods and services produced within a selected country in a specific time period. There are different ways to measure a country's GDP, nominal, real, GDP per capita and GDP growth (Amadeo, 2018b). Apart from that, it can be calculated by using three approaches, namely expenditure approach, income approach and production approach ("GDP Calculation Methodology", 2018).

Chulaphan and Barahona (2017) carried a research with the aim to study the relationship between economic growth in Thailand and tourist expansion by analysing how tourist arrivals from different areas affected the Thailand's economic growth. Thailand's Industrial Production Index (IPI) and international tourist arrivals per continent (Tr) from January 2008 to November 2015 was used. The empirical results showed that there was Granger-causality between tourist arrivals from South Asia with economic growth in Thailand. In other words, there was positive relationship between economy growth and the tourist arrivals in Thailand.

In addition, there is another study that conducted by Sokhanvar, Ciftcioglu, and Javid (2018) to investigate the causal relationships between economic development and tourism in developing market economies. This study applied Granger causality analysis across 16 nations to find the causal relationships between international tourism receipts (% GDP) and economic growth (annual %) by using annual data for the period from 1995 to 2014. A unidirectional causality from tourism receipts to GDP growth in Brazil, Mexico and Philippines was shown from the empirical results. On the other hand, there was a unidirectional causality from GDP growth to tourism receipts in China, Indonesia, Malaysia and Peru. Besides, there was a mutual causality between GDP growth and tourism receipts in Chile but there was no causality distinguished between tourism receipts and GDP growth in South Africa, Hungary, Colombia, Thailand, Poland, Turkey and Russian Federation.

Furthermore, there is also a study carried out by Yazdi, Salehi, and Soheilzad (2015) to study the causal relationship between the economic growth and tourism in Iran from the year 1988 to 2013. The study was carried out by using Granger causality test, Vector Error Correction Model (VECM) and ARDL model. The Granger causality test showed that there was a mutual relationship between tourism expenditure and economic growth in the short run and long run in Iran.

Habibi (2016) investigated the non-economic and economic determinants of international tourist flows to Malaysia using the GMM. The study was conducted by using data from 33 countries during the period 2000 to 2012. The results implied that GDP, which is a proxy of income had positive relationship with tourist arrivals. This indicated that the greater the GDP per capita in a region, the more the tourist arrivals from that region. This is because economic conditions in tourists' local nations are very crucial for both demand and arrivals in Malaysia.

Borhan and Arsad (2016) conducted a study to investigate the dynamic short-run and long-run relationship between the number of international tourist arrivals from six European countries, namely Denmark, Germany, Sweden, UK, France and the Netherlands between four economic variables which are level of income, tourism price of alternative destination nation, tourism price and exchange rate. The statistics covered the period from quarter 1 of 1999 to quarter 3 of 2014 and employed the ARDL bounds testing approach. The findings showed that income level had significant positive relationship on the number of tourist arrivals from most of the countries except for Sweden and UK. In this study, it discovered that the result of income on tourism can be either negative or positive relying on the type of tourism good is. Regarding to the negative effect of the income level on the number of tourist arrivals from Sweden and the UK to Malaysia, this happened because they considered tourism in Malaysia as an inferior good, indicating that tourists from these countries preferred to travel to a more luxury destination around the world.

Based on the research carried out by Jayaraman et al. (2011) which examined the macroeconomic variables that affecting tourism revenue in Malaysia by using multiple regression model from 2002 to 2008, there was a significant and negative relationship between GDP for Malaysia and Malaysia's tourism revenue. The negative relationship indicated that an increase in GDP will reduce the revenue generated by tourists. This is against to the study done by Chulaphan and Barahona (2017) stating that there was positive relationship between GDP and the tourist arrivals in Thailand.

Zidana (2015) conducted a research on investigating the macroeconomic determinants of the performance of tourism industry in Malawi from 1980 to 2013 by using OLS method and found out that GDP had a significant positive relationship on tourism receipts in Malawi in the long run. In other words, when there was a rise in GDP for source countries, there will be an increase in tourism receipts for Malawi. However, there was no significant relationship in the short run.

Martins et al. (2017) found out that there was positive relationship between GDP and tourism demand when they conducted a research to investigate the relationship between tourism demand and macroeconomic variables using Poisson panel data model. The database was consisted of unbalanced panel of 218 nations from 1995 to 2012. The positive relationship indicated that a rise in the world GDP will increase tourism demand.

From the study that carried out by Wu, Liu, Hsiao, and Huang (2016) which investigated the economic growth-tourism causality by employing Panel

Smooth Transition Vector Error Correction Model (PST-VECM), the results showed that there was mutual relationship between GDP and tourism in both long run and short run. The database included Macau SAR, South Korea, Japan, Indonesia, Malaysia, Thailand, Singapore, China, Australia and Hong Kong from 1995 to 2013. This was consistent with the study that done by Brida, Lanzilotta, and Sebestian (2015) and Phiri (2015) that also supported the mutual relationship between tourism and growth.

Tang (2013) conducted a research using bounds testing approach to analyse the dynamic relationship between real GDP, real exchange rates and real tourism receipts in Malaysia that covered annual sample period from 1974 to 2009. The results showed that there is no Granger causality between real income and real tourism receipts in the short run, whereas there was mutual relationship in the long run. Besides, in order to enhance the robustness of the findings, this study employed ARDL, DOLS and FMOLS to estimate the long run elasticities and the result also showed that there was significant positive relationship between real income effect on real tourism receipts, implying that increase in real income in Malaysia will lead to an increase in tourism receipts in Malaysia.

2.2 Review of Relevant Theoretical Models

There are four different views which examined by past researchers, which consists of Economic-Driven Tourism Growth (EDTG), Tourism-Led Economic Growth (TLEG), mutual relationship between economic growth and tourism, and no causal relationship.

There is a handful of studies that provided evidence of the existence of a unidirectional relationship, known as TLEG hypothesis which is from tourism to the economy or EDTG which is from the economy to tourism. The TLEG hypothesis basically proposed that growth of tourism activities leads economic to grow in positive direction. Shahzad, Shahbaz, Ferrer, and Kumar (2017) and Li, Jin, and Shi (2018) suggested that tourism development promoted the economic growth, which advocated for the TLEG hypothesis. Besides, Tang and Tan (2018) proposed that tourism affect economic growth in a positive and significant way, which support the TLEG hypothesis.

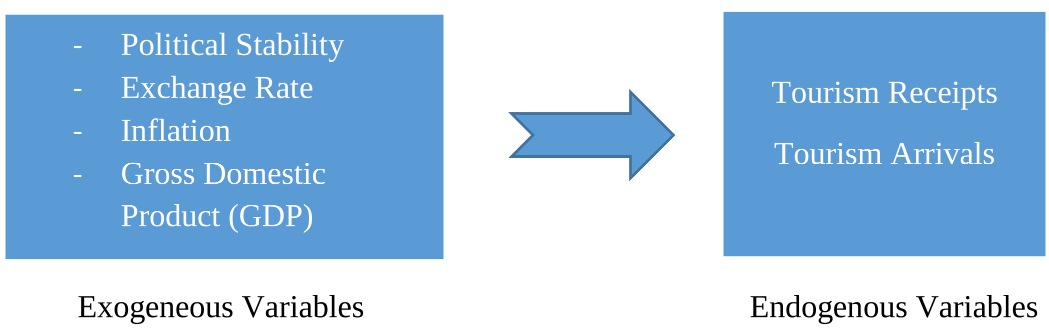
The EDTG hypothesis suggested that the development of economics leads tourism to positively grow. Reason supporting this hypothesis stated the economic growth of a country not only leads tourism facilities to develop, it also brought education sector and safety progresses to have a positive grow, thus caused the positive rise of tourist arrivals (Sokhanvar et al., 2018). Payne and Mervar (2010) revealed one-way direction relationship which support the EDTG hypothesis. Moreover, from the research done by Oh (2005), the results shown that there was an existence of one-way causal relationship of economic-driven tourism growth.

Apart from the unidirectional hypotheses, some scholars also found that the existence of the causal relationship between tourism and the economy growth can be on bilateral character running in both directions (Antonakakis, Dragouni, Eeckels, & Filis, 2015). For instance, the findings of Yazdi et al. (2015) in Iran and Wu et al. (2016) in Taiwan supported to the bidirectional hypothesis, which indicated the mutual relationship across the tourism and economy growth. Based on the past study carried out by Bilen, Yilanci, and Eryüzlü (2017), twelve Mediterranean countries data from year 1995 to 2012 was tested in order to examine the relationship between economic growth and tourism development. The study proved the existence of bidirectional long-run and short-run causality between tourism and economic growth. Furthermore, from the studies done by Odhiambo (2011) concluded that the TLEG hypothesis is only applicable to Tanzania in short run while in long run, it is where the growth-led tourism hypothesis dominated.

However, at the same time, there were few past studies proved neutral (or non-causal) relationship, which can be said as there is no impact between the economic growth and tourism, and vice versa (Sokhanvar et al., 2018). As in the cases of Katircioglu (2009) who tested the TLEG hypothesis, the results shown that in Turkey, there was no cointegration between international tourism and economic. Tang and Jang (2009) in the US also discussed that there was no causal relationship between the economic growth and tourism can be confirmed. In addition, the results from Kasimati (2011) who investigated Greek's economic growth and tourism industry by using Granger Causality Test. The finding showed the absence of relationship between tourism and economic growth. Moreover, Antonakakis et al. (2015) found that the tourism-economic growth relationship is not stable over time as it is very responsive to major economic events.

2.3 Proposed Conceptual Framework

Figure 2.1: Factors Contributing to Tourism Revenue



2.4 Conclusion

Based on the literature reviews, previously there are many studies that focus on the relationship between tourist arrivals and tourism receipts and its determinants in different nations using different approaches. However, the results from the above-mentioned studies were hardly to be consistent with each other. Therefore, we would like to examine the significant relationship between the endogenous variables (tourist arrivals and tourism receipts) and the exogenous variables (inflation, GDP, exchange rate and political stability) in order to throw some light on the inconsistency of the findings from the previous researchers. For the next chapter, we will discuss on the data and methodology for conducting the test.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The time series and cross-sectional data are pooled together to examine relationship between tourism receipts (TR), tourist arrivals (TA) and independent variables such as exchange rate (ER), political stability (PSI), gross domestic product (GDP), and inflation (INF). The balanced data consists of annual data for the variables from ten selected Asia Pacific countries which are Malaysia, Indonesia, Thailand, China, Korea, Japan, Australia, Hong Kong, Macau and New Zealand for the period of year 2002 to year 2016. The secondary data are collected from World Bank (2018) and Global Economy (2018).

The main economic approach we used in this study is cointegration test which is test for the long run relationship between variables. Before the cointegration test, it is compulsory to check the presence of unit roots. We choose Im-Pesaran-Shin (IPS) test and Fisher ADF test to examine the presence of unit roots in panel data. Even though the model contains unit root, but if the stochastic trend moves at the same direction, it will not lead to spurious regression problem. When the stochastic trend moves at the same direction, it will have a genuine relationship and there is a possibility of cointegration between variables. Pedroni cointegration test, Kao test, DOLS and FMOLS are applied to examine the long run relationship among the variables. The Granger Causality test is applied to test the presence of causal relationship between variables.

The hypothesis development, model specification, data collection, data description, analysis method and conclusion will be revealed in this chapter.

3.1 Hypothesis Development

Previous chapter discussed existing theories and relationships between tourist arrivals and tourism receipts as well as the association between exchange rate, political stability, inflation and GDP. It has formed the basis for the hypothesis of this research.

According to chapter two literature review, there is a negative relationship between exchange rate and tourist arrivals and tourism receipts. If the exchange rate of tourism destination country depreciates, the amount of tourism receipts and tourist arrivals will increase. Also, inflation is negatively correlated with tourist arrivals and tourism receipts. This is due to the rising of price level of goods and services in tourism destination will reduce the purchasing power of tourists and tourism revenue. Subsequently, the political stability is positively correlated with tourism receipts and tourist arrivals. The positive relationship reflected that the international tourists tend to visit tourist destinations which can give them a high level of security. Whereas, the relationship between GDP and tourist arrivals and tourism receipts is positive. It indicated that the higher the GDP, the more the number of tourist arrivals and subsequently, tourism receipts increase. The hypotheses of our study are as shown below:

Exchange Rate

- H_0: The relationship between exchange rate and tourism revenue is not significant.
- H_1: The relationship between exchange rate and tourism revenue is significant.

Inflation

- H_0: The relationship between inflation and tourism revenue is not significant.
- H_1: The relationship between inflation and tourism revenue is significant.

Political Stability

- H_0: The relationship between political stability and tourism revenue is not significant.
- H_1: The relationship between political stability and tourism revenue is significant.

GDP

- H_0: The relationship between GDP and tourism revenue is not significant.
- H_1: The relationship between GDP and tourism revenue is significant.

3.2 Model Specification

This study proposed the econometric regressions to examine the long run relationship between tourist arrivals and tourism receipts (dependent variables) and exchange rate, GDP, inflation, and political stability (independent variables). Equation (1) and (2) are economic models while equation (3) and (4) are econometric models. They are formed and specified as below:

$$TA = f\ (ER, GDP, INF, PSI) \quad (1)$$

$$TR = f\ (ER, GDP, INF, PSI) \quad (2)$$

$$TA_{it} = \beta_0 + \beta_1 ER_{it} + \beta_2 GDP_{it} + \beta_3 INF_{it} + \beta_4 PSI_{it} + \varepsilon_{it} \quad (3)$$

$$TR_{it} = \beta_0 + \beta_1 ER_{it} + \beta_2 GDP_{it} + \beta_3 INF_{it} + \beta_4 PSI_{it} + u_{it} \quad (4)$$

where TA represents tourist arrivals, TR refers to tourism receipts, ER is exchange rate, GDP represents gross domestic product, INF refers to inflation, PSI is political stability while ε and u are error terms. β_0 is intercept while β_1, β_2, β_3 and β_4 are parameters to be estimated. For the *it*, *i* represents country and *t* represents time period.

