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Tveteras, Sigbjorn and Roll, Kristin H.

CENTRUM Catolica, Pontificia Universidad Catolica del Peru, Department of Industrial Economics, University of Stavanger

11 July 2011

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Sigbjorn Tveteras

CENTRUM Católica, Pontificia Universidad Católica del Perú

and

Kristin H. Roll

University of Stavanger, Department of Industrial Economics

Draft July 2011

Abstract Travel cost is a barrier for many tourists who wish to visit faraway destinations. This affects exotic tourism destinations located far from key markets since it the great majority of travelers from these markets will find travel cost prohibitively high. However, exotic tourism destinations might attract more visitors if they are able to improve market access through improved international air connectivity. The objective of this study is to test whether an increase in the number of long-haul flights has positive impacts on the number of tourist arrivals. We estimate a dynamic demand model using panel data of tourist arrivals to Peru and flight connections from 75 origin countries spanning the years 2004 to 2009, and find significant positive direct and indirect effects of long haul flights on demand for air travel to Peru.

Corresponding author: Sigbjorn Tveteras (stveteras@pucp.pe), CENTRUM Católica, Pontificia Universidad Católica del Perú, Jr. Daniel Alomía Robles 125, Urb. Los Álamos de Monterrico, 33 Lima - Peru

"Come fly with my, let's float down to Peru, in llama land there is a one-man band, and he'll toot his flute for you, come on fly with me, let's take off in the blue," (Cahn and van Heusen)

Introduction

During the last decades globalization has reduced travel cost and made tourism one of the fastest growing industries worldwide to the benefit of several developing countries (Lee and Chang, 2008; Brida and Pulina, 2010).[1] Nonetheless, since travel cost increases with distance, faraway destinations continues to be out-of-reach of many tourists' travel budgets. This is confirmed by McKercher, *et al.* (2008) who report that destinations situated more than 2,000 kilometers from origin market capture less than 1% of outbound passenger traffic from these markets. Distance is consequently a competitive disadvantage for exotic tourism destinations located far from key markets like Japan, United States of America, and the European Union or from growth markets like China, India, and Russia. These exotic destinations are predominantly made up of developing countries situated in the Southern Hemisphere. The great majority of travelers from the markets that emits most tourists will find travel cost to these destinations prohibitively high.

In this setting, travel cost is not only the monetary expenditure on the air fare, but also the opportunity costs associated with time and convenience of travel (Gronau, 1970; De Vany, 1974; Anderson and Kraus, 1981). International air connectivity between the departure airport and the final destination airport affects travel time and, hence, the opportunity cost of travel. High opportunity costs can for example explain why intricate travel itineraries with many stopovers and long waiting hours usually are associated with

[1] From 1950 to 2005 the growth rate in tourist arrivals globally was 6.5% annually (World Tourism Organization, 2007).

lower air fares. Moreover, high earners with long workdays and short holidays will typically have a higher opportunity cost of their time than in the opposite case and thus be willing to pay more to reduce travel time. Business travelers belong to this group as well.

Therefore improved long-haul air connectivity might mitigate the negative effects of distance on tourism arrivals. For example, a new long haul flight route may not only lead to more tourist arrivals because it induces increased competition among airlines and lower air fares, but also because it can reduce travel time for travelers. A wider range of travel options can also be positive for air travel demand due to differences in preferences and travel budgets among tourists (Quandt and Baumol, 1966; Fuji, *et al*. 1992). Travel options can range from nonstop (*i.e.*, point-to-point) flight routes on the one hand, to travel routes involving many flights and many stopovers on the other. In this respect, an important point is that international airport hubs usually connect a wide geographic area. This implies that not only those travellers who reside in the vicinity of a hub airport can benefit from its long-haul flight departures, but all those who are connected to its hub-and-spoke network. Consequently, tourism destinations might attract a greater number of visitors if they are able to increase provision of long-haul flights from important markets.

Furthermore, exotic destinations as defined here (*i.e.*, destinations that are faraway relative to key markets) tend to be developing countries, which also means that air connectivity as measured by the number of flights (or by seat capacity) tend to be less developed. Thus if the level of air connectivity is critical for tourism arrivals there are important policy implications for exotic destinations, since attracting new airlines can bring in more tourists and create positive feedback effects for the economy at large (Lee and Chang, 2008).

The objective of this study is to test whether an increase in the level of international air connectivity, as represented by an increased number of long-haul flights between origin and destination, has a positive impact on the number of tourist arrivals. This is a topic that has received little attention in other studies with exception of Fuji *et al.* (1992). In their study, Fuji *et al*. (1992) focuses on direct flights to different neighboring islands comprising Hawaii, and found that nonstop flights lead to modest gains in tourist arrivals to one of Hawaii's neighbor islands. However, because of the relatively long distance to the Hawaiian Islands compared with the distance between its constituent islands – the island hop - it can be difficult to generalize the results from their study to other destinations.

