Charles University in Prague

Faculty of Social Sciences
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MASTER THESIS

Determinants of International Tourists Inflows:

The case of China

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Declaration of Authorship

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Prague, July 31, 2014

Signature

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Abstract

This study is aim to evaluate the effect of five factors on the amount of tourists arrivals to China in those countries who have most visitors. To apply empirical estimation, a balanced panel data based gravity equation is established, with 22 countries and 15 years period (1998 – 2002). Our main estimates conclude that GDP per capita has a positive impact on the amount of tourists, as well as population, whereas exchange rate and distance will deter the amounts of tourists. Unfortunately PPP conversion factor also has a positive impact but not as expected. The findings of this study will fill the gap of relative literatures for China and provide another evidence of gravity model.

JEL Classification	F12, F21, F23, H25, H71, H87
Keywords	Tourism, China, Gravity model, Panel Data

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Acronyms

CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
OLS	Ordinary Least Squares
LSDV	Least Squares Dummy Variable
FE	Fixed Effects
RE	Random Effects
PPP	Purchasing power parity

Master Thesis Proposal

Author:	Yu Zang
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Proposed Topic:

Determinants of International Tourists Inflows: The case of China

Topic Characteristics:

In the past ten years, Chinese tourism industry developed in a rapid way and kept developing continuously. The gross revenue of international tourism to China reached to 50 billion USD in 2012, which is about 3 times to 2003. And Chinese government has focused on extending the influence of Chinese language and culture and simplification of visa to attractive more and more international tourists. However, international tourism only occupied about 0.6% of GDP, there is still much space for improvement.

This study will analysis the determinants of international tourism inbound to China. The main factors considered are tourist arrivals (by countries), distance between foreign countries and China, the GDP, exchange rate, population and PPP of origin countries. Moreover, language and culture similarities might be considered as a dummy variable. The main contribution of this paper will be providing an evidence of China in similar researches.

I will mainly use the data of tourist arrivals to China from National Bureau of Statistics of the People's Republic of China, and the distance between countries from database of Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). GDP, GDP per capita, exchange rate, population and purchasing power parity (PPP) will be obtained from the database of World Bank.

Hypotheses:

1. The distance between China and other countries has a negative impact on amounts of incoming tourists
2. The country with higher GDP per capita will have more tourists to China
3. More populated country has less tourists to China
4. The appreciation of Chinese currency will deter the amount of tourists to China
5. The country with higher PPP will have more tourists to China

Methodology:

The main methodology of this study will be gravity model. I will use argumented gravity model with panel data. Fixed effects model and random effects model will be estimated in comparision with pooled OLS.

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Author **Supervisor**

1. Introduction

For the identification of factors which impact tourism market, some researchers consider that international tourist arrivals is a suitable indicator for assessment of tourism market. This variable tourist inflows is also seen as an important financial factor to increase country's revenue and job opportunity.

The definition of international tourism, number of arrivals is defined as following by the World Bank: International inbound tourists (overnight visitors) are the number of tourists who travel to a country other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited. Sources and collection methods for arrivals differ across countries. In some cases data are from border statistics (police, immigration, and the like) and supplemented by border surveys. In other cases data are from tourism accommodation establishments. Attribute to the data base of China National Tourism Administration, we obtained the amount of international tourism to China either in total amount or more details by classification.

Chinese tourism market has been developing from their most famous policy "reform and open" after 1978. After China joined to WTO (World Trade Organization) and the development of economic globalization, more and more countries started to be familiar with China and people from other countries started to visit China. After 21th century, some operations of Chinese government, like reform of exchange rate of Chinese Yuan and policy of loosening visa, objectively pushed international tourists to China higher and higher. But compared to China's boom of economy, the development of China's tourism market are tiny. This can be understood that tourism is not a main factor of China for income in one way, and also can be understood in another way that the potential of China's tourism is still undeveloped and it will bring more revenue since China's attractive history and geographic and lead to another prosperity of China's economy.

According to plenty of researchers, the number of international tourist inflows is influenced by those macroeconomic factors: local people's income, cost of travelling at destination, total population and comparative of domestic and abroad. And some factors of culture will attract more visitors, like having common history or speaking common language. Geographical factors also have advantages, some researchers found that countries share common border or have shorter distance, will possess more visitors.

But there are few researches about international tourists to China, although China's tourism revenue has been growing and the amount of international tourists to China are becoming more and more. This also reflects less development and less attention of China's tourism market, since there are plenty of similar researches on this subject for different countries in all continents, like U.S.A, Spain, Egypt, Turkey and so on, the researches for China is less and less.

Therefore, one of the aim of this study is to fill the lack of relative research on international tourism inflows to China, and supplement the newest data (to 2012). Another aim of this study is to estimate which factors of origin countries are crucial to decide the amount of tourists to China, and to observe the coefficient or proportion. The third is to provide some evidence as a reference to policy maker to see which factors determine the amount of tourists to China, as Chinese government has been promoting learning Chinese and visiting China.

The structure of this study is as following. The first chapter is this chapter, which is introduction, to introduce the skeleton of the whole study and the motivation. The second Chapter is the summary of literature review of same or similar subjects and researches, from which inspired me for this study and obtained motivation. Meanwhile, literature mentioned in this chapter also provided theoretical support on this subject and the theories how to choose data and methodology.

The third chapter is an overview of China's tourism market, providing some inspects of market development to lead people know more about the situation of China's tourism market. From some factors of Chinese tourism market, we will know this is an emerging and a market with much potential.

Chapter four is to introduce data chosen to estimate and hypothesis on those variables according to data. The data will be used in this study are GDP per capita, exchange rates, population, PPP conversion factor and distance between origin countries to China. The dependent variable is amount of tourists to China. The hypothesis is also be proposed by this Chapter. It is assumed, that GDP per capita and population of origin countries will have a significant and positive effect on the amount of tourists travelling to China, while exchange rate, PPP conversion factor and distance will deter the amounts when they growth.

Chapter five is to describe methodology used by this study, which is based on researches of the gravity model. A balanced panel data with 22 countries and 15 years will be employed, the equation is originated in gravity model. Pooled OLS, Fixed Effects and Random Effects model will be used to estimate the hypothesis in this chapter, and also specific tests will be employed to compare those models.

The sixth chapter is to describe the results from running the model mentioned in previous chapter, to observe which model suits our data best and to discuss whether hypothesis are met our expectation.

Chapter seven is to make final conclusion and discuss further possibility of research. Last, if this study leads more interests to you, you can find details of original data in Appendices.

2. Literature review

In the article “An Econometric Analysis of Inbound Tourism for China”, authors C. Lim and Grace W reviewed the development of Chinese inbound tourism industry and predicted the preview in the future. They tested stationarity of tourist arrivals and unit roots. They used ARIMA models and found ARIMA (0, 1, 3) suits the data better. The most important conclusion they made, is that China will attract 130 million tourists annually by the year of 2020. And that will make China the top tourist destination in the world.

To analysis development and prediction on China’s tourism, Yvonne Zhou-Grundy applied 9 models in the article “Forecasting International Regional Tourist Arrivals to China”. The authors used models to forecast international arrivals to China by time series as well as causal explanatory methods. The study used 13 countries who have visitors to China, and mainly used annual data from 1994 to 2005. After summarizing the results of all models and comparing, the author believe that international tourism to China showed a strongly demand and in the future it will expand.

Wen Zhang & Yuling Han also analyzed the China’s tourism. In their article “An Analysis on China’s International Tourism Development and Regional Cooperation”, they elaborated current development and changing trends of China’s international tourism, discussed opportunities and challenges and analyzes the importance and inevitability of regional cooperation. They believe, intra-regional and short haul travelling will be the first choice of most travelers in the future. Since countries in the Asia-Pacific region have various historical and cultural links to China, collaborating with those countries will be very important to China and bring more profit. Their argument also can be proved by data discussed in the later chapter of this study.

There are some researches investigating the impact of inbound tourism in China's economy. The article "Economic Impact Analysis of Inbound Tourism in China: An Extended Input-Output Model" by Keyang Li is one of them. The author investigated through an extended Input-Output model incorporating in put substitution in a general equilibrium framework. His analysis is based on the China 2007 Input-Output table. The advancement of this methodology is improving the application of Input-Output table. The main finding of this article is that, the contribution of inbound tourist expenditures to the economy is confirmed. It increases domestic production and demand of domestic inputs. Apart from this, output level will go up and more jobs are generated. The increasing of inbound tourism demand also pushed up the general price level of goods and services. Most tourism related sectors will be beneficial, if demand from inbound tourists is higher, like air transport, lodging, entertainment and travel agencies.

The literature showed a broad outlook on China's tourism in the future. This motivated me to do more research on this area. However, if we want to broad our mind, we have to refer more literature but from other angles. There are some other literature, researching on inbound tourism but to different countries, as well as to China, and lots of them provided valuable results and conclusions.

Turkey is a most visited country in middle Asian and far-east. Attribute to its unique cultural and religious advantages, and plus its suitable weather, every year there are plenty of tourists coming for leisure. Literature about Turkish tourism can always be found. In 2004, authors Alper Aslan and Muhittin Kaplan and Ferit Kula also did research in the article "International Tourism Demand for Turkey: A Dynamic Panel Data". They measured the performance of tourist arrivals to Turkey from 9 countries in the period between 1995 and 2004. Their dynamic panel data was estimated by GMM-DIFF estimator proposed by Arellano and Bond. According to them, one main conclusion is that lagged dependent variable showed the significant value, which may be explained as an effect on decision of destination by consumers. The other contribution, in my point of view, is that they concluded that the determinants of tourists who visit Turkey are not determined in Turkey. In other words, the economic conditions of origin countries determine are important factors in

determining amount of tourists in Turkey. Thus, researches on the factors of origin countries will be valuable.

Africa is another popular subject on tourism research, as its potential and undeveloped market. W.A. Naudé & A. Saayman did a research in 2004, and published the article “The Determinants of Tourist Arrivals in Africa: A Panel Data Regression Analysis”. They used observations from 1996 to 2000, which is a quite short period, and obtained different conclusion to other literature. Commonly used variables, like level of income, relative prices and cost of travel are not that significant in their study to explain the demand of tourism. While other typical factors presented within African continent, like political and social instability, structural and institutional weaknesses are strongly suggested to determine the amount of tourists to Africa. Also, among different African countries, the situation varies. The view authors showed, is worthy of recognition, but considering the short time series they used, the results may be improved if further studies.

Gravity model is a widely applied method to estimate the determinants of tourists. It is estimated by various authors on tourism of many different countries. Most of those results showed efficiency and consistency. In the following part of this chapter, I will summarize some literatures estimating determinants of tourists by using gravity model.

The United States is considered as one of the world largest tourism destination, in the paper “Cultural Effects on Inbound Tourism into the USA: A gravity approach” by Christoph Vietze (2008), it is discussed the determinants of inbound tourism arrivals into the USA. The author included and estimated many interesting variables. He used the country to country tourism flow data provided by the World Tourism Organization, with 208 countries of origin and a time period of 5 years (2001-2005), which indicates that his regression analysis contains 1040 independent observations per variable. By running an augmented gravity equation to estimate empirically, the author found the model fits the data very well by 80 percent of data can be explained and most of the estimated variables are statistically significant. More important, the author found that cultural proximity has positive effects on the

tourism flows between country of origin and country of destination. Specifically, people prefer to travel to countries with a similar cultural and political background. People from countries with the same language (English) and same high ranking of the governments are more than other countries. The authors shows a clear and stable evidence that tourists from Christian countries prefer the United States for travelling much stronger than other countries. But may due to the availability of the data, the time periods of the dataset the author used are too short (5 years), which doesn't give us a sufficient support to see the time trends, that is the imperfect part of this study.

In the central Asia, Turkey is an important economy, and tourism is an important sector in Turkish economy. Res.Asst. M. Ozan SARAY and Asst.Prof. Kadir KARAGÖZ (2010) published an article "Determinants of Tourist Inflows in Turkey: Evidence from Panel Gravity Model" in 2010. In order to investigate which factors are significant for tourist inflow, the authors included the economic size, population and distance to estimate. The authors used a panel gravity model distinguished two models by GDP and GDP per capita, with balanced panels of 48 countries and 16 years (1992-2007) of time. They found that population has a negative effect on tourist number, which means Turkey doesn't attracts more tourists from crowed countries, and GDP per capita positively affects the tourist arrivals which indicates that tourism is a luxury good. In their models, distance is a significant factor in explaining the tourist arrivals. The both model they used to estimate, only involved three variables GDP per capita of destination country (Turkey), weighted distance and population into consideration, which is not seen very often in the similar literatures. And that might be affect the effect the contribution of estimation. However the most important result, according to my point of view, is that each variable has a highly significant effect on tourist inflows except the distance if GDP is used, but all variables are significant if GDP per capita is used instead of GDP.

Egypt is one of the most important tourist destinations in the Middle East and North Africa. In the study "The Determinants of International Tourism Demand for Egypt: Panel Data Evidence", Mohamed Abbas Mohamed Ali Ibrahim examined the main

determinants of the international tourism flows to Egypt. The author used annual panel data set includes the number of tourist arrivals from most important generating countries during the period 1990-2008. The explanatory variables involved in this study are income, price, trade openness and special factors which authors used population and exchange rate. The measure for income, authors used GDP per capita, and CPI for the price. The difference to other literatures of this study is the variable trade openness. Based on researches of Turner et al (1998), Turner and Witt (2001), Song and Witt (2003), the author used measure for trade openness as following: $TO_{i,t} = (EX_{i,t} + IM_{i,t}) / GDP_t$. The author estimated Fixed Effects panel estimates by SUR method. The main conclusion obtained is that tourism in Egypt is very sensitive to prices, according to model that estimated value of living cost of tourists in Egypt is -1.96. The shortcomings of this study is that, there was only 8 origin countries estimated, which makes the range of data in too narrowed. It may be of the availability of the data of tourists arriving to Egypt.

There are some papers taking exchange rate into consideration. Azer Dilanchiev (2010) did a research “Tourism Demand in Georgia: Gravity Model Analysis”, estimated GDP per capita, population, CPI, distance and exchange rate, and a interested variable to be noticed is common history as a dummy variable. And this paper estimates tourism demand of Georgia by application of Rodrigue (2004) modified Gravity model and OLS regression analysis based on pooled cross sectional time-series, using data of 33 countries from the year 2000 to 2001, which is granted from Georgian National Tourism Administration Report. He found that Consumer Price Index of Georgia shows that there is a negative relationship between CPI and tourist arrivals. The exchange rates indicates that increase in value of Georgian Lari toward origin countries currency can decrease tourist arrivals. As expected, GDP per capita of origin country shows that tourists will increase as proportionally with GDP per capita. It is in the same way of population variable in the origin country. Since Georgia was one of the member states of USSR, the study attempted to analyze the effect from those countries as they shared common history with Georgia, and the relationship is positive as expected. The data sample is not as broad as other papers since he only used 33 countries to analyze, but this might because of the limit of

Georgian tourism. However, this paper widened and gave us an example of using gravity to analyze tourist flows.

Another study concerned about exchange rate is by Andrew Muhammad (2008) "Determining Tourist Arrivals in Uganda: The Impact of Distance, Trade and Origin-Specific Factors". He estimated the effects of real GDP, distance, trade with Uganda and exchange rates. As wealthier countries have more travelers to go abroad, real GDP is expected to have a positive impact on the number of arrivals. The variable distance is an interesting one to estimate, since the economic situation of most African countries are below the average level. The author expected that international trade would have a positive impact on the number of arrivals from any given country, and exchange rate should be inversely related to the number of arrivals because a weaker currency make visiting Uganda more expensive. He used the data of tourist arrivals from 2000 to 2004 provided by the Uganda Bureau of Statistics, and real GDP and exchange rate provided by the World Bank – World Development Indicators on line database. The distances between origin countries and Uganda are provided by the Travel Distance Calculator online, import and export values were provided by the United Nations Commodity Trade Statistics Database. The results shows that the model can explain about 79 per cent of data. As expected, Real GDP has a positive impact on the number of arrivals from a particular country. The negative estimate is due to Rwanda which is the poorest country of the five neighbors. Distance in the gravity model reflects transportation and travel costs, the impact of distance was negative which is as well as other paper and study. The results show that Uganda's imports (visitor's exports to Uganda) had a larger impact than exports (visitor's imports from Uganda). This is to be expected since Uganda had an estimated trade deficit of $423 million in 2006, and exchange rate was met the expectation. The contribution of this paper is that it shows a evidence that gravity model can well explain the data no matter from bigger countries or small countries, and even if the economy situation of research country is below the average. Another contribution is that it shows distance is still the most important factor of travelling, as most of Uganda's neighbor countries are

developing countries or undeveloped countries, although the time period of data is not broad (2000-2004).