Since all data for the variables are in different measurements such as dollar form, percentage and points, natural logarithmic form is used in all variables for the purpose of reducing the skewness of data and increasing the normality of the distribution in order to make the results become interpretable (Benoit, 2011). The two natural logarithmic form models are as follow:

$$ln\,TA_{it} = \beta_0 + \beta_1\, lnER_{it} + \beta_2\, lnGDP_{it} + \beta_3 lnINF_{it} + \beta_4 lnPSI_{it} + \varepsilon_{it} \quad (5)$$

$$lnTR_{it} = \beta_0 + \beta_1\, lnER_{it} + \beta_2\, lnGDP_{it} + \beta_3\, lnINF_{it} + \beta_4\, lnPSI_{it} + u_{it} \quad (6)$$

where *lnTA* is natural log of tourist arrivals, *lnTR* is natural log of tourism receipts, *lnGDP* refers to natural log of GDP, *lnINF* refers to natural log of inflation, *lnPSI* represents the natural log of political stability while ε and u are regression error term. β_0 is intercept and β_1, β_2, β_3 and β_4 are parameters to be estimated. For the *it*, i represents country and t represents time period.

The equation (5) is determined as Model 1 which tests for the relationship between tourist arrivals and all independent variables while the equation (6) is determined as Model 2 which tests for the relationship between tourism receipts and all independent variables.

3.3 Data Collection

This study has used secondary data to conduct the panel analysis. All the data collected is from the top ten most visited countries in Asia Pacific and the time period for the data is from year 2002 to 2016, accounted for 150 observations. The countries involved Malaysia, Thailand, Indonesia, China, Japan, Australia, New Zealand, Korea Republic, Macau and Hong Kong. Furthermore, this study has taken the tourist arrivals (TA) and tourism receipts (TR) as dependent variables while the exchange rate (ER), gross domestic product (GDP), inflation (INF) and political stability (PSI) are chosen as exogenous variables. The data are retrieved from the reliable databases which are World Development Indicators (WDI) from World Bank (2018) and Global Economy (2018).

Table 3.1: Variables & Source

Variables	**Proxy**	**Indicator Name**	**Unit Measurement**	**Sources**
Tourist Arrivals	Tourist Arrivals	TA	Number of Arrivals	WDI, World Bank
Tourism Receipts	Tourism Receipts	TR	Current US$	WDI, World Bank
Exchange Rate	Exchange Rate	ER	Local Currency Unit (LCU) per US$	WDI, World Bank
Gross Domestic Product (GDP)	GDP per capita	GDP	Current US$	WDI, World Bank
Inflation	Consumer Price Index (CPI) Inflation Rate	INF	Annual % of CPI	WDI, World Bank
Political Stability	Political Stability	PSI	Points	Global Economy

3.4 Data Description

3.4.1 Tourism Receipts

Tourism receipts refers to inbound visitors who spend and make payments on goods and services in the destination country. It is classified as the export of goods and services and the expenditures that associated with inbound visitors are registered as credit in the balance of payment in the country. Previous researches showed that there was a positive relationship between tourism receipts and tourist arrivals. When there is an increase in tourist arrivals, it indicates that there is also an increase in tourism receipts. Based on World Bank (2018), the unit measurement of tourism receipts is in current US$.

3.4.2 Tourist Arrivals

Tourist arrivals refers to the number of tourists visit to other country while holding usual residence but outside their usual environment for a period not exceeding 12 months. When an individual who visits several countries during a given period is counted as a new arrival. The person who make several trips to same country several times a year, it is counted as separate arrival. However, every country has different method of collection for arrivals. In some countries, number of arrivals are limited to arrivals by air while some countries only include number of arrivals where they stayed in hotel. When data on international tourists are incomplete and unavailable, the data will show same-day visitors and crew members.

3.4.3 Exchange Rate

According to Investopedia (2018), exchange rate is the price of a country's currency in terms of another currency. The exchange rate is calculated as annual average based on monthly average. In this research, for Malaysia, the exchange rate is MYR per US$. For example, in year 2017, the exchange rate for Malaysia is RM4.30/US$. Exchange rate is an important factor that affects tourism (Medium, 2016). When US currency strengthened and appreciated over the year, most of the countries' currencies weakened against US dollars. The dollar appreciation has a direct impact on the performance of travel and tourism sectors in the countries which highly rely on visitors from each other countries. When US residents travel to other countries, it is relatively cheaper. However, for citizens who visit to US are relatively expensive.

Inbound international tourism becomes less expensive when there is a devaluation of country's currency and this results in the increasing number of tourist flows. In contrast, when there is an appreciation of country's currency, inbound international tourism becomes more expensive and leads to a reduction in tourist flows (De Vita, 2014). It can be concluded that the exchange rate fluctuation has an enormous impact on the performance of tourism of each country.

3.4.4 Inflation

Inflation occurs when the price of goods and services increasing over time (Investopedia, 2018). Previous studies showed that there was an inverse relationship between inflation and tourist arrivals and tourism receipts. When the price of goods and services increases in tourist destination, it will reduce the purchasing power of tourists. Thus, the high cost of travelling may lead to a reduction in the attractiveness to the tourists. Consequently, inflation in tourist destination will reduce the tourist arrivals. As the cost of travelling increases, the tourism demand drops.

3.4.5 Political Stability

Political stability represents the level of securities in a country. Political stability is chosen as an indicator for our study because it has a significant relationship with tourism. Tourism is vulnerable to external shocks such as terrorism and political instability because it is a sector where spending is based on faith and trust (Mansfeld & Pizam, 2006). Normally, tourists try to keep away from risky tourism destination country. Political stability directly affects the decision of tourists. Tourists may substitute the destination country if they feel unsafe in that country. Fewer tourist arrivals will lead to the losses of tourism receipts as well as tourism revenue.

3.4.6 Gross Domestic Product (GDP)

GDP is the value of all final goods and services in a country in a particular period. Generally, GDP is used to measure economic health of a country and determine whether the economy of a country is expanding or contracting. GDP is chosen as an indicator for this study as it has significant impact to the tourist arrivals and tourism receipts. As mentioned in chapter 2, the expansion of economy growth of a country positively influenced the number of tourist arrivals of the country. However, it is also possible that there is a negative relationship between GDP and tourist arrivals and tourism receipt. The relationship between GDP and tourist arrivals is positive and significant if the results show the positive sign of GDP coefficient.

3.5 Expected Sign of Variables

In this research, two models were developed which included the relevant variables to examine how these variables will affect the tourism. The independent variables that have been used in research are GDP, political stability, inflation, and exchange rate. Whereas tourism receipts and tourist arrivals have been used as dependent variables. Model 1 and Model 2 can refer to the equation (5) and (6) where both independent variables are same but Model 1 is to estimate tourist arrivals while Model 2 is to test tourism receipts.

Based on this study, exchange rate is an important factor which can affect the tourism receipts and tourist arrivals. The expected relationship between exchange rate and tourism revenue is negative. Negative relationship in a sense that depreciation in exchange rate will help to increase the number of tourist arrivals. This is because when exchange rate depreciates in value, the price of goods and services will be cheaper and eventually attract the tourists to spend in the destination country (Kosnan, Ismail & Kapiappan, 2013).

The expected sign for inflation is negative. Previous studies showed there was a significant and negative relationship between inflation and tourist arrivals. When inflation increases, the price of goods and services will rise and result in a reduction in purchasing power of tourists and tourism revenue. Besides, the rising in price of goods and services will also cut down the tourist arrivals significantly (Demir & Gozgor, 2018). This is because the relative domestic prices reduce the interests of tourists visiting the tourism destination country. In contrast, the decreasing price of goods and services will help to boost up the tourist arrivals. By referring to the past studies, it showed that tourism revenue was negatively affected by inflation.

On the contrary, the expected relationship between tourism and political stability is positive. It indicated that the increasing in political stability leads to a rise in tourism receipts. The positive sign of political stability represents that visitors preferred to pay a visit to tourism destination country which provide securities. Also, there are past studies suggested that there was high significant positive relationship between terrorism and tourism receipts in the region. Despite of that, an increase in terrorism can increase the tourism receipts where the country's relative market shares increased because tourists will substitute away from high-risk areas towards low-risk areas (Mushtaq & Zaman, 2014). However, countries that came across high level of political risks will experience significant reductions in their tourism businesses.

Furthermore, GDP is the basic determinants of tourism receipts and tourist arrivals. The expected sign between GDP and tourism revenue is positive. The positive relationship reflects that the expansion of economy in a country will lead to a rise in the number of tourist arrivals. The higher the GDP per capita, the more the number of tourist arrivals and subsequently, tourism receipts increases (Zidana, 2015). Most of the previous studies stated there was significant and positive relationship between GDP and tourism revenue. However, past researchers also suggested that the level of income will influence the tourist arrivals either negatively or positively. It depends on the type of tourism goods. When the level of income is negatively affecting tourist arrivals, for instance from Sweden to Malaysia, the tourists view Malaysia as inferior place to visit. It indicates that tourists from Sweden prefer to pay a visit to a luxury tourist destination country when their incomes are high.

3.6 Analysis Method

3.6.1 Panel Unit Root Test

The panel empirical analysis always starts with the panel unit root test in order to test its stationarity. If the series is not stationary, it will cause spurious regression problem which means the result is meaningless although there are high significant t-ratios and high R^2.

Two types of panel unit root test are used in this study which are Im-Pesaran-Shin (2003) test and Fisher Augmented Dickey-Fuller (ADF) test that proposed by Maddala & Wu (1999). The null hypothesis for both tests is each series has unit root (non-stationary) while the alternative hypothesis for both tests is each series does not have unit root (stationary).

The IPS test is a way that combined the evidence on the unit root hypothesis from the individual unit root tests performed on the individual series. Hence, the null hypothesis for IPS requires all individual to have unit root while the alternative hypothesis allows some individual series to have unit root. The model of IPS is stated below:

$$Y_{it} = \alpha_i + \rho_i y_{it-1} + \varepsilon_{it} \qquad (7)$$

where i = 1, 2, …, *N*; t = 1, 2, …, *T*.

IPS takes consideration of the means of ADF statistics computed for each individual series in panel when the error term ε_{it} in equation (7) is serial correlated, possibly with different serial correlation patterns across individual series with sufficiently large *T* and *N*. Therefore, the IPS had used the ADF regression as the first step:

$$\Delta Y_{it} = \alpha y_{it-1} + \sum_{k=1}^{pi} \beta_{ik} \Delta y_{it-k} + \gamma_{it} \delta + \varepsilon_{it} \qquad (8)$$

where i = 1, 2, …, *N*; t = 1, 2, …, *T*.

Secondly, IPS provided critical values across different number of cross-sectional series and time series, and for the equations either with intercept or intercept and linear trend or none of them in order to compare with the average t-statistics. Then, IPS tests the average t-statistics for the individual ADF regression by using the formula below:

$$\bar{t} = \frac{1}{N}\left(\sum_{i=1}^{N} t_{iT}\,(\mathrm{p}_i)\right) \qquad (9)$$

where N = number of cross-sectional units; IPS assumed that t_{iT} are i.i.d. and have finite mean and variance.

Fisher ADF test combined p-values of the test-statistics for a unit root in each cross-sectional unit, *i*. According to Choi (as cited in Barbieri, 2006), although Fisher ADF test and IPS test combined information based on individual unit root tests, the assumptions of Fisher ADF are more general such as infinite number of groups are required and assumed all groups have same non-stochastic trend. Fisher (as cited in Maddala & Wu, 1999) had recommended a test of χ^2(2N) where $T_i \rightarrow \infty$ for all N (number of cross-sectional unit). The proposed Fisher test is as shown below:

$$\mathrm{P} = -2\sum_{i=1}^{N} ln\, p_i \qquad (10)$$

A Z test was then proposed by Choi (as cited in Barbieri, 2006) to overcome the limitation of large N:

$$\mathrm{Z} = \frac{1}{2\sqrt{N}}\sum_{i=1}^{N}(-2\, ln\, p_i - 2) \qquad (11)$$

The advantages of this test are the unbalanced panel data can be estimated, any unit root tests derived can be carried out and different lag lengths in individual ADF regression are allowed to use. However, the disadvantage is Monte Carlo simulation has to derive the p-values.

3.6.2 Panel Co-integration Test

Co-integration was first introduced by Engle & Granger (1987) to examine the long run equilibrium relationships among non-stationary variables if they are I (1). In this study, Pedroni (1999; 2004) and Kao (1999) tests had been used to conduct the research in order to determine the existence of co-integration relationship and to examine the spurious regression problem at I (1). However, if the variables are integrated at I (0), it can be said that the variables are all co-integrated.

Four panel statistics and three group panel statistics had proposed by Pedroni (1999) for conducting the hypothesis testing with the null hypothesis where there is no co-integration while the alternative hypothesis is there is co-integration. The parameters are allowed to be same across cross-sectional series under panel statistics while the parameters are allowed to vary over the cross-sectional series under group panel statistics. Furthermore, the tests are divided into within the dimensions or between the dimensions.

Pedroni test considered the regression as below by taking the intercepts and trend across cross-sections into account:

$$y_{it} = \alpha_i + \delta_i t + \beta_{1i} x_{2i,t} + \cdots + \beta_{Mi} x_{Mi,t} + \varepsilon_{i,t} \quad (12)$$

where i = 1, 2, …, N over time periods; t = 1, 2, …, T; m = 1, 2, …, M; y_{it}, x_{it} and $\varepsilon_{i,t}$ are assumed to be I (1); α_i and δ_i are the individual and deterministic trend effects and may be set as zero in case needed.