To test empirically the effect of long-haul flights on tourist arrivals we use data from Peru. The Andean country qualifies as an "exotic" destination, not only because of Incas, Machu Picchu, and pristine Amazonian rainforests, but more simply because it is a faraway destination compared to the origin country of most visiting tourists. The average travel distance of Peru's international tourist arrivals in 2009 is approximately 5,500 kilometers.[2] According to one definition, flights that exceed 3,000 kilometers are long haul, which implies that most inbound tourists visiting Peru are long haul travelers. While long-haul air connectivity with North, Central, and South America is relatively good, only two European cities have long-haul flights to Peru and none from other continents. To estimate the effect of long haul flights, we estimate a dynamic demand model using panel data of tourist arrivals and flight connections from 75 origin countries spanning the years 2004 to 2009.

[2] The calculated distance average is weighted based on the share of tourist arrivals from each of Peru's visiting countries.

A survey reports that 70% among the visitors whose trip purpose was related to vacation and recreation were first time visitors (PromPeru, 2010). This indicates that there are relatively few repeat visitors coming to Peru. This is not surprising since the travel cost associated with visits to faraway destinations is high (Klenosky 2002, Lo and Lam 2004). According to Lo and Lam (2004) these types of tourists are less concerned with expenditure and more concerned with quality due to the once-in-a-lifetime aspect of the trip, and we therefore expect long-haul air connectivity to be particular important for travel demand to Peru.

In the next section we give first a brief overview of tourism flows, geographical distances, and air connectivity between Peru and its markets. Next, we discuss the methodological framework for estimating derived demand for air travel and the data that correspond to the empirical application. Then follows the empirical results section, which presents different demand models that were estimated using the Arrellano-Bond estimator for dynamic panel data models. Finally, in the concluding section we discuss the implications of the results from the estimated models.

Background

Tourism Arrivals to Peru

Each year a growing number of inbound tourists arrive to Peru. Figure 1 shows distance and number of tourist arrivals from some of Peru's most important markets. The dotted lines indicate the upper and lower bounds demarcating short, medium, and long haul markets. Distances below 1,000 km (i.e. below the lower dotted line) are defined as short haul, in between 1,000 km and 3,000 km are medium haul and, finally, distances above 3,000 km (*i.e.*, above the upper dotted line) are defined as long haul. It is apparent that some of the most attractive markets are located far from Peru. Distance between the tourists' origin countries and Peru decreases from left to right in the figure, starting with China that is furthest away and then ending with neighboring Ecuador as the closest market to Peru. Distance from European markets to Peru varies around 10,000 km. From the figure, we can see there is a relationship between distance and number of tourist arrivals, in line with the findings in McKercher *et al*. (2008).[3] Ecuador is the only country that qualifies as a short haul market. With an average distance less than 1,000 km, Ecuador is also one of the most important markets to Peru, with almost 150,000 tourist arrivals every year. The highest number of tourist arrivals comes from Chile and with a distance of 2,969 kilometers this market almost qualifies as long haul. USA, the second largest market, is definitely a long haul market with a distance of 5,587km to Peru.

Figure 1 here

Figure 2 shows the number of direct flight routes to Peru in 2009. The majority of long haul flight routes to Peru depart from fellow countries in the Americas. The only two exceptions are Netherlands and Spain. Not all flights included in the figure are actual nonstop flights, as some of them have a stopover in another country en route to Lima, Peru. However, flights are treated as nonstop when travellers do not need to change planes during the trip. For example, several of the flights from the US have a stopover in a country in Central or South America before they reach Lima. To a certain degree, this involves double counting, since for example, a flight that depart from the US with a stopover in Bogota,

[3] The correlation between the log of tourist arrivals and the log of distance is -0.38.

Colombia, will also count as a nonstop flight from Colombia. This is justified by the fact that the flight gives both US and Colombian citizens the opportunity to travel nonstop to Peru.

Figure 2 here

Derived Demand for Long-Haul Air Travel

The necessity of air travel when visiting an exotic destination like Peru implies that we can interpret demand for air travel as derived demand. This means that demand not only depends on the characteristics of the air travel product, but also on those of the tourism destination itself. Moreover, it means that there are factors besides distance that influence travel decision. As a result, it is necessary to take into account all of those factors that are important for modeling tourism demand to derive the related demand for long-haul air travel. There is a large literature on tourism demand modeling (Crouch 1994; Witt and Witt, 1995; Lim, 1997; Lim, 1999, Song and Witt, 2000). This literature gives a good indication of the types of variables that should be included in the specification of a tourism demand models and what magnitudes to expect of the estimated coefficients. Consequently, this is also relevant when estimating derived demand for air travel.

