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Abstract

The purpose of the paper is to relate the tourism-demand model with the traditional theories that explain international trade flows. In the existing tourism literature, tourism flows and tourism demand forecasts are typically explained by the demand-side variables. But in the traditional trade theories, international trade flows are explained from the supply-side variables, i.e. the comparative advantage of the exporting countries. A model is proposed in the paper, trying to explain in a modern and global economy, the factors that from a supply-side perspective can decide the comparative advantage of countries in a certain type of service activity. The preliminary results render a strong support for the relevance of certain supply-side factors in explaining international tourism flows such as both natural endowments and created assets associated with foreign investments, hotel capacity and level of development.

Key words: Comparative advantage, international tourism flows, international trade, trade in services, foreign direct investment

JEL Codes: C33, F14, F19, F21, F23, L83, O57

[1] We are greatly indebted to the World Tourism Organisation for giving us access to their comprehensive database on tourism indicators that make it possible to establish the panel data set used in the paper.

1. INTRODUCTION

Every year more than 750 million people travel from their residential countries to tourism destination countries for leisure, business and other purposes. For quite some time now organizations such as the World Tourism Organization and the World Trade Organization have dealt with tourism activities as an equivalent to actual goods exporting activities for the destination countries involved (WTO, 1998). However, both within economic and tourism research, developments with respect to adapting existing trade theories to services and adapting existing empirical analysis to the realities of such flows are much behind what seems to be needed. It is desired to better understand such trade in services and help to answer the fundamental questions such as: Why some countries are more successful tourism destinations compared to other countries? What are the challenges of increasing global production systems within tourism to the exporting countries involved? What are the benefits for developing countries of liberalizing their tourism trade both with respect to allowing more inbound tourism and more inbound commercial activities through Foreign Direct Investment (FDI)?

The focus in this paper is just on the first question concerning what decides comparative advantages in tourism and to discuss whether the past singular focus on the demand side in the tourism literature is justified. It is argued that the emphasis on the demand side in the past is partly owing to the fact that tourism is traditionally defined as a demand phenomenon and measured by the flow of people from origin to destination countries. However, this flow of people is indirectly a parallel source to a flow of money (tourism receipts) from tourism origin to destination country in exchange of an indirect flow of goods and services (tourism trade) from people in the destination country to people in the tourism originating country. Viewed in this perspective it is clear that tourism flows and trade flows (although it appears to be in an opposite direction, since tourists have to travel to and consume the goods and services directly in the destination country) are two closely related types of international economic activities. In this paper we argue that the tourism flows by tourist arrival to the destination country is a reasonable and superior indicator to other variables in terms of data availability of such type of trade. However, we also consider in the data section alternatives to a dependent variable (indicators of trade) such as tourism receipts and trade in travel services.

From a theoretical point of view, tourism has traditionally been viewed as a demand rather than supply-driven industry in the existing literature. This literature is briefly introduced and discussed in Section 2 of the paper. Then the paper moves on in Section 3, to discuss whether

tourism flows could be analysed equivalently as international trade and be explained by some of the same factors that are used to explain comparative advantage in international trade theory. Through a brief historical review of trade theory, we propose a number of factors that should be relevant in explaining comparative advantage in tourism. To support this we add some literature from within tourism or other service activities that take a more supply-side approach in Section 4. The data are described in Section 5, and it is explained how different aspects of trade theory from Section 3 are tested with the proposed model. In view to data availability only a few supply-side factors can be covered in the model. The model specification is presented in section 6. Section 7 shows the results for the pooled panel and when alternatively using a more efficient fixed effect panel model on the data. Section 8 rounds off the paper with some discussion of the preliminary results and some considerations for the further investigation.