Kao test followed the basic approach as Pedroni test but the cross sections specific intercept and coefficients had been specified in the first stage of regressors. So, the bivariate regression is described as below:

$$Y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \qquad (13)$$

For

$$Y_{it} = Y_{it-1} + \mu_{it} \qquad (14)$$

$$x_{it} = x_{it-1} + \gamma_{it} \qquad (15)$$

where i = 1, 2, …, *N* over time periods; t = 1, 2, …, *T*.

Next, Kao considered to run pooled auxiliary regression or the augmented pooled specification for each cross section. The pooled auxiliary regression is stated in equation (16) while the augmented pooled specification is stated in equation (17).

$$\varepsilon_{it} = p_i \varepsilon_{it-1} + \gamma_{it} \qquad (16)$$

$$\varepsilon_{it} = p_i \varepsilon_{it-1} + \sum_{j=1}^{Pi} \varphi ij \, \Delta\varepsilon_{it-j} + v_{it} \qquad (17)$$

3.6.3 Panel Dynamic Ordinary Least Square (DOLS)

According to Kao and Chiang (2000), DOLS is superior to OLS and FMOLS estimators as the test had considered the endogeneity problem and serial correlation by adding the lags and leads. Moreover, DOLS requires no initial estimation and no non-parametric correction compared to FMOLS. Thus, pooled DOLS is developed and described in which OLS is used to estimate the augmented cointegrating regression:

$$y_{it} = \propto_i + \beta X_{it} + \sum_{j=-q}^{q} \Delta X_{it+k} \delta_i + \mu_{it} \qquad (18)$$

where y_{it} and X_{it} are the data that had eliminated the individual deterministic trends. The short run dynamics coefficients δ_i are allowed to be cross section specific and Q_{it} to be the regressors that are formed by interacting the ΔX_{it+k} terms with cross section dummy variables.

3.6.4 Panel Fully Modified Ordinary Least Square (FMOLS)

Unlike DOLS, FMOLS is unable to improve the OLS estimator problem. However, Saikkonen, and Stock and Watson (as cited in Kao & Chiang, 2000) recommended that FMOLS and DOLS are more promising in estimating the cointegrated panel regression. This is because FMOLS has a same function with DOLS which is to eliminate the endogeneity problem and serial correlation by adding lags and leads. The FMOLS estimators can be written as follow:

$$\hat{\beta}_{FM} = [\sum_{i=1}^{N} \sum_{t=1}^{T} (x_{it} - \bar{x}_i)(x_{it} - \bar{x}_i)']^{-1} [\sum_{i=1}^{N} (\sum_{t=1}^{T} (x_{it} - x_i) \hat{y}_{it}^{+} - T\hat{\Delta}_{\varepsilon u}^{+})] \qquad (19)$$

where $\hat{y}_{it}^{+}$ is the modified y_{it} after the endogeneity correction while $\hat{\Delta}_{\varepsilon u}^{+}$ is the serial correlation correction term.

3.6.5 Panel Dumitrescu-Hurlin Granger Causality Test

Granger causality test is used to detect the causal effect between variables by stating there is no causality effect as H_0 and there is a causality effect as H_1. Dumitrescu and Hurlin (2012) proposed a test to detect the causality for the panel data and the regression is as follow:

$$y_{it} = \propto_i + \sum_{k=1}^{K} \beta_{ik}\, y_{i,t-k} + \sum_{k=1}^{K} \gamma_{ik}\, x_{i,t-k} + \mu_{it} \qquad (20)$$

where i = 1, 2, …, *N*; t = 1, 2, …, *T*; $x_{i,t}$ and $y_{i,t}$ are the observations of two stationary variables for individual *i* in period *t*; lag order K is assumed to be identical for all individuals in balanced panel data.

The next step is to run the *N* individual regressions implicitly enclosed in equation (20) and perform F-test to estimate the $\overline{W}$:

$$\overline{W} = \frac{1}{N}\sum_{i=1}^{K} W_{i,T} \qquad (21)$$

where $W_{i,T}$ denotes the individual Wald statistics for the *i*-th cross-section unit corresponding to the individual test H_0: $\beta_i = 0$.

Granger causality test can be applied in balanced data and also in unbalanced data where this is its major advantage.

3.7 Conclusion

From this chapter, a better understanding of the concept is obtained for this study which starts off with the theoretical framework and ended with the methodologies which will be carried out in the next chapter. The methodologies involved are panel unit root tests, panel co-integration tests, panel DOLS, panel FMOLS and panel Dumitrescu-Hurlin Granger causality test where the empirical result will be presented and discussed in the next chapter.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In Chapter 3, several panel data approaches are discussed. These approaches are employed to estimate the panel regression model and all the empirical results will be reported in this chapter. The EViews 10.0 is used to perform the econometric and statistical analysis. First of all, descriptive analysis is run to ensure no missing data among the top ten most visited Asia Pacific countries. Panel unit root tests are conducted to check the presence of unit roots among the variables to ensure that there is no spurious regression problem. Moreover, panel co-integration tests are used to examine the long run relationship among the variables. Lastly, panel Dumitrescu-Hurlin Granger Causality test is used to detect the causal effect between variables.

4.1 Results and interpretations

4.1.1 Descriptive Statistics

Table 4.1: Summary Result of Descriptive Statistics for All Variables

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
TA	150	16.21188	0.840196	14.52157	17.89761
TR	150	23.49583	0.684642	21.87352	24.68341
ER	150	3.805798	2.366210	1.786043	9.502593
GDP	150	9.578109	1.175615	6.864619	11.45110
INF	150	2.586155	0.235251	1.524969	3.162771
PSI	150	1.657826	0.179595	1.068153	1.876407

Note: TA stands for Tourist Arrivals in number, TR stands for Tourism Receipts in current USD, ER stands for Exchange Rate, GDP stands for Gross Domestic Products, INF stands for Inflation and PSI stands for Political Stability.

This study is based on the annual data for top ten most visited Asia Pacific countries: Malaysia, Indonesia, Thailand, China, Korea, Japan, Australia, Hong Kong, Macau and New Zealand. All variables are obtained from the WDI and Global Economy. Table 4.1 shows the average value which is also known as mean and standard deviation is used to measure how far the observations are from the sample average, maximum, and minimum values among the 10 countries. The means of TA is 16.21, TR is 23.49, ER is 3.81, GDP is 9.58, INF is 2.59 and PSI is 1.66. Standard deviation in PSI is 0.18, followed by INF (0.24), TR (0.68), TA (0.84), GDP (1.18) and ER (2.36).

4.1.2 Panel Unit Root Test

<u>Table 4.2: Summary Result of Panel Unit Root Test</u>

	IPS		FISHER ADF	
	Level (Trend & Intercept)	**1st difference (Intercept)**	**Level (Trend & Intercept)**	**1st difference (Intercept)**
TA	1.14359 (0.8736) (0)	-9.86293*** (0.0000) (0)	17.3975 (0.6270) (0)	109.682*** (0.0000) (0)
TR	1.56571 (0.9413) (1)	-7.79670*** (0.0000) (0)	12.7841 (0.8865) (1)	88.2508 *** (0.0000) (0)
ER	1.72458 (0.9577) (2)	-4.16367*** (0.0000) (0)	13.0235 (0.8764) (2)	58.4426 *** (0.0000) (1)
GDP	3.86568 (0.9999) (0)	-3.51480*** (0.0002) (0)	10.1590 (0.9652) (0)	45.1425 *** (0.0011) (0)
INF	-0.26762 (0.3945) (3)	-12.6963*** (0.0000) (0)	15.6750 (0.7366) (3)	137.593*** (0.0000) (0)
PSI	0.77228 (0.7800) (3)	-11.0310*** (0.0000) (0)	9.44163 (0.9772) (3)	120.543*** (0.0000) (0)

Note: IPS and Fisher ADF represents the Im et al. (2003) and Maddala and Wu (1999) for panel unit root tests. *** indicates rejection of the null hypothesis of no-cointegration at 1% of significance level. The figure without bracket is the test statistic value and follow by the bracket is probability value, while the subsequent brackets shows the lag length.

Table 4.2 summarizes the result of the two major panel unit root tests for the series of TA, TR, ER, GDP, INF and PSI variables. The results of the IPS panel unit root test in the level indicate that all variables are not stationary. These results clearly show that the null hypothesis of the panel unit root in the level of the series is not rejected at various lag length since all the p-value are more than 0.01, 0.05 and 0.1. Therefore, IPS test for first difference is conducted and the results show that the null hypothesis is rejected, suggesting that the series is stationary at 1%, 5% and 10% significance level. The results of the panel data for Fisher ADF test in the level suggest that the null hypothesis that all panels contain a unit root is not rejected. This indicates that all variables are not stationary in the level. Hence, Fisher ADF test for first difference of the series is carried out and the results show that the null hypothesis is rejected, proposing that the series is stationary in the first difference at 1%, 5% and 10% significance level.

In conclusion, both results of the panel unit root tests give the similar results, showing that the variables are non-stationary in the level, but stationary in the first difference. Since the panel regression model are stationary, then can proceed to next step which is to test for panel co-integration to examine the long run relationship among the variables.

4.1.3 Panel Co-integration Test

There are two models in this research. Model 1 is test for tourist arrivals while Model 2 is test for tourism receipts. Model 1 and Model 2 can refer to the equation (5) and (6) in Chapter 3.

Table 4.3: Summary Result of Panel Co-integration Test for Model 1

A) Pedroni	
Panel co-integration statistics (within dimension)	
Panel v-statistic	-2.266160 (0.9883)
Panel rho-statistic	1.265030 (0.8971)
Panel PP-statistic	-3.772588*** (0.0001)
Panel ADF-statistic	-3.821622*** (0.0001)
Group mean panel co-integration statistics (between-dimension)	
Group rho-statistic	2.112044 (0.9827)
Group PP-statistic	-5.169066*** (0.0000)
Group ADF-statistic	-4.482613*** (0.0000)
B) Kao	
ADF	3.060966*** (0.0011)

Note: Both tests indicated that the null hypothesis of no co-integration for the variables. *, ** and *** represented that reject null hypothesis at 10%, 5% and 1% significant level respectively. The figure without bracket is the test statistic value and with bracket represented probability value. The lag length is selected automatically based on SIC.

Table 4.4: Summary Result of Panel Co-integration Test for Model 2

A) Pedroni	
Panel co-integration statistics (within dimension)	
Panel v-statistic	-1.396280 (0.9187)
Panel rho-statistic	1.408913 (0.9206)
Panel PP-statistic	-1.599328* (0.0549)
Panel ADF-statistic	-6.120122*** (0.0000)
Group mean panel co-integration statistics (between-dimension)	
Group rho-statistic	2.743495 (0.9970)
Group PP-statistic	-2.483231*** (0.0065)
Group ADF-statistic	-52.31751*** (0.0000)
B) Kao	
ADF	-2.312118** (0.0104)

Note: Both tests indicated that the null hypothesis of no co-integration for the variables. *, ** and *** represented that reject null hypothesis at 10%, 5% and 1% significant level respectively. The figure without bracket is the test statistic value and with bracket represented probability value. The lag length is selected automatically based on SIC.

According to Stephanie (2016), co-integration concept can be determined as a systematic and long-term identical movement between two or more economics variables. From the Pedroni tests as reported in Table 4.3, there are four out of seven statistics rejecting the null hypothesis of no co-integration at one percent level of significance. However, from the Pedroni tests as reported in Table 4.4, there are three out of seven statistics rejecting the null hypothesis of no co-integration at one percent level of significance and one out of seven statistics rejecting the null hypothesis of no co-integration at ten percent level of significance. This indicates that all the variables are co-integrated and long run relationship does exist with each other in multi country panel.

On the other hand, based on the results from Kao tests reported in Table 4.3 and Table 4.4 also show a sufficient evidence to conclude that that all variables are co-integrated at one percent and five percent level of significance respectively.

In a nutshell, there exists a strong evidence to show that there is long-run co-integration relationship in two models between the variables in top ten most visited Asia Pacific countries.

4.1.4 Panel Long Run Estimates Test

Table 4.5: Summary Result of Panel Long Run Estimates Test for Model 1

Long-run estimates:				
	DOLS		FMOLS	
	Coefficient	Probability	Coefficient	Probability
lnER	1.069502***	0.0000	0.913095***	0.0000
lnGDP	0.565819***	0.0000	0.636893***	0.0000
lnINF	-0.384154***	0.0005	0.281980***	0.0000
lnPSI	-0.794939***	0.0000	-0.598400***	0.0000

Note: DOLS represents the panel dynamic ordinary least squares method while FMOLS represents fully modified ordinary least squares method. Both approaches are used for estimating and testing hypotheses about a cointegrating vector to panel data. *, ** and *** represented that reject null hypothesis at 10%, 5% and 1% significant level respectively.

Table 4.6: Summary Result of Panel Long Run Estimates Test for Model 2

Long-run estimates:				
	DOLS		**FMOLS**	
	Coefficient	**Probability**	**Coefficient**	**Probability**
lnER	1.248200***	0.0026	1.087499***	0.0000
lnGDP	1.014752***	0.0000	1.105060***	0.0000
lnINF	0.533708**	0.0384	0.589724***	0.0000
lnPSI	-1.379884***	0.0083	-1.212299***	0.0000

Note: DOLS represents the panel dynamic ordinary least squares method while FMOLS represents fully modified ordinary least square method. Both approaches are used for estimating and testing hypotheses about a cointegrating vector to panel data. *, ** and *** represented that reject null hypothesis at 10%, 5% and 1% significant level respectively.

Table 4.5 and table 4.6 show the results of DOLS and FMOLS method under panel long run estimates tests for Model 1 and Model 2. DOLS and FMOLS are applied to test the long run relationship among the variables. According to Kao and Chiang (2000), DOLS and FMOLS have a similar functionality which is used to eliminate the endogeneity problem by adding the lags and leads.