Our estimated demand function is specified using a logarithmic transformation of variables is as follows:

$$lnITA_{it} = \delta lnITA_{it-1} + \beta_{NSF} lnNSF_{it} + \beta_{1SF} ln1SF_{it} + \beta_{GDP} lnGDP/Cap_{it} + \beta_{RP} lnRP_{it} + \beta_{POP} lnPop_{it} + \beta_{DIST} lnDist_{it} + \beta_{T} lnTrend_{it} + u_{it}, \quad (1)$$

where ITA_{it} is the number of international tourist arrivals from origin country i in year t. Note that ITA_{it} is arrivals by air, so this figure can also be interpreted as demand for air travel to Peru. The dependent variable is also included on the right hand side of the equation lagged one year, ITA_{it-1}. For convenience we drop use of period and country subindices from the variable notation in the following description of the variables. *NSF* and *1SF* are the number of nonstop and 1-stop flights from origin country i to Peru, respectively. *GDP/Cap* is a measure of the tourist's income based on average income in the tourist's origin country. *RP* is the relative price level between Peru and country *i,* and *Dist* is the geographic distance between Peru and country i. *Pop* is the population level in country i. A time trend is included to account for a common trend in international arrivals to Peru. Finally the error term u_{it} is composed of country-specific fixed effects (η_i) and a random disturbance term (v_{it}) that is assumed independent across individuals (i.e., countries). The reason for this composition is that we believe that there are individual differences between countries. In the following we discuss the role of the different variables included in the empirical model specification in greater detail.

Distance (*Dist*) between origin country and tourism destination is a proxy for travel expenses. Air fares are proprietary data of the airlines and usually unavailable for these kinds of studies. This study is no exception. In place of actual price data, we will treat distance as a proxy for the magnitude of the air fare This is justified by a close relationship between distance and air fare (McKercher, et al. 2008). The main cost elements for long-haul air travel are fuel and flight and cabin crew (Francis et al., 2007), and since these operational cost increase with the length of the flight there should be a strong relationship between distance and air fare. This is also obvious with the impact of rising fuel prices on profitability of airlines' long haul routes (Ringbeck, Gautum, and Pietsch, 2009). Assuming negative price elasticity for air travel demand, increased distance is hence assumed to reduce the demand for leisure travels.

However, according to McKercher, *et al*. (2008) distance can also be correlated with cultural distance measured by shared language, food, music, customs etc. Countries that are located closer to each other tend to have more common cultural denominators than countries further apart. One motivation for traveling to exotic destinations is to seek escape through cultural differences (McKercher, 1998). Nevertheless, having to do transactions in a country where language and cultural differences are barriers can also create stress. In this way, language and other cultural differences become detractors of travel demand. We do not have information of whether the escape factor (i.e. the pull effect) is larger than the perceived stress-factor (i.e. the detractor effect) of cultural differences on aggregate demand of travels to long haul destinations, but just conclude that distance influence demand in more than one way.

GDP per capita (*GDP/Cap*) and relative prices (*RP*) are two economic variables included in the demand estimation. GDP per capita measures tourists' purchasing power, which given the size of the budget needed for long-haul leisure travel, should be a key determinant of demand. Relative prices measures how the price level in the destination compares to the origin country of the tourist, and also takes into account the effect of exchange rate changes. This variable is calculated as $(CPI_{\mathrm{Peru,t}} \mathrm{x} ExchRate_{\mathrm{iPeru,t}})/CPI_{\mathrm{i,t}}$. where $CPI_{\mathrm{Peru,t}}$ is the consumer price index in Peru at time t, $CPI_{\mathrm{i,t}}$ is the consumer price index in the tourist's origin country and, finally, $ExchRate_{\mathrm{iPeru}}$ is the exchange rate that converts the Peruvian price level into the currency of the visitor's country. Thus when the nominator increases it implies that the price level in Peru is getting relatively more expensive compared with the visitor's country. This can be caused both by increasing price level in Peru or weakening of the tourist's own currency. Likewise, when the price level in the tourist's country decreases, the relative price in Peru increases. Population (*Pop*) in the origin country is another variable that should influence demand since a larger population will lead to more traveling in absolute sense, and thus is included in the econometric demand model.

The variables we have reviewed so far are fairly common variables for tourist demand models. However, the main variables of interest in this study are those that measure the effect of nonstop long haul flights on demand for air travel to Peru. Nonstop flights (*NSF*) counts the number of long haul flights that depart annually from the tourist's origin country to the faraway destination (*i.e.*, Peru). Furthermore, when an airline creates a new long haul route not only travelers in the country of departure that benefit (i.e. a direct effect), but also those travelers in neighboring countries who belong to the same hub-and-spoke network (i.e. an indirect effect). To capture these indirect effects of long haul flights on air travel demand, we create a variable called 1-stop Flights (*1SF*).

To take into account how geography in different regions influence how hub-and-spoke networks works the 1-stop flights variable is defined in two alternative ways. In the first definition, it counts the number of long haul flights that depart annually from airports within 1,000 km radius of the tourist's origin country to the destination, which is the distance defined as a short-haul flight. In case the origin country has its own flights to the tourism destination these are excluded.

In the alternative formulation the radius is extended to include international airport hubs located 2,000 km from the tourist's origin country. These two alternative distances were chosen based on findings in McKercher *et al*. (2008). That study showed that neighboring countries or destination within 1,000 km receives 80% of inbound visitors, while destinations within 2,000 km of the source market receive 99% of inbound visitors. Many of the arrivals within 1,000 km (or 2,000 km) are transit passengers, and it is therefore reasonable to assume that most transit passengers travel within 1,000 km (or 2,000 km) for the first leg of their long-haul travel. This is also logical because travelers must first reach an international airport hub in their region before they can embark on a long-haul flight.

