Determinants of inbound tourists in Cambodia : a dynamic panel data approach

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June 2016

Abstract

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Keywords: Tourism demand, tourism sector, dynamic panel model, Cambodia
JEL classification: C33, L83, Z32

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Determinants of Inbound Tourists in Cambodia: A Dynamic Panel Data Approach[ζ]

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Understanding the determinants of tourism demand is crucial for the tourism sector. This paper develops a dynamic panel model to examine the determinants of inbound tourists to Siem Reap airport, Phnom Penh airport, and land and waterway borders in Cambodia. Consistent with the consumer theory of tourism consumption, a 10% increase in the origin country GDP per capita is predicted to increase the number of tourist visits to Siem Reap airport by 5.8%. A 10% increase in the real exchange rate between the origin country and Cambodia is predicted to decrease the number of tourist visits by 0.89%. In contrast, the number of foreign tourists in a previous period has little effect on the number of foreign tourists in the current period. Additionally, the determinants are different by the mode of entry to Cambodia.

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1. Introduction

Past decades have seen the substantial growth of international tourism. International tourist arrivals in the world increased from 435 million in 1990 to 1,087 million in 2013. International tourism receipts reached 1,197 billion USD in 2013. Tourism sectors account for a growing share of economic activity and contribute to employment creation around the globe. The number of international tourists is predicted to increase over the coming decades (UNWTO, 2015). As a result, international tourism contributes to expanding the tourism sector in developing economies, making tourism promotion an important growth strategy for economic development.

The number of inbound tourists to Cambodia has increased rapidly from 0.1 million tourists in 1993 to 4.5 million tourists in 2014. The estimated amount of tourism receipts in Cambodia has increased from 0.1 billion USD in 1995 to 2.7 billion USD in 2014 (Cambodian Ministry of Tourism, 2014). The substantial growth of inbound tourists is likely to produce large economic benefits for the tourism industry in Cambodia. Therefore, it is crucial to improve our understanding of the determinants of inbound tourists for tourism promotion, and an empirical investigation of this issue will have important policy implications.

In this paper, I develop a dynamic panel model to estimate the determinants of inbound tourists in Cambodia. To design an empirical framework, I discuss the theoretical background for tourism demand based on consumer theory in microeconomics. I specify a demand function of tourism consumption by foreign residents to represent a general relationship between tourist visits and determinant factors. The number of inbound tourists is predicted to increase with lower relative prices of tourism at the destination, lower travel costs between the origin and destination countries, and higher income levels in the origin country. Additionally, supply constraints in tourism goods and services imply that the number of inbound tourists in a previous period can affect the number of foreign tourists in this period. Considering demand and supply sides in tourism consumption, I specify a dynamic panel data model with a lagged dependent variable and a set of potential endogenous and exogenous explanatory variables. To obtain consistent estimates of the coefficient on the lagged dependent variable, I use the generalized method of moments (GMM) estimator developed by Arellano and Bond (1991).

This paper is related to the growing literature on tourism demand modeling and forecasting. A comprehensive review of the literature is provided by Song et al. (2009). The prior studies use a wide variety of econometric analysis including times series models and panel data models. A dynamic panel data approach is increasingly used to

estimate the determinants of tourism demand. Using the dynamic panel model, Munoz (2007) examines the determinants of German demand for tourism in Spain. Leitão (2015) investigates the determinants of tourism demand in Portugal. However, there is little work to apply this approach for inbound tourists in Cambodia. Hor and Thaiprasert (2015) examine tourism demand in Cambodia using fixed- and random-effect panel models. Their findings show that the GDP per capita of the origin countries in the previous year has a positive impact on tourist arrivals to Cambodia. Higher relative prices in Cambodia have a negative effect on tourist arrivals. This paper is different in that a dynamic panel model is used and potential endogeneity problems are explicitly addressed. Additionally, prior studies tend to focus on the aggregate number of inbound tourists. Using data on inbound tourist visits by airports and by land and waterways, I also examine whether the determinants of inbound tourists differ by the mode of entry.

The main findings can be summarized as follows. Across alternative specifications, the results indicate that the number of foreign tourists in a previous period has little influence on the number of foreign tourists in a current period. This finding implies that tourist arrivals to Cambodia are not affected by supply constraints, learning processes of tourism sites, and dissemination of tourism information. Second, a 10% increase in the origin country GDP per capita is predicted to increase the number of tourist visits to Siem Reap airport by 5.8%. A 10% increase in the real exchange rate between the origin country and Cambodia is predicted to decrease the number of tourist visits by 0.89%. Although these results are consistent with the predictions of consumer theory on tourism consumption, tourist arrivals to Phnom Penh airport and by land and waterways do not consistently support these theoretical implications. Finally, the weekly frequency of direct flights as a proxy for travel costs has little effect on tourist visits to Siem Reap and Phnom Penh airports.