Based on the result of DOLS in table 4.5, it can be found that there is a positive relationship between exchange rate and tourist arrivals, and GDP and tourist arrivals at one percent significant levels. This means that one percent increase in exchange rate and GDP will lead to an increase of tourist arrivals to 106.95 percent and 56.58 percent respectively in long run. However, there is a negative relationship between inflation and tourist arrivals, and political stability and tourist arrivals at one percent significant level. This means that one percent increase in inflation and political stability will lead to 38 percent and 79.49 percent decrease of tourist arrivals at one percent significant level in long run.

DOLS equation based on the Table 4.5 can be written as:

$$\ln(TA) = 1.06950\ lnEX + 0.5658\ In\ GDP - 0.3841 \ln Inf - 0.7949\ lnPSI \quad (22)$$

From the result of FMOLS in table 4.5, it is implied that there is a positive relationship between exchange rate and tourist arrivals, GDP and tourist arrivals, and inflation and tourist arrivals. This means that one percent increase in exchange rate, GDP and inflation will lead to an increase of tourist arrivals to 91.31 percent, 63.68 percent and 28.2 percent respectively in long run. On the contrary, there is a negative relationship between political stability and tourist arrivals. This means that one percent increase in political stability will lead to a decrease of 59.84 percent in tourist arrivals at one percent significant level in long run.

FMOLS equation based on the Table 4.5 can be written as:

$$\ln(TA) = 0.9131\ lnEX + 0.6369\ In\ GDP + 0.2820 \ln Inf - 0.5984\ lnPSI \quad (23)$$

Based on the result of DOLS in table 4.6, it can be found that there is a positive relationship between exchange rate and tourism receipts, and GDP and tourism receipts at one percent significant level. Inflation has a positive relationship with tourism receipts at five percent significant level. This means that one percent increase in exchange rate, GDP and inflation will lead to an increase of tourism receipts to 124.82 percent, 101.48 percent, and 53.3 percent respectively in long run. On the other hand, there is a negative relationship between political stability and tourism receipts at one percent significant level. This means that one percent increase in political stability will lead to a decrease of 137.99 percent in tourism receipts at one percent significant level in long run.

DOLS equation based on the Table 4.6 can be written as:

$$\ln(TR) = 1.2482 lnEX + 1.0148\ In\ GDP + 0.5337 \ln Inf - 1.3799\ lnPSI \quad (24)$$

Based on the result of FMOLS in table 4.6, it can be found that there is a positive relationship between exchange rate and tourism receipts, GDP and tourism receipts, and inflation and tourism receipts at one percent significant level. This means that one percent increase in exchange rate, GDP and inflation will lead to an increase of tourism receipts to 108.75 percent, 110.51 percent, and 58.97 percent respectively in long run. Besides, there is a negative relationship between political stability and tourism receipts at one percent significant level. This means that one percent increase in political stability will lead to a decrease of 121.22 percent in tourism receipts at one percent significant level in long run.

FMOLS equation based on the Table 4.6 can be written as:

$$\ln(TR) = 1.0850 lnEX + 1.1051\ In\ GDP + 0.5897 \ln Inf - 1.2122\ lnPSI \quad (25)$$

Based on the Table 4.5 and Table 4.6, it can be found that only GDP is matched with the expected sign while other variables are varied. The positive relationship between GDP and tourist arrivals are supported by Chulaphan and Barahona (2017). They made a research by using Thailand's Industrial Production Index (IPI) and international tourist arrivals per continent (Tr) from January 2008 to November 2015. The result showed that number of tourist arrivals was led by economic growth of Thailand.

For the variables that are varied, it can be supported by journals. Yi (2015) stated there was a positive relationship between tourist arrivals and exchange rate. A devaluation of currency of a country will reduce the tourist arrivals and thus reduce the tourism revenue. The economy of a country is the reason that affected the number of tourist arrivals, tourists will more prefer to travel to the country that consisted a good infrastructure. According to Zidana (2015), there was a positive relationship between exchange rate and tourism receipts. Factors affected tourism only in short run, people will continue to travel regardless the exchange rate in long run. Both evidences have shown the decline in tourism revenue when there is an increase in exchange rate.

Moreover, inflation has an indirect positive relationship to the tourism revenue. Shaari et al. (2017) stated that an increasing of money supply and government spending in infrastructure will lead to inflation. Infrastructure such as transportation services, public safety, and financial system can boost the demand of tourist arrivals as well as the tourism revenue. There is a negative relationship between political stability and tourism revenue. The tourism revenue will increase when there is a decline in political stability. This is because the journalists, researchers and human rights activists will visit to those countries which politically instable in order to complete their tasks. The recovery period of the countries which politically instable will be shorter than previous because they will end the war quickly to prevent more people sacrificed and this will eventually increase the tourism revenue.

In conclusion, the results of DOLS and FMOLS show the significant long run relationship among the variables with the tourism revenue in the top ten most visited Asia Pacific.

4.1.5 Panel Dumitrescu-Hurlin Granger Causality Test

Table 4.7: Summary Result of Dumitrescu-Hurlin Granger Causality Test for Model 1

Null hypothesis	Probability	Conclusion
ER does not homogeneously cause TA TA does not homogeneously cause ER	0.0618* 0.2475	ER → TA
INF does not homogeneously cause TA TA does not homogeneously cause INF	0.0017*** 0.0160**	INF ↔ TA
PSI does not homogeneously cause TA TA does not homogeneously cause PS	0.0041*** 0.0246**	PSI ↔ TA
GDP does not homogeneously cause ER ER does not homogeneously cause GDP	0.0104** 1.E-06***	GDP ↔ ER
INF does not homogeneously cause ER ER does not homogeneously cause INF	0.0261** 0.3876	INF → ER
INF does not homogeneously cause GDP GDP does not homogeneously cause INF	0.0001*** 0.0344**	INF ↔ GDP

Note: *, ** and *** denote rejection of null hypothesis at 10%, 5% and 1% respectively. The optimal lag length is 2. A→B denotes the causality running from variable A to variable B; A↔B denotes bidirectional causality between variable A and variable B.

Table 4.8: Summary Result of Dumitrescu-Hurlin Granger Causality Test for Model 2

Null hypothesis	Probability	Conclusion
ER does not homogeneously cause TR TR does not homogeneously cause ER	0.1414 5.E-05***	TR → ER
INF does not homogeneously cause TR TR does not homogeneously cause INF	0.6742 0.0021***	TR → INF
PSI does not homogeneously cause TR TR does not homogeneously cause PS	0.0826* 0.0169**	PSI ↔ TR
GDP does not homogeneously cause ER ER does not homogeneously cause GDP	0.0104** 1.E-06***	GDP ↔ ER
INF does not homogeneously cause ER ER does not homogeneously cause INF	0.0261** 0.3876	INF → ER
INF does not homogeneously cause GDP GDP does not homogeneously cause INF	0.0001*** 0.0344**	INF ↔ GDP

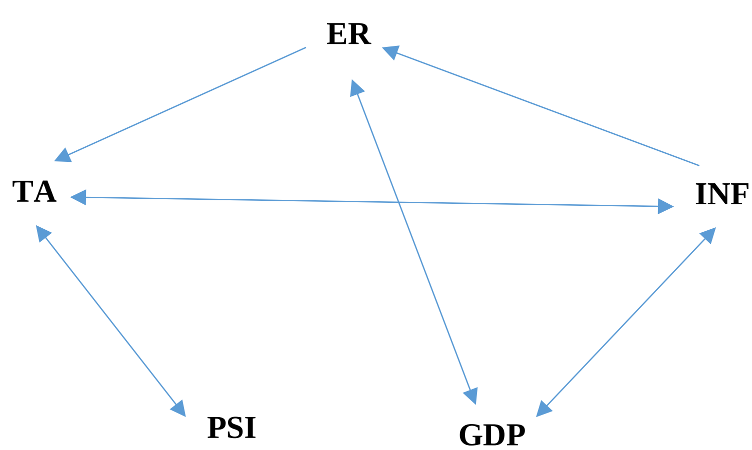
Note: *, ** and *** denote rejection of null hypothesis at 10%, 5% and 1% respectively. The optimal lag length is 2. A→B denotes the causality running from variable A to variable B; A↔ B denotes bidirectional causality between variable A and variable B.

Table 4.7 synopsizes the findings of the test as regards to Dumitrescu-Hurlin Granger Causality between tourist arrivals (TA), and ER, INF, PSI and GDP in top 10 most visited Asia Pacific countries while Table 4.8 summarizes the findings of the test as regards to Dumitrescu-Hurlin Granger Causality between tourism receipts (TR) and ER, INF, PSI and GDP in top 10 most visited Asia Pacific countries. The results in Table 4.7 and Table 4.8 represent the unidirectional and bidirectional relationship between the panel data of all variables.

According to Table 4.7, there is a unidirectional causality running from ER to TA, the result shows that ER has positive impact on TA significantly. Besides, there is also unidirectional causality running from INF to ER. Furthermore, there are four bidirectional causalities between INF and TA, PSI and TA, GDP and ER, as well as INF and GDP.

As shown in Table 4.8, it can be concluded that there are three bidirectional causalities between political stability and tourism receipts, GDP and exchange rate, as well as inflation and GDP. However, unidirectional causalities are found from tourism receipts to exchange rate, tourism receipts to inflation, and lastly from inflation to exchange rate.

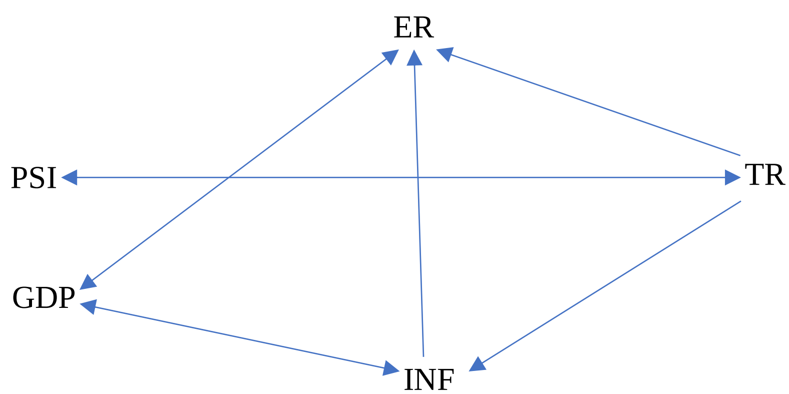
Figure 4.1: Direction of Causality for Model 1



Note: A→B indicates that changes in A contain leading information for changes in B. A↔ B indicates that changes in A contain leading information for changes in B and vice versa.

Figure 4.1 shows the graphical illustration of causality linkages summarized from the Dumitrescu-Hurlin Granger Causality test results in Table 4.7. Based on the casual relationship as shown in Figure 4.1, the unidirectional causality between exchange rate and tourist arrivals represents that exchange rate will bring effect in short run. There is a bidirectional causality between inflation and tourist arrivals reflected that both variables will bring effect in short run. In addition, GDP has bidirectional causal relationship with exchange rate and inflation. It represents that both variables will bring effect in short run. Furthermore, there is a unidirectional causal relationship between inflation and exchange rate. Also, bidirectional causal relationship exists between tourist arrivals and political stability.

Figure 4.2: Direction of Causality for Model 2



Note: A→B indicates that changes in A contain leading information for changes in B. A↔ B indicates that changes in A contain leading information for changes in B and vice versa.

Figure 4.2 shows the graphical illustration of causality linkages summarized from the Dumitrescu-Hurlin Granger Causality test result in Table 4.8. The bidirectional causality between political stability and tourism receipts reflects that both variables will bring effect in short run. Moreover, there is unidirectional causality from tourism receipts to exchange rate and this is supported by Martins et al. (2017) which explained the negative causal relationship between tourism revenue and exchange rate. The unidirectional causality from tourism receipts to exchange rate and inflation show that the exchange rate and the inflation will bring effect in short run. However, GDP does not have any effect in short run and this is supported by Tang (2013) with no Granger causality between real tourism receipts and real income in the short run.

Overall, exchange rate, inflation and political stability have causality relationship with tourism revenue. However, GDP does not have causality relationship with tourism revenue and this result is consistent with Katircioglu (2009), Sokhanvar et al. (2018), Kasimati (2011) and Antonakakis et al. (2015).

4.2 Conclusion

In a nutshell, the empirical results have clearly shown the relationship between the independent variables and tourism revenue through the five tests which cover the panel version of unit root test, co-integration test, DOLS test, FMOLS test and Dumitrescu-Hurlin Granger causality test in this chapter. In chapter 5, the results will be summarized and the major findings of the paper, policy implications, limitations, and recommendation of the study will be discussed.

Chapter 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.0 Introduction

In this chapter, it focuses on the statistical analyses and also a clear discussion on the major findings. Moreover, this chapter will also discuss the implication of study which is important to policy maker. The problems that we have encountered during the research progress are discussed in limitations of the study. Lastly, recommendations for the future researchers will be provided in the last part of this chapter.

5.1 Summary of Statistical Analysis

The purpose of this research is to study the relationship between the tourism revenue, which is Tourist Arrivals (TA) and Tourism Receipts (TR) with the independent variables which includes Exchange Rate (ER), GDP, Inflation (INF) and Political Stability (PSI). There are 10 top visited Asia Pacific countries used for this research, with all tourism revenue that generated for the period of 2002 to 2016.

The first test conducted is the panel unit root tests for all the variables. Most analyses begin with this test in order to examine whether the stationarity of the variables. The inaccurate results will show if the series is not stationary. Based on the results obtained, the variables are not static in the level form, however they are stationary during the first difference test. The test results show that all variables have rejected the null hypothesis at integration of order (0).