Note that in the definition of *1SF* variable using 2,000 km criteria, we introduce an additional constraint. Tourists are only willing to fly in the 'wrong direction' when the connecting hub is less than 1,000 km from their origin country. 'Wrong direction' is defined as a deviation of more than 90 degrees from the direct route that starts from the origin country to their final destination. For example, a French tourist traveling to Peru would be willing to fly first the 431 km leg from Paris to Amsterdam. But a Portuguese traveler would not be willing to do the same, since travel from Lisbon to Amsterdam is 1,867 km in the wrong direction. This assumption seems plausible and is based on the report system of online search engines for flight tickets, which appear to try to find the most direct flight routes. The difference in alternative flights offered on Internet search engines is more related to the number of stopovers and the waiting time associated with each stop.[4]

[4] When we calculate distance from the hub-'country' to the spoke-'countries' special treatment is given to large countries, e.g., Brazil, Canada, Russia etc. For large countries the distance is calculated between the nearest international hub in those large countries (often the countries' capitals) to the hub-'country'. For example, when calculating the distance from France or Russia to Netherlands (which harbors Amsterdam Airport Schiphol) we calculate the distance from Paris and Moscow to Schiphol in Netherlands, respectively. Finally, note that for USA, which has departures to Peru from five different cities, we will not be able to

Data and Econometric Approach

To estimate the empirical model specified in Equation 1, we use a data panel of tourist arrivals to Peru that are reported by the tourists' country of origin from 2004 to 2009. Only countries with an accumulated number of tourist arrivals to Peru that exceeds 1,000 visitors during the six-year period are included in the model. This somewhat arbitrary limit is set to avoid extreme percentage changes associated with changes when visitor numbers are small or nil. Dropping these countries does not influence the representativity significantly as the 75 remaining countries account for more than 99% of the inbound visitors. The 75 countries are distributed as follows: 3 in Africa, 18 in Asia, 10 in Central America, 31 in Europe, 3 in North America, 3 in Oceania, and, finally, 9 in South America. With 6 years of data and 75 countries there are in total 450 observations available as a balanced panel. Moreover, as the number of countries (N) is large and the number of time periods (T) is small the data is considered a short panel.

The data has been collected from different sources. The data on tourist arrivals and international flights to Lima are provided by PromPeru, the national Peruvian export and tourist promotion agency. Distance calculation is based on the online service (www.distancefromto.net) that uses the Google map system to calculate geographical distances. Data on population, GDP per capita, nominal exchange rates and inflation rates are from the International Monetary Fund. Descriptive statistics of the variables are provided in Table 1.

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distinguish between direct (*NSF*) and indirect (*1SF*) effects, since we do not have outbound travel data from the individual states.

Table 1

There are several econometric issues related to estimating Equation 1. First, the fixed effects contained in the error term are correlated with the lagged dependent variable. When T is small this correlation can remain even after a within groups estimator transformation intended to remove the individual effect, η_i. This is because a non-negligible part of the individual effect remains after this transformation, thus, giving rise to autocorrelation (Bond, 2002). Second, there is a potential two-way causality between international tourist arrivals (*ITA*) and the number of nonstop flights (*NSF)* and/or one stop flights (*1SF*). While new flight routes that ease travel to Peru can increase the number of tourist arrivals, it can also be that increased demand for leisure travel to Peru leads to creation of new long haul flight routes to Peru. Ignoring this endogeneity issue can therefore lead to biased results. One approach that specifically addresses these estimation issues is the Arrellano-Bond estimator for dynamic panel data models, which is designed for cases of large N and small T (Arrellano and Bond, 1991; Bond, 2002). Although the Arrellano-Bond uses lags of the endogenous variables as its own instruments, it is also possible to add 'traditional' instruments to the estimation. Specifically, we use GDP/Cap and Pop as these variables have a higher correlation with the instrumented variables than with the dependent variables. From the preceding discussion it also follows that both $lnITA_{it-1}$ and $lnNSF_{it}$ should be instrumented GMM style with own lagged values in levels and differences (Roodman, 2006). Now we turn to the results from the estimated dynamic demand models formulated in Equation 1 using the Arrellano-Bond estimator.[5]

[5] For the estimation of the dynamic model we used xtabond2 in STATA 10.

Empirical results

Four different variants of this model was estimated and are reported here: i) a baseline model where only the direct effect ($lnNSF_{it}$) is included to investigate the effect of direct flights, ii) an full model that both account for the direct effect ($lnNSF_{it}$) and the indirect effect ($ln1SF_{it}$), iii) an full model estimated on the subsample of the European countries, and iv) an full model estimated on the subsample of the American countries. The reason why only these continents are chosen is because Europe and America are the only ones with direct flights to Peru.