The similar evidence also can be found in Africa. In “The Determinants of African Tourism” Johan Fourie and Maria Santana-Gallego estimated factors that dive African inbound (arrivals to Africa from other continents) and within-African tourism (arrivals from and to an African country). They found that there is no difference between determinants of African-inbound and within-African tourism. The authors established a standard panel gravity equation with 175 origin/destination countries between 1995 and 2008, which means 175 observations and 13 years of time series. Their consideration included GDP per capita, distance between countries, bilateral trade, land area and standard dummy variables. They estimated many interesting variables which are sorted by geography, cultural affinity and development and stability. The authors estimated the determinants of tourist arrivals for the full sample of countries, then they split the sample into OECD destinations and African destinations to analysis similarities and differences between tourist arrivals between developed countries and African continent. The main methods they used are OLS-FE estimator (pooled Ordinary Least Squares, Fixed effects) and SYS-GMM estimator (System-Generalized Methods of Moments). The results showed that the determinants of tourism to Africa are not systematically different from factors driving tourism to other regions. GDP per capita has a positive impact as expected and distance has a negative impact as other literatures, and incomes of origin and destination countries, land size, partnering in a regional trade agreement and sharing a common border, language, religion or former colonial ties all increase tourist arrival to Africa. The study used data of 175 countries which is a large sample compared to other papers, which may provide a convictive result of estimation. However, they included too many variables which may affect accuracy in a contrary direction, as R^2 is always increasing as variables are increasing.

Xiomara Archibald, Jason LaCorbinière and Winston Moore also analysis area’s tourism in their paper “Analysis of Tourism Competitiveness in The Caribbean: A Gravity Model Approach”. Although they estimated competitiveness not

determinants, there still are many valuable results we can use for reference. Their explanatory variables included are distance between the home and destination countries, prices at home, relative prices, bilateral exchange rate of the home and destination country and population size. The data employed in the paper contains 22 countries and 12 years, and they estimated by bot fixed effects (FE) and general method of methods (GMM). The assessment of competitiveness they compared tourist arrivals equilibrium estimated by gravity model and actual tourist arrivals. This way of assessment is not seen in many literatures, and they calculated distance by Great Circle formula which makes distance is unchanged during the time. However, this study still gave us an evidence that the relative destination market price, exchange rate and airfares are important determinants of tourist arrivals.

The main factors affecting tourism not only can be found in countries with big size, but also are proved in countries with small size. Siti Shuhada Ahmad Kosnan and Normaz Wana Ismail estimated "Demand Factors for International Tourism in Malaysia: 1998-2009". They used gravity model approach for the panel data with the data from 29 countries. The variables they considered are distance, transportation cost, exchange rate and cost of living, the dummy variables they used are sharing border and common language. The results of their estimation showed that if market size is larger, the tourist receipt will increase, and the shorter the distance, the lower transaction cost. The coefficient of population is significant and positive, which implied that the greater the population, the greater the tourists to Malaysia. The difference in this literature than other literatures is, the author used pooled OLS and random effects (RE) estimator not pooled OLS and fixed effects estimator (FE). The results in the study are consistent with correctly sign and the level of significant. The vague part in this paper is that the author didn't give a specific formula of calculating distance, as he explained that he used the weighted distance instead of geographic distance.

Most of literatures of tourism determinants analysis focus on the international flows, using displacement of tourists rather than monetary flows. In the study "Spatial pattern and domestic tourism: an econometric analysis using inter-regional

monetary flows by type of journey" by Tamara de la Mata and Carlos Llano, they gave us a different angle of views. The authors developed an econometric analysis of intra and interregional trade flows of the tourism in Spain by means of several specification of the gravity model and three alternative databases containing the monetary flows of 2001 and 2007. His methodology can be concluded to two steps: first "estimating the sector's production for each of the 17 Spanish regions consumed by Spanish residents and not exported abroad", and second "determining for each region the share of this domestic trade corresponding to the intra and interregional trade and the bilateral distribution of the latter". However, from my point of view, the lack of data will deter the accuracy of estimation. And it is very difficult to estimate domestic tourists, as some tourists won't be recorded from either travel agency or bureau, which is also one of the reasons that research on domestic tourism is less than international tourism.

3. Market Description

Tourism in China has development greatly over last twenty years after reform and opening, which is a famous policy made by Chinese government. Recent years, China is becoming one of the world's most popular inbound and also outbound tourist market. This travel boom is sustained by China's historical and geographical attraction itself in one way, and also by easing restrictions on movement to China by Chinese authorities. China's fast growing economy is also fueling the emergence of traveling to China.

From the description of Wikipedia, China is the third most visited country in the world. In 2020, China will become the largest tourist country and the fourth largest for overseas travel, according to the WTO. Also China is expected to grow rapidly in the word from 2006 and on the way to 2015, jumping into the second place for taltal travel spending by 2015.

By latest data from TravelChinaGuide, in 2013, China's tourism industry kept continuously and healthily developing. The total revenue has reached 2,947.5 billion Chinese Yuan (about 491.25 U.S dollars), an increase of 14% than 2012, and provided over 500,000 direct job opportunities. The inbound tourists reached an amazing 129 million people and brought an income of 51.7 U.S dollars. Culture is still the soul of travel. With a history of over 5,000 years and as an ancient oriental giant, China generates a special cultural magnetism to tourists all over the world. Some recent international events, like Beijing Olympics in 2008, Shanghai expo in 2010, further promoted the popularity of China.

In this chapter, I will provide some data and analysis as a glance on China's tourism market. However, since some data of 2013 are not published yet, I will use all data 2012 as a reference to show circumstances of Chinese tourist market.

3.1. Analysis of Tourists Source

In 2012, China's inbound foreign tourist market grew slightly. The entry of foreign visitors throughout the year are 27,191,600 passengers, with an increase of 0.3% over previous year.

Asian markets are still major source markets. It was essentially flat with last year. There were 16,648,800 passengers arriving, accounting for 61.2% of the total inbound foreign tourists. South Korea is the first major immigration source country among Asian countries. The 20 countries have most tourists to China is show in Table 3.1.

In addition to American market's slightly decreasing, other continents' markets remain increasing with varying degrees. Specific conditions are: the entering tourists from European markets are 5,921,600 passengers, increasing 0.2 percent; the entering tourists from American markets are 3,179,500 passengers, decreasing 0.7 percent; the entering tourists from Oceania markets are 914 900 passengers, increasing 6.5 percent; the entering tourists from African markets are 524 900 passengers, increasing 7.4 %.

In the year of 2012, incoming foreign tourists were staying 7.5 days on average in the domestic of China, with an extension of 0.2 days compared to last year, which also made an increase 2.7%; average consumption per capita is 212.75 U.S. dollars per day, with an increase of 1.7% over the previous year, which means 3.53 U.S. dollars.

Table 3.1: Top 20 countries in terms of Tourist inflows (2012)

Rank	Country	Tourist Inflows (in thousand)	Compared to last year （%）
1	South Korea	406.99	-2.8
2	Japan	351.82	-3.8
3	Russia	242.62	-4.3
4	U.S.A	211.81	0.1

5	Malaysia	123.55	-0.8
6	Vietnam	113.72	13
7	Singapore	102.77	-3.3
8	Mongolia	101.05	1.6
9	Philippine	96.2	7.6
10	Australia	77.43	6.6
11	Canada	70.83	-5.3
12	Germany	65.96	3.5
13	Thailand	64.76	6.5
14	Indonesia	62.2	2.2
15	English	61.84	3.8
16	India	61.02	0.6
17	France	52.48	6.4
18	Kazakhstan	49.14	-2.9
19	Italy	25.2	7.2
20	Myanmar	20.59	7.8

Source: China National Tourism Administration

3.2. Classification or tourists

If we classify the tourists by sex (see Appendix 1), we can find that male tourists prefer more travelling to China. The amount of male tourists are almost two times than female. Although the total amount of tourists to China has been increasing, the proportion of male and female kept almost invariably 2:1.

If we classify the tourists by age (see Appendix 2), we can find that tourists from 25 to 44 take the most part, which are almost 50% in total. The second part is people in ages from 45 to 64, which is about 32%. It is logical to see this result, as people from those ages are who has the capability to support the cost of travel and are willing to travel around.

If we classify the tourists by purpose (see Appendix 3), we can find that people visiting China by leisure takes about 42%. After that, people visiting China with business purpose occupied the second place. There is one thing to be noticed,

people visiting China for family or friends are less than 4%. From one angle this suggest that Chinese people have little communication to people from other countries.

3.3. Classification of tourism revenue

If we classify the tourism revenue by transport (see Appendix 4), it will be seen that most popular way of transport is by bus. The second popular transport is by airplane. Compared to other transport (by railway, by car and by ship), by bus and by airplane have absolutely superiority. The total revenue of by bus and by airplane are almost 10 times than other transports.

If we classify the tourism revenue by activities (see Appendix 5), it will be seen that most consuming activity in China is neither by accommodation nor by food, but by buying goods. The consumption on good in China even is higher than the sum of accommodation and food. The cost of tour only can be put on 4th place after those three activities.

3.4. The size and operation of travel agencies

The situation of tourist market can be seen from the situation of travel agencies (see Appendix 6). Attribute to China National Tourism Administration, the operation situation of travel agencies are summarized as following.

By the end of 2012, there were 24,944 travel agencies in the range of the whole country, which was increased 5.3% over the previous year.

By the end of 2012, the total assets of agencies in the range of the whole country is 83.955 billion Chinese Yuan (about 12 billion U.S dollars), which is increased 18.1% than previous year. The total operation income of various types of travel agents achieved 337.475 billion Chinese Yuan (about 48 billion U.S dollars), which is increased 17.5% than previous year. Business tax and surcharges reached 1.471 billion Chinese Yuan (about 0.2 billion U.S dollars), increasing 12.6% compared to previous year.

In 2012, entire travel agencies attracted 16,436,400 inbound tourists and 6882.70 million man days, increased 13.0% and 11.3% than previous year respectively. There

were 23,666,100 inbound tourists and 7771.86 million man days received through travel agents, increased 3.8% and 8.5% than previous year respectively.

In 2012, entire travel agencies organized 143,686,400 overnight visitors and 43,423.72 million man-days in domestic, increased 4.8% and 21.1% than previous year respectively. And there were 163,034,900 overnight and 38,407.67 million man-days served through travel agencies, decreased 3.5% and increased 14.1% than previous year respectively.

3.5. Size and operation of star hotels

Just as the size and operation of travel agency can tell the situation of travel market, the size and operation of star hotel can reflect the situation as well (see Appendix 6). Summarized the information from China National Tourism Administration, the size and operation of star hotels are showed as following.

As the end of 2012, there were 12,807 star hotels included in the management system of national star hotel statistics, 11,367 of which completed reporting statement of financial position of 2012 and were administrated through the provincial tourism administration department.

By the end of 2012, those 11367 star hotels contain 1,497,200 rooms and 2,677,400 beds; possess fixed assets of 476.754 billion Chinese Yuan (about 68 U.S dollars). Total operating income reached at 243.022 billion Chinese Yuan (about 34.7 U.S dollars), business taxes were paid at 15.295 billion Chinese Yuan. The average room occupancy rate of the whole year is 59.5%.

Among those11367 star hotels, there were 640 five-star hotels, 2186 four-star hotels, 5379 three-star hotels, 3020 two-star hotels and 142 one-star hotels.

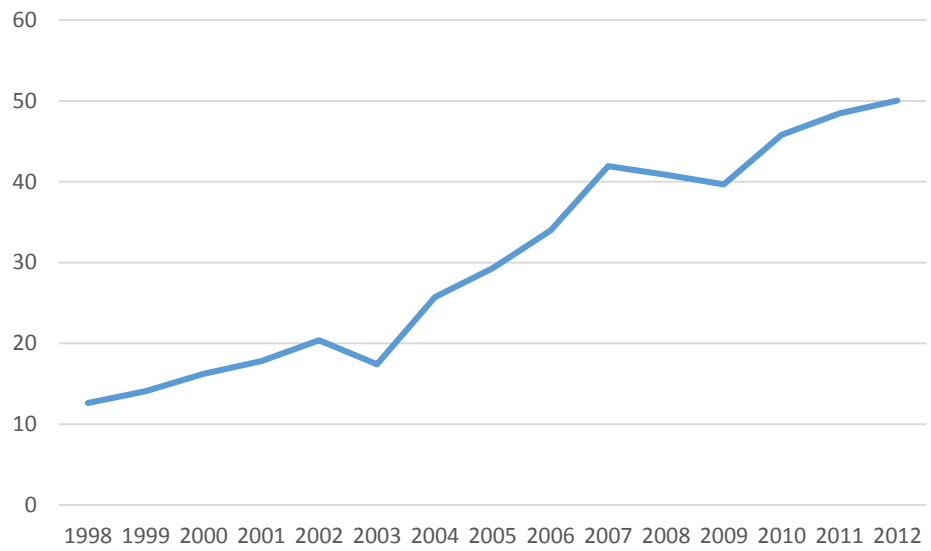
3.6. Tourism in China’s economy

As introduced in previous paragraphs, China’s tourism market has been greatly developing and will keep developing in the future. Owing to limitation of space of this study, I couldn’t narrative market’s development in more years, but 2012 is enough to be a good example to infer the situation in other years, since China’s tourism kept developing then situation of every year is similar.

By the end of this chapter, I will mainly analysis the role of China's tourism (mainly international tourism, which is concerned to the study) in the China's economy. As China's tourism and China's economy both was growing rapidly during last two decades, it is important to know relation between them two, like do they grow synchronous, or with a proportion?

The revenue of international tourism to China has an enormous development during last 15 years (see Figure 3.1). The total revenue of 2012 is 4 times than 1998, which reaches 50 billion U.S. dollars. On the whole, the revenue of international tourism has been increasing although there were two troughs in this time period.

Figure 3.1: International Toursim Revenue (in billion U.S dollars)



Data: National Bureau of Statistics of China

Tourism has become an importance-gaining in China's economy, but it cannot be said that China already fully used her tourism potential which stems from her geographical and historical wealth. Although the amount of tourist arrival to China and tourism revenue both grow rapidly, it still doesn't take too much share in China's economy. Even the share of tourism sector in China's economy has been decreasing, comparing the boom of China's economy (see Table 3.2). However, this

also can be explained that potential of China's tourism market is still undeveloped. To activate China's tourism market may bring out tremendous revenue in the future.

Table 3.2: Share of Tourism Sector in China's Economy

	TR	GNI	TR/GNI	EXP	TR/EXP
1998	12.602	1002.817644	1.26%	207.4255	6.08%
1999	14.099	1068.80823	1.32%	220.9639	6.38%
2000	16.224	1183.809061	1.37%	279.5611	5.80%
2001	17.792	1305.634057	1.36%	299.4077	5.94%
2002	20.385	1438.882453	1.42%	365.4104	5.58%
2003	17.406	1630.740291	1.07%	485.0271	3.59%
2004	25.739	1926.51272	1.34%	658.3054	3.91%
2005	29.296	2240.7939	1.31%	836.6223	3.50%
2006	33.949	2707.808533	1.25%	1061.475	3.20%
2007	41.919	3502.096604	1.20%	1341.649	3.12%
2008	40.843	4550.40732	0.90%	1581.808	2.58%
2009	39.675	4981.701437	0.80%	1333.196	2.98%
2010	45.814	5904.605992	0.78%	1743.377	2.63%
2011	48.464	7251.60377	0.67%	2088.956	2.32%
2012	50.028	8187.34936	0.61%	2248.388	2.23%

Note: The data of tourism revenue is from National Bureau of Statistics of China, the data of GNI and EXP are from database of the World Bank

1) TR: Annual tourism revenue, in billion USD
2) GNI: (formerly GNP) is Gross National Income, in billion USD
3) Ratio of tourism revenue to GNI
4) EXP: Exports of goods and services, in billion USD
5) Ratio of tourism revenue to exports

The revenue of China's tourism has never been bigger than 1.5% of GNI in last 15 years, in last 5 years the share of tourism revenue even dropped to less than 1%. It is more hyperbolic if compare China's tourism revenue to China's exports. Before 15

years, tourism revenue weighted more than 6% of China's exports. It slide down to 3% 5 years ago, in the year of 2012 it even fell to a bit more than 2%.

The data suggest the unbalanced developed between China's tourist market and China's economy. Considered China's geographical and historical advantages, the development of China's tourist market actually is still at the low level. As some Chines researchers analyzed, this is because of government paid less attention to tourism, and invested few on basic constructions. Another reason is market service is in scarcity, service personnel is lack of training with relative skills.

Export is always thought of the main source of China's economy, and the good or bad of China's economy largely depends on the exports. As China's export is gradually stagnating recently, to active and develop China's tourism market may lead to new boom of China's economy.

4. Data

In this chapter, I will describe the data I collected to estimate and basic facts of variables in the equation.

The most important variable is tourism inflows, which is tourist arrivals (total annual) to China collected from National Bureau of Statistics of the People's Republic of China.