After making sure that all variables are in stationary form, it allows to continue with the panel co-integration approach. If there is an existence of co-integration, it means the systematic and long-run co-movement relationships exist in non-stationary variables. Pedroni and Kao tests are carried out in order to examine the existence of co-integrating relationships in the long run. The Pedroni test suggests that there is co-integration among all variables and a long run linkage among each variable. For the Kao test, it states that there is co-integration at 1% and 5% significance level, strengthening the conclusion that co-integration is exists between the variables.

Once it is cleared with co-integration test, the panel long run estimates test is run by using DOLS and FMOLS approaches. The DOLS and FMOLS enhance the panel co-integration regression with specific lags and leads to remove serial correlation and endogeneity. Based on the results gained in DOLS of this study, exchange rate and GDP show positive relationship towards tourist arrivals at 1% significant levels (1% increase in exchange rate and GDP leads to 106.95% and 56.58% rise in tourist arrivals). However, political stability and inflation prove that the negative relationship towards tourist arrivals at the same significant level (1% rise in political stability and inflation leads to 79.49% and 38% increase in tourist arrivals). For tourism receipts, exchange rate and GDP show positive relationship at 1% significant level and inflation show same positive relationship at 5% significant level (1% increase in exchange rate, GDP and inflation 124.82%, 101.48% and 53.3% leads to rise in tourism receipts). The political stability states a negative relationship towards tourism receipts (1% increase in political stability leads to 137.99% drop in tourism receipts).

In FMOLS, positive relationship occurs between exchange rate, GDP and inflation towards tourist arrivals (1% increase in exchange rate, GDP and inflation leads to 91.31%, 63.68% and 28.2% rise in tourist arrivals). Besides, it shows negative relationship between political stability and tourist arrivals at 1% significant level (1% drop in political stability leads to 59.84% drop in tourist arrivals). In the part of tourism receipts, exchange rate, GDP and inflation also show positive relationship with tourism receipts (1% increase in exchange rate, GDP and inflation lead to 108.75%, 110.51% and 58.97% rise in tourism receipts). Negative relationship is shown between political stability and tourism receipts at 1% significant level in long run (1% decrease in political stability leads to 121.22% drop in tourism receipts). Based on the results obtained, it can be implied that the null hypothesis of having no co-integration is rejected, proving that there are long run co-integrated relationships among variables.

The final test performed is the Dumitrescu-Hurlin Granger Causality test. This approach is important to examine the causal effect between variables, whether they are unidirectional or bidirectional. From the test results, unidirectional causalities running from exchange rate to tourist arrivals and inflation to exchange rate while there are four bidirectional causalities between inflation and tourist arrivals, political stability and tourist arrivals, GDP and exchange rate, as well as inflation and GDP. Furthermore, there are three bidirectional causalities which are political stability and tourism receipts, GDP and exchange rate, and inflation and GDP. Unidirectional causalities are also found from tourism receipts to exchange rate, tourism receipts to inflation and last but not least, inflation to exchange rate.

5.2 Discussion of Major Findings

The purpose doing this research is to examine the long run relationships and causal relationships of the exchange rate, inflation, political stability and GDP with the tourism revenue in top ten Asia pacific countries. Thus, a few methods are employed to obtain the results such as IPS test, Fisher ADF test, Pedroni test, Kao test, DOLS, FMOLS and Dumitrescu-Hurlin Granger causality test. The results are used to examine whether the results are same with the expected results mentioned in Chapter 3.

Previous researchers investigated that there was negative relationship between exchange rate and tourism revenue in long run but the results show a positive relationship existed between exchange rate and tourism revenue in long run. When the exchange rate increases, the tourism revenue will increase and this is supported by Zidana (2015) which the factors affected tourism only in short run, people will continue to travel regardless the exchange rate in long run. Besides, the results show that the relationship between inflation and tourism revenue is inconsistent in long run but mostly is positive correlated with tourism revenue in long run. An increase in money supply and government spending in infrastructure leads to inflation where the infrastructure such as transportation services, public safety, and financial system can boost the tourism revenue.

Political stability is negative correlated with tourism revenue and this result is not consistent with the expected result. There will be an increase in tourism revenue as the political condition of a country is instable. This is because an increase in terrorism can increase the tourism receipts where the country's relative market shares increased because tourists will substitute away from high-risk areas towards low-risk areas (Mushtaq & Zaman, 2014). The journalists, researchers and human rights activists travel to those countries which are in instable political condition in order to complete their tasks. Moreover, GDP is found to have a positive relationship with tourism revenue and this result is consistent with the expected result. This is supported by Habibi (2016) where his results stated that GDP had positive relationship with tourist arrivals. This indicated that the higher the GDP per capita, the more the tourist arrivals.

Lastly, Dumitrescu-Hurlin Granger causality test is employed to test bidirectional and unidirectional relationship between the variables. In model 1 which the dependent variable is tourist arrivals, it can be concluded that there are four bidirectional causalities happened between inflation and tourist arrivals, political stability and tourist arrivals, GDP and exchange rate, as well as inflation and GDP. However, two unidirectional causalities are found from exchange rate and tourist arrivals, inflation and exchange rate. In Model 2 which used tourism receipts as its dependent variable, there are three bidirectional relationships happen between political stability and tourism receipts, GDP and exchange rate, inflation and GDP. However, three unidirectional causalities are found from tourism receipts and exchange rate, tourism receipts and inflation, and inflation and exchange rate.

In a nutshell, long-run co-integration relationships are existing among the variables. Exchange rate, inflation and political stability have causality relationship with tourism revenue but GDP does not have causality relationship with tourism revenue and this shows that TLEG and EDTG hypothesis are not found in GDP and tourism in this research.

5.3 Implication of Study

Based on the findings of our research, it can be concluded that the increase in exchange rate, inflation and GDP can lead to increase in tourist arrivals and tourism receipts. As a result, this research can benefit the policy makers to draw certain policy in order to increase the tourism receipts and tourist arrivals.

- **Policy Implication**

Since tourism industry brings a lot of benefits to the economy of a country such as increase job opportunity, improve infrastructures and generate income for the host country and its local communities, therefore, it is important for the policy makers to work hard in increasing the tourism receipts and tourist arrivals. Based on the research, it is concluded that exchange rate, GDP and inflation have positive relationship between tourist arrivals and tourism receipts. Thus, from a policy implication perspective, in order to reduce the income inequality and the gap between the rich and poor, there are some recommendations can be made to increase the tourist arrivals and tourism receipts by emphasising on these particular variables.

One of the policies that the policy makers can implement is to control the inflation. This is because inflation has positive relationship with the tourist arrivals and tourism receipts. Inflation is caused by the increase in money supply and government spending in improving infrastructures such as transportation services, telecommunication services, public safety and the organising of tourism campaign. By doing so, it can boost the tourism revenue because tourists prefer to visit the country which can give them convenience when travelling. For instance, the policy makers can build more public transport to connect the tourist spots from one point to another to ease the process of travelling by the tourists especially in a less developed town. Besides, the policy makers can organise campaign which aims at educating the taxi drivers and tourist guides to provide services that can meet the expectations of the tourists by using the native language to communicate with the tourists. When policy makers spend on these projects, the government spending will increase and lead to an increase in money supply. Hence, when the money supply is increased, it will cause inflation. Since inflation have positive relationship with tourism revenue, the tourism revenue will be increased.

In terms of GDP, the policy makers can influence the rate of GDP via expansionary fiscal policy and expansionary monetary policy. Expansionary fiscal policy that include the cutting of taxes to increase disposable income and encourage spending can help to increase the GDP. Consumer spending is able to drive the total economic output of a country, which increases income per capita. National populations that spend more on goods and services can benefit the GDP (Marquis, 2017). Moreover, contractionary monetary policy is the cutting of interest rate that boost the domestic demand. This is because when the interest rate is low, the cost of borrowing also low, and thus more people will borrow money and spend. Besides, when the interest rate is low, more people will spend the money because they are reluctant to deposit their money into financial institutions. As such, the GDP can be improved and can contribute to tourism revenue.

5.4 Limitation of the Study

As with any research study, there is a possibility of flaws in data and interpretation. In the research study, one of the considerations that needs to be taken into account is the fact that the data set is small which accounted for 150 observations. It is hard to find the significant relationships from the data when the sample size is small (Simmons, 2018). Statistically, the larger the sample size, the more reliable the results. Small sample size will limit our scope of analysis and become one of the obstacles in finding a meaningful relationship.

Furthermore, cross sectional independence is used for our panel data models. When the country is cross sectional independence, the relationship between independent variables and dependent variable is linear. For instance, when GDP is increased by 10%, tourism receipts is increased by 10%. Whereas when the observations are cross sectional dependence, the relationship between independent variables and dependent variable is not linear. For instance, when GDP is increased by 10%, tourism receipts may not increase by 10%. However, in the theoretical literature of panel data analysis, cross sectional dependence has been more advanced over the last ten years (Sarafidis & Wansbeek, 2010). Cross sectional dependence methods are developed to deal with non-stationary panels and test for non-zero correlations across observations. It helps to address the issue of unobserved heterogeneity effectively. In fact, testing for cross sectional dependence is important to fit into panel data models. When observations (t) more than number of individual (n), one may use the Lagrange Multiplier (LM) test by using Stata. If t less than n, the LM test statistic enjoys no desirable statistical properties. The tests are valid when t less than n.

5.5 Recommendation of the Study

Small sample size will lead to insignificant relationship and less reliable result. One of the ways to overcome this issue is to increase the sample size in order to obtain a statistically significant and more reliable results. Larger sample sizes give more reliable results with greater precision (Deziel, 2018) but it may consume more time and money. Therefore, sample size calculation is recommended before conducting research study in order to ensure a sufficient large sample size without wasting resources on sampling. The sample size calculation is based on the parameters, for example, the confidence level. The higher the confidence level, the larger the sample size.

Since cross sectional dependence is more preferable compared to cross sectional independence, which able to help the addressing of the issue on unobserved heterogeneity (Sarafidis & Wansbeek, 2010). Thus, it is recommended to use cross sectional dependence and non-linear relationship between endogenous variables and exogenous variables in the future study because non-linear relationship has higher probability to occur in reality compared to linear relationship.

5.6 Conclusion

As a conclusion, this study has implemented several tests like co-integration test, panel long run estimates test and Granger causality test to examine the relationship among all the variables. The results show that ER, GDP, INF and PSI have long run relationship and causal relationship with tourism revenue (TA and TR) except for GDP where it has no causality (short run) relationship with tourism revenue in the countries that conducted for the study. Finally, this paper has met the primary objective in which to examine the long run relationship and the causal relationship between all independent variables towards tourism revenue.

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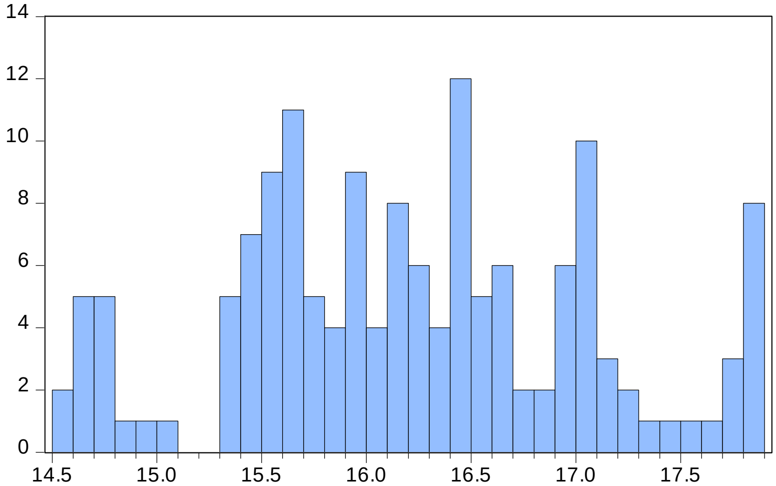
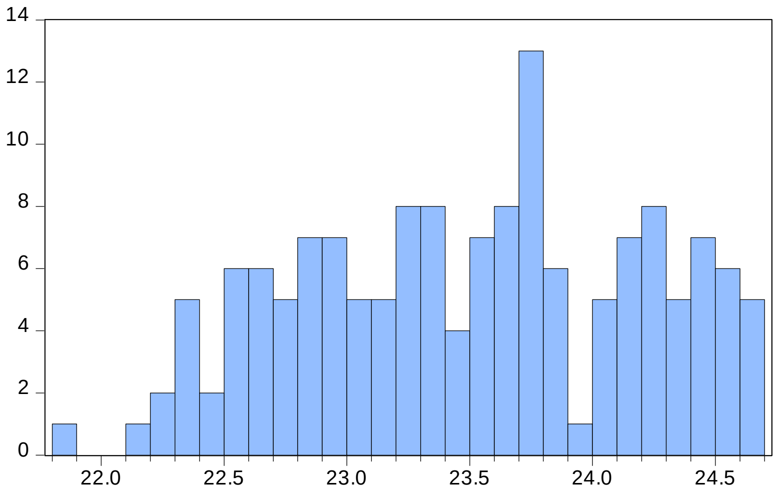
APPENDICES