In the estimation of a baseline model (model i) we concentrate on the effect of nonstop flights ($lnNSF_{it}$), while 1-stop flights ($ln1SF_{it}$) is dropped from the equation. Table 2 reports the regression results of the baseline demand model for long haul flights to Peru. In the first two columns we report the coefficients and standard errors of the estimated dynamic (short-run) model, while column 3 and 4 rapport coefficients and standard errors of the calculated static (long run) model. Since this a dynamic model an autoregressive term $lnITA_{it-1}$ is included in the model specification, as specified in Equation 1. The autoregressive coefficient estimate of 0.79 indicates that time series tourist arrivals to Peru has a long memory. With long memory it takes several periods (i.e. years) before the full effect of changes in the independent variables are transmitted to the demand for long haul flights. This explains why the coefficients of the dynamic (short run) model are much lower than the solution for the static (long run) model.[6] In both the dynamic and static models all the estimated coefficients are highly significant and have the expected signs. The key

[6] The long-run coefficients are found by dividing the short-run counterparts with (1- $lnITA_{it-1}$). So for example the long-run parameter for *lnNSF* is calculated as: 0.0662/(1-0.791).

variable of interest in this study, $lnNSF_{it}$, is significant at the 1% level and shows a positive relationship with demand. This indicate that new long haul flights to Peru, *ceteris paribus*, have a positive impact on demand for leisure air travel to Peru. The long-term effect of a 1% increase in the number of flight routes from origin country *i* to Peru is a 0.32% increase in demand in country *i* for leisure air travel to Peru.

Table 2 here

The income elasticity as measured by GDP/Cap_{it} is near unit elastic with 0.94. This means that there is a close relationship between income levels and leisure travel to Peru. Moreover, the magnitude of the estimated parameter is in line with findings in other studies. The relative price is elastic with -1.10 so when prices in Peru rises with 1% compared to the tourist's origin country then demand decreases slightly more than 1%. We also find there is a close relationship between the population size in the source market and demand for travel with a long-term coefficient of 0.71. As expected, distance has a significant negative impact on demand. When distance increases with 1% demand decreases with 1.2%. This implies that the negative effect on demand is much higher when increases distance from say 1,000 km to 2,000 km than from 8,000km to 9,000 km, because in percentage terms the latter is lower than the former. This finding is in line with decaying distance functions of tourism travel (McKercher et al., 2008). The negative trend indicates that demand decreases 0.1% every year. This negative trend might seem odd for a market that is growing. However, in our dynamic model the positive and highly significant autoregressive term accounts for the positive trend in tourism arrivals. In sum, the signs and the magnitudes of the estimated coefficients seem plausible compared with findings in other studies.

As a next step we extended the baseline model to also account for the indirect effect of direct flights ($ln1SF_{it}$), in addition to the direct effect ($lnNSF_{it}$). When we proceed to estimate these models, neither of the alternative definitions of $ln1SF_{it}$ (i.e., 1,000 km and 2,000 km limit) are statistically significant. However, this might reflect that neither of the two definitions of $ln1SF_{it}$ are suitable for the entire sample of countries, but should be estimated on a subsample of different countries. For example, since Europe is geographically compact and there are few long-haul flights to Peru, one would believe there are indirect effects of these flights on travellers in neighboring European countries. To test this hypothesis we estimate a third model, which includes in the sample only the European countries. This subsample consists of 31 countries which add up to a total of 155 observations. The results of this model are summarized in Table 3.

When the data sample is reduced to the European countries, a few of the explanatory variables are not significant any more. Reduction in cross-country variation in some of the variables might explain why this occurs. For example most of the European countries have a distance of approximately 10-13,000 km to Peru. Thus for all European travelers a trip to Peru represents a very long travel. So while distance surely remains important, there is a loss of cross-country variation in *lnDist* that makes it difficult to estimate its impact with precision. Also *lnGDP/Cap* and *lnRP* are not significant anymore, possibly for similar reasons. However, we see that both *lnNSF* and $ln1SF^{1000km}$ are significant. This means that there are both direct and indirect effects of long haul flights to Peru on tourism arrivals from Europe. We see that the long term elasticity of *lnNSF* is 0.52. This means that e.g. a 1% increase in flight departures from Madrid to Lima, Peru, increases arrivals of Spanish tourist with 0.52%. This magnitude is a slightly higher than the 0.32% estimate when using the entire sample. The indirect effect measured by the 1-stop flight variable $ln1SF^{1000km}$ is significant with a long-term coefficient of 0.41%. Consequently, the combined direct and indirect effects of European long-haul routes to Peru create a substantial positive impact of improved long-haul flight connectivity on European arrivals to Peru.

Note that in another estimation not reported here, where we use the alternative definition of the 1-stop flight variable, i.e., $ln1SF^{2000km}$, to account for the indirect effect, then it was not statistically significant. A possible explanation of this is that Europe is geographically compact and most Western European countries are within 1,000 km of Amsterdam or Madrid international airports with departures for Lima, Peru. Moreover, there are many other important hubs in Europe, like Frankfurt, Copenhagen, London and Moscow, so that Central and Eastern European countries might prefer to use hubs situated closer to their origin country.