And the second important variable distance between countries, which is collected from the database of Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)

GDP, GDP per capita, exchange rate, population and PPP conversion factor are obtained from database of the World Bank.

The weighted distance are calculated based on the variable distance and GDP mentioned above.

Therefore, the panel data includes 22 countries (see Appendix 7) and 15 years (1998-2002), which means 330 observations in total. The independent variable in this study to estimate is the tourism inflows to China, and dependent variables are: GDP per capital, Exchange rate, Population, PPP conversion factor and weighted Distance.

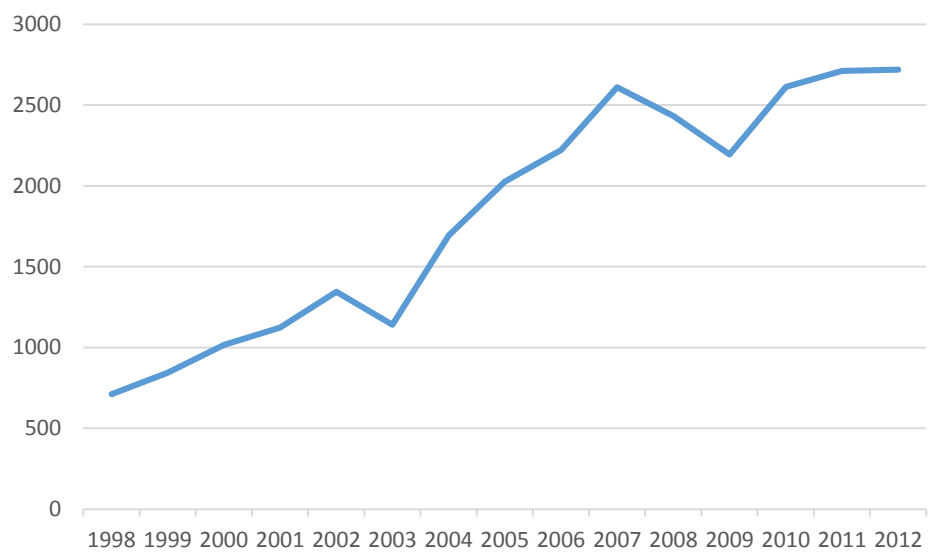
A short panel has many entities (large n) but few time periods (small T), while a long panel has many time periods (large T) but few entities (Cameron and Trivedi, 2009: 230). In this study it is long panel. In a balanced panel, all entities have measurements in all time periods. In this study it will be balanced panel data, as all variables for all countries during whole time period are obtained.

4.1. Tourists

The tourists visiting China by countries from 1998-2002 are shown in Appendix 8.1-8.3. The tourists to China of the Democratic People's Republic of Korea, play an important role among all other countries, but not so important among Asian countries. However, since the limitation of other data (only population among other variables in this study can be found) of the Democratic People's Republic of Korea, I have to omit the Democratic People's Republic of Korea in the regression.

The total tourist inflows to China in last 15 years has a huge development (see Figure 4.1), contributed to China's fast developed economy and the continuity of reform and opening policy from 1978. According to the data obtained from National Bureau of Statistics of China, the total amount of tourists 2012 is nearly 4 times to 1998, which is really a huge increasing. During this period, there was two fall among the progress of total amount climbing. One of them was in 2008, there was about 7% less than 2007, and it kept decreasing in 2009. If we look through the whole economic atmosphere, we can find that this is the time when the Great recession happened. It is obviously that tourists to China were effected, either tourists from every continent or total amount are reduced. But the decrease didn't last too long, it was recovered soon in 2012 which was back to level of 2007.

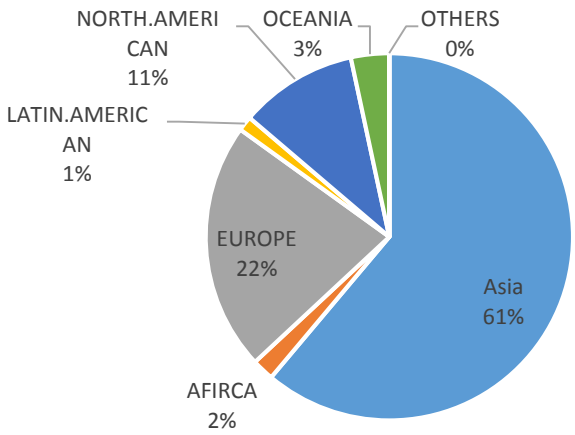
Figure 4.1: Total International Tourists to China (in 10,000)



Data: National Bureau of Statistics

The main source of Chinese tourist inflows is Asian countries. The tourists from Asia was contributing about 60% of total international tourists during these 15 years, and the amount was keeping in a stable status. The distribution of tourists' amount according to continent are nearly keeping stable as well, we can take the latest data (2012) as a reference (see Figure 4.2). The tourists from Europe occupied one fifth in total amount, which is the second largest tourist source although the difference to Asian countries are huge. The tourists from Europe and Asia took more than 80% of the total amount, which means, the tourists from other continents (American, African, Oceania) took even less than 20%. It is surprised that other continents have so few tourists to China, especially North American's two very developed countries – Canada and U.S.A.

Figure 4.2: The distribution of tourist to China in 2012 (in continent)



Data: China National Toursim Administration

4.2. Distance

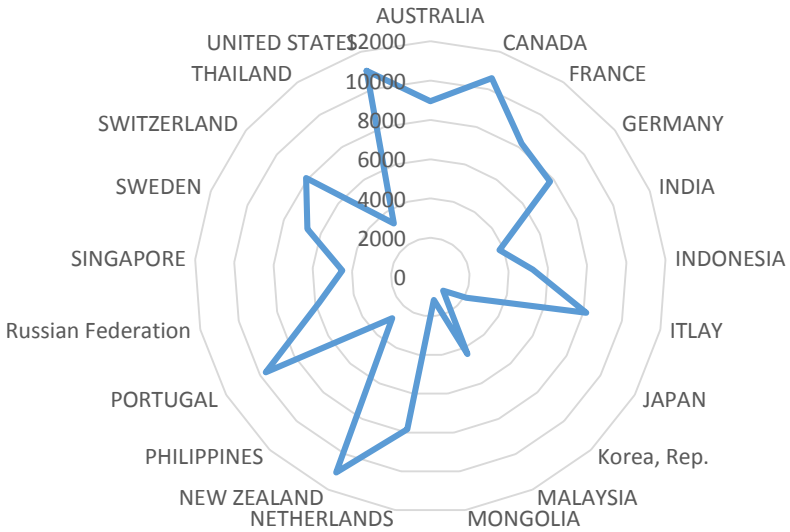
The data are collected from Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). The distance of all main tourists source countries are shown in Appendix 9.

The original data is generated by Mayer and Zignago (2005) to analyze market access difficulties in global and regional trade flows. Their research provides useful data for empirical economic research including geographical elements and variables. The common use of these files is the estimation by trade economists of gravity equations describing bilateral patterns of trade flows. There some other fields than international trade using the data set, like researchers interested in explaining migration patterns, international flows of tourists or telephone traffic, etc. The data in this study is from the set *GeoDist*, which can also be found online (http://www.cepii.fr/anglaisgraph/bdd/distances.htm).

There are two kinds of distance measures according the researchers: simple distances, for which only one city is necessary to calculate international distances; and weighted distances, for which they need data on principal cities in each country. The simple distances are calculated following the great circle formula, which uses latitudes and longitudes of the most important city (in terms of population) or of its official capital. In this study, the data of distance used is from the first kind, but the weighted distance in this study will be calculated with GDP, the way of calculating weighted distance has specific description in the chapter of methodology.

Especially in this study, the distance to China of all countries which are involved in the data set are shown in Figure 4.3. The average distance of Asian countries is around 3000 kilometers. However the farthest countries to China are Canada and the United States, which have over 10,000 kilometers far. And the nearest country is Korean Republic, which only has 955 kilometers distance.

Figure 4.3: The distance between departure counties and China



Data: Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)

As the most important factor in gravity model, the effect of distance has been proved by plenty of literatures. The proof is either obtained by estimation in bilateral international trade or in international tourism. The general description is, as distance is lengthening, the communication either in business or culture between two countries is becoming less. Therefore, the hypothesis for distance is, **the distance between China and other countries has a negative impact on amounts of incoming tourists**.

4.3. GDP

The data of GDP is taken from the database of the World Bank.

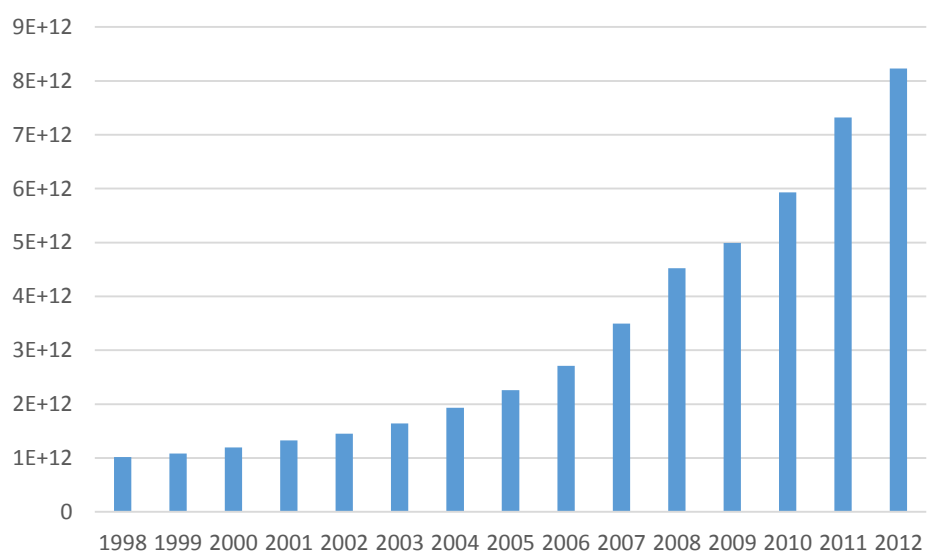
GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official

exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

According to description in the chapter 3, GDP will be used to calculate the weighted distance with the data of geographic distance. The aim of using GDP is to make the variable distance as a dynamic variable during time series. The details of GDP by countries are shown in Appendix 10.1-10.3.

The China's economy has been developing in a fast speed those years, especially after the 21th century. Figure 4.4 shows the development of China's GDP development. According to the data obtained and excluding other factors (money growth, inflation, etc.), the average GDP growth is surprisingly up to 16.6% in the period of 1998-2012. The speed is even higher after the year 2002, which is reached at 19.9%. During this time, the Chinese government has been persisting in open-door economics and after 15 year's growth, the GDP of China in 2012 is 8 times than1998, which is an enormous progress. The China's economy was not stopped obviously, even the Great recession happened in 2008.

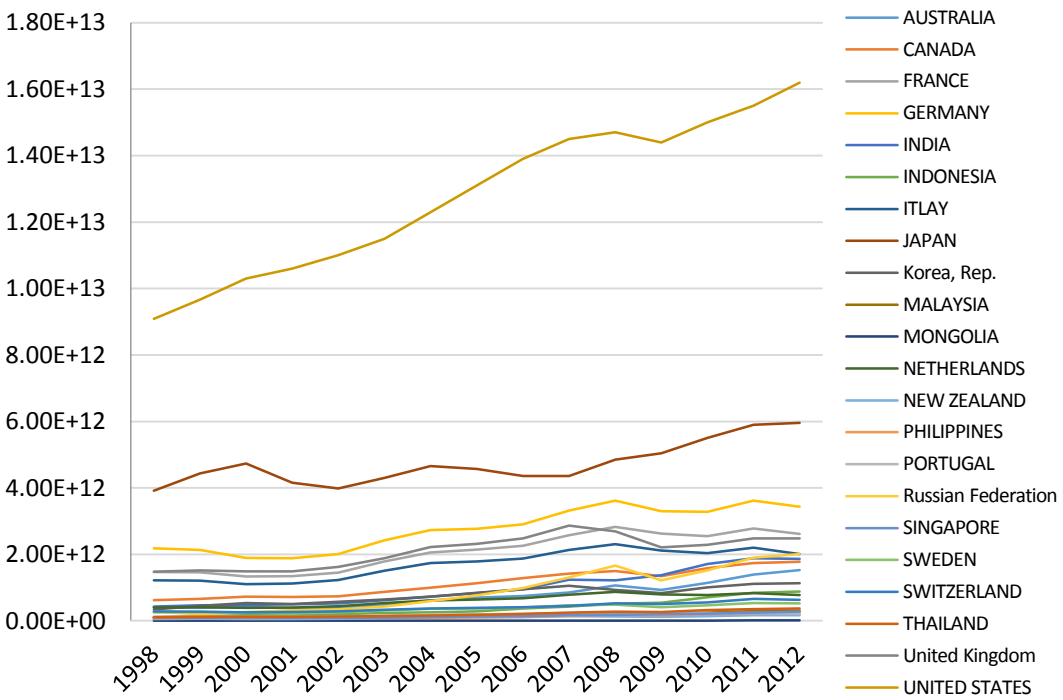
Figure 4.4: GDP development of China



Data: The World Bank

Other countries also have development during last 15 years (see Figure 4.5). In the country list of this study, most Asian countries have more development than other developed countries. Like India, Korea, Malaysia and Thailand, they all have 2 or 3 times development than 15 years. Indonesia and Mongolia even have 8 times growth than before, which is really a huge progress. In contrast, most European countries only have 0.5-1 growth speed in last 15 years. Australia and Canada have better situation, they both have about 2 times growth.

Figure 4.5: GDP development in last 15 years



Data: The World Bank

4.4. GDP per capita

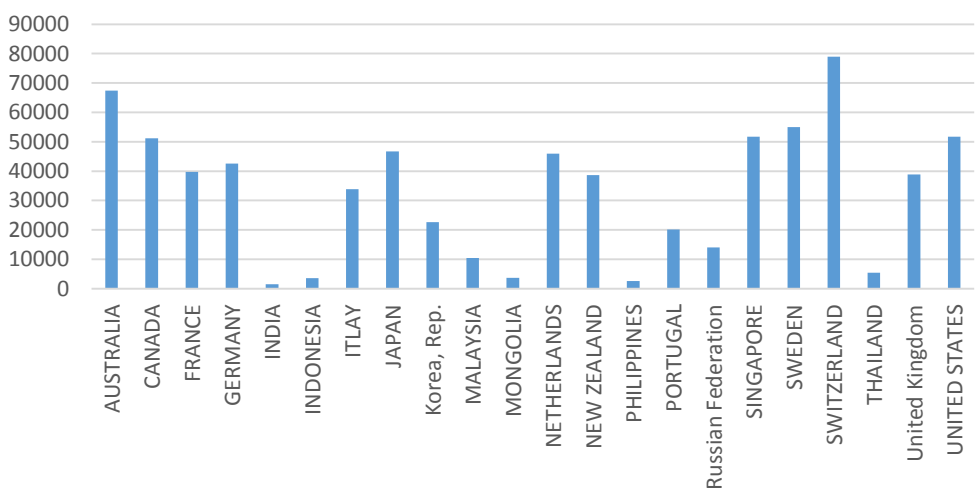
The data of GDP per capita is taken from the database of the World Bank (Appendix 11.1-11.3).

GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.

The GDP per capita is selected as a measurement of income. From the literature viewed in the previous chapter, income is an important factor affecting the amount of tourists. After satisfying basic demand (food, accommodation), income can be delivered to satisfy other demands of people, such as investment or interests. Travelling can be considered as a demand of interests than basic demands. Thus, the people with more income, are more willing to travel abroad. It is also assumed in this study, that income will have a positive effect on the amount of tourist inflows.

Taken GDP per capita of 2012 as an example, the income level of each countries can be seen in Figure 4.6. The highest income is in the Switzerland, which is 78927 US dollars, and the second highest income is in the Australia. The lowest income level is in the India, which is only 1503 U.S. dollars. The most of Asian countries (except Japan, Korea and Singapore) in the list have much lower income level than other countries, and the difference between them are extremely huge.

Figure 4.6: GDP per capita 2012



Data: The World Bank

The selection of GDP per capita mainly has two considerations. Firstly, in some literatures, other variables are significant when estimated by GDP per capita but not GDP. Secondly, GDP per capita is more precise to describe people's income level than GDP. Especially concerned to tourism, it is more like an individual decision, thus GDP per capita will be better used. In this study, the hypothesis about GDP capita is, **the country with higher GDP per capita will have more tourists to China**.

4.5. Exchange rates

The data of exchange rate are taken from the database of the World Bank (Appendix 12.1-12.3).

Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).