Appendix 4.1: Descriptive statistics for TA



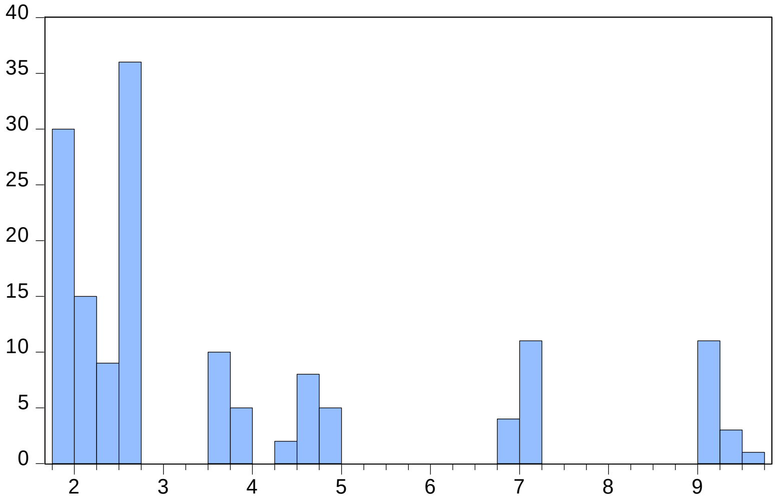
Series: LN_TA_	
Sample 2002 2016	
Observations 150	
Mean	16.21188
Median	16.18074
Maximum	17.89761
Minimum	14.52157
Std. Dev.	0.840196
Skewness	0.090076
Kurtosis	2.475469
Jarque-Bera	1.922423
Probability	0.382429

Appendix 4.2: Descriptive statistics for TR



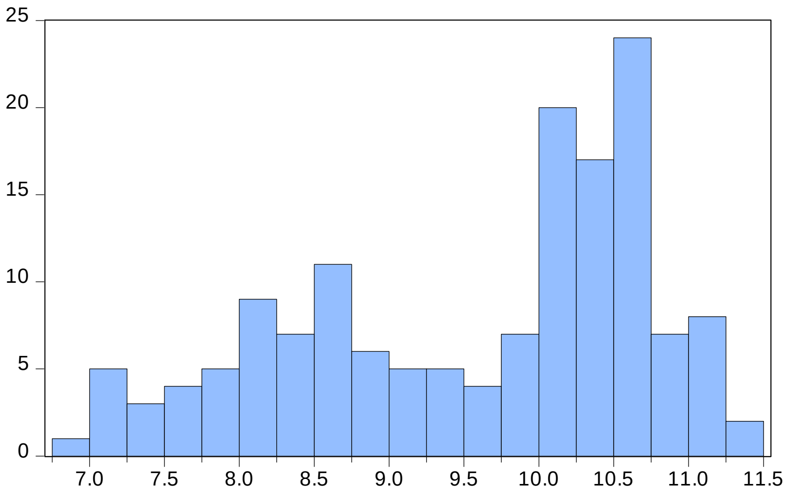
Series: LN_TR_	
Sample 2002 2016	
Observations 150	
Mean	23.49583
Median	23.54200
Maximum	24.68341
Minimum	21.87352
Std. Dev.	0.684642
Skewness	-0.100245
Kurtosis	2.036138
Jarque-Bera	6.057668
Probability	0.048372

Appendix 4.3: Descriptive statistics for ER



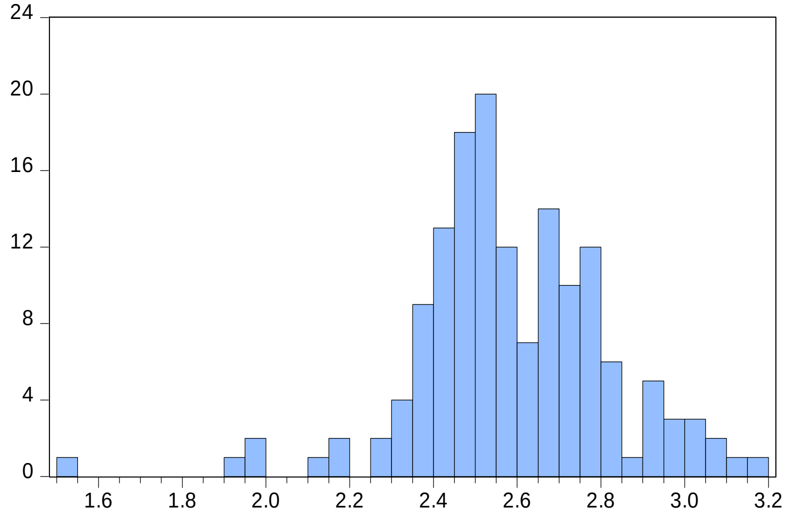
Series: LN_ER_	
Sample 2002 2016	
Observations 150	
Mean	3.805798
Median	2.564146
Maximum	9.502593
Minimum	1.786043
Std. Dev.	2.366210
Skewness	1.266784
Kurtosis	3.258234
Jarque-Bera	40.53533
Probability	0.000000

Appendix 4.4: Descriptive statistics for GDP



Series: LN_GDP_	
Sample 2002 2016	
Observations 150	
Mean	9.578109
Median	10.05458
Maximum	11.45110
Minimum	6.864619
Std. Dev.	1.175615
Skewness	-0.556011
Kurtosis	2.110751
Jarque-Bera	12.67096
Probability	0.001772

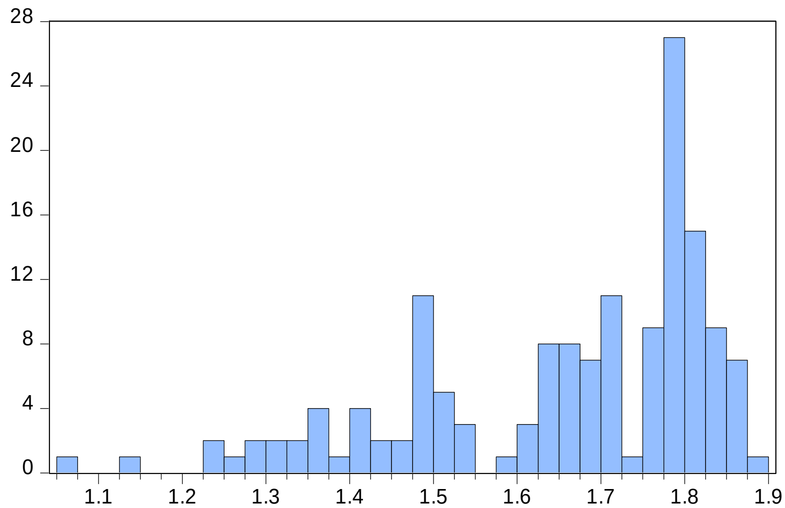
Appendix 4.5: Descriptive statistics for INF



Series: LN_INF_
Sample 2002 2016
Observations 150

Mean	2.586155
Median	2.554596
Maximum	3.162771
Minimum	1.524969
Std. Dev.	0.235251
Skewness	-0.474973
Kurtosis	5.450908
Jarque-Bera	43.18340
Probability	0.000000

Appendix 4.6: Descriptive statistics for PSI



Series: LN_PSI_
Sample 2002 2016
Observations 150

Mean	1.657826
Median	1.712896
Maximum	1.876407
Minimum	1.068153
Std. Dev.	0.179595
Skewness	-1.001784
Kurtosis	3.192612
Jarque-Bera	25.32116
Probability	0.000003

Appendix 4.7: IPS test for TA with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_TA_
Date: 07/01/18 Time: 17:26
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Total (balanced) observations: 140
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		1.14359	0.8736
Im, Pesaran and Shin t-bar		-1.81963	
T-bar critical values ***:	1% level	-2.91000	
	5% level	-2.67600	
	10% level	-2.55000	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-1.8398	0.6313	-2.167	0.922	0	0	14
Indo	-3.5096	0.0776	-2.167	0.922	0	0	14
Thai	-2.5895	0.2888	-2.167	0.922	0	0	14
China	-1.6154	0.7333	-2.167	0.922	0	0	14
Korea	-3.5015	0.0786	-2.167	0.922	0	0	14
Japan	-0.7333	0.9475	-2.167	0.922	0	0	14
Australia	0.0635	0.9923	-2.167	0.922	0	0	14
HK	-2.2354	0.4371	-2.167	0.922	0	0	14
Macau	-2.0952	0.5043	-2.167	0.922	0	0	14
NZ	-0.1400	0.9868	-2.167	0.922	0	0	14
Average	-1.8196		-2.167	0.922			

Appendix 4.8: IPS test for TR with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_TR_
Date: 07/01/18 Time: 17:29
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	1.56571	0.9413

** Probabilities are computed assuming asympotic normality

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-0.9895	0.9088	-2.171	1.166	1	1	13
Indo	-3.2658	0.1155	-2.171	1.166	1	1	13
Thai	-2.8950	0.1951	-2.171	1.166	1	1	13
China	-1.3347	0.8298	-2.171	1.166	1	1	13
Korea	-1.3794	0.8161	-2.171	1.166	1	1	13
Japan	-1.1318	0.8811	-2.171	1.166	1	1	13
Australia	-1.5270	0.7648	-2.171	1.166	1	1	13
HK	-0.0040	0.9900	-2.171	1.166	1	1	13
Macau	-0.9462	0.9162	-2.171	1.166	1	1	13
NZ	-2.8856	0.1976	-2.171	1.166	1	1	13
Average	-1.6359		-2.171	1.166			

Appendix 4.9: IPS test for ER with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_ER_
Date: 06/28/18 Time: 12:43
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 2
Total (balanced) observations: 120
Cross-sections included: 10

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	1.72458	0.9577

** Probabilities are computed assuming asympotic normality

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	0.1245	0.9924	-1.948	1.391	2	2	12
Indo	-0.9437	0.9131	-1.948	1.391	2	2	12
Thai	0.9306	0.9991	-1.948	1.391	2	2	12
China	0.1453	0.9928	-1.948	1.391	2	2	12
Korea	-3.0462	0.1614	-1.948	1.391	2	2	12
Japan	-2.8442	0.2119	-1.948	1.391	2	2	12
Australia	-0.3543	0.9747	-1.948	1.391	2	2	12
HK	-2.5405	0.3074	-1.948	1.391	2	2	12
Macau	-2.6846	0.2581	-1.948	1.391	2	2	12
NZ	-1.8358	0.6251	-1.948	1.391	2	2	12
Average	-1.3049		-1.948	1.391			

Appendix 4.10: IPS test for GDP with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_GDP_
Date: 07/01/18 Time: 17:07
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Total (balanced) observations: 140
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		3.86568	0.9999
Im, Pesaran and Shin t-bar		-0.99326	
T-bar critical values ***:	1% level	-2.91000	
	5% level	-2.67600	
	10% level	-2.55000	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-0.5135	0.9677	-2.167	0.922	0	0	14
Indo	-0.1881	0.9851	-2.167	0.922	0	0	14
Thai	-0.2541	0.9824	-2.167	0.922	0	0	14
China	1.0932	0.9996	-2.167	0.922	0	0	14
Korea	-2.1792	0.4636	-2.167	0.922	0	0	14
Japan	-1.4928	0.7817	-2.167	0.922	0	0	14
Australia	-0.2162	0.9840	-2.167	0.922	0	0	14
HK	-3.4702	0.0824	-2.167	0.922	0	0	14
Macau	0.0613	0.9923	-2.167	0.922	0	0	14
NZ	-2.7730	0.2279	-2.167	0.922	0	0	14
Average	-0.9933		-2.167	0.922			

Appendix 4.11: IPS test for INF with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_INF_
Date: 06/28/18 Time: 13:03
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 3
Total (balanced) observations: 110
Cross-sections included: 10

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	-0.26762	0.3945

** Probabilities are computed assuming asympotic normality

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-2.5813	0.2934	-1.933	2.228	3	3	11
Indo	-2.2908	0.4052	-1.933	2.228	3	3	11
Thai	-1.7183	0.6733	-1.933	2.228	3	3	11
China	-3.4066	0.1019	-1.933	2.228	3	3	11
Korea	-2.3607	0.3748	-1.933	2.228	3	3	11
Japan	-1.7290	0.6685	-1.933	2.228	3	3	11
Australia	-1.0376	0.8911	-1.933	2.228	3	3	11
HK	-1.4303	0.7901	-1.933	2.228	3	3	11
Macau	-2.2127	0.4388	-1.933	2.228	3	3	11
NZ	-1.8260	0.6250	-1.933	2.228	3	3	11
Average	-2.0593		-1.933	2.228			

Appendix 4.12: IPS test for PSI with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_PSI_
Date: 06/28/18 Time: 13:06
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 3
Total (balanced) observations: 110
Cross-sections included: 10

Method	Statistic	Prob.**
Im, Pesaran and Shin W-stat	0.77228	0.7800

** Probabilities are computed assuming asympotic normality

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-0.9247	0.9119	-1.933	2.228	3	3	11
Indo	-0.8025	0.9304	-1.933	2.228	3	3	11
Thai	-2.1422	0.4707	-1.933	2.228	3	3	11
China	-1.3232	0.8233	-1.933	2.228	3	3	11
Korea	-2.1776	0.4547	-1.933	2.228	3	3	11
Japan	-0.5552	0.9573	-1.933	2.228	3	3	11
Australia	-2.5236	0.3137	-1.933	2.228	3	3	11
HK	-2.4794	0.3297	-1.933	2.228	3	3	11
Macau	-1.0443	0.8898	-1.933	2.228	3	3	11
NZ	-1.7116	0.6763	-1.933	2.228	3	3	11
Average	-1.5684		-1.933	2.228			

Appendix 4.13: IPS test for TA with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_TA_)
Date: 07/19/18 Time: 21:42
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		-9.86293	0.0000
Im, Pesaran and Shin t-bar		-4.59979	
T-bar critical values ***:	1% level	-2.27200	
	5% level	-2.03600	
	10% level	-1.91200	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-6.7774	0.0001	-1.510	0.981	0	0	13
Indo	-6.1864	0.0003	-1.510	0.981	0	0	13
Thai	-4.9889	0.0021	-1.510	0.981	0	0	13
China	-4.0978	0.0093	-1.510	0.981	0	0	13
Korea	-7.1259	0.0001	-1.510	0.981	0	0	13
Japan	-3.7099	0.0182	-1.510	0.981	0	0	13
Australia	-2.4678	0.1444	-1.510	0.981	0	0	13
HK	-4.8495	0.0027	-1.510	0.981	0	0	13
Macau	-3.7925	0.0158	-1.510	0.981	0	0	13
NZ	-2.0019	0.2824	-1.510	0.981	0	0	13
Average	-4.5998		-1.510	0.981			