The rest of this paper is organized as follows. Section 2 provides an empirical framework, including theoretical hypotheses, an empirical model, and estimation strategy. Section 3 describes data on tourist arrivals to Cambodia and other data sources. Section 4 presents the estimation results for Siem Reap airport, Phnom Penh airport, and land and waterways. Section 5 concludes.

2. Empirical Framework

2.1. Theoretical Hypotheses

I begin by discussing the theoretical background for tourism demand to analyze the determinants of inbound tourists in Cambodia. A formal framework for tourism demand can be developed based on consumer theory in microeconomics (Candela and Figini,

2012, Chapters 5 and 6). In a simple model, a consumer obtains utility from consuming tourism goods and services. There are prices for goods and services, and income levels impose a budge constraint on consumption levels. In this setting, the objective is to maximize the consumer's utility from tourism consumption under a budget constraint. The optimal choice depends on income, relative prices of tourism goods and services, and the consumer's preferences for tourism goods and services. Thus, consumer theory is useful for understanding how a consumer makes decisions about tourism consumption.

Following Song et al. (2009, Chapter 1), tourism demand for foreign tourists from origin country *i* to destination country *j* in time *t* is written as:

$$DT_{ijt} = f\left(Y_{it}, P_{ijt}, T_{ijt}, Z_{ijt}, f_t\right) \quad (1)$$

where DT_{ijt} is the number of tourist visits from origin country *i* to destination country *j* in time *t*. Y_{it} is the income level of tourists from origin country *i*. P_{ijt} is the relative price of tourism in destination country *j* compared with the prices in origin country *i* for time *t*. T_{ijt} is the travel cost of tourist visits from origin country *i* to destination country *j* in time *t*. Z_{ijt} is a set of variables that capture other factors about tourist visits from origin country *i* to destination country *j* in time *t*. Finally, f_t captures the influence of time periods on tourists, including seasonal cycles and long-term trends in the tourism sector.

Equation (1) is a demand function for inbound tourism that represents a general relationship between tourist visits and determinant factors. Based on consumer theory, I predict that the number of tourists should increase with lower relative prices of tourism at the destination, lower travel costs between the origin and destination countries, and the higher income levels in the origin country. In addition to these economic factors, there are a wide range of potential factors that influence the decision to visit the destination country. These may include political, social, cultural, and geographic factors. The number of tourist visits may also depend on changes in tourism policy such as visa restrictions. The actual number of tourists visiting the destination country is a result of underlying decisions by foreign residents after considering both economic and non-economic factors.

While these explanations are provided from a consumption point of view, the demand for tourism can also depend on a supply of tourism goods and services. Specifically, constraints on supply influence tourism demand because there may be an inadequate or excessive supply of tourism goods and services, including hotel accommodation, passenger transportation, and travel package tours. The supply of tourism products cannot be adjusted instantaneously to meet the level of demand,

implying that there is an adjustment process in meeting the demand and supply of tourism goods and services. Let DT^*_{ijt} be the number of tourist visits demanded from origin country *i* in time *t*. A partial adjustment process is specified as:

$$DT_{ijt} - DT_{ij,t-1} = \lambda\left(DT^*_{ijt} - DT_{ij,t-1}\right), \quad 0 < \lambda < 1. \qquad (2)$$

The right-hand side of equation (2) implies that supply constraints cause the difference between the number of tourist visits demanded in time *t* and the number of tourist visits supplied in a previous period. The number of tourist visits adjusts gradually towards the equilibrium level with λ indicating the speed of adjustment.

Combining equations (1) and (2) and rearranging, tourism demand is written:

$$DT_{ijt} = \rho DT_{ij,t-1} + f\left(Y_{it}, P_{ijt}, T_{ijt}, Z_{ijt}, f_t\right) \qquad (3)$$

where $\rho = 1 - \lambda$ and $0 < \rho < 1$. Equation (3) is a theoretical model of tourism demand, which shows that the number of tourist visits is related to the lag in the number of tourist visits and determinants of tourism demand. The lagged dependent variable can be interpreted as capturing repeated visits and information spillover from foreign tourists. Some foreign tourists visit a tourism destination and learn about the attractiveness of tourism sites. Because knowledge of tourism sites improves the match between consumer tastes and tourism experiences, the tourists may return to the same destination. After acquiring tourism information, they may also disseminate it to other potential tourists in their origin country. These learning processes and dissemination of tourism information imply that the number of foreign tourists in a previous period influences the number of foreign tourists in the current period.