2. TOURISM-DEMAND MODELS

The tourism-demand model has prevailed in the tourism literature as the appropriate modelling framework to estimate the international tourist demand that often occurs between two or several pairs of countries (Crouch, 1994a; Witt, Witt and Wilson, 1994; Lim, 1997; Morley, 1998; Sinclair, 1998). The dependent variables within these models include, in most cases, the tourism flows measured either by number of tourist arrivals and departures, or by tourism demand in terms of expenditures and receipts. Flows of tourism receipts may be slightly superior to other variables as they indirectly include the dimension of numbers of days spent by tourists at the individual destination. The most important explanatory variables of tourism flows to date have been identified in the literature overview as follows (Crouch, 1994a and Lim, 1997):

- Income (in the tourism original country)
- Population (in the tourism original country)
- Cost of living (i.e. relative prices or consumer price index (CPI) ratios between the original and destination countries)
- Transportation cost (between the two countries)
- Currency exchange rate (between the pairs of destination and original countries)
- Other price factors (inflation, exchange rates)

The tourism-demand model focuses primarily on explaining how the income changes in the tourism origin countries or changes in relative price, transportation cost and exchange rates between the origin and destination countries affect the tourist flows to the destination countries, often including in the analysis just one or a few destination countries.

These tourism-demand models measure the tourism income and price elasticity and other coefficients of the variables. One of the advantages of the tourism-demand model is that it can function as a forecasting model in the short run to estimate the tourism demand for a destination country from its main tourism markets.

The traditional demand theory in tourism suffers from a number of drawbacks, as it ignores the particularities of the products (Papatheodorou, 2001). It is not realistic to assume a representative tourist treats all the destinations as homogeneous tourist products. Tourist products are heterogeneous and unique in the way that tourists obtain unique travel experiences in the different tourism destinations. Besides, the tourism-demand model ignores the comparative advantage of tourism exporting countries and ignores the often active role that tourism destination countries play in attracting tourism flows. Moreover, the tourism-demand model is also static; treating all the tourism destinations equally, ignoring the destination development. Real experiences of individual countries, however, show that during some periods, some destinations may wither and new destinations may emerge as new tourism attractions. The development and competitiveness in the tourism destinations should be taken into consideration when analysing the tourism flows.

3. INTERNATIONAL TRADE THEORY

Somewhat in opposition to the tourism-demand models, trade theory and the explanations of international trade flows of goods have been entirely dominated by supply-side perspectives. This is owing to among other things standard assumptions of the neoclassical trade theory such as similarity of preferences in the Heckscher-Ohlin model (Krugman and Obstfeld, 1997), even though mainstream theory throughout the 20th century has also been well aware of the fact that differences in preferences could be an independent explanation for the existence of trade. The only stand-alone theory that really takes into account preferences and the relevance of similarity in preferences in explaining the direction of international trade flows is the theory of Linder (1961). Some important parallels to this theory may also be seen in the largely empirical proximity hypothesis underlying the gravity model (Bergstrand, 1989;

Thursby and Thursby, 1987; Zhang and Kristensen, 1995). All other models of international trade theory must be viewed as taking outset in supply-side type of explanations.

The very early theories such as those of Ricardo and Heckscher-Ohlin explain trade flows with the productive efficiency (technology in Ricardo) or relatively available resource endowments of countries (where the H-O theory assumed that all countries have access to the same technologies). It is the difference in technology and/or endowments according to these theories that are the prime motivators or underlying causes of international trade. In practice, the differences in productive capacities cause relative product prices to deviate a lot in a state of autarky. When barriers to trade are dismantled such large price differences are no longer justifiable and countries will start to trade until gross prices even out across countries. The reason why goods are more affordable in some countries compared to others is due to the comparative advantage of each country which refers back to their unique endowments or technologies.

While the Heckscher-Ohlin theory has lost in significance with the industrial and especially the IT revolution and the following decline in role of natural resources relative to knowledge (created assets) in the production process, the Ricardian theory, and perhaps due to its unwillingness to delve further into specific explanations for differences in efficiency, remains as universally valid as ever before. However, the more recent developments or late 20th century trade theories also point to diverging views of the relative importance of private and public aspects in creating the efficiency differences that arise across countries.

The new trade theories give a central role in the increasing returns argument to these efficiency differences (Romer, 1986). But it depends a lot on the source whether the increasing returns are firm