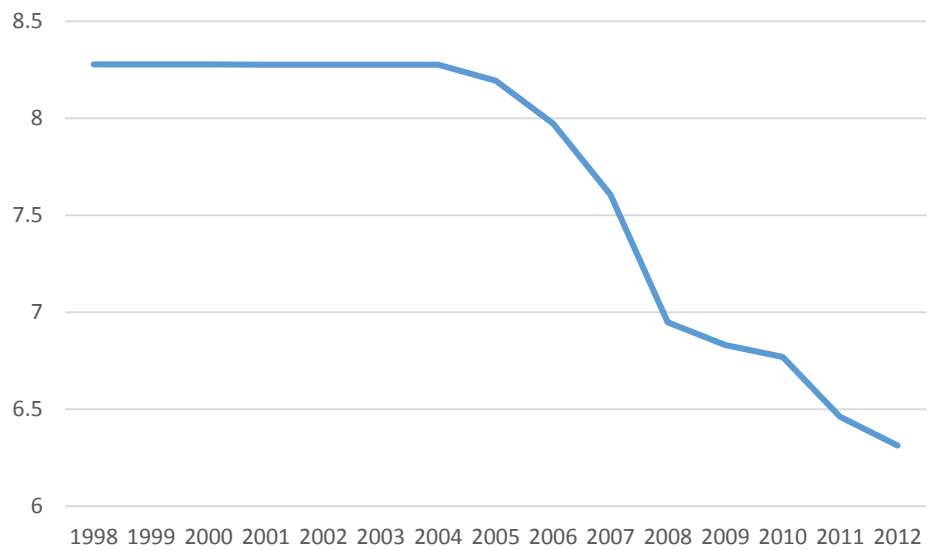
Due to the data availability, it is difficult to obtain exchange rates of all currencies involved in this study against Chinese Yuan. Therefore, we have to use the exchange rates of all currencies against the U.S dollars. This is not the perfect situation for the estimation, but since law of arbitrage, the exchange rates we used should keep consistency to the exchange rates of all those currencies involved against Chinese Yuan.

We can see how Chinese Yuan vary during these period from Figure 4.7. China began floating exchange rate regime since 21th July, 2005. The floating exchange rate brought an obvious effect on Chinese currency, which is also can be seen in the graph. The exchange rate of Chinese Yuan kept same before the reform of the exchange rate system, but after 2005 Chinese Yuan kept appreciating with an average yearly speed of 3%. Every following years, the Chinese currency reaches a highest point that last year. And in the time series of this study, the Chinese Yuan

reached at the highest point in 2012. The total appreciation is nearly 30% since 2005.

However, the amount of tourist inflows haven't been decreasing in this period, if we only considerate the exchange rate.

Figure 4.7: Exchange rate of Chinese Yuan



Data: The World Bank

As an index of cost at destination, varying of exchange rate may affect obviously on people's decision. Especially after Chinese reform on exchange rate regime, Chinese Yuan has keeping appreciating continuously. The appreciation of Chinese Yuan will directly impact on tourist's total cost, most of household will consider this factor before making plan. If the exchange rate vary too much, they may give up the plane to China but find a similar destination to substitute. Thus, the hypothesis is, **the appreciation of Chinese currency will deter the amount of tourists to China.**

4.6. Population

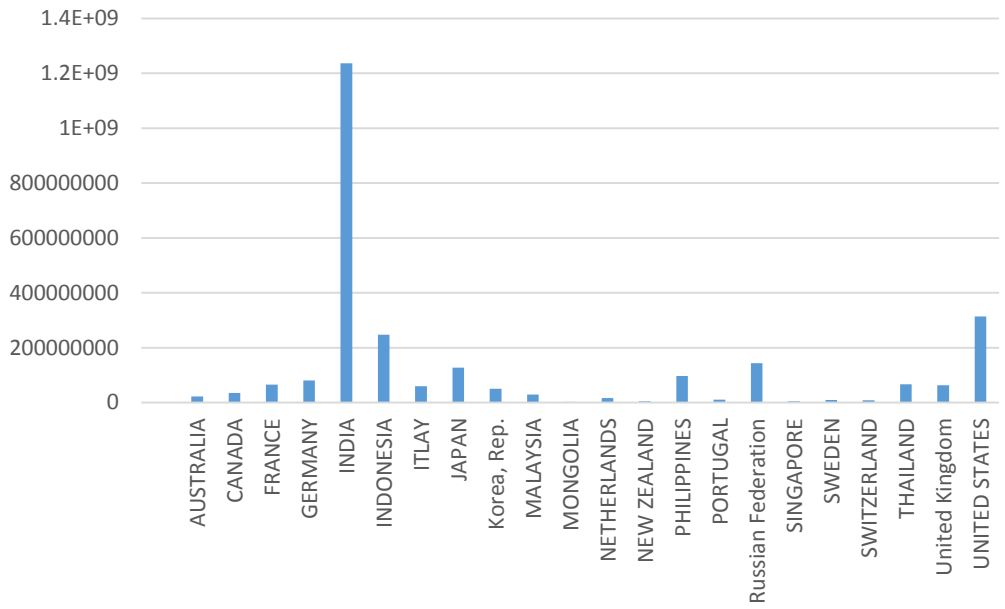
The data of population is taken from the database of the World Bank (Appendix 13.1-13.3).

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. The values shown are midyear estimates.

The amount of arriving tourists are based on the domestic population, if a country has an increasing population, the amount of travelling tourist will increase as well. It is estimated in the other literatures, which are mentioned in the previous chapter, that population of domestic countries will have positive effect on tourist inflows of estimating country. Therefore, in this study it is also assumed that population of those visiting countries and tourist arrival in China will move in the same direction.

Taken the population of 2012 as an example (see Figure 4.8). Most of countries in the list have population less than 0.2 billion, only Indonesia and the United States have more but not much more than 0.2 billion population. However India has 1.24 billion population, which are much more than other countries in the list. Almost all the countries have a growth during last 15 years, India and Indonesia both have 1.3% average growth speed in the last 15 years which is fastest. But Germany and Russia have a negative growth, which are -0.13% and -0.15%.

Figure 4.8: Population of Countries in the list in 2012



Data: The World Bank

The tourist amount from one country are based on the domestic population. If the population of one country is increasing, the amount of tourists will be increasing in the theory too. Although population growth and tourists growth may be not proportional. Thus, the hypothesis is, **more populated country has more tourists to China**.

4.7. PPP conversion factor

The data of PPP conversion factor is taken from the database of the World Bank (Appendix 14.1-14.3).

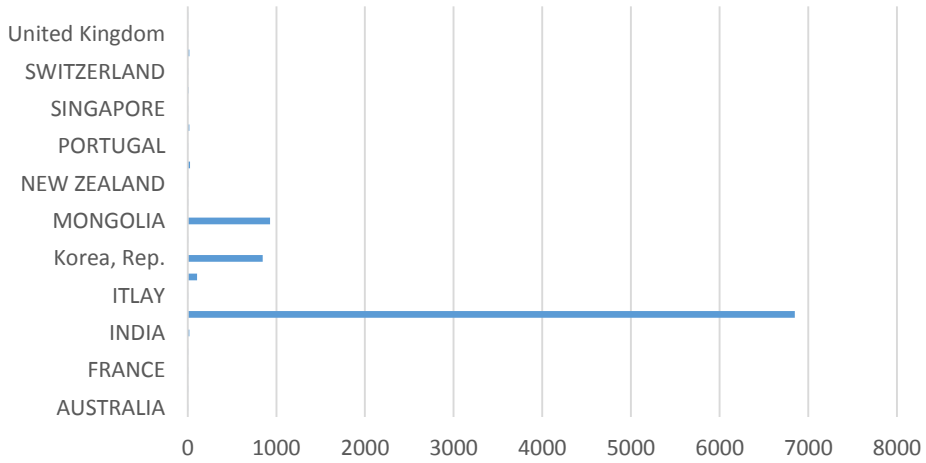
Purchasing power parity conversion factor is the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as U.S. dollar would buy in the United States. This conversion factor is for GDP. For most economies PPP figures are extrapolated from the 2011 International Comparison Program (ICP) benchmark estimates or imputed using a statistical model based on the 2011 ICP.

The selection of PPP conversion factor is considered as a variable of price level. If we consider international tourism as a product, the cost or the price must be considered. The cost of travelling to a new place can be considered as the contract of price levels. The cheaper the price of destination, people are more willing to travel there. Thud we involved PPP conversion factor as a variable. As price takes reverse effect on the demand, therefore high price level in the destination will deter people from travelling into this country.

Due to the data availability, it is hardly to find the factor which is the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as China. However, the price level should keep same although the data is taken as in U.S domestic market as the reference.

Taken the PPP conversion factor of 2012 as an example, the price level of each countries can be seen in Figure 4.9. Most of European countries except Sweden, as well as Canada, Singapore and Oceania countries (Australia, New Zealand) have the similar price level, PPP conversion factors are around 1. Some European countries even have higher price level, but in contract, most of Asian countries' price level are lower. India, which has PPP conversion factor at 6847, has the lowest price level in the country list, and Portugal (0.60) has the most expensive price level.

Figure 4.9: PPP conversion factor of countries in the list in 2012



Data: The World Bank

If local people from one country have more purchasing power, they would like to go abroad to achieve their power. Conversely, if local people find that they have less purchasing power, they would prefer to stay in domestic country. Thus, the hypothesis is, **the country with higher PPP conversion factor will have less tourists to China**.

4.8. Description of variables

The target countries of this article are 22 and all over the world. Among them, there are 9 Asian countries, 9 European countries, 2 Northern American countries and 2 Oceania countries.

The econometric model employed by this study, including following variables: Tourists, GDP per capita, Exchange rate, Population, PPP conversion factor and Weighted Distance, and all variables are in the form of logarithm. Due to availability of data and avoiding an unbalanced panel data, I am able to collect only annual values in period of 1998-2012, but because of missing data of most variables for North Korea, I just omit it from the estimation at the beginning.

The descriptive statistics of all variables are shown in Table 4.1.

Table 4.1: Descriptive statistics of all variables

	Min.	1st Qu.	Median	Mean	3rd Qu	Max
Tour	2.28	16.71	41.82	71.36	74.65	477.71
GDPpc	425.4	4121.5	23687.0	23875.8	37843.8	83087.1
EX	0.500	1.000	3.278	545.392	44.291	10389.938
POP	2.36E+06	1.05E+07	5.35E+07	1.14E+08	8.54E+07	1.24E+09
PPP	0.605	0.941	1.510	263.978	17.338	6847.467
WDIST	22.5	184.2	388.0	424.9	629.0	1210.0

From 1998 through 2012, the mean amount of country-specific arrivals in China was 71.36. The highest inflow of arrivals from any country was 477.71 and the lowest

was 2.28. The mean GDP per capita of all countries is 23875.8, but the highest is 83087.1 and lowest is 425.4. The minimum exchange rate for all countries was 0.500, which indicated the highest valuable currency, and the maximum exchange rate was 10389.938 which indicated the lowest valuable currency. The most population of all countries during this time period is 1.24E+09, while the least population is 2.36E+06. Highest value of PPP is 6847.467 of all countries, which indicated a relative high price level in the locality, while the lowest is 0.605 which indicated a relative low price level in the locality. The maximum distance between China and the origin countries, weighted by GDP, is 1210.0 and the nearest country was 22.5. The mean distance from all countries, weighted by GDP, is 424.9.

5. Methodology

To analysis the determinants of tourist arrivals to China, we will set up an equation with tourism inflows as a dependent variable by gravity model in this study. In this chapter, we will mainly discuss the features of the gravity equation reach to equation use to estimate concerned to this study.

The original gravity model is founded by Newton, appeared in the Newton's law of Universal Gravitation. Newton's law of gravity in physics represent that two bodies are subject to a force of attraction which depends positively on the product of their masses and negatively on their distance. The definition of gravitation is the physical force that increases with mass and decreases with distance. In physics, the gravitation force between two subjects is given as:

$$F_{ij} = G\frac{m_i m_j}{r_{ij}} (1)$$

where:

F is the force between the masses,

G is the gravitational constant,

m_i is the first mass,

m_j is the second mass, and

r is the distance between the centers of the masses.

In economics, the gravity model is widely used and a common workhorse in various kinds of empirical issues. The gravity model has long established history not only because of its strong empirical success, but also because of it is easily to understand and practice. The main application of gravity model is to estimate the bilateral relationship and which is reversed by the distance between two countries, such as trade flows, transportation, migration, tourism or other economic or non-economic

activities. TImbergen (1962) firstly used gravity model to estimate bilateral trade and developed it in the common form stated as below,

$$T_{ij} = A\frac{Y_i^{\beta_1} Y_j^{\beta_2}}{D_{ij}} \quad (2)$$

where:

T_{ij} is the trade volume between country i and j,

A is proportional constant,

Y_i and Y_j are economic sizes of country i and j respectively (common in GDP or GNP),

D_{ij} is the distance between origin country and destination country.

The basic assumption of the equation is that there is positive relation between bilateral trade and GDP while negative relation between bilateral trade and distance. Linneman (1966) provided theoretical background and proposed to include tariff barriers and transportation cost.

Anderson (1979) was the first author who provided a theoretical framework for the gravity model can be derived from different theoretical models, he also noted that gravity model producing a good fit when estimating trade issues related to good or other factors moving across the border. And Bergstrand (1985) provided empirical evidence that gravity model is a reduced form of a general equilibrium subsystem in which countries' income represents the productive capacity of the exporter and the absorptive capacity of the importer and distance approximates transport costs.

In order to estimate tourism demand, Rodrigue (2004) used modified Tinbergen gravity model. Some adjustment was made, variables are converted to suit the tourism related variables. The model modified by Rodrigue is as following:

$$TD = K\frac{m_i m_j}{D_{ij}} \quad (3)$$

where:

TD is tourist arrival from country i to country j,

K is constant

M_i is a factor to generate movement of international tourism,

M_j is a factor to attract movement of international tourism,

D_{ij} is the distance between origin country I and destination country j.

Concerned to tourism demand, there are many measurement in the literatures, which also means the dependent variable in the equation, such as the number of international tourist arrivals, revenue from tourists or the number of nights spent by tourists. It is argued by Song and Li (2008), that the most popular method is to use the number of tourist arrivals.

Recently, gravity model is widely used to investigate the role of tourism in the international tourism empirical literature. Based on the theories and equations mentioned above, the general specification form of the gravity model is as following:

$$TA_{ij} = \propto_0 (Y_i)^{\alpha_1} \left(Y_j\right)^{\alpha_2} \left(D_{ij}\right)^{\alpha_3} f(A_{ij}) u_{ij} \quad (4)$$

where,

TA is dependent variable stands for amount of tourist arrivals from country i to country j in year t,

Y_{it} is the GDP of origin country i in year t,

Y_{jt} is the GDP of destination country j in year t,

D_{ij} is the geographical distance between country i and country j,

A_{ijt} are additional explanatory variable with variation in all three dimension i, j and t

But noticed, given the large cross section relative to the number of years, the inclusion of China's GDP will cause a singularity problem. Thus, China's GDP will be

excluded from the model. Then for estimation purpose, equation (4) is transferred to linear equation form of natural logs as expressed:

$$\ln TA_{ij} = \propto_i + \lambda_j + \delta_t + \propto_1 \ln Y_{it} + \propto_2 \ln D_{ij} + \propto_{ijt} A_{ijt} + u_{ijt} \quad (5)$$

Variables α, λ, δ represent the country and time fixed effect, and u represents the white noise disturbance term.

As some authors have already proved, that if GDP per capita used instead of GDP, all other variables will have significant effect on tourist inflows. Thus, variable GDP will be replaced to GDP per capita in the equation we use.

Especially in this study, origin country denotes to those countries which have visitors to China and destination country stands for China. Distance is indicated to the distance between those origin countries and China. Additional explanatory variables are GDP per capita, exchange rate, population and PPP conversion factor. The selection of those variables are based on the literatures which are mentioned in former chapter.

Therefore, the model based on the Gravity model will be used in this study for Chinese Tourism demand is as following:

$$\ln TA_{it} = \propto_0 + \propto_1 \ln GDPpc_{it} + \propto_2 \ln EX_{it} + \propto_3 \ln POP_{it} + \propto_4 \ln PPP_{it} + \propto_5 \ln D_{ij} + \varepsilon_{IT} \quad (6)$$

where,

TA_{it} is the amount of tourist arrivals from Country i to China,

$GDPpc_{it}$ is Gross domestic product per capita of country i in year t,

EX_{it} is exchange rate of country i in year t,

POP_{it} is population of country i in year t,

PPP is purchasing power parity conversion factor of country i in year t.

D_{ij} is the distance between country i to China

In the model of this study, the subscript "i" denotes origin countries and subscript "j" stands for China.

If we look through those variables in the equation, we can find that almost all variables are varied along with the time except distance. As a non-economic variable, distance between countries won't be changed unless crustal movement happens. This is also a most controversial part of gravity model. Although it won't be a problem in cross section analysis, it will cause trouble when time dimension entered (i.e. panel-data). To overcome this difficulty and to make distance a time-varying variable, several literatures suggested approaches. In this study, the variable distance will be adopted as following:

$$WD_{ijt} = \frac{(D_{ij} \times GDP_{it})}{\sum GDP_{it}} \quad (7)$$

where,

WD_{it} is weighted distance of country i to China in year t,

D_{ij} is distance between country i to country j,

GDP_{it} is Gross Domestic Product of country i in year t.