2.2.Empirical Model

The theoretical discussion up to this point provides a foundation to specify an equation for estimating the number of inbound tourists to Cambodia. In this paper, it is of interest to estimate income and price elasticities with respect to the number of inbound tourists in Cambodia. I specify a log linear form of equation (3) for origin country *i* and year *t* as:

$$\ln DT_{it} = \beta_0 + \rho \ln DT_{i,t-1} + \beta_1 \ln Y_{it} + \beta_2 \ln P_{it} + \gamma T_{it} + \boldsymbol{Z}'_{it}\delta + f_i + f_t + \varepsilon_{it} \qquad (4)$$

where f_t is a year fixed effect, f_i is an origin country fixed effect, and ε_{it} is an error term. Note that I focus on determinants of tourist visits to Cambodia. Because there is only one destination country, I omit the subscript *j*. I use the country-level panel data across years and time is denoted as year.

The independent variables are defined as follows. Y_{it} is the per capita GDP in origin country *i* for year *t*. P_{it} is the relative price of tourism goods and services in Cambodia compared with the price in origin country *i* for year *t*. In practice, data on

general prices of similar tourism goods and services across countries are not readily available. To measure a relative price in Cambodia for residents in origin country *i*, I use consumer price indexes in Cambodia and origin country *i* for year *t* and an exchange rate of USD and local currency used in origin country *i* as:

$$P_{it} = \frac{CPI_{it}^{KHM}}{CPI_{it}} \cdot EXR_{it}. \quad (5)$$

CPI_{it}^{KHM} and CPI_{it} are a consumer price index in Cambodia and origin country *i*, respectively. EXR_{it} is measured as the annual average of an official exchange rate of morigin country's local currency per USD, with a higher value indicating depreciation of the local currency in the origin country. The formal local currency in Cambodia is the Cambodian riel, but the Cambodian economy is substantially dollarized. This implies that the USD exchange rate is relevant for foreign tourists to purchase tourism goods and services in Cambodia.

As a proxy for T_{it}, I use the weekly frequency of direct passenger flights from origin country *i* to Cambodia. I predict that the greater weekly frequency of direct flights should reduce travel costs for foreign tourists in the countries that are connected by direct flights. A reduction in travel costs should increase the number of inbound tourists to Cambodia. International airfares may be more appropriate for measuring the travel costs from origin country *i* to Cambodia. However, panel data on international airfares are not readily available for this research.

I include additional control variables for Z_{it}, including the total population and GDP growth rates in origin country *i*. The number of potential tourists to Cambodia should increase with the total population in the origin countries, and they may choose foreign trips during better economic cycles. Thus, I predict that the number of tourist visits increases with the total population and GDP growth rates. Additionally, some tourists visit Cambodia for business purposes. As a proxy for business-motivated visits, I include origin country exports to and imports from Cambodia.

Finally, f_i is a time-invariant country effect, such as the geographic distance, a difference in time zones, and similarities in climate. f_t is an aggregate time effect that affects tourist visits to Cambodia in year *t*.

2.3. Estimation Method

Considering a wide range of potential determinants of inbound tourists, I arrive at equation (4) as a main specification. This does not necessarily imply that a fully specified model is the most appropriate to account for the determinants of inbound tourists in part because some variables may be irrelevant in the data. However, it is also

unclear *ex ante* which specification is more appropriate to capture the determinants for Cambodia. Therefore, I adopt a general-to-specific modeling approach by first estimating the fully specified model in equation (4) and then adjusting the specification to fit better with the data.

The main specification in equation (4) is a panel data model with a lagged dependent variable and a set of potentially endogenous and exogenous explanatory variables. Because the lagged dependent variable is correlated with the fixed effects in the error term, dynamic panel bias arises in applying ordinary least squares (OLS), random effects, and fixed effects estimations. To obtain consistent estimates of the coefficient on the lagged dependent variable, I use the GMM estimator, developed by Arellano and Bond (1991).[1] In this method, I take the first difference of equation (4) to eliminate the country fixed effects, f_i. Assuming that there is no serial correlation for the error terms, the GMM estimator uses an instrument matrix of lagged levels of $\ln DT_{i,t-j}\ (j \geq 2)$ and current and lagged levels of the explanatory variables as instruments for the differenced lagged dependent variable, $\Delta \ln DT_{i,t-1} = \ln DT_{i,t-1} - \ln DT_{i,t-2}$. With the instrument matrix and the matrix of differenced error terms, I construct a set of moment conditions to obtain consistent estimates of the coefficients.