Table 3 here

The last model estimated is a model of the subsample of fellow countries in the Americas. The Americas makes up a diverse set of countries ranging from Canada in the North to Argentina in the South.[7]

[7] To keep us to the long-haul definition, only countries beyond 2,500 km of Peru were included. Strictly speaking long-haul is defined as over 3,000 km, but to include an important market such as Chile which is just below the 3,000 km mark, we lowered the definition to 2,500 km. This does not mean that neighboring countries are excluded because distance is calculated from the center of each country. Thus, large or long-stretching neighboring countries such as Brazil and Chile are included, while Bolivia, Colombia and Ecuador are excluded.

In Table 4 are the results from the econometric estimation of demand for air travel to Peru from fellow countries in the Americas. One important distinction from the model results comprising European countries is that for the Americas countries it is the 1-stop flights variable $ln1SF^{2000km}$ that is significant instead of $ln1SF^{1000km}$. This could reflect that countries in the Americas are on average further apart than European ones, geographically speaking, leading to hub-and-spoke networks that are more spread out. Stated more simply, the average distance between airport hubs is larger in the Americas than in Europe, which makes sense considering the high population density in Europe.

Table 4 here

That said, the static (long-run) parameter estimates for nonstop flights and 1-stop flights are strikingly similar for Europe and the Americas. The *NSF* is 0.54 in the Americas compared to 0.52 in Europe, while the *1SF* is 0.33 in the Americas compared to 0.41 in Europe. Apart from that, there are more significant parameters among the other variables in the Americas model, possibly due to larger cross-country variation. The long-run elasticity of *lnGDP/Cap* is 1.03 and of *lnRP* is -1.15 are both similar to those found in the model presented in Table 2 using the entire sample of 75 countries. The population elasticity is somewhat lower 0.40 and distance somewhat higher at 1.66. But, all in all the magnitude of the 'standard' tourism demand model variables are plausible and, once again, provides evidence that international air connectivity is important for a faraway tourism destination like Peru.

Concluding Discussion

In this paper we have addressed the role of long-haul air connectivity for tourism destinations in economic fringe zones. This is a topic that has received little attention in other studies with the exception of Fuji *et al.* (1992). Successful tourism destinations that receive millions of tourists annually rely on excellent international air connectivity. Since most of these destinations already have well-developed air transportation networks they may not be overly concerned with the issue of international connectivity. This is not the case for many emerging tourism destinations located far from those markets that emit the largest number of high-spending tourists. These destinations usually do not enjoy the same level of market access that a broad network of international flight routes provide.

Peru is one such destination. Located 5,500 kilometer from its average market, the travel cost associated with visiting Peru is high, both in terms of expenditure of the air fare and the opportunity cost associated with time and convenience of travel. This is supported by our results which indicate that demand for air travel drops 1.2% for every1% increase in kilometer distance between Peru and origin market of tourist. Distance is hence a major challenge for the Peruvian tourism industry to attract international visitors.

The main concern of this study is whether more long haul flights routes can mitigate the negative effects of distance on tourist arrivals. We estimate a dynamic demand model of air travel using the Arrellano-Bond estimator for panel data. Controlling for standard tourism demand drivers, we find that an increase in the number of international flight departures to Peru has marked positive effect on tourist arrival. Long-run demand elasticities when the number of long haul flights increases ranges between of 0.3 and 0.5. This means, for example, that 1% increase in the number of flights from USA leads to a 0.3% increase in tourist arrivals from USA to Peru. Furthermore, there are potential indirect effects since neighboring countries may benefit from the new long-haul flight routes through regional hub-and-spoke systems. We find that the positive effect on neighboring countries' tourist arrivals expressed with long-term demand elasticities ranges between 0.3 to 0.4.

A numerical example can illustrate the aggregate effect of increased long-haul flights on tourist arrivals. According to the estimated model for Europe, the direct and indirect effects of a new flight will be elasticites 0.5 and 0.4. This indicate that by adding another long-haul flights from the Netherlands to Peru, the increase in visitor to Peru will be 226, where 33 are visitors from the Netherlands (direct effect) and 193 are visitors from other European countries (indirect effect).[8]

These positive effects on tourism arrivals raise an important issue on how to attract airlines and create new long haul flight routes. Kuoman and Yong (2009) noted that airport service fees in Lima are high when compared to a few other important South American airport hubs. They argue that the airport license provided by public authorities is particularly costly in Peru, and that these costs are then passed on to the airlines through high service fees. Thus the argument of Zhang and Zhang (2001) of airport financing becomes highly relevant. In their paper they argue that "strict" financial break-even for airports may not be socially desirable in emerging economies on a growth path due to positive feedback effects of increased air traffic on economic growth. This argument can easily be extended to countries or destinations where tourism represents a sizeable economic sector (Lee and Chang, 2008; Brida and Pulina, 2010). New airlines can then bring in more tourists and create positive demand spillover effects to related sectors of the

[8] The countries that are within a radius of 1000 km of Schipol Airport include Austria, Belgium, Czech Republic, Denmark, France, Germany, Ireland, Luxemburg, Norway, Poland, Slovenia, Switzerland and United Kingdom. The number of countries, many with large populations, explains why the indirect effect is substantial.

economy such as domestic air and ground transportation, museums, amusement parks, cultural activities, other entertainment activities, bars, sports, gambling, travel intermediaries etc. (Dwyer *et al*., 2004; Blake *et al*. 2006).