Thus, the final equation will be used is as following:

$$\ln TA_{it} = \propto_0 + \propto_1 \ln GDPpc_{it} + \propto_2 \ln EX_{it} + \propto_3 \ln POP_{it} + \propto_4 \ln PPP_{it} + \propto_5 \ln WD_{ij} + \varepsilon_{IT} \quad (8)$$

In the literatures, pooled Ordinary Least Squares (OLS) is commonly used of empirical research on gravity equations. But an often described problem of pooled panel estimation, is the problem of omitting variables. Despite this, we still have to use full pooled panel because of country and time constant variables must be included in the structure of gravity approach.

However, if unobserved heterogeneity is assumed, a simple OLS regression will not show consistent results to interpret them and this methodology will provide inconsistent and inefficient estimates. The fixed-effects (FE) will offer more suitable estimation in this case. Because the OLS estimates are biased and inconsistent in case the model has fixed effect, LSDV (Leas Squares Dummy Variable) and within estimation will be used to estimate.

Although those countries involved are linked to each other more or less, there are many difference among them implying variation of the factor's impact on amount of tourists to China. These variations can arise due to specific characteristics as tourism-specific factors of management, preferences, foreign exchange regimes, etc. By running a Random Effects model we will see if there are unobserved group-specific effects uncorrelated with the explanatory variables.

Beside those models, we will test which model is better to suit our data, among pooled OLS, Fixed Effects or Random Effects. F-test will be used to compare OLS and Fixed Effects model. The null hypothesis for F-test in order to identify the model that best fits the data is: there are not significant effects, which means OLS is better. If we have to reject the null hypothesis, then it suggests us that Fixed-Effects model suits our data better.

Hausman's Specification Test is commonly used to differentiate between Random Effects and Fixed Effects in panel data. If the null hypothesis is true, RE estimator is consistent and efficient, FE estimator is consistent but inefficient. If the alternative hypothesis is true, RE estimator is inconsistent, FE is consistent. In other words, Random-Effects is preferred under the null hypothesis due to higher efficiency, while Fixed-Effects is preferred at least consistent under the alternative.

Further, if we need to compare OLS and Random Effects, Breusch and Pagan Lagrange Multiplier test is designed to test. The null hypothesis in the LM test is that variances of groups are zero. This is, no significant difference across units (i.e. no panel effects). If the null hypothesis is not rejected, OLS is appropriate.

6. Result

As mentioned in the previous chapter, it is impossible to obtain most of data of North Korea, so I have to omit North Korea in the empirical test although the tourists from North Korea play an important part in total tourist inflows to China. Therefore, the estimation is built up with a balanced panel data of 22 countries and 15 time periods. In this chapter, I will mainly describe the empirical results employed in R studio.

To see which panel data methods describe the data consistently, I have to regress variables and apply some specific tests. First of all, the pooled OLS estimation is employed and details of results are shown in Table 6.1. Surprisingly, all variables are significant in the regression. There are about 40 per cent data can be explained by the model (R-Squared equals to 0.43, adjusted R-Squared equals to 0.42). All variables -- GDP per capita, exchange rate, population, PPP conversion factor and weighted distance are significant at 1% level. From the result, we can conclude that 1 per cent increase in GDP per capita of origin countries will lead to 0.33 per cent more tourists to travel to China. If exchange rate goes up 1 per cent, it will diminish tourist amount by 0.33 per cent. As population growth in origin countries, tourists visiting China will grow as well. An additional 1 per cent of population will increase tourists by 0.39 per cent. The result of PPP conversion factor is not as expected, the positive coefficient of this variable indicates as PPP conversion factor increasing, the tourists will be increasing. However, the most important variable distance is as same as expected. The negative coefficient indicates that as lengthening as the distance, the amount of tourists will be reduced. In the case of this study, 1 per cent increase in distance will cause 0.57 per cent decreasing of tourists.

Table 6.1: pooled OLS

```
Oneway (individual) effect Pooling Model

Call:
plm(formula = lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST,
    data = newdata.set, model = "pooling", index = c("Country",
        "Year"))
```

```
Balanced Panel: n=22, T=15, N=330

Residuals :
   Min. 1st Qu.  Median 3rd Qu.    Max.
-2.3400 -0.6650  0.0396  0.6450  2.0500

Coefficients :
             Estimate Std. Error t-value  Pr(>|t|)
(Intercept) -3.124636   0.959569 -3.2563 0.0012482 **
lnGDPpc      0.325663   0.056871  5.7263 2.342e-08 ***
lnEx        -0.331232   0.085224 -3.8866 0.0001233 ***
lnPOP        0.388234   0.038407 10.1083 < 2.2e-16 ***
lnPPP        0.484547   0.086019  5.6330 3.847e-08 ***
lnWDIST     -0.571141   0.095810 -5.9612 6.539e-09 ***
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Total Sum of Squares:    511.68
Residual Sum of Squares: 290.51
R-Squared      :  0.43224
      Adj. R-Squared :  0.42438
F-statistic: 49.3321 on 5 and 324 DF, p-value: < 2.22e-16
```

Because pooled OLS estimator assumes the intercept and the slopes are constant through the time and across the countries, so it can't make the difference between them. Therefore LSDV estimation will be employed in the estimation which turns to Fixed Effect (FE) model.

The output of least square dummy variables (LSDV) yields 22 dummies, which means one dummy for each country (Table 6.2). This suggest that, across sections, individual intercepts are different. However, what we should notice is only variable PPP conversion factor is significant under this LSDV estimator, but weaker significant than OLS model (at 5% level). Nevertheless, all of those countries still share the same slopes of regressors (GDP per capita, exchange rate, population, PPP conversion factor and weighted distance). The coefficient of PPP conversion factor is negative in this situation, which is different to pooled OLS but same as expected. An additional 1 per cent growth of PPP conversion factor will diminish amount of tourists by 0.799 per cent.

Table 6.2: Fixed Effects using Least squares dummy variable model

```
Call:
lm(formula = lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST +
    factor(Country) - 1, data = newdata.set)

Residuals:
     Min       1Q   Median       3Q      Max
-0.94881 -0.10908  0.02709  0.15026  0.42982
```

```
Coefficients:
                                 Estimate Std. Error t value Pr(>|t|)
lnGDPpc                         -1.608986   6.742979  -0.239    0.812
lnEx                             0.005239   0.022837   0.229    0.819
lnPOP                           -0.001772   6.746831   0.000    1.000
lnPPP                           -0.799146   0.092832  -8.609  4.1e-16
 ***
lnWDIST                          2.594027   6.743510   0.385    0.701
factor(Country)AUSTRALIA         4.446486 141.370699   0.031    0.975
factor(Country)CANADA            3.745795 142.969401   0.026    0.979
factor(Country)FRANCE            3.765115 148.751991   0.025    0.980
factor(Country)GERMANY           4.146423 151.032584   0.027    0.978
factor(Country)INDIA             2.217859 148.977798   0.015    0.988
factor(Country)INDONESIA         7.153094 140.494468   0.051    0.959
factor(Country)ITLAY             2.714091 147.480478   0.018    0.985
factor(Country)JAPAN            13.695127 163.463204   0.084    0.933
factor(Country)Korea, Rep.      15.718281 156.594553   0.100    0.920
factor(Country)MALAYSIA          4.212288 135.868773   0.031    0.975
factor(Country)MONGOLIA          9.536857 119.143544   0.080    0.936
factor(Country)NETHERLANDS       3.224639 140.924058   0.023    0.982
factor(Country)NEW ZEALAND       1.523030 126.555455   0.012    0.990
factor(Country)PHILIPPINES       4.794939 137.242152   0.035    0.972
factor(Country)PORTUGAL          0.056594 131.280490   0.000    1.000
factor(Country)Russia            5.964757 145.600854   0.041    0.967
factor(Country)SINGAPORE         6.288991 134.948078   0.047    0.963
factor(Country)SWEDEN            5.275956 138.470731   0.038    0.970
factor(Country)SWITZERLAND       3.251943 137.925804   0.024    0.981
factor(Country)THAILAND          5.043783 139.334577   0.036    0.971
factor(Country)United Kingdom    3.935035 148.864050   0.026    0.979
factor(Country)UNITED STATES     5.003264 159.031221   0.031    0.975
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Residual standard error: 0.2084 on 303 degrees of freedom
Multiple R-squared:  0.9972,   Adjusted R-squared:  0.997
F-statistic:  4012 on 27 and 303 DF,  p-value: < 2.2e-16
```

Compared coefficients of pooled OLS and LSDV, it is found that the second model fits data better than the first. The F statistic is increased from 49.33 to 4012 ($p<2.2e-16$), and R-squared is improved from 0.432 to 0.997. Due to including dummies, the coefficient of PPP conversion factor is changed from positive to negative, but all other variables lost significance using LSDV estimator.

Although LSDV and within Fixed Effect model will deliver same coefficients theoretically (Table 6.3), I would like to compare pooled OLS and Fixed Effects model in order to see which one fits our data better.

Table 6.3: Fixed effects – "Withing Estimator"

```
Oneway (individual) effect Within Model

Call:
plm(formula = lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST,
    data = newdata.set, model = "within", index = c("Country",
        "Year"))

Balanced Panel: n=22, T=15, N=330

Residuals :
   Min. 1st Qu.  Median 3rd Qu.    Max.
-0.9490 -0.1090  0.0271  0.1500  0.4300

Coefficients :
          Estimate Std. Error t-value Pr(>|t|)
lnGDPpc -1.6089856  6.7429787 -0.2386   0.8116
lnEx     0.0052389  0.0228367  0.2294   0.8187
lnPOP   -0.0017719  6.7468310 -0.0003   0.9998
lnPPP   -0.7991456  0.0928321 -8.6085  4.1e-16 ***
lnWDIST  2.5940272  6.7435100  0.3847   0.7008
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Total Sum of Squares:    68.399
Residual Sum of Squares: 13.16
R-Squared      :  0.8076
      Adj. R-Squared :  0.74152
F-statistic: 254.364 on 5 and 303 DF, p-value: < 2.22e-16
```

To aim this purpose, F-test will be used, and the null hypothesis states that OLS regression is better than FE model. The p-value of F-test is 2.2e-16, which means that we have to reject the null hypothesis (Table 6.4).

Table 6.4: Testing for fixed effects, null: OLS is better than fixed effects

```
        F test for individual effects

data:  lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST
F = 304.0847, df1 = 21, df2 = 303, p-value < 2.2e-16
alternative hypothesis: significant effects
```

Therefore I will further consider the Fixed Effects model. Furthermore, variation with countries over time can be obtained also by within method (Table 6.5).

Table 6.5: Variation with countries

```
     AUSTRALIA          CANADA          FRANCE         GERMANY
 INDIA       INDONESIA
    4.44648595      3.74579527      3.76511547      4.14642270      2.21
785889      7.15309353
         ITLAY           JAPAN     Korea, Rep.        MALAYSIA         MO
NGOLIA     NETHERLANDS
    2.71409076     13.69512726     15.71828127      4.21228830      9.53
685732      3.22463850
   NEW ZEALAND     PHILIPPINES        PORTUGAL          Russia       SIN
GAPORE          SWEDEN
    1.52302969      4.79493897      0.05659432      5.96475657      6.28
899095      5.27595625
   SWITZERLAND        THAILAND United Kingdom   UNITED STATES
    3.25194268      5.04378335      3.93503541      5.00326372
```

In order to make the full use of the data and correct inference, Random Effects model is to be tested (Table 6.6). Compared to Fixed Effects model, population and distance turn to be significant but PPP conversion factor turns to be insignificant. The coefficients of GDP per capita and exchange rate remain insignificant. In Random Effects model, growth in population of origin countries will lead to growth of tourists to China, 1 per cent increasing will improve 0.57 per cent amount of tourists. But the coefficient of distance is tricky, it is significant but positive, which means the long distance is the more tourists are. This is totally reversed as expected and does not make sense.

Table 6.6: Random Effects

```
Oneway (individual) effect Random Effect Model
   (Swamy-Arora's transformation)

Call:
plm(formula = lnTour ~ lnGDPpcCHN + lnGDPpc + lnEx + lnPOP +
    lnPPP + lnWDIST, data = newdata.set, model = "random", index = c
("Country",
    "Year"))

Balanced Panel: n=22, T=15, N=330
```

```
Effects:
                 var std.dev share
idiosyncratic 0.03975 0.19937 0.064
individual    0.58491 0.76479 0.936
theta:  0.9328

Residuals :
    Min.  1st Qu.   Median  3rd Qu.     Max.
-0.91700 -0.12000 -0.00269  0.15300  0.52500

Coefficients :
             Estimate Std. Error t-value  Pr(>|t|)
(Intercept) -10.511819   2.505111 -4.1961 3.513e-05 ***
lnGDPpcCHN    0.447031   0.038113 11.7290 < 2.2e-16 ***
lnGDPpc       0.230430   0.165635  1.3912 0.1651242
lnEx          0.011247   0.023417  0.4803 0.6313430
lnPOP         0.473502   0.125715  3.7665 0.0001967 ***
lnPPP         0.060525   0.060058  1.0078 0.3143149
lnWDIST       0.018568   0.176589  0.1051 0.9163222
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Total Sum of Squares:    70.398
Residual Sum of Squares: 14.831
R-Squared      :  0.78933
      Adj. R-Squared :  0.77259
F-statistic: 201.704 on 6 and 323 DF, p-value: < 2.22e-16
```

To determine which one of them describes our data better, which means to see whether the unobserved effect is correlated with the explanatory variables, the Hausman test is to be ran (Table 6.7). The null hypothesis states that both Random effects and Fixed effects model are consistent, but Random effects model is more efficient, and alternative hypothesis is Random effects is inconsistent and Fixed effects is consistent. Since the p-value equals to 2.2e-16, we have to reject null hypothesis. Therefore, it suggests that Fixed effects model suits the data better.

Table 6.7: Fixed effects of Random effects?

```
        Hausman Test

data:  lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST
chisq = 236.2251, df = 5, p-value < 2.2e-16
alternative hypothesis: one model is inconsistent
```

Furthermore, the test for time-fixed effects is employed, and the regression showed us significant coefficients for year dummies (Table 6.8). With those year dummies, exchange rate and PPP conversion factor turned to be significant, but GDP per capita, population and distance turned to be insignificant. Under those effects, 1 per cent increasing of exchange rate will cause 0.05 per cent increasing of tourist inflows but

this is converse to our expectation. But the coefficient of PPP conversion factor is as expected, an additional 1 per cent increasing of PPP conversion factor will lead to 0.26 per cent decreasing of tourist inflows.

Table 6.8: Testing for time-fixed effects

```
Oneway (individual) effect Within Model

Call:
plm(formula = lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST +
    factor(Year), data = newdata.set, model = "within", index = c("C
ountry",
    "Year"))

Balanced Panel: n=22, T=15, N=330

Residuals :
    Min.  1st Qu.   Median  3rd Qu.     Max.
-0.52300 -0.05750  0.00613  0.06810  0.61700

Coefficients :
                   Estimate Std. Error t-value  Pr(>|t|)
lnGDPpc            0.015948   4.355487  0.0037 0.9970811
lnEx               0.059932   0.015373  3.8985 0.0001204 ***
lnPOP              0.830891   4.360596  0.1905 0.8490156
lnPPP             -0.262198   0.081149 -3.2311 0.0013758 **
lnWDIST            0.302222   4.355340  0.0694 0.9447262
factor(Year)1999   0.200861   0.041705  4.8163 2.364e-06 ***
factor(Year)2000   0.313581   0.041715  7.5172 7.071e-13 ***
factor(Year)2001   0.398014   0.041886  9.5024 < 2.2e-16 ***
factor(Year)2002   0.536724   0.042359 12.6709 < 2.2e-16 ***
factor(Year)2003   0.282209   0.044659  6.3192 9.920e-10 ***
factor(Year)2004   0.671093   0.048324 13.8875 < 2.2e-16 ***
factor(Year)2005   0.837291   0.051309 16.3186 < 2.2e-16 ***
factor(Year)2006   0.884321   0.055475 15.9408 < 2.2e-16 ***
factor(Year)2007   0.959019   0.062030 15.4606 < 2.2e-16 ***
factor(Year)2008   0.861808   0.065928 13.0719 < 2.2e-16 ***
factor(Year)2009   0.813752   0.062643 12.9904 < 2.2e-16 ***
factor(Year)2010   0.952631   0.067646 14.0826 < 2.2e-16 ***
factor(Year)2011   0.958557   0.073785 12.9912 < 2.2e-16 ***
factor(Year)2012   0.965403   0.074844 12.8988 < 2.2e-16 ***
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1

Total Sum of Squares:    68.399
Residual Sum of Squares: 5.1123
R-Squared      :  0.92526
      Adj. R-Squared :  0.8103
```

LM test of time-fixed effects yields p-value equals to 2.2e-16 (Table 6.9), the null hypothesis states that there is no time-fixed effects. With this p-value, we have to reject the null hypothesis and time-fixed effects have to be considered.