A potential concern in equation (4) is that a proxy variable for T_{it}, the weekly frequency of direct passenger flights from origin country i to Cambodia, may be endogenous. For instance, airline companies can adjust the weekly frequency of direct flights based on the actual and forecast demand for passengers. The greater (smaller) number of inbound tourists can increase (decrease) the weekly frequency of direct flights. In this case, an endogeneity bias must be address. Thus, I use an instrument matrix of lagged levels of $T_{i,t-j}(j \geq 2)$ and current and lagged levels of the explanatory variables as instruments for the differenced explanatory variable, $\Delta T_{it} = T_{it} - T_{i,t-1}$.

I report a two-step estimator, which is asymptotically efficient and robust to heteroskedasticity and arbitrary patterns of serial correlation within country pairs. Because the parameters' standard errors in the two-step estimator are strongly biased downward in a finite sample, I report a small-sample correction for the two-step standard errors developed by Windmeijer (2005). Additionally, I conduct the following specification tests to check the validity of instruments used: the Hansen test of overidentifying restrictions and the Arellano-Bond test for serial correlation. These statistics test the joint validity of the moment conditions and second-order serial

[1] Roodman (2009) provides an excellent discussion about implementing the GMM estimators in Stata.

correlation of the first-difference disturbances, respectively. In the presence of the second-order serial correlation in the differenced error term, a second-period lag of endogenous variables is invalid as instruments for the difference variables. In this case, the instrument sets must start with third-period lags.

3. Data Description

3.1. Data on Inbound Tourists in Cambodia

Data on inbound tourists in Cambodia are constructed from a series of the *Annual Tourism Statistics Report* compiled by the Statistics and Tourism Information Department, the Ministry of Tourism in Cambodia. This report is based on data sources provided by the Immigration Department, the Ministry of Interior in Cambodia, and provides information on inbound and outbound tourists in Cambodia. In this paper, I use the reports for 2006–2014 to construct a dataset on the number of visitor arrivals by country of residence to (1) Phnom Penh international airport, (2) Siem Reap international airport, and (3) cross-border check points through land and waterways. There are 16 border check points for land and three check points for international ports.

Figure 1 shows the trend in annual international tourist arrivals and estimated tourism receipts in the Annual Tourism Statistics Report 2014. The number of inbound tourists to Cambodia has increased rapidly over time from 0.1 million tourists in 1993 to 4.5 million tourists in 2014. Additionally, the estimated amount of tourism receipts in Cambodia has also increased from 0.1 billion USD in 1995 to 2.7 billion USD in 2014. These trends clearly indicate the substantial growth of inbound tourists and possible economic benefits for the tourism industry in Cambodia. Additionally, such rapid growth suggests that it is crucial to investigate the potential determinants of inbound tourists.

---Figure 1 here---

Table 1 presents the number of tourist arrivals by entry points and country of residence for 2014. The total number of tourist arrivals in 2014 was 917,800 for Phnom Penh international airport, 1,355,693 for Siem Reap international airport, and 2,229,282 for land and waterways. At Phnom Penh airport, there were 186,649 tourist arrivals from China, accounting for 20.3% of the total number of tourists. The next most important origin countries include Malaysia, the United States, and France. In Siem Reap airport, there were 338,559 tourists from Korea, followed by 320,147 tourists from China and 141,342 tourists from Japan. These countries combine to account for

59.0% of the total number of tourists. In contrast, the main origin countries for land and waterways include Vietnam, Laos, and Thailand. Almost 70% of tourists by land and waterways come from neighboring countries. Thus, the pattern of inbound tourists is largely different by the mode of entry for each origin country, suggesting that potential determinants of tourist arrivals could also differ by the mode of entry. For this reason, the following analysis is conducted separately for inbound tourists for each mode of entry: Phnom Penh airport, Siem Reap airport, and land and waterways.

---Table 1 here---

3.2.Other Data Sources

I use the World Economic Outlook Database by the International Monetary Fund (IMF) for data on per capita GDP, GDP growth rates, and total population. The IMF also provides data on the annual average of an official exchange rate of origin country's local currency per USD. Data on consumer price indexes are taken from the World Development Indicator by the World Bank. I use the *Annual Tourism Statistics Report* to construct data on the weekly frequency of direct flights from foreign countries to Phnom Penh and Siem Reap international airports in Cambodia. Finally, data on exports and imports come from the UN Comtrade Database.

4. Estimation Results

In this section, I discuss the estimation results for tourist visits to Siem Reap airport, followed by the results for visits to Phnom Penh international airport and those by land and waterways. Table 2 presents the summary statistics of the sample used for estimating the dynamic panel model with additional control variables.