The results in this paper of course can be used to argue that if only air connectivity is improved then tourism will blossom even in the remotest corners of the world. However, while travel cost is important, the attractiveness of a destination certainly is a key determinant for air travel demand. For example, there have been several positive developments in the Peruvian tourism industry in the latest years that we have not incorporated in the empirical model. This includes Machu Picchu becoming one of the Seven Wonders of the World, an innovative national cuisine that during the last few years has managed to become internationally recognized for its excellence, a decade-long period of strong economic growth that also has contributed to improve tourism infrastructure,[9] and, finally, a national promotion agency (PromPeru) that has been working systematically to promote Peru as a tourism destination (Tveteras, 2010) – and which recently introduced a new country logo for Peru to much appraisal (Mapstone, 2011).

This suggests that to reap the full benefits of improved long haul air connectivity it is necessary to develop the tourist destination through investments in infrastructure, marketing and provision of new and innovative tourism products. This can create the pull factors required to take full advantage of the opportunities offered by expanding long-haul flight capacity (Klenosky, 2002). Based on the results in this study, the Peruvian tourism

[9] Economic growth will normally improve tourism infrastructure, health and safety amongst other and thus contribute to raise the level of development above those minimum standards.Eugenio-Martin *et al.* (2008) show that for middle-income countries such as Peru tourists appear to attach more importance to the provision of minimum standards of development than to a price competitive destination. Economic growth will normally improve tourism infrastructure, health and safety amongst other and thus contribute to raise the level of development above those minimum standards.

industry faces uplifting prospects as Air France in 2011 will start a new flight route with five-days-a-week departures from Paris to Lima.

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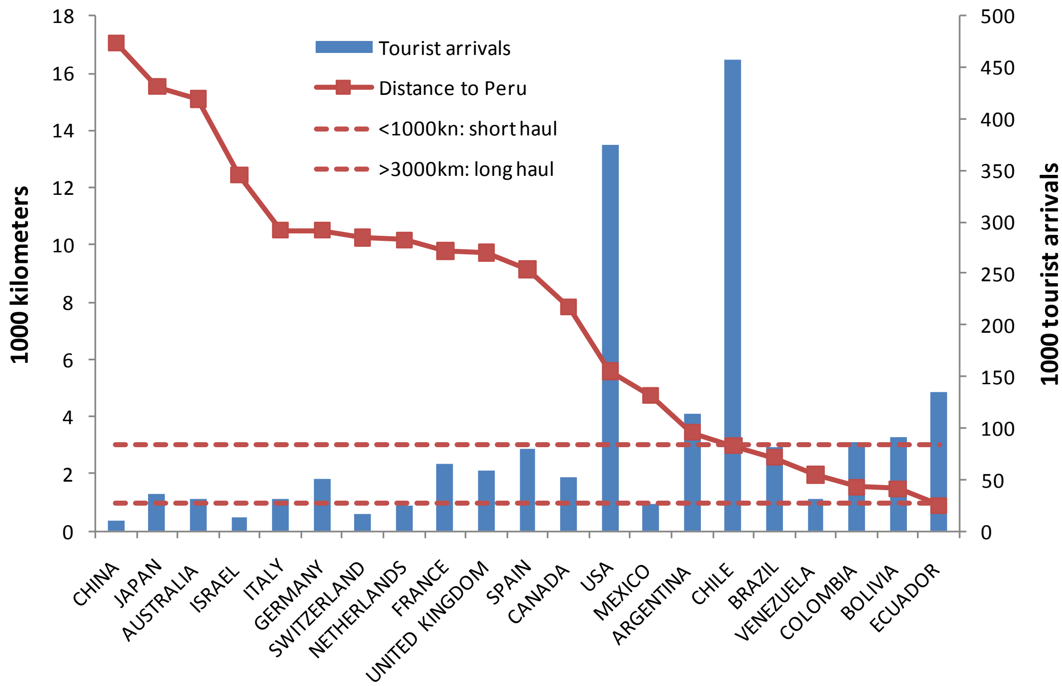

Figure 1. Distance to Peru and no. of tourist arrivals in 2009 from major markets.