Table 6.9: LM test for time effects

```
        Lagrange Multiplier Test - time effects (Breusch-Pagan)

data:  lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST
```

```
chisq = 127.5502, df = 1, p-value < 2.2e-16
alternative hypothesis: significant effects
```

Serial correlation tests apply to macro panels with long time series. To test the serial correlation in our data, Breusch-Godfrey/Wooldridge test is to be used (Table 6.10). The null hypothesis states that there is not serial correlation while the alternative hypothesis states that there is serial correlation in idiosyncratic error. The p-value equals to 2.2e-16 in our case, which means we have to reject null hypothesis and there is not serial correlation in our data.

Table 6.10: Testing for serial correlation

```
        Breusch-Godfrey/Wooldridge test for serial correlation in pa
nel models

data:  lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST
chisq = 155.8879, df = 15, p-value < 2.2e-16
alternative hypothesis: serial correlation in idiosyncratic errors
```

Breusch-Pagan test is used to test whether there is heteroskadasticity in the data (Appendix 25). The null hypothesis is homoscedasticity, if heteroskedasticity is detected, robust covariance matrix will be used to account for it. The p-value equals to 4.2e-11, then we have to reject null hypothesis which means heteroskedasticity is detected.

Table 6.11: Testing for heteroskedasticity

```
        Breusch-Pagan test

data:  lnTour ~ lnGDPpc + lnEx + lnPOP + lnPPP + lnWDIST + factor(Co
untry)
BP = 102.9044, df = 26, p-value = 4.2e-11
```

By running HAC covariance matrix, we found that coeeficient of PPP conversion factor is heteroskedasticitly consistent (Table 6.12).

Table 6.12: HC standard errors of the coefficients

```
t test of coefficients:

          Estimate Std. Error t value  Pr(>|t|)
lnGDPpc -1.6089856  6.1365185 -0.2622    0.7933
lnEx     0.0052389  0.0370568  0.1414    0.8877
lnPOP   -0.0017719  6.0599518 -0.0003    0.9998
lnPPP   -0.7991456  0.2008970 -3.9779 8.704e-05 ***
lnWDIST  2.5940272  6.1309015  0.4231    0.6725
---
Signif. codes:  0 ?**?0.001 ?*?0.01 ??0.05 ??0.1 ??1
```

7. Conclusion

This paper is aim to estimate the role of macroeconomic factors having effects on international tourist inflows of China. Several studies have focused their attention on this matter of their own country or area and have confirmed that macroeconomic environment has a strong influence on amount of international tourists. Despite there are obvious limitations like absence of statistics of tourist inflows for more countries or longer time-series for all data we need, the results of this study are consistent and sufficient enough to draw a conclusion which matches most of literature proofs and our initial assumptions.

Literature showed China's tourism market will keep developing in the future, and international tourists travelling to China will be more and more and excess countries who have more international tourist than China now. However, it seems China's government didn't pay much attention on tourism or attract international tourists. Since China has never been an economy depending on tourism industry and exports has always been mainstay industry of China. Nevertheless, exports of China already had a trend to stagnate. Tourism could be next Choice to stimulate China's economy in the future.

To know which country may have potential tourists travelling to China, or decide which country's tourist's is best to attractive, analyzing determinants of international tourists are becoming important. Penal data is a good approach, as it can analyze data cross-section or cross time. The gravity model is especially recommended, as it is not complicated and easily used. Also, a lot of researchers has proved it by estimating data from a plenty of countries.

Based on the former investigations by many valuable articles done by different researchers, the range of choosing explanatory variables has been limpid. The income and distance are key variable generated by gravity model, thus GDP per capita and weighted distance are selected. Other variables integrated from literatures are exchange rate, population and PPP conversion factor.

The methodology we used is panel data from 1998 to 2002 with 22 countries. We apply following methods to estimate the coefficients: pooled OLS, Least Square Dummy Variables, Fixed Effects and Random Effects. We found that OLS provided all coefficients are significant, Fixed effects model (LSDV or within estimation) provided better results from the point view of R-squared and F-test but less significance of variables. Moreover after testing Fixed Effects and Random Effects models we found that our data is better fitted by Fixed Effect Model, meaning that there is heterogeneity across countries and the unobservable variable is correlated with the independent variables. Testing and controlling for heteroskedasticity and autocorrelation has only yielded PPP conversion factor significant out of other variables.

Using pooled OLS model we conclude that GDP per capita has a positive impact on international tourist inflows to China, meaning that if people have more income they will prefer to travel. This is a consistent result with our hypothesis and a stylized fact that an expansion of GDP per capita growth contributes to an increasing of tourists. While exchange rate has a negative impact on the amount of tourists, meaning that expenditure is still an important factor when people choose where to travel. The result keeps consistent as we expected, that appreciation of local currency will lead to reduction of tourists to go abroad. The amount of tourists are based on the amount of population of one country, thus growth of population will lead to growth of tourists. This expectation is proved since coefficient of population is significant and positive. PPP conversion factor is the only one received different result as we assumed. Theoretically, higher PPP conversion factor means domestic price level is lower than price level abroad. Thus, we assumed that if PPP conversion factor goes up, the amount of tourists will go down. But the result showed us in converse way, PPP conversion factor and amount of tourists will act in same direction. From my point of view, this might be caused that those countries who have more tourists to China are mainly Asian countries, and PPP conversion factor in those countries are much higher. The most variable distance is consistent as assumed, it shows when people make decision of travelling destination. They will

prefer near place than further, long distance will reduce the interests and willing of tourists.

Fixed Effects model suits better our data statistically, but it yielded almost totally different result than OLS. GDP per capita, exchange rate, population and distance all showed different direction as we expected and they are not significant any more. The only variable significant is PPP conversion factor, and more significant than yielded from OLS. The coefficient of PPP conversion factor is negative, that is just same as we assumed. After comparing Random Effects and Fixed Effects, we decided to consider Fixed Effects no matter statistically or logically. If we add year dummies, the regression will show us significant results. Exchange rate and PPP conversion factor are significant with those year dummies, and LM test of time-fixed effects suggest us we should use time-effects. Testing and controlling for heteroskedasticity and serial correlation with Arellano HC covariance matrix estimators, we found that PPP conversion factor is significant among those variables and the coefficient is negative as we assumed.

A better and objective result can be provided in case of larger observations. But due to availability of data (the data of tourists to China only lists 22 countries in China National Tourism Administration), we couldn't enlarge the sample size. And also, if we enlarge time series (like from 15 to 20), some variables will be missing and then we have to omit plenty of unavailable observation, which means we must work with an unbalanced panel data. Also, some common dummy variables like common history, common language and common border are not included in this study, and these hypothesis are not presented. This is because of lack of data in one way, another way is those dummy variables actually only have effects in Asian countries but not worldwide. But I believe the expansion of data, especially the tourists amount from other Asian countries (like middle Asia), may help to use those dummy variables. And moreover, for further research the collection of tourists to China with more comprehensive countries in worldwide, will have better estimation and improve the quality.

8. Appendix

Appendix 1: Classification of tourists (by sex) in 10,000

	1998	1999	2000	2001	2002
Male	481.79	553.07	655.97	728.83	877.51
Female	228.98	290.16	360.07	393.81	466.44
	2003	2004	2005	2006	2007
Male	778.58	1,120.40	1,321.15	1,435.41	1,656.99
Female	361.71	572.85	704.36	785.62	953.98
	2008	2009	2010	2011	2012
Male	1,560.90	1,430.15	1,678.88	1,745.41	1,737.76
Female	871.64	763.6	933.81	965.79	981.4

Appendix 2: Classification of tourists (by age) in 10,000

	1998	1999	2000	2001	2002
Uner 14	24.05	29.03	35.71	40.49	48.16
15-24	61.7	67.86	82.43	87.56	101.77
25-44	355.91	413.8	494.44	545.42	651.28
45-64	229.54	282.44	343.53	384.84	464.96
Over 65	39.57	50.1	59.93	64.33	77.78
	2003	2004	2005	2006	2007
Uner 14	37.72	64.15	79.93	88.29	107.77
15-24	86.72	131.97	164.46	173.24	209.43
25-44	591.32	828.82	979.74	1,031.99	1,192.54
45-64	380.8	588.27	703.84	804.46	948.39
Over 65	43.73	80.05	97.55	123.05	152.83
	2008	2009	2010	2011	2012
Uner 14	98.52	92.05	109.44	111.94	111.79
15-24	206.13	171.9	203.09	212.44	215.87
25-44	1,129.10	1,004.28	1,171.31	1,227.62	1,229.72
45-64	871.7	796.56	965.2	992.28	988.7
Over 65	127.09	128.95	163.65	166.92	173.07

Appendix 3: Classification of tourists (by purpose) in 10,000

	1998	1999	2000	2001	2002
Business				198.48	322.04
Leisure				492.35	556.05
Visiting friends				39.26	41.25
Serive				128.92	153.33
Others				263.63	271.28

	2003	2004	2005	2006	2007
Business	290.2	386.14	459.81	554.84	696.05
Leisure	430.67	741.21	934.46	1,133.19	1,314.08
Visiting friends	24.73	37.62	40.54	17.03	7.96
Serive	152.51	175.48	201.16	209.24	233.35
Others	242.17	352.8	389.54	306.73	359.53

	2008	2009	2010	2011	2012
Business	567.77	523.72	619.67	632.64	628.02
Leisure	1,203.96	1,013.27	1,238.20	1,221.82	1,162.90
Visiting friends	6.79	8.01	9.1	10.99	10.77
Serive	243.19	227.37	246.27	269.39	286.47
Others	410.82	421.38	499.44	576.35	630.99

Appendix 4: Classification of tourism revenue (by transport) in 0.1 billion U.S dollars

	1998	1999	2000	2001	2002
Bus	31.85	41.65	48.8	50.05	52.6
Airplane	22.37	31.4	35.02	35.88	36.61
Railway	3.33	4.45	5.96	5.21	4.65
Car	3.27	3.82	5.96	4.45	8.74
Ship	2.88	1.98	1.86	4.51	2.6
	2003	2004	2005	2006	2007
Bus	44.38	66.88	82.94	73.76	111.43
Airplane	30.9	49.52	59.28	66.63	87.91
Railway	3.92	4.63	9.04	2.79	7.71
Car	7.37	8.1	7.18	3.1	6.94
Ship	2.2	4.63	7.44	1.24	8.87
	2008	2009	2010	2011	2012
Bus	124.87	117.41	130.91	151.17	172.78
Airplane	90.47	85.84	98.08	114.7	131.64
Railway	13.46	12.77	12.47	14.06	16.46
Car	10.47	9.58	10.81	14.06	15.54
Ship	10.47	9.22	9.56	8.35	9.14

Appendix 5: Classification of tourism revenue (by activities) in 0.1 billion U.S dollars

	1998	1999	2000	2001	2002
Tour	5.48	7.49	7.51	8.02	14.31
Accommodation	17.37	20.34	22.05	22.42	25.65
Food	15.48	15.28	15.23	15.39	16.6
Goods	25.91	27.71	32.31	37.54	42.11
Entertainment	8.1	8.45	11.93	13.77	15.25
Communication	5.02	4.11	5.03	6.79	7.2
Transportation	4.42	5.33	5.34	6.02	8.82
Others	12.39	10.63	14.04	17.92	21.31
	2003	2004	2005	2006	2007
Tour	12.2	13.07	12.27	9.86	18
Accommodation	21.64	31.24	37.75	48.97	59.38
Food	14.31	19.42	27.48	35.12	37.48
Goods	36.2	57.98	63.78	112.07	104.94
Entertainment	13.02	18.25	17.02	12.53	21.1
Communication	6.18	8.81	8.44	5.11	7.61
Transportation	7.86	10.87	10.3	12.01	12.42
Others	18.27	30.86	32.99	30.06	46.83
	2008	2009	2010	2011	2012
Tour	22.02	20.8	21.07	25.32	25.55
Accommodation	48.6	44.34	51.95	50.98	52.11
Food	38.73	36.14	41.15	35.98	37.47
Goods	85.34	91.49	115.9	118.56	111.54
Entertainment	29.7	28.82	31.72	34.66	36.13
Communication	10.02	9.55	10.68	10.36	7.91
Transportation	13.55	13.29	14.6	16.19	16.1
Others	35.6	34.91	40.15	41.41	40.68

Appendix 6: The development of travel agencies and star hotels

	1998	1999	2000	2001	2002
Travel agencies	6,222	7,326	8,993	10,532	11,552
Star hotels	5,782	7,035	10,481	7,358	8,880
	2003	2004	2005	2006	2007
Travel agencies	13,361	14,927	16,245	17,957	18,943
Star hotels	9,751	10,888	11,828	12,751	13,583
	2008	2009	2010	2011	2012
Travel agencies	20,110	20,399	22,784	23,690	24,944
Star hotels	14,099	14,237	13,991	13,513	12,807

Appendix 7: List of countries used in the analysis

AUSTRALIA	ITLAY	NEW ZEALAND	SWITZERLAND
CANADA	JAPAN	PHILIPPINES	THAILAND
FRANCE	KOREA	PORTUGAL	U.K
GERMANY	MALAYSIA	RUSSIA	UNITED STATES
INDIA	MONGOLIA	SINGAPORE	
INDONESIA	NETHERLANDS	SWEDEN	

Appendix 8.1: International Tourists to China 1998-2002 (by countries) in 10,000

	1998	1999	2000	2001	2002
Total	**710.77**	**843.23**	**1016.04**	**1122.64**	**1343.95**
Asia	**400.06**	**499.27**	**610.15**	**686.42**	**851.89**
KOREA,D.P.REP.	6.12	6.98	7.64	7.71	7.93
INDIA	6.57	8.42	12.09	15.94	21.36
INDONESIA	10.46	18.29	22.06	22.42	27.47
JAPAN	157.21	185.52	220.15	238.57	292.56
MALAYSIA	30.01	37.29	44.1	46.86	59.24
MONGOLIA	26.48	35.45	39.91	38.71	45.31
PHILIPPINES	25.65	29.83	36.39	40.8	50.86
SINGAPORE	31.64	35.25	39.94	41.5	49.71
KOREA	63.28	99.2	134.47	167.88	212.43
THAILAND	14.43	20.64	24.11	29.84	38.63
AFIRCA	**5.43**	**5.21**	**6.56**	**7.32**	**9.85**
EUROPE	**187.33**	**211.27**	**248.9**	**268.38**	**294.86**
U.K	24.29	25.89	28.39	30.25	34.3
GERMANY	19.19	21.76	23.91	25.34	28.18
FRANCE	13.8	15.56	18.5	19.95	22.21
ITLAY	7.25	7.22	7.78	7.77	9.17
NETHERLANDS	5.89	7.01	7.6	9.3	10.04
PORTUGAL	3.85	4.02	2.28	2.68	3.61
SWEDEN	4.06	4.68	5.36	5.28	6.28
SWITZERLAND	2.84	2.99	3.07	3.08	3.24
RUSSIA	69.2	83.3	108.02	119.62	127.16
LATIN.AMERICAN	**7.46**	**7.59**	**8.29**	**7.45**	**9.66**
NORTH.AMERICAN	**87.33**	**95.01**	**113.28**	**120.31**	**141.26**
CANADA	19.6	21.37	23.66	25.39	29.13
UNITED STATES	67.73	73.64	89.62	94.92	112.12
OCEANIA	**22.48**	**24.38**	**28.18**	**30.97**	**35.32**
AUSTRALIA	18.64	20.35	23.41	25.51	29.13
NEW ZEALAND	3	3.14	3.76	4.44	5.02
OTHERS	**0.68**	**0.5**	**0.68**	**1.79**	**1.11**