---Table 2 here---

4.1. Tourist Visits to Siem Reap Airport

Table 3 shows the estimation results for tourist visits to Siem Reap airport. Column (1) is the benchmark estimation result. The lagged variable of log tourists has an insignificant coefficient. The Hansen test of overidentifying restrictions has a *p*-value of 0.15, suggesting that there is no evidence to reject the validity of instruments. The Arellano-Bond test for serial correlation has a *p*-value of 0.1, implying that there is no strong evidence of the second-order serial correlation of first-difference disturbance. Additionally, I estimate the specification with additional control variables in column (2).

Although the specification tests support the validity of instruments for endogenous variables, the coefficient of the lagged tourists is not significant. These results imply that the number of foreign tourists in a previous period has little influence on the number of foreign tourists in the current period. This result does not support the theoretical hypothesis on supply constraints, learning processes of tourism sites, and dissemination of tourism information.

---Table 3 here---

In column (3), I report the estimation result by excluding the lagged log tourists. The Hansen test has a *p*-value of 0.51 and the Arellano-Bond test has a *p*-value of 0.22. These results support the validity of the instruments, including the lag period of the instruments for flight frequency, which are treated as an endogenous variable. Consistent with the prediction based on consumer theory, the coefficient of GDP per capita is significant and positive. The coefficient of the real exchange rate is significant and negative. These results indicate that a 10% increase in the origin country GDP per capita is predicted to increase the number of tourist visits to Siem Reap airport by 5.8%. In contrast, a 10% increase in the real exchange rate between the origin country and Cambodia is predicted to decrease the number of tourist visits by 0.89%.

The coefficient of flight frequency is not significant, which can be interpreted as the direct flight frequency having little effect on tourist visits to Siem Reap airport. An alternative interpretation is that the weekly frequency of direct flights may not capture sufficiently variations in travel costs for foreign tourists across countries, leading to an insignificant coefficient. Moreover, a number of foreign tourists arrive at Siem Reap airport through indirect flight networks, which generate opportunity costs related to stop-over transits. These complex factors must be included in the travel costs.

Finally, column (4) presents the result with additional control variables. The results for GDP per capita and real exchange rate do not change quantitatively, implying that the main results in column (3) are robust to the additional control variables. The flight frequency still has an insignificant coefficient. All the coefficients of the control variables are not significant.

4.2. Tourist Visits to Phnom Penh Airport

I discuss the estimation results for Phnom Penh airport in Table 4. Column (1) is the result of the benchmark specification. The lagged variable of log tourists has an insignificant coefficient. The Arellano-Bond test supports a second-period lag of

endogenous variables as instruments for the difference variables, but the Hansen test shows evidence for rejecting the validity of the instruments. These results suggest that the specification in column (1) is not appropriate for tourist visits to Phnom Penh airport. In column (2), I report the result including the additional control variables to the benchmark specification. This result also shows that the Hansen test shows evidence to reject the validity of instruments. The coefficient of the lagged tourists is not significant. These results may suggest that the lagged dependent variable should not be included in the true model to account for tourist visits to Phnom Penh, as is the case for Siem Reap airport.

---Table 4 here---

In column (3), I estimate the specification without the lagged tourists. The Hansen and Arellano-Bond tests do not provide strong evidence against this specification. The coefficients of GDP per capita and flight frequency are not significant. The coefficient of real exchange rate is significantly positive, which is not consistent with my prediction. This result indicates that the tourist visits to Phnom Penh increase with the higher relative price in Cambodia compared with the price in origin country. An interpretation is that the measure of real exchange rate does not sufficiently capture the relative price of tourism goods and services in Phnom Penh, which is measured by the consumer price index. Additionally, inbound tourists to Cambodia have various purposes including not only tourism, but business meetings, visits to friends and relatives, and conferences. If tourism consumption is not the main purpose for inbound tourists, my specification needs to take into account not only relative tourism prices, but other relative prices related to other purposes.

Finally, I report the specification with additional control variables in column (4). The result is similar for the main explanatory variables. Among the control variables included, the coefficient of the total population in the origin country is significant and positive, consistent with my prediction.

4.3. Tourist Visits by Land and Waterways

I discuss the results for tourist visits by land and waterways in Table 5. There is no flight frequency variable in the specification because tourists cross the land and waterway borders. Column (1) shows the Arellano-Bond GMM estimation of the benchmark specification. The Hansen test and Arellano-Bond test provide evidence for the validity of the instruments used in the specification. The coefficient of lagged

tourists is significant and positive, implying that the number of tourists by land and waterways in this period has a positive influence on the number of tourists in the next period. Also, the coefficient of the real exchange rate is significant and negative, consistent with my prediction.

I proceed to check if the benchmark result is robust to additional control variables. Column (2) shows the Arellano-Bond GMM estimation of the specification with additional control variables. The coefficient of the lagged tourists is not significant in this specification. The Arellano-Bond test suggests that a second-period and deeper lags of endogenous variables can be used as instruments. Additionally, the Hansen test supports the validity of instruments. This specification implies that tourist visits through land and waterways in a previous period have little effect on the visits in the current period. The coefficients of GDP per capita and the real exchange rate are insignificant, whereas the population and imports from Cambodia have significant coefficients.