Appendix 4.14: IPS test for TR with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_TR_)
Date: 07/19/18 Time: 21:43
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		-7.79670	0.0000
Im, Pesaran and Shin t-bar		-3.95249	
T-bar critical values ***:	1% level	-2.27200	
	5% level	-2.03600	
	10% level	-1.91200	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-3.5229	0.0252	-1.510	0.981	0	0	13
Indo	-6.0621	0.0004	-1.510	0.981	0	0	13
Thai	-4.2720	0.0069	-1.510	0.981	0	0	13
China	-4.7990	0.0029	-1.510	0.981	0	0	13
Korea	-4.7565	0.0031	-1.510	0.981	0	0	13
Japan	-4.2996	0.0066	-1.510	0.981	0	0	13
Australia	-3.2960	0.0371	-1.510	0.981	0	0	13
HK	-2.9272	0.0691	-1.510	0.981	0	0	13
Macau	-2.2033	0.2138	-1.510	0.981	0	0	13
NZ	-3.3864	0.0318	-1.510	0.981	0	0	13
Average	-3.9525		-1.510	0.981			

Appendix 4.15: IPS test for ER with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_ER_)
Date: 07/19/18 Time: 21:29
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		-4.16367	0.0000
Im, Pesaran and Shin t-bar		-2.81437	
T-bar critical values ***:	1% level	-2.27200	
	5% level	-2.03600	
	10% level	-1.91200	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-2.1248	0.2389	-1.510	0.981	0	0	13
Indo	-2.9558	0.0659	-1.510	0.981	0	0	13
Thai	-2.1700	0.2242	-1.510	0.981	0	0	13
China	-1.0704	0.6931	-1.510	0.981	0	0	13
Korea	-2.5226	0.1327	-1.510	0.981	0	0	13
Japan	-2.2312	0.2054	-1.510	0.981	0	0	13
Australia	-2.7782	0.0882	-1.510	0.981	0	0	13
HK	-4.3131	0.0065	-1.510	0.981	0	0	13
Macau	-4.2990	0.0066	-1.510	0.981	0	0	13
NZ	-3.6784	0.0192	-1.510	0.981	0	0	13
Average	-2.8144		-1.510	0.981			

Appendix 4.16: IPS test for GDP with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_GDP_)
Date: 07/19/18 Time: 21:39
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		-3.51480	0.0002
Im, Pesaran and Shin t-bar		-2.61109	
T-bar critical values ***:	1% level	-2.27200	
	5% level	-2.03600	
	10% level	-1.91200	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-3.2075	0.0431	-1.510	0.981	0	0	13
Indo	-2.1937	0.2168	-1.510	0.981	0	0	13
Thai	-2.5318	0.1308	-1.510	0.981	0	0	13
China	-1.1205	0.6732	-1.510	0.981	0	0	13
Korea	-2.7238	0.0964	-1.510	0.981	0	0	13
Japan	-2.4204	0.1552	-1.510	0.981	0	0	13
Australia	-2.2198	0.2088	-1.510	0.981	0	0	13
HK	-3.8847	0.0135	-1.510	0.981	0	0	13
Macau	-2.1185	0.2410	-1.510	0.981	0	0	13
NZ	-3.6902	0.0189	-1.510	0.981	0	0	13
Average	-2.6111		-1.510	0.981			

Appendix 4.17: IPS test for INF with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_INF_)
Date: 07/19/18 Time: 21:40
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		-12.6963	0.0000
Im, Pesaran and Shin t-bar		-5.48742	
T-bar critical values ***:	1% level	-2.27200	
	5% level	-2.03600	
	10% level	-1.91200	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-6.5155	0.0002	-1.510	0.981	0	0	13
Indo	-5.2437	0.0014	-1.510	0.981	0	0	13
Thai	-7.1790	0.0001	-1.510	0.981	0	0	13
China	-3.4892	0.0267	-1.510	0.981	0	0	13
Korea	-5.7996	0.0006	-1.510	0.981	0	0	13
Japan	-5.9032	0.0005	-1.510	0.981	0	0	13
Australia	-7.4687	0.0000	-1.510	0.981	0	0	13
HK	-3.9198	0.0127	-1.510	0.981	0	0	13
Macau	-3.2771	0.0383	-1.510	0.981	0	0	13
NZ	-6.0784	0.0004	-1.510	0.981	0	0	13
Average	-5.4874		-1.510	0.981			

Appendix 4.18: IPS test for PSI with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_PSI_)
Date: 07/19/18 Time: 21:40
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method		Statistic	Prob.**
Im, Pesaran and Shin W-stat		-11.0310	0.0000
Im, Pesaran and Shin t-bar		-4.96571	
T-bar critical values ***:	1% level	-2.27200	
	5% level	-2.03600	
	10% level	-1.91200	

** Probabilities are computed assuming asympotic normality
*** Critical values from original paper

Intermediate ADF test results

Cross section	t-Stat	Prob.	E(t)	E(Var)	Lag	Max Lag	Obs
M'sia	-4.0616	0.0099	-1.510	0.981	0	0	13
Indo	-5.9958	0.0004	-1.510	0.981	0	0	13
Thai	-2.8791	0.0747	-1.510	0.981	0	0	13
China	-7.4276	0.0001	-1.510	0.981	0	0	13
Korea	-4.7220	0.0033	-1.510	0.981	0	0	13
Japan	-6.0633	0.0004	-1.510	0.981	0	0	13
Australia	-7.0670	0.0001	-1.510	0.981	0	0	13
HK	-2.9783	0.0634	-1.510	0.981	0	0	13
Macau	-2.8216	0.0822	-1.510	0.981	0	0	13
NZ	-5.6409	0.0007	-1.510	0.981	0	0	13
Average	-4.9657		-1.510	0.981			

Appendix 4.19: Fisher ADF test for TA with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_TA_
Date: 07/01/18 Time: 17:25
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Total (balanced) observations: 140
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	17.3975	0.6270
ADF - Choi Z-stat	1.16476	0.8779

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results LN_TA_

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.6313	0	0	14
Indo	0.0776	0	0	14
Thai	0.2888	0	0	14
China	0.7333	0	0	14
Korea	0.0786	0	0	14
Japan	0.9475	0	0	14
Australia	0.9923	0	0	14
HK	0.4371	0	0	14
Macau	0.5043	0	0	14
NZ	0.9868	0	0	14

Appendix 4.20: Fisher ADF test for TR with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_TR_
Date: 07/01/18 Time: 17:30
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 1
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	12.7841	0.8865
ADF - Choi Z-stat	1.86163	0.9687

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results LN_TR_

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.9088	1	1	13
Indo	0.1155	1	1	13
Thai	0.1951	1	1	13
China	0.8298	1	1	13
Korea	0.8161	1	1	13
Japan	0.8811	1	1	13
Australia	0.7648	1	1	13
HK	0.9900	1	1	13
Macau	0.9162	1	1	13
NZ	0.1976	1	1	13

Appendix 4.21: Fisher ADF test for ER with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_ER_
Date: 06/28/18 Time: 12:58
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 2
Total (balanced) observations: 120
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	13.0235	0.8764
ADF - Choi Z-stat	2.75006	0.9970

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results LN_ER_

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.9924	2	2	12
Indo	0.9131	2	2	12
Thai	0.9991	2	2	12
China	0.9928	2	2	12
Korea	0.1614	2	2	12
Japan	0.2119	2	2	12
Australia	0.9747	2	2	12
HK	0.3074	2	2	12
Macau	0.2581	2	2	12
NZ	0.6251	2	2	12

Appendix 4.22: Fisher ADF test for GDP with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_GDP_
Date: 07/01/18 Time: 17:05
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 0
Total (balanced) observations: 140
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	10.1590	0.9652
ADF - Choi Z-stat	3.98177	1.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results LN_GDP_

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.9677	0	0	14
Indo	0.9851	0	0	14
Thai	0.9824	0	0	14
China	0.9996	0	0	14
Korea	0.4636	0	0	14
Japan	0.7817	0	0	14
Australia	0.9840	0	0	14
HK	0.0824	0	0	14
Macau	0.9923	0	0	14
NZ	0.2279	0	0	14

Appendix 4.23: Fisher ADF test for INF with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_INF_
Date: 06/28/18 Time: 13:04
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 3
Total (balanced) observations: 110
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	15.6750	0.7366
ADF - Choi Z-stat	0.22615	0.5895

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results LN_INF_

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.2934	3	3	11
Indo	0.4052	3	3	11
Thai	0.6733	3	3	11
China	0.1019	3	3	11
Korea	0.3748	3	3	11
Japan	0.6685	3	3	11
Australia	0.8911	3	3	11
HK	0.7901	3	3	11
Macau	0.4388	3	3	11
NZ	0.6250	3	3	11

Appendix 4.24: Fisher ADF test for PSI with trend and intercept at level

Null Hypothesis: Unit root (individual unit root process)
Series: LN_PSI_
Date: 07/01/18 Time: 17:24
Sample: 2002 2016
Exogenous variables: Individual effects, individual linear trends
User-specified lags: 3
Total (balanced) observations: 110
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	9.44163	0.9772
ADF - Choi Z-stat	1.91283	0.9721

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results LN_PSI_

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.9119	3	3	11
Indo	0.9304	3	3	11
Thai	0.4707	3	3	11
China	0.8233	3	3	11
Korea	0.4547	3	3	11
Japan	0.9573	3	3	11
Australia	0.3137	3	3	11
HK	0.3297	3	3	11
Macau	0.8898	3	3	11
NZ	0.6763	3	3	11

Appendix 4.25: Fisher ADF test for TA with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_TA_)
Date: 07/19/18 Time: 21:43
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	109.682	0.0000
ADF - Choi Z-stat	-7.84085	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(LN_TA_)

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.0001	0	0	13
Indo	0.0003	0	0	13
Thai	0.0021	0	0	13
China	0.0093	0	0	13
Korea	0.0001	0	0	13
Japan	0.0182	0	0	13
Australia	0.1444	0	0	13
HK	0.0027	0	0	13
Macau	0.0158	0	0	13
NZ	0.2824	0	0	13

Appendix 4.26: Fisher ADF test for TR with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_TR_)
Date: 07/19/18 Time: 21:43
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	88.2508	0.0000
ADF - Choi Z-stat	-6.85419	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(LN_TR_)

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.0252	0	0	13
Indo	0.0004	0	0	13
Thai	0.0069	0	0	13
China	0.0029	0	0	13
Korea	0.0031	0	0	13
Japan	0.0066	0	0	13
Australia	0.0371	0	0	13
HK	0.0691	0	0	13
Macau	0.2138	0	0	13
NZ	0.0318	0	0	13

Appendix 4.27: Fisher ADF test for ER with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_ER_)
Date: 07/19/18 Time: 21:29
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 1
Total (balanced) observations: 120
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	58.4426	0.0000
ADF - Choi Z-stat	-3.86756	0.0001

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(LN_ER_)

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.6636	1	1	12
Indo	0.0775	1	1	12
Thai	0.4398	1	1	12
China	0.7105	1	1	12
Korea	0.0611	1	1	12
Japan	0.2592	1	1	12
Australia	0.1667	1	1	12
HK	0.0003	1	1	12
Macau	0.0003	1	1	12
NZ	0.0536	1	1	12

Appendix 4.28: Fisher ADF test for GDP with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_GDP_)
Date: 07/19/18 Time: 21:38
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	45.1425	0.0011
ADF - Choi Z-stat	-3.57108	0.0002

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(LN_GDP_)

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.0431	0	0	13
Indo	0.2168	0	0	13
Thai	0.1308	0	0	13
China	0.6732	0	0	13
Korea	0.0964	0	0	13
Japan	0.1552	0	0	13
Australia	0.2088	0	0	13
HK	0.0135	0	0	13
Macau	0.2410	0	0	13
NZ	0.0189	0	0	13

Appendix 4.29: Fisher ADF test for INF with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_INF_)
Date: 07/19/18 Time: 21:40
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	137.593	0.0000
ADF - Choi Z-stat	-9.51463	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi
-square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(LN_INF_)

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.0002	0	0	13
Indo	0.0014	0	0	13
Thai	0.0001	0	0	13
China	0.0267	0	0	13
Korea	0.0006	0	0	13
Japan	0.0005	0	0	13
Australia	0.0000	0	0	13
HK	0.0127	0	0	13
Macau	0.0383	0	0	13
NZ	0.0004	0	0	13

Appendix 4.30: Fisher ADF test for PSI with intercept at first difference

Null Hypothesis: Unit root (individual unit root process)
Series: D(LN_PSI_)
Date: 07/19/18 Time: 21:40
Sample: 2002 2016
Exogenous variables: Individual effects
User-specified lags: 0
Total (balanced) observations: 130
Cross-sections included: 10

Method	Statistic	Prob.**
ADF - Fisher Chi-square	120.543	0.0000
ADF - Choi Z-stat	-8.51590	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(LN_PSI_)

Cross section	Prob.	Lag	Max Lag	Obs
M'sia	0.0099	0	0	13
Indo	0.0004	0	0	13
Thai	0.0747	0	0	13
China	0.0001	0	0	13
Korea	0.0033	0	0	13
Japan	0.0004	0	0	13
Australia	0.0001	0	0	13
HK	0.0634	0	0	13
Macau	0.0822	0	0	13
NZ	0.0007	0	0	13