Appendix 8.2: International Tourists to China 2003-2007 (by countries) in 10,000

	2003	2004	2005	2006	2007
Total	**1140.29**	**1693.25**	**2025.51**	**2221.03**	**2610.97**
Asia	**726.08**	**1073.14**	**1249.99**	**1358.82**	**1606.12**
KOREA,D.P.REP.	7.71	11.21	12.58	11.01	11.37
INDIA	21.91	30.94	35.65	40.51	46.25
INDONESIA	23.18	34.98	37.76	43.3	47.71
JAPAN	225.48	333.43	339	374.59	397.75
MALAYSIA	43.01	74.19	89.96	91.06	106.2
MONGOLIA	41.83	55.38	64.2	63.12	68.2
PHILIPPINES	45.77	54.94	65.4	70.42	83.3
SINGAPORE	37.81	63.68	75.59	82.79	92.2
KOREA	194.55	284.49	354.53	392.4	477.71
THAILAND	27.54	46.42	58.63	59.2	61.16
AFIRCA	**10.42**	**17.34**	**23.8**	**29.38**	**37.91**
EUROPE	**260**	**377.71**	**479.14**	**527.96**	**621.68**
U.K	28.83	41.81	49.96	55.26	60.51
GERMANY	22.2	36.53	45.49	50.06	55.67
FRANCE	15.61	28.11	37.2	40.22	46.34
ITLAY	6.58	12.24	19.7	19.53	21.52
NETHERLANDS	6.79	11.74	14.58	16.78	19.41
PORTUGAL	3.01	3.95	4.38	4.45	4.83
SWEDEN	5	8.72	11.03	12.96	14.51
SWITZERLAND	2.37	4.07	5.14	5.79	6.46
RUSSIA	138.07	179.22	222.39	240.51	300.39
LATIN.AMERICAN	**8.01**	**13.25**	**16.05**	**19.58**	**24.26**
NORTH.AMERICAN	**105.29**	**165.67**	**198.53**	**221**	**256.15**
CANADA	23.03	34.8	42.98	49.91	57.72
UNITED STATES	82.25	130.86	155.55	171.03	190.12
OCEANIA	**29.98**	**45.19**	**57.36**	**63.86**	**72.85**
AUSTRALIA	24.54	37.63	48.3	53.81	60.74
NEW ZEALAND	4.34	6.46	7.84	8.86	10.87
OTHERS	**0.51**	**0.96**	**0.65**	**0.43**	**0.31**

Appendix 8.3: International Tourists to China 2008-2012 (by countries) in 10,000

	2008	2009	2010	2011	2012
Total	**2432.53**	**2193.75**	**2612.69**	**2711.2**	**2719.15**
Asia	**1455.1**	**1377.93**	**1617.86**	**1662.32**	**1662.22**
KOREA,D.P.REP.	10.18	10.56	11.64	15.23	18.06
INDIA	43.66	44.89	54.93	60.65	61.02
INDONESIA	42.63	46.9	57.34	60.87	62.2
JAPAN	344.61	331.75	373.12	365.82	351.82
MALAYSIA	104.05	105.9	124.52	124.51	123.55
MONGOLIA	70.53	57.67	79.44	99.42	101.05
PHILIPPINES	79.53	74.89	82.83	89.43	96.2
SINGAPORE	87.58	88.95	100.37	106.3	102.77
KOREA	396.04	319.75	407.64	418.54	406.99
THAILAND	55.43	54.18	63.55	60.8	64.76
AFIRCA	**37.84**	**40.12**	**46.36**	**48.88**	**52.49**
EUROPE	**612.33**	**459.11**	**569.79**	**593.78**	**594.82**
U.K	55.15	52.88	57.5	59.57	61.84
GERMANY	52.89	51.85	60.86	63.7	65.96
FRANCE	43	42.48	51.27	49.31	52.48
ITLAY	19.44	19.14	22.92	23.5	25.2
NETHERLANDS	18.09	16.69	18.91	19.75	19.55
PORTUGAL	4.39	4.36	4.77	4.7	4.86
SWEDEN	13.77	12.58	15.45	17.01	17.16
SWITZERLAND	6.34	6.26	7.43	7.53	8.28
RUSSIA	312.34	174.3	237.03	253.63	242.61
LATIN.AMERICAN	**26.03**	**23.1**	**30.05**	**33.69**	**35.31**
NORTH.AMERICAN	**232.12**	**226.01**	**269.49**	**286.42**	**282.64**
CANADA	53.47	55.03	68.53	74.8	70.83
UNITED STATES	178.64	170.98	200.96	211.61	211.81
OCEANIA	**68.88**	**67.24**	**78.93**	**85.93**	**91.49**
AUSTRALIA	57.15	56.15	66.13	72.62	77.43
NEW ZEALAND	10.52	10.04	11.61	12.09	12.83
OTHERS	**0.23**	**0.22**	**0.21**	**0.19**	**0.19**

Appendix 9: The distance between departure countries and China

Country	Distance	Country	Distance
AUSTRALIA	8956.436	NETHERLANDS	7831.141
CANADA	10598.32	NEW ZEALAND	11041.03
FRANCE	8225.232	PHILIPPINES	2850.319
GERMANY	7785.342	PORTUGAL	9675.63
INDIA	3785.013	Russia	5795.045
INDONESIA	5220.879	SINGAPORE	4484.657
ITLAY	8134.695	SWEDEN	6713.787
JAPAN	2098.111	SWITZERLAND	8084.264
Korea, Rep.	955.6511	THAILAND	3303.891
MALAYSIA	4355.047	UNITED STATES	10993.68
MONGOLIA	1172.047		

Appendix 10.1: GDP of involved countries from 1998-2002

	1998	1999	2000	2001	2002
AUSTRALIA	4.00E+11	3.89E+11	4.15E+11	3.79E+11	3.94E+11
CANADA	6.17E+11	6.61E+11	7.25E+11	7.15E+11	7.35E+11
FRANCE	1.47E+12	1.46E+12	1.33E+12	1.34E+12	1.45E+12
GERMANY	2.18E+12	2.13E+12	1.89E+12	1.88E+12	2.01E+12
INDIA	4.29E+11	4.67E+11	4.77E+11	4.94E+11	5.24E+11
INDONESIA	9.54E+10	1.40E+11	1.65E+11	1.60E+11	1.96E+11
ITLAY	1.22E+12	1.21E+12	1.10E+12	1.12E+12	1.23E+12
JAPAN	3.91E+12	4.43E+12	4.73E+12	4.16E+12	3.98E+12
Korea, Rep.	3.45E+11	4.45E+11	5.33E+11	5.05E+11	5.76E+11
MALAYSIA	7.22E+10	7.91E+10	9.38E+10	9.28E+10	1.01E+11
MONGOLIA	1.12E+09	1.06E+09	1.14E+09	1.27E+09	1.4E+09
NETHERLANDS	4.03E+11	4.11E+11	3.85E+11	4.01E+11	4.38E+11
NEW ZEALAND	5.56E+10	5.81E+10	5.2E+10	5.33E+10	6.6E+10
PHILIPPINES	7.22E+10	8.3E+10	8.1E+10	7.63E+10	8.14E+10
PORTUGAL	1.23E+11	1.26E+11	1.17E+11	1.20E+11	1.32E+11
RUSSIA	2.71E+11	1.96E+11	2.60E+11	3.07E+11	3.45E+11
SINGAPORE	9.58E+10	8.6E+10	9.59E+10	9.11E+10	9.06E+10
SWEDEN	2.55E+11	2.59E+11	2.47E+11	2.27E+11	2.51E+11
SWITZERLAND	2.79E+11	2.74E+11	2.56E+11	2.63E+11	2.87E+11
THAILAND	1.12E+11	1.23E+11	1.23E+11	1.16E+11	1.27E+11
UNITED KINGDOM	1.48E+12	1.52E+12	1.49E+12	1.49E+12	1.62E+12
UNITED STATES	9.09E+12	9.67E+12	1.03E+13	1.06E+13	1.10E+13

Appendix 10.2: GDP of involved countries from 2003-2007

	2003	2004	2005	2006	2007
AUSTRALIA	4.67E+11	6.13E+11	6.94E+11	7.47E+11	8.54E+11
CANADA	8.66E+11	9.92E+11	1.13E+12	1.28E+12	1.42E+12
FRANCE	1.79E+12	2.06E+12	2.14E+12	2.26E+12	2.58E+12
GERMANY	2.42E+12	2.73E+12	2.77E+12	2.90E+12	3.32E+12
INDIA	6.18E+11	7.22E+11	8.34E+11	9.49E+11	1.24E+12
INDONESIA	2.35E+11	2.57E+11	2.86E+11	3.65E+11	4.32E+11
ITLAY	1.51E+12	1.74E+12	1.79E+12	1.87E+12	2.13E+12
JAPAN	4.30E+12	4.66E+12	4.57E+12	4.36E+12	4.36E+12
Korea, Rep.	6.44E+11	7.22E+11	8.45E+11	9.52E+11	1.05E+12
MALAYSIA	1.10E+11	1.25E+11	1.44E+11	1.63E+11	1.94E+11
MONGOLIA	1.6E+09	1.99E+09	2.52E+09	3.41E+09	4.23E+09
NETHERLANDS	5.38E+11	6.10E+11	6.38E+11	6.78E+11	7.83E+11
NEW ZEALAND	8.74E+10	1.03E+11	1.14E+11	1.10E+11	1.35E+11
PHILIPPINES	8.39E+10	9.14E+10	1.03E+11	1.22E+11	1.49E+11
PORTUGAL	1.62E+11	1.85E+11	1.92E+11	2.02E+11	2.32E+11
RUSSIA	4.30E+11	5.91E+11	7.64E+11	9.90E+11	1.30E+12
SINGAPORE	9.34E+10	1.09E+11	1.24E+11	1.39E+11	1.69E+11
SWEDEN	3.15E+11	3.62E+11	3.71E+11	3.99E+11	4.63E+11
SWITZERLAND	3.35E+11	3.74E+11	3.85E+11	4.05E+11	4.51E+11
THAILAND	1.43E+11	1.61E+11	1.76E+11	2.07E+11	2.47E+11
UNITED KINGDOM	1.88E+12	2.22E+12	2.32E+12	2.48E+12	2.86E+12
UNITED STATES	1.15E+13	1.23E+13	1.31E+13	1.39E+13	1.45E+13

Appendix 10.3: GDP of involved countries from 2008-2012

	2008	2009	2010	2011	2012
AUSTRALIA	1.06E+12	9.27E+11	1.14E+12	1.39E+12	1.53E+12
CANADA	1.50E+12	1.34E+12	1.58E+12	1.74E+12	1.78E+12
FRANCE	2.83E+12	2.62E+12	2.55E+12	2.78E+12	2.61E+12
GERMANY	3.62E+12	3.30E+12	3.28E+12	3.62E+12	3.43E+12
INDIA	1.22E+12	1.37E+12	1.71E+12	1.88E+12	1.86E+12
INDONESIA	5.10E+11	5.40E+11	7.09E+11	8.46E+11	8.78E+11
ITLAY	2.31E+12	2.11E+12	2.04E+12	2.20E+12	2.01E+12
JAPAN	4.85E+12	5.04E+12	5.50E+12	5.90E+12	5.96E+12
Korea, Rep.	9.31E+11	8.34E+11	1.01E+12	1.11E+12	1.13E+12
MALAYSIA	2.31E+11	2.02E+11	2.48E+11	2.89E+11	3.05E+11
MONGOLIA	5.62E+09	4.58E+09	6.2E+09	8.76E+09	1.03E+10
NETHERLANDS	8.71E+11	7.96E+11	7.72E+11	8.32E+11	7.71E+11
NEW ZEALAND	1.31E+11	1.19E+11	1.43E+11	1.63E+11	1.71E+11
PHILIPPINES	1.74E+11	1.68E+11	2.00E+11	2.24E+11	2.50E+11
PORTUGAL	2.52E+11	2.34E+11	2.27E+11	2.38E+11	2.12E+11
RUSSIA	1.66E+12	1.22E+12	1.52E+12	1.90E+12	2.01E+12
SINGAPORE	1.79E+11	1.94E+11	2.17E+11	2.45E+11	2.75E+11
SWEDEN	4.86E+11	4.06E+11	4.63E+11	5.36E+11	5.24E+11
SWITZERLAND	5.24E+11	5.09E+11	5.51E+11	6.57E+11	6.31E+11
THAILAND	2.73E+11	2.64E+11	3.19E+11	3.46E+11	3.66E+11
UNITED KINGDOM	2.69E+12	2.21E+12	2.29E+12	2.48E+12	2.48E+12
UNITED STATES	1.47E+13	1.44E+13	1.50E+13	1.55E+13	1.62E+13

Appendix 11.1: GDP per capita of involved countries from 1998 to 2002

	1998	1999	2000	2001	2002
AUSTRALIA	21352.31	20546.74	21678.49	19504.57	20071.97
CANADA	20390.39	21681.38	23559.5	23017.37	23425.23
FRANCE	24405.88	24075.02	21774.94	21812.19	23494.42
GERMANY	26547.78	25956.64	22945.71	22840.27	24325.67
INDIA	425.4453	455.4735	457.2835	466.2142	486.6405
INDONESIA	470.1961	679.7937	789.8059	756.931	909.8873
ITLAY	21519.06	21227.31	19388.28	19721.97	21435.14
JAPAN	30967.29	34998.81	37291.71	32716.42	31235.59
Korea, Rep.	7462.919	9554.506	11346.64	10654.85	12093.71
MALAYSIA	3228.601	3456.848	4004.546	3877.997	4130.678
MONGOLIA	477.3441	445.0004	474.206	524.0378	571.602
NETHERLANDS	25634.62	26021.64	24179.73	24968.82	27110.61
NEW ZEALAND	14575.86	15160.32	13474.71	13728.57	16715.12
PHILIPPINES	970.6139	1091.783	1043.456	961.717	1004.991
PORTUGAL	12092.19	12372.87	11399.48	11612.01	12695.82
RUSSIA	1844.486	1338.986	1775.141	2100.738	2375.158
SINGAPORE	24399.98	21715.1	23814.56	22027.17	21691.29
SWEDEN	28779.12	29218.47	27869.38	25557.61	28118.98
SWITZERLAND	39227.03	38290.67	35639.48	36328.14	39350.44
THAILAND	1836.684	1989.995	1968.537	1831.903	1988.734
UNITED KINGDOM	25266.39	25870.99	25361.94	25126.02	27305.34
UNITED STATES	32948.95	34639.12	36467.3	37285.82	38175.38

Appendix 11.2: GDP per capita of involved countries from 2003 to 2007

	2003	2004	2005	2006	2007
AUSTRALIA	23455.84	30464	34011.74	36113	40996.32
CANADA	27335.31	31011.91	35087.89	39256.71	43300.56
FRANCE	28794.09	32784.83	33818.97	35457.05	40341.92
GERMANY	29367.41	33040.05	33542.78	35237.6	40402.99
INDIA	565.3355	649.7106	740.1143	830.1632	1068.679
INDONESIA	1076.219	1160.615	1273.465	1601.031	1871.288
ITLAY	26291.34	29832.61	30478.85	31776.98	35826.02
JAPAN	33690.94	36441.5	35781.23	34102.21	34094.89
Korea, Rep.	13451.14	15028.81	17550.83	19676.15	21590.26
MALAYSIA	4427.46	4918.167	5553.944	6179.658	7218.397
MONGOLIA	646.2369	798.0244	998.7564	1333.877	1631.901
NETHERLANDS	33177.36	37458.43	39122.29	41458.93	47770.8
NEW ZEALAND	21706.96	25194.81	27536.81	26359.61	31996.76
PHILIPPINES	1015.78	1084.765	1200.938	1398.827	1680.551
PORTUGAL	15482.81	17684.07	18265.43	19177.43	21980.69
RUSSIA	2976.146	4108.562	5337.065	6946.881	9146.416
SINGAPORE	22689.53	26240.55	28952.81	31585.6	36766.28
SWEDEN	35131.21	40261.12	41040.67	43948.62	50558.4
SWITZERLAND	45588.62	50641.84	51734.3	54140.5	59663.77
THAILAND	2211.874	2478.818	2689.953	3143.236	3737.717
UNITED KINGDOM	31442.2	37027.04	38440.74	40819.9	46610.53
UNITED STATES	39682.47	41928.89	44313.59	46443.81	48070.38

Appendix 11.3: GDP per capita of involved countries from 2008 to 2012

	2008	2009	2010	2011	2012
AUSTRALIA	49672.75	42721.88	51824.8	62080.98	67441.59
CANADA	45199.08	39775.04	46376.34	50578.35	51206.16
FRANCE	43991.7	40487.92	39186.03	42521.81	39771.84
GERMANY	44132.04	40270.16	40144.51	44314.97	42624.75
INDIA	1042.083	1147.239	1417.067	1539.604	1503
INDONESIA	2178.266	2272.041	2946.656	3471.435	3556.786
ITLAY	38563.05	35073.16	33760.59	36147.65	33837.41
JAPAN	37972.24	39473.36	43117.77	46134.57	46730.92
Korea, Rep.	19028.13	16958.64	20540.02	22388.2	22589.96
MALAYSIA	8460.357	7277.763	8754.243	10058.04	10432.06
MONGOLIA	2135.811	1715.364	2285.645	3181.104	3672.967
NETHERLANDS	52951.03	48173.91	46468.4	49841.61	45989.68
NEW ZEALAND	30610.29	27474.33	32796.09	36918.79	38636.87
PHILIPPINES	1920.992	1831.974	2135.918	2357.571	2587.017
PORTUGAL	23860.68	22153.1	21511.83	22512.33	20188.03
RUSSIA	11700.22	8615.659	10709.51	13284.03	14037.02
SINGAPORE	36972.39	38922.78	42783.72	47268.23	51709.45
SWEDEN	52730.78	43639.55	49359.87	56755.33	55039.57
SWITZERLAND	68555.37	65790.07	70370.02	83087.05	78927.6
THAILAND	4118.401	3978.905	4802.663	5192.119	5479.761
UNITED KINGDOM	43510.26	35476.35	36424.53	39186.44	38919.6
UNITED STATES	48407.08	46998.82	48357.68	49853.68	51748.56