---Table 5 here---

The result in column (2) can be interpreted as suggesting that the lagged dependent variable does not belong to the true model to account for tourist visits through land and waterways, as is the case for tourist visits to Siem Reap and Phnom Penh airports. Thus, I exclude the lagged dependent variable from the specification, and estimate the first-differenced specification by OLS. The result in column (3) shows that the coefficient of GDP per capita is significant and positive, consistent with the prediction of consumer decisions for tourism consumption. However, the real exchange rate coefficient is not significant. Additionally, the coefficients of GDP growth rate and population are significant and negative. The coefficient of origin country exports to Cambodia is not significant, but the coefficient of origin country imports from Cambodia is significant and positive.

5. Conclusion

The tourism sector is increasingly important for economic development, and the determinants of tourism demand are crucial for tourism promotion policies. This paper develops a dynamic panel model to shed light on the determinants of inbound tourists in Cambodia. Consistent with the consumer theory of tourism consumption, a 10% increase in the origin country GDP per capita is predicted to increase the number of tourist visits to Siem Reap airport by 5.8%. A 10% increase in the real exchange rate between the origin country and Cambodia is predicted to decrease the number of tourist

visits by 0.89%. Theoretical discussions highlight the role of dynamic processes in tourist visits arising from supply constraints, learning processes of tourism sites, and dissemination of tourism information. However, the results show that the number of foreign tourists in a previous period has little influence on the number of foreign tourists in the current period for Cambodia. Additionally, the determinants are different for different modes of entry to Cambodia, implying that tourism promotion policies should consider the motivations of inbound tourists.

I conclude by mentioning some remaining issues in my empirical analysis. The purposes of inbound tourists are diverse, including tourism, business meetings, visits to friends and relatives, and conferences. The country-level data on inbound tourists to Cambodia are not disaggregated by specific purposes. As a result, my result may mask possible variation in determinants of inbound tourists by their purposes. Also, travel costs should significantly affect inbound tourists, and a precise measure is critical for identification. My proxy for travel costs needs to be improved by considering airfares, flight networks, and airline services. These data issues indicate that the quality of available data is crucial for empirical analysis of tourism demand.

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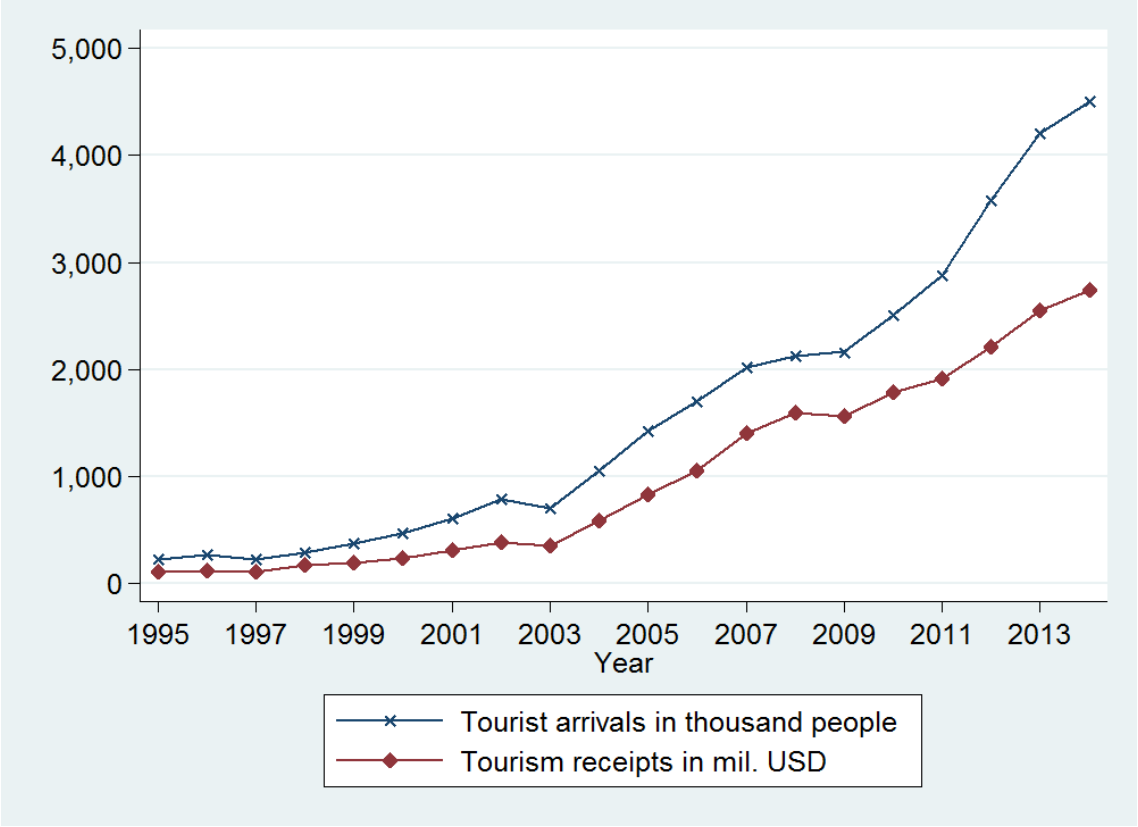
Figure 1. Trends in Tourist Arrivals and Tourism Receipts