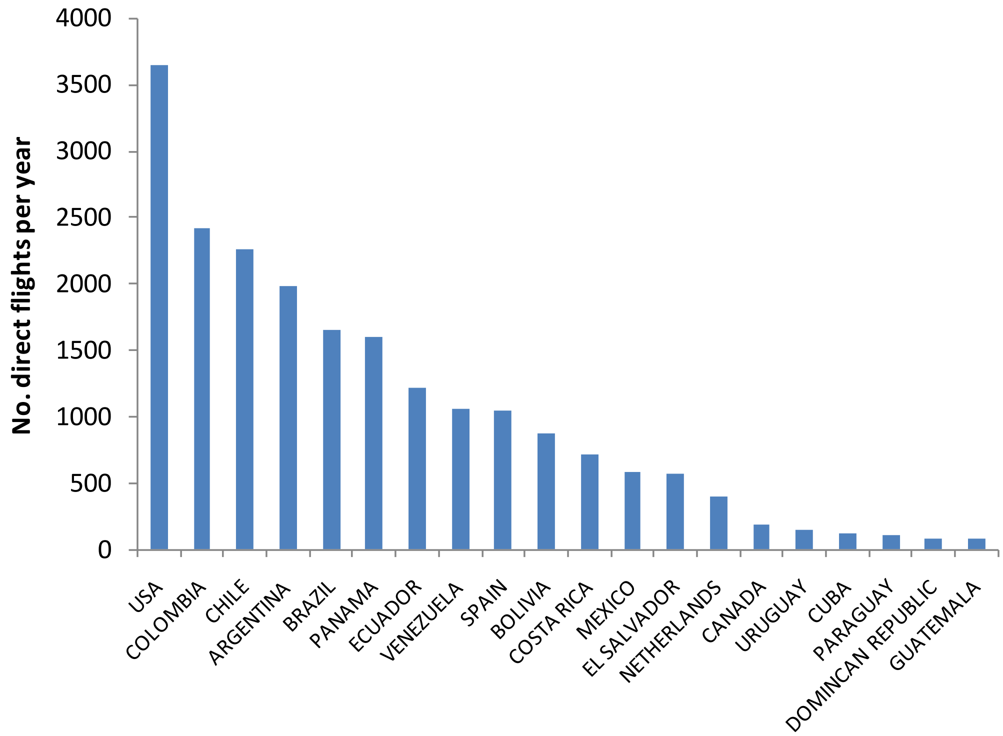

Figure 2. No. of direct flight routes to Peru by country in 2009.

Table 1. *Summary statistics*

Variables	N	Mean	Std. Dev.	Min	Max
ITA	450	22,477	61,742	17	464,678
NSF	450	206.7	557.7	0	3,732
1SF^{1000km}	450	302.1	572.6	0	3,130
1SF^{2000km}	450	954.7	1,221	0	6,592
Pop	450	70.70	201.6	0.401	1,335
GDP/Cap	450	1.168e+06	3.688e+06	2,506	2.420e+07
Dist	450	9,988	5,335	891.1	19,391
RP	450	181.9	756.6	0.0969	5,116
Number of countries	75	75	75	75	75

Table 2. *Estimated dynamic and static demand models for long haul flights to Peru*

Variables	**Dynamic Model (Short Run)**		**Static Model (Long Run)**	
	Coeff	*St.err.*	*Coeff*	*St.err.*
$lnITA_{it-1}$	.791***	.0332	-	-
$lnNSF_{it}$	.0662***	.0254	.3168***	.0973
$lnGDP/cap_{it}$	.196***	.0389	.9373***	.0985
$lnRP_{it}$	-.230***	.0461	-1.1014***	.1183
$lnPop_{it}$	.149***	.0248	.7121***	.0919
$lnDist_{it}$	-.249**	.0969	-1.1925**	.4853
$Trend_{it}$	-.0229***	.0080	-.1097***	.0426
$Constant_i$	1.653**	.8160	7.9082*	4.1950
Observations	375		375	
Number of countries	75		75	

Significance level *** p<0.01, ** p<0.05, * p<0.1

Table 3. *Estimated air travel demand to Peru from European countries*

Variables	Dynamic Model (Short Run)		Static Model (Long Run)	
	Coeff	*St.err.*	*Coeff*	*St.err.*
$lnITA_{it-1}$	.7970***	.0724		
$lnNSF_{it}$	.1040**	.0429	.5158***	.1402
$ln1SF_{it}^{1000km}$	.0836**	.0364	.4128***	.1128
$lnGDP/Cap_{it}$	.0396	.0356	.1955	.1193
$lnRP_{it}$	-.0535	.0425	-.2642	.1502
$lnPop_{it}$	.1450***	.0535	.7154***	.0817
$lnDist_{it}$	.8440	.9440	4.1662	4.7658
$Trend_{it}$	-.0336**	.0131	-.1567	.1151
$Constant_{i}$	-7.0060	8.8120	-34.5878	44.1576
Observations	155		155	
Number of countries	31		31	

Significance level *** p<0.01, ** p<0.05, * p<0.1

Table 4. *Estimated air travel demand to Peru from fellow countries in the Americas*

Variables	**Dynamic Model (Short Run)**		**Static Model (Long Run)**	
	Coeff	*St.err.*	*Coeff*	*St.err.*
$lnITA_{it-1}$	.9060***	.0334		
$lnNSF_{it}$	.0509***	.0193	.5419***	.0891
$ln1SF_{it}^{2000km}$	.0307**	.0140	.3267**	.1634
$lnGDP/Cap_{it}$	.0966***	.0331	1.0276***	.2247
$lnRP_{it}$	-.1080***	.0359	-1.1486***	.3241
$lnPop_{it}$	.0373	.0230	.3965*	.2075
$lnDist_{it}$	-.1560**	.0760	-1.6612**	.8191
$Trend_{it}$	-.0314***	.0119	-.3344**	.1311
$Constant_{i}$	.8860*	.5370	9.4302	5.8457
Observations	75		75	
Number of countries	15		15	

Significance level *** p<0.01, ** p<0.05, * p<0.1