Appendix 4.31: Pedroni test for Model 1

Pedroni Residual Cointegration Test
Series: LN_TA_ LN_GDP_ LN_ER_ LN_INF_ LN_PSI_
Date: 06/26/18 Time: 12:25
Sample: 2002 2016
Included observations: 150
Cross-sections included: 10
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 1
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-2.700695	0.9965	-2.266160	0.9883
Panel rho-Statistic	3.043277	0.9988	1.265030	0.8971
Panel PP-Statistic	1.942425	0.9740	-3.772588	0.0001
Panel ADF-Statistic	1.790526	0.9633	-3.821622	0.0001

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.112044	0.9827
Group PP-Statistic	-5.169066	0.0000
Group ADF-Statistic	-4.482613	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
M'sia	-0.273	0.005519	0.004417	3.00	14
Indo	0.094	0.003655	0.004028	1.00	14
Thai	-0.593	0.002082	0.001975	2.00	14
China	-0.252	0.001423	0.000602	5.00	14
Korea	-0.413	0.004109	0.004109	0.00	14
Japan	0.680	0.055795	0.054052	2.00	14
Australia	-0.014	0.003523	0.003523	0.00	14
HK	-0.275	0.002147	0.000802	5.00	14
Macau	0.053	0.006985	0.006354	2.00	14
NZ	0.725	0.001723	0.003070	2.00	14

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
M'sia	-0.273	0.005519	0	1	14
Indo	0.094	0.003655	0	1	14
Thai	-0.593	0.002082	0	1	14
China	-0.252	0.001423	0	1	14
Korea	-0.413	0.004109	0	1	14
Japan	0.680	0.055795	0	1	14
Australia	-0.014	0.003523	0	1	14
HK	-0.275	0.002147	0	1	14
Macau	0.053	0.006985	0	1	14
NZ	0.595	0.000524	1	1	13

Appendix 4.32: Pedroni test for Model 2

Pedroni Residual Cointegration Test
Series: LN_TR_ LN_ER_ LN_GDP_ LN_INF_ LN_PSI_
Date: 07/01/18 Time: 17:35
Sample: 2002 2016
Included observations: 150
Cross-sections included: 10
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 6
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-1.321764	0.9069	-1.396280	0.9187
Panel rho-Statistic	2.038451	0.9792	1.408913	0.9206
Panel PP-Statistic	-0.269336	0.3938	-1.599328	0.0549
Panel ADF-Statistic	-11.79688	0.0000	-6.120122	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.743495	0.9970
Group PP-Statistic	-2.483231	0.0065
Group ADF-Statistic	-52.31751	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
M'sia	-0.069	0.008062	0.008780	1.00	14
Indo	0.052	0.011891	0.011168	2.00	14
Thai	-0.388	0.004173	0.001076	6.00	14
China	-0.143	0.005789	0.005074	2.00	14
Korea	0.010	0.007356	0.006676	3.00	14
Japan	0.445	0.046303	0.046303	0.00	14
Australia	-0.199	0.003660	0.003622	1.00	14
HK	0.210	0.007059	0.007474	1.00	14
Macau	0.486	0.003535	0.003535	0.00	14
NZ	0.662	0.006052	0.008461	1.00	14

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
M'sia	-1.425	0.001875	6	--	8
Indo	-0.857	0.002049	6	--	8
Thai	-3.381	0.001432	6	--	8
China	1.522	0.001325	6	--	8
Korea	-0.505	1.51E-05	6	--	8
Japan	-0.357	5.91E-05	6	--	8
Australia	-16.42	7.16E-06	6	--	8
HK	-1.707	0.000125	6	--	8
Macau	0.181	5.73E-05	6	--	8
NZ	-1.541	0.000118	6	--	8

Appendix 4.33: Kao test for Model 1

Kao Residual Cointegration Test
Series: LN_TA_ LN_ER_ LN_GDP_ LN_INF_ LN_PSI_
Date: 07/02/18 Time: 00:21
Sample: 2002 2016
Included observations: 150
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 11
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	3.060966	0.0011
Residual variance	0.011423	
HAC variance	0.011912	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 07/02/18 Time: 00:21
Sample (adjusted): 2014 2016
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.131412	0.422444	-0.311076	0.7593
D(RESID(-1))	0.207274	0.376249	0.550896	0.5885
D(RESID(-2))	1.503647	0.365701	4.111683	0.0007
D(RESID(-3))	0.163806	0.386798	0.423491	0.6770
D(RESID(-4))	-0.434603	0.387493	-1.121576	0.2768
D(RESID(-5))	0.207048	0.257875	0.802899	0.4325
D(RESID(-6))	-0.270160	0.284931	-0.948159	0.3556
D(RESID(-7))	-0.281764	0.274796	-1.025360	0.3188
D(RESID(-8))	-0.213533	0.214613	-0.994968	0.3329
D(RESID(-9))	0.357449	0.291655	1.225585	0.2361
D(RESID(-10))	-0.201569	0.186328	-1.081798	0.2936
D(RESID(-11))	-0.154560	0.151277	-1.021704	0.3205

R-squared	0.667090	Mean dependent var	0.072339
Adjusted R-squared	0.463645	S.D. dependent var	0.103067
S.E. of regression	0.075482	Akaike info criterion	-2.040658
Sum squared resid	0.102557	Schwarz criterion	-1.480179
Log likelihood	42.60987	Hannan-Quinn criter.	-1.861356
Durbin-Watson stat	1.858227		

Appendix 4.34: Kao test for Model 2

Kao Residual Cointegration Test
Series: LN_TR_ LN_ER_ LN_GDP_ LN_INF_ LN_PSI_
Date: 06/25/18 Time: 14:48
Sample: 2002 2016
Included observations: 150
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 3
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-2.312118	0.0104
Residual variance	0.019007	
HAC variance	0.019513	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 06/25/18 Time: 14:48
Sample (adjusted): 2003 2016
Included observations: 140 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.273275	0.056845	-4.807409	0.0000

R-squared	0.133153	Mean dependent var	0.016739
Adjusted R-squared	0.133153	S.D. dependent var	0.160349
S.E. of regression	0.149292	Akaike info criterion	-0.958707
Sum squared resid	3.098049	Schwarz criterion	-0.937695
Log likelihood	68.10950	Hannan-Quinn criter.	-0.950169
Durbin-Watson stat	1.810709		

Appendix 4.35: DOLS test for Model 1

Dependent Variable: LN_TA_
Method: Panel Dynamic Least Squares (DOLS)
Date: 07/02/18 Time: 00:33
Sample (adjusted): 2003 2016
Periods included: 14
Cross-sections included: 10
Total panel (balanced) observations: 140
Panel method: Weighted estimation
Cointegrating equation deterministics: C
Automatic leads and lags specification (based on AIC criterion, max=0)
Long-run variance weights (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_ER_	1.069502	0.098105	10.90159	0.0000
LN_GDP_	0.565819	0.045946	12.31492	0.0000
LN_INF_	-0.384154	0.105723	-3.633590	0.0005
LN_PSI_	-0.794939	0.174462	-4.556521	0.0000

R-squared	0.965821	Mean dependent var	16.23975
Adjusted R-squared	0.944757	S.D. dependent var	0.840122
S.E. of regression	0.197460	Sum squared resid	3.353182
Long-run variance	0.037815		

Appendix 4.36: DOLS test for Model 2

Dependent Variable: LN_TR_
Method: Panel Dynamic Least Squares (DOLS)
Date: 07/01/18 Time: 17:42
Sample (adjusted): 2003 2016
Periods included: 14
Cross-sections included: 10
Total panel (balanced) observations: 140
Panel method: Pooled estimation
Cointegrating equation deterministics: C
Automatic leads and lags specification (based on AIC criterion, max=0)
Coefficient covariance computed using default method
Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for coefficient covariances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_ER_	1.248200	0.401829	3.106296	0.0026
LN_GDP_	1.014752	0.083448	12.16032	0.0000
LN_INF_	0.533708	0.253821	2.102692	0.0384
LN_PSI_	-1.379884	0.510301	-2.704057	0.0083

R-squared	0.943467	Mean dependent var	23.54645
Adjusted R-squared	0.908627	S.D. dependent var	0.666098
S.E. of regression	0.201347	Sum squared resid	3.486509
Long-run variance	0.038002		

Appendix 4.37: FMOLS test for Model 1

Dependent Variable: LN_TA_
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 07/02/18 Time: 00:27
Sample (adjusted): 2003 2016
Periods included: 14
Cross-sections included: 10
Total panel (balanced) observations: 140
Panel method: Weighted estimation
Cointegrating equation deterministics: C
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_ER_	0.913095	0.060530	15.08498	0.0000
LN_GDP_	0.636893	0.030158	21.11833	0.0000
LN_INF_	0.281980	0.038059	7.408990	0.0000
LN_PSI_	-0.598400	0.034034	-17.58229	0.0000

R-squared	0.938915	Mean dependent var	16.23975
Adjusted R-squared	0.932613	S.D. dependent var	0.840122
S.E. of regression	0.218087	Sum squared resid	5.992829
Long-run variance	0.024844		

Appendix 4.38: FMOLS test for Model 2

Dependent Variable: LN_TR_
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 07/01/18 Time: 17:40
Sample (adjusted): 2003 2016
Periods included: 14
Cross-sections included: 10
Total panel (balanced) observations: 140
Panel method: Weighted estimation
Cointegrating equation deterministics: C
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_ER_	1.087499	0.060530	17.96627	0.0000
LN_GDP_	1.105060	0.030158	36.64197	0.0000
LN_INF_	0.589724	0.038059	15.49491	0.0000
LN_PSI_	-1.212299	0.034034	-35.61997	0.0000

R-squared	0.888719	Mean dependent var	23.54645
Adjusted R-squared	0.877237	S.D. dependent var	0.666098
S.E. of regression	0.233384	Sum squared resid	6.862975
Long-run variance	0.025027		

Appendix 4.39: Dumitrescu-Hurlin Granger causality test for Model 1

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 07/02/18 Time: 00:24
Sample: 2002 2016
Lags: 2

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
LN_ER_ does not homogeneously cause LN_TA_	4.89402	1.86769	0.0618
LN_TA_ does not homogeneously cause LN_ER_	4.04586	1.15649	0.2475
LN_GDP_ does not homogeneously cause LN_TA_	2.42624	-0.20160	0.8402
LN_TA_ does not homogeneously cause LN_GDP_	2.68457	0.01501	0.9880
LN_INF_ does not homogeneously cause LN_TA_	6.40724	3.13657	0.0017
LN_TA_ does not homogeneously cause LN_INF_	5.53933	2.40880	0.0160
LN_PSI_ does not homogeneously cause LN_TA_	6.09250	2.87265	0.0041
LN_TA_ does not homogeneously cause LN_PSI_	5.34787	2.24825	0.0246
LN_GDP_ does not homogeneously cause LN_ER_	5.72425	2.56386	0.0104
LN_ER_ does not homogeneously cause LN_GDP_	8.47210	4.86801	1.E-06
LN_INF_ does not homogeneously cause LN_ER_	5.31985	2.22476	0.0261
LN_ER_ does not homogeneously cause LN_INF_	3.69703	0.86399	0.3876
LN_PSI_ does not homogeneously cause LN_ER_	3.83641	0.98086	0.3267
LN_ER_ does not homogeneously cause LN_PSI_	1.30267	-1.14375	0.2527
LN_INF_ does not homogeneously cause LN_GDP_	7.31790	3.90018	0.0001
LN_GDP_ does not homogeneously cause LN_INF_	5.18869	2.11478	0.0344
LN_PSI_ does not homogeneously cause LN_GDP_	2.61973	-0.03935	0.9686
LN_GDP_ does not homogeneously cause LN_PSI_	3.55080	0.74137	0.4585
LN_PSI_ does not homogeneously cause LN_INF_	3.78760	0.93993	0.3473
LN_INF_ does not homogeneously cause LN_PSI_	2.66564	-0.00086	0.9993

Appendix 4.40: Dumitrescu-Hurlin Granger causality test for Model 2

Pairwise Dumitrescu Hurlin Panel Causality Tests
Date: 07/01/18 Time: 17:45
Sample: 2002 2016
Lags: 2

Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
LN_ER_ does not homogeneously cause LN_TR_	0.91308	-1.47042	0.1414
LN_TR_ does not homogeneously cause LN_ER_	7.49371	4.04760	5.E-05
LN_GDP_ does not homogeneously cause LN_TR_	2.27412	-0.32916	0.7420
LN_TR_ does not homogeneously cause LN_GDP_	3.83660	0.98102	0.3266
LN_INF_ does not homogeneously cause LN_TR_	3.16794	0.42033	0.6742
LN_TR_ does not homogeneously cause LN_INF_	6.33597	3.07680	0.0021
LN_PSI_ does not homogeneously cause LN_TR_	4.73701	1.73604	0.0826
LN_TR_ does not homogeneously cause LN_PSI_	5.51427	2.38779	0.0169
LN_GDP_ does not homogeneously cause LN_ER_	5.72425	2.56386	0.0104
LN_ER_ does not homogeneously cause LN_GDP_	8.47210	4.86801	1.E-06
LN_INF_ does not homogeneously cause LN_ER_	5.31985	2.22476	0.0261
LN_ER_ does not homogeneously cause LN_INF_	3.69703	0.86399	0.3876
LN_PSI_ does not homogeneously cause LN_ER_	3.83641	0.98086	0.3267
LN_ER_ does not homogeneously cause LN_PSI_	1.30267	-1.14375	0.2527
LN_INF_ does not homogeneously cause LN_GDP_	7.31790	3.90018	0.0001
LN_GDP_ does not homogeneously cause LN_INF_	5.18869	2.11478	0.0344
LN_PSI_ does not homogeneously cause LN_GDP_	2.61973	-0.03935	0.9686
LN_GDP_ does not homogeneously cause LN_PSI_	3.55080	0.74137	0.4585
LN_PSI_ does not homogeneously cause LN_INF_	3.78760	0.93993	0.3473
LN_INF_ does not homogeneously cause LN_PSI_	2.66564	-0.00086	0.9993