Source: Annual Tourism Statistics Report 2014

Table 1. Number of tourist arrivals by entry mode and country of residence for 2014

Phnom Penh International Airport			Siem Reap International Airport			Land and Waterways		
Country	Number	Percentage Share	Country	Number	Percentage Share	Country	Number	Percentage Share
China	186,649	20.34	Korea	338,559	24.97	Vietnam	874,422	39.22
Malaysia	80,139	8.73	China	320,147	23.62	Laos	456,678	20.49
United States	72,986	7.95	Japan	141,342	10.43	Thailand	221,760	9.95
France	58,373	6.36	United States	72,706	5.36	Russia	90,320	4.05
Taiwan	58,073	6.33	Malaysia	46,243	3.41	Philippines	65,042	2.92
Korea	55,839	6.08	France	45,359	3.35	China	53,539	2.40
Australia	54,814	5.97	United Kingdom	44,007	3.25	United Kingdom	52,842	2.37
Japan	49,792	5.43	Australia	43,282	3.19	United States	45,674	2.05
Singapore	42,977	4.68	Germany	32,873	2.42	France	37,320	1.67
Thailand	42,349	4.61	Taiwan	29,525	2.18	Australia	36,071	1.62
United Kingdom	36,457	3.97	Philippines	20,026	1.48	Germany	33,764	1.51
Vietnam	20,792	2.27	Canada	18,460	1.36	Korea	30,026	1.35
Germany	17,506	1.91	Spain	18,444	1.36	Japan	24,654	1.11
Canada	16,884	1.84	Singapore	16,971	1.25	Indonesia	21,712	0.97
India	12,169	1.33	Thailand	15,348	1.13	Malaysia	18,055	0.81
Indonesia	9,932	1.08	Italy	12,703	0.94	Canada	16,920	0.76
New Zealand	9,682	1.05	India	10,940	0.81	Netherlands	13,533	0.61
Philippines	8,407	0.92	Vietnam	10,587	0.78	Taiwan	9,930	0.45
Italy	6,983	0.76	Russia	10,318	0.76	Italy	9,862	0.44
Netherlands	5,661	0.62	Switzerland	7,683	0.57	Sweden	7,997	0.36

Source: Annual Tourism Statistics Report 2014

Table 2. Summary statistics

Panel A: Tourist visit to Siem Reap Airport					
Variable	No. of obs.	Mean	Std. Dev.	Min	Max
Log tourists	371	7.75	2.09	0.69	12.73
Log GDP per capita	371	9.72	1.24	6.53	11.69
Log real exchange rate	371	1.93	2.55	-1.24	9.83
Flight frequency	371	3.22	12.53	0	105
GDP growth rate	371	1.89	3.59	-15.14	15.24
Log population	371	3.16	1.60	-1.15	7.22
Log export to Cambodia	371	15.42	3.29	4.57	22.23
Log import from Cambodia	371	16.81	2.45	8.42	21.81
Panel B: Tourist visit to Phnom Penh Airport					
Variable	No. of obs.	Mean	Std. Dev.	Min	Max
Log tourists	367	7.58	2.08	1.61	12.14
Log GDP per capita	367	9.72	1.25	6.53	11.69
Log real exchange rate	367	1.92	2.56	-1.24	9.83
Flight frequency	367	3.14	10.29	0	70
GDP growth rate	367	1.90	3.60	-15.14	15.24
Log population	367	3.16	1.61	-1.15	7.22
Log export to Cambodia	367	15.36	3.27	4.57	22.23
Log import from Cambodia	367	16.80	2.45	8.42	21.81
Panel C: Tourist visit by Land and Waterway					
Variable	No. of obs.	Mean	Std. Dev.	Min	Max
Log tourists	372	8.08	2.10	2.40	13.68
Log GDP per capita	372	9.72	1.24	6.53	11.69
Log real exchange rate	372	1.93	2.55	-1.24	9.83
GDP growth rate	372	1.89	3.59	-15.14	15.24
Log population	372	3.15	1.60	-1.15	7.22
Log export to Cambodia	372	15.41	3.29	4.57	22.23
Log import from Cambodia	372	16.81	2.44	8.42	21.81

Table 3. GMM estimation results for tourists to Siem Reap airport

Dependent variable: log tourists

	(1)	(2)	(3)	(4)
Lagged log tourists	-0.21	-0.27		
	(0.31)	(0.19)		
Log GDP per capita	0.64**	0.94**	0.58**	0.66**
	(0.22)	(0.24)	(0.19)	(0.18)
Log real exchange rate	-0.050	-0.081+	-0.089**	-0.12**
	(0.059)	(0.043)	(0.020)	(0.026)
Flight frequency	0.0099	0.014	0.0036	0.012
	(0.013)	(0.016)	(0.013)	(0.013)
GDP growth rate		0.0015		0.010
		(0.0097)		(0.0075)
Log population		-0.58		-2.26
		(1.01)		(1.49)
Log export to Cambodia		-0.0010		0.0072
		(0.017)		(0.017)
Log import from Cambodia		-0.0092		0.00066
		(0.021)		(0.024)
No. of observations	469	371	551	430
No. of countries	84	67	84	68
Hansen *J* statistic	15.8	8.50	5.29	3.03
(P-value)	0.15	0.67	0.51	0.81
Arellano-Bond statistic	-1.67	-1.54	-1.24	-1.50
(P-value)	0.095	0.12	0.22	0.13
No. of instruments	22	26	17	21

Notes: Figures in parentheses are standard errors corrected for small-sample bias in the two-step GMM standard errors by Windmeijer (2005); **, *, and + indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4. GMM estimation results of tourists to Phnom Penh airport

Dependent variable: log tourists

	(1)	(2)	(3)	(4)
Lagged log tourists	0.22	0.36		
	(0.26)	(0.37)		
Log GDP per capita	0.21	0.33	0.27	0.29
	(0.44)	(0.25)	(0.29)	(0.27)
Log real exchange rate	0.093**	0.12*	0.080**	0.10**
	(0.029)	(0.052)	(0.025)	(0.026)
Flight frequency	0.0063	0.0035	0.0050	0.0077
	(0.013)	(0.0098)	(0.0061)	(0.0073)
GDP growth rate		-0.0033		-0.0069
		(0.0090)		(0.0064)
Log population		0.62		2.01+
		(0.97)		(1.08)
Log export to Cambodia		-0.012		-0.011
		(0.025)		(0.014)
Log import from Cambodia		-0.039		-0.017
		(0.040)		(0.025)
No. of observations	467	367	549	425
No. of countries	84	67	84	68
Hansen *J* statistic	27.6	21.3	5.17	4.76
(P-value)	0.0037	0.030	0.52	0.57
Arellano-Bond statistic	0.55	0.65	-1.71	-1.22
(P-value)	0.58	0.52	0.087	0.22
No. of instruments	22	26	17	21

Notes: Figures in parentheses are standard errors corrected for small-sample bias in the two-step GMM standard errors by Windmeijer (2005); **, *, and + indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5. Estimation results for tourists via land/waterways

Dependent variable: log tourists

Estimation / Variable	(1) GMM	(2) GMM	(3) FD-OLS
Lagged log tourists	0.53*	0.11	
	(0.22)	(0.65)	
Log GDP per capita	0.39	0.17	0.55*
	(0.26)	(0.25)	(0.24)
Log real exchange rate	-0.077*	-0.018	0.047
	(0.034)	(0.039)	(0.067)
GDP growth rate		-0.0062	-0.015**
		(0.0064)	(0.0052)
Log population		-2.70+	-1.52+
		(1.60)	(0.90)
Log export to Cambodia		0.0023	-0.014
		(0.016)	(0.012)
Log import from Cambodia		0.045+	0.049**
		(0.025)	(0.018)
No. of observations	468	372	430
No. of countries	84	67	
R-squared			0.23
Hansen *J* statistic	7.22	6.22	
(P-value)	0.20	0.29	
Arellano-Bond statistic	0.79	0.96	
(P-value)	0.43	0.34	
No. of instruments	15	19	

Notes: Figures in parentheses in columns (1) and (2) are standard errors corrected for small-sample bias in the two-step GMM standard errors by Windmeijer (2005); figures in parentheses in column (3) report standard errors corrected for clustering within origin countries; **, *, and + indicate statistical significance at the 1%, 5%, and 10% levels, respectively; FD-OLS indicates the OLS regression of a first-differenced specification.