Appendix 12.1: Exchange rates of involved countries from 1998 to 2002

	1998	1999	2000	2001	2002
AUSTRALIA	1.591828	1.54995	1.724827	1.933443	1.840563
CANADA	1.483463	1.485732	1.48511	1.548761	1.569318
FRANCE	5.899516	0.938627	1.085401	1.11751	1.062552
GERMANY	1.759668	0.938627	1.085401	1.11751	1.062552
INDIA	41.25937	43.05543	44.94161	47.18641	48.61032
INDONESIA	10013.62	7855.15	8421.775	10260.85	9311.192
ITLAY	1736.207	0.938627	1.085401	1.11751	1.062552
JAPAN	130.9053	113.9068	107.7655	121.5289	125.388
Korea, Rep.	1401.437	1188.817	1130.958	1290.995	1251.088
MALAYSIA	3.924375	3.8	3.8	3.8	3.8
MONGOLIA	840.8283	1021.868	1076.667	1097.698	1110.31
NETHERLANDS	1.983733	0.938627	1.085401	1.11751	1.062552
NEW ZEALAND	1.868249	1.889614	2.201149	2.378751	2.162191
PHILIPPINES	40.89305	39.08898	44.19225	50.99265	51.60357
PORTUGAL	180.1045	0.938627	1.085401	1.11751	1.062552
RUSSIA	9.705083	24.6199	28.12917	29.16853	31.34848
SINGAPORE	1.673602	1.694957	1.723963	1.791723	1.790588
SWEDEN	7.949868	8.262428	9.162244	10.32914	9.737123
SWITZERLAND	5.528284	6.109484	6.939828	8.609181	10.54075
THAILAND	41.35939	37.81366	40.1118	44.4319	42.96008
UNITED KINGDOM	0.603824	0.618057	0.660931	0.694655	0.667223
UNITED STATES	1	1	1	1	1

Appendix 12.2: Exchange rates of involved countries from 2003 to 2007

	2003	2004	2005	2006	2007
AUSTRALIA	1.541914	1.359753	1.309473	1.327973	1.195073
CANADA	1.401052	1.301019	1.211763	1.134363	1.074099
FRANCE	0.886034	0.805365	0.80412	0.797141	0.730638
GERMANY	0.886034	0.805365	0.80412	0.797141	0.730638
INDIA	46.58328	45.31647	44.09998	45.30701	41.34853
INDONESIA	8577.133	8938.85	9704.742	9159.317	9141
ITLAY	0.886034	0.805365	0.80412	0.797141	0.730638
JAPAN	115.9335	108.1926	110.2182	116.2993	117.7535
Korea, Rep.	1191.614	1145.319	1024.117	954.7905	929.2573
MALAYSIA	3.8	3.8	3.787092	3.668177	3.437569
MONGOLIA	1146.543	1185.298	1205.247	1179.699	1170.401
NETHERLANDS	0.886034	0.805365	0.80412	0.797141	0.730638
NEW ZEALAND	1.722099	1.508681	1.420273	1.542056	1.360675
PHILIPPINES	54.20333	56.03992	55.08549	51.31427	46.14839
PORTUGAL	0.886034	0.805365	0.80412	0.797141	0.730638
RUSSIA	30.69203	28.81374	28.28444	27.19096	25.58085
SINGAPORE	1.742183	1.690228	1.664398	1.588933	1.507102
SWEDEN	8.086304	7.348887	7.473088	7.378249	6.75877
SWITZERLAND	7.564749	6.459693	6.359328	6.771549	7.045365
THAILAND	41.48462	40.22241	40.22013	37.88198	34.51818
UNITED KINGDOM	0.612473	0.54618	0.549998	0.543487	0.499772
UNITED STATES	1	1	1	1	1

Appendix 12.3: Exchange rates of involved countries from 2008 to 2012

	2008	2009	2010	2011	2012
AUSTRALIA	1.192178	1.282189	1.090159	0.969463	0.965801
CANADA	1.06704	1.143101	1.030163	0.989531	0.999188
FRANCE	0.682675	0.719843	0.755045	0.719355	0.778294
GERMANY	0.682675	0.719843	0.755045	0.719355	0.778294
INDIA	43.50518	48.40527	45.72581	46.67047	53.43723
INDONESIA	9698.963	10389.94	9090.433	8770.433	9386.629
ITLAY	0.682675	0.719843	0.755045	0.719355	0.778294
JAPAN	103.3595	93.57009	87.77988	79.80702	79.79046
Korea, Rep.	1102.047	1276.93	1156.061	1108.292	1126.471
MALAYSIA	3.335833	3.524503	3.221087	3.060003	3.088801
MONGOLIA	1165.804	1437.795	1357.064	1265.516	1357.58
NETHERLANDS	0.682675	0.719843	0.755045	0.719355	0.778294
NEW ZEALAND	1.422727	1.600877	1.387834	1.265811	1.234284
PHILIPPINES	44.32329	47.67969	45.10966	43.31314	42.22879
PORTUGAL	0.682675	0.719843	0.755045	0.719355	0.778294
RUSSIA	24.85288	31.74036	30.36792	29.38234	30.83983
SINGAPORE	1.414861	1.454515	1.363508	1.257776	1.249676
SWEDEN	6.591099	7.653819	7.207524	6.493543	6.775016
SWITZERLAND	8.261223	8.473674	7.321222	7.261132	8.209969
THAILAND	33.3133	34.28577	31.68571	30.49173	31.08309
UNITED KINGDOM	0.543966	0.641919	0.647179	0.624141	0.633047
UNITED STATES	1	1	1	1	1

Appendix 13.1: Population of involved countries from 1998 to 2002

	1998	1999	2000	2001	2002
AUSTRALIA	18711000	18926000	19153000	19413000	19651400
CANADA	30247900	30499200	30769700	31081900	31362000
FRANCE	60185178	60495470	60911057	61355725	61803229
GERMANY	82047195	82100243	82211508	82349925	82488495
INDIA	1.01E+09	1.03E+09	1.04E+09	1.06E+09	1.08E+09
INDONESIA	2.03E+08	2.06E+08	2.09E+08	2.12E+08	2.15E+08
ITLAY	56906744	56916317	56942108	56977217	57157406
JAPAN	1.26E+08	1.27E+08	1.27E+08	1.27E+08	1.27E+08
Korea, Rep.	46286503	46616677	47008111	47357362	47622179
MALAYSIA	22355057	22896048	23420751	23925742	24413795
MONGOLIA	2355618	2376197	2397473	2419669	2443231
NETHERLANDS	15707209	15812088	15925513	16046180	16148929
NEW ZEALAND	3815000	3835100	3857700	3880500	3948500
PHILIPPINES	74393147	76018006	77651848	79297756	80953652
PORTUGAL	10160196	10217828	10289898	10362722	10419631
RUSSIA	1.47E+08	1.46E+08	1.46E+08	1.46E+08	1.45E+08
SINGAPORE	3927200	3958700	4027900	4138000	4176000
SWEDEN	8850974	8857874	8872109	8895960	8924958
SWITZERLAND	7110001	7143991	7184250	7229854	7284753
THAILAND	60903042	61623143	62343379	63069070	63797841
UNITED KINGDOM	58487141	58682466	58892514	59107960	59362051
UNITED STATES	2.76E+08	2.79E+08	2.82E+08	2.85E+08	2.88E+08

Appendix 13.2: Population of involved countries from 2003 to 2007

	2003	2004	2005	2006	2007
AUSTRALIA	19895400	20127400	20394800	20697900	20827600
CANADA	31676000	31995000	32312000	32570505	32887928
FRANCE	62242474	62702121	63176246	63617975	64012572
GERMANY	82534176	82516260	82469422	82376451	82266372
INDIA	1.09E+09	1.11E+09	1.13E+09	1.14E+09	1.16E+09
INDONESIA	2.18E+08	2.21E+08	2.24E+08	2.28E+08	2.31E+08
ITLAY	57604658	58175310	58607043	58941499	59375289
JAPAN	1.28E+08	1.28E+08	1.28E+08	1.28E+08	1.28E+08
Korea, Rep.	47859311	48039415	48138077	48371946	48597652
MALAYSIA	24890654	25365089	25843466	26327098	26813819
MONGOLIA	2468595	2496248	2526502	2559496	2595068
NETHERLANDS	16225302	16281779	16319868	16346101	16381696
NEW ZEALAND	4027200	4087500	4133900	4184600	4228300
PHILIPPINES	82604681	84231329	85821214	87366573	88875548
PORTUGAL	10458821	10483861	10503330	10522288	10542964
RUSSIA	1.45E+08	1.44E+08	1.43E+08	1.43E+08	1.42E+08
SINGAPORE	4114800	4166700	4265800	4401400	4588600
SWEDEN	8958229	8993531	9029572	9080505	9148092
SWITZERLAND	7339001	7389625	7437115	7483934	7551117
THAILAND	64488338	65087400	65559487	65883961	66076927
UNITED KINGDOM	59637719	59978349	60387997	60828396	61296895
UNITED STATES	2.9E+08	2.93E+08	2.96E+08	2.98E+08	3.01E+08

Appendix 13.3: Population of involved countries from 2008 to 2012

	2008	2009	2010	2011	2012
AUSTRALIA	21249200	21691700	22031800	22340000	22722000
CANADA	33245773	33628571	34005274	34342780	34754312
FRANCE	64371099	64702921	65031235	65371613	65696689
GERMANY	82110097	81902307	81776930	81797673	80425823
INDIA	1.17E+09	1.19E+09	1.21E+09	1.22E+09	1.24E+09
INDONESIA	2.34E+08	2.37E+08	2.41E+08	2.44E+08	2.47E+08
ITLAY	59832179	60192698	60483385	60723569	59539717
JAPAN	1.28E+08	1.28E+08	1.27E+08	1.28E+08	1.28E+08
Korea, Rep.	48948698	49182038	49410366	49779440	50004441
MALAYSIA	27302348	27790324	28275835	28758968	29239927
MONGOLIA	2632834	2672223	2712738	2754209	2796484
NETHERLANDS	16445593	16530388	16615394	16693074	16754962
NEW ZEALAND	4268900	4315800	4367800	4405200	4433100
PHILIPPINES	90371287	91886400	93444322	95053437	96706764
PORTUGAL	10558177	10568247	10573100	10557560	10514844
RUSSIA	1.42E+08	1.42E+08	1.42E+08	1.43E+08	1.44E+08
SINGAPORE	4839400	4987600	5076700	5183700	5312400
SWEDEN	9219637	9298515	9378126	9449213	9519374
SWITZERLAND	7647675	7743831	7824909	7912398	7996861
THAILAND	66185340	66277335	66402316	66576332	66785001
UNITED KINGDOM	61773855	62238723	62747868	63259912	63612729
UNITED STATES	3.04E+08	3.07E+08	3.09E+08	3.12E+08	3.14E+08

Appendix 14.1: PPP conversion factor of involved countries from 1998 to 2002

	1998	1999	2000	2001	2002
AUSTRALIA	1.295609	1.29695	1.31053	1.324261	1.33649
CANADA	1.187096	1.19081	1.230623	1.216527	1.229333
FRANCE	0.966952	0.959872	0.937969	0.917725	0.90497
GERMANY	0.9879	0.974899	0.965808	0.954626	0.941873
INDIA	13.05771	13.26888	13.44698	13.56851	13.8597
INDONESIA	2104.083	2368.225	2789.093	3116.413	3250.214
ITLAY	0.808223	0.81841	0.816172	0.806992	0.845423
JAPAN	166.4701	162.0357	154.9819	149.6957	143.7742
Korea, Rep.	773.7424	754.893	745.5778	757.0128	769.7718
MALAYSIA	1.533332	1.512419	1.609771	1.548825	1.573113
MONGOLIA	215.6927	235.7964	258.2238	278.8164	292.0878
NETHERLANDS	0.905826	0.90702	0.891527	0.905494	0.901942
NEW ZEALAND	1.44892	1.43466	1.440346	1.469103	1.468962
PHILIPPINES	17.75811	18.66099	19.28823	19.90263	20.41728
PORTUGAL	0.692866	0.696704	0.698864	0.705021	0.708096
RUSSIA	3.257896	5.539641	7.301961	8.315501	9.273504
SINGAPORE	1.252247	1.175564	1.191257	1.138696	1.111605
SWEDEN	9.368399	9.293505	9.124331	9.340873	9.35167
SWITZERLAND	1.878407	1.872205	1.849228	1.837963	1.771118
THAILAND	16.99044	16.07476	15.92921	15.89469	15.78201
UNITED KINGDOM	0.645013	0.652644	0.635241	0.626133	0.627627
UNITED STATES	1	1	1	1	1

Appendix 14.2: PPP conversion factor of involved countries from 2003 to 2007

	2003	2004	2005	2006	2007
AUSTRALIA	1.351692	1.367063	1.388356	1.406829	1.426873
CANADA	1.225894	1.231222	1.213644	1.20574	1.212028
FRANCE	0.937596	0.940399	0.923334	0.901776	0.893733
GERMANY	0.91728	0.896981	0.866875	0.836564	0.831325
INDIA	14.11372	14.52367	14.66854	15.14506	15.60277
INDONESIA	3361.393	3551.463	3934.264	4354.633	4719.649
ITLAY	0.85364	0.873177	0.866646	0.832538	0.817654
JAPAN	139.7747	134.2054	129.552	124.649	120.2964
Korea, Rep.	794.0014	796.2605	788.9201	773.484	769.1624
MALAYSIA	1.593171	1.643851	1.733921	1.749172	1.787133
MONGOLIA	315.6791	358.5421	417.2215	493.7758	536.9449
NETHERLANDS	0.926722	0.909487	0.896154	0.867205	0.858165
NEW ZEALAND	1.499039	1.510635	1.535	1.4847	1.50789
PHILIPPINES	20.65808	21.21617	21.75489	22.15061	22.24478
PORTUGAL	0.70585	0.716444	0.68433	0.661117	0.660403
RUSSIA	9.866728	11.55126	12.73613	12.61388	13.98403
SINGAPORE	1.073394	1.090547	1.078562	1.067815	1.105287
SWEDEN	9.33318	9.109196	9.378367	9.073851	8.892715
SWITZERLAND	1.775749	1.754755	1.742756	1.656833	1.602248
THAILAND	15.67828	15.73698	15.9321	16.26733	16.39393
UNITED KINGDOM	0.640702	0.632797	0.636173	0.626038	0.64591
UNITED STATES	1	1	1	1	1

Appendix 14.3: PPP conversion factor of involved countries from 2008 to 2012

	2008	2009	2010	2011	2012
AUSTRALIA	1.479073	1.442415	1.506132	1.511052	1.481086
CANADA	1.23439	1.202668	1.223272	1.239904	1.238937
FRANCE	0.882239	0.857656	0.856771	0.844618	0.84096
GERMANY	0.811651	0.80611	0.796383	0.778587	0.776427
INDIA	16.62984	17.50352	18.84786	20.06338	21.13297
INDONESIA	5469.409	5876.757	6285.923	6665.474	6847.467
ITLAY	0.788864	0.776388	0.780179	0.768425	0.753557
JAPAN	116.8458	115.4437	111.5941	107.4543	104.6847
Korea, Rep.	785.7179	822.2107	841.7378	854.5857	847.9324
MALAYSIA	1.934988	1.805151	1.85702	1.921729	1.902657
MONGOLIA	639.6181	646.3273	766.5294	842.9617	927.9353
NETHERLANDS	0.842328	0.838227	0.849371	0.831693	0.825372
NEW ZEALAND	1.490709	1.459322	1.502639	1.485915	1.448153
PHILIPPINES	23.46566	23.93221	24.64441	25.14154	25.17949
PORTUGAL	0.649209	0.630853	0.631984	0.627576	0.604902
RUSSIA	14.3412	14.03379	15.83311	17.34557	18.48846
SINGAPORE	1.071831	1.091947	1.081179	1.066319	1.069859
SWEDEN	8.773296	8.881646	8.994113	8.819881	8.699078
SWITZERLAND	1.548664	1.512964	1.50921	1.441417	1.391403
THAILAND	16.71196	16.90715	17.31688	17.70133	17.63141
UNITED KINGDOM	0.650843	0.653432	0.691126	0.698151	0.689656
UNITED STATES	1	1	1	1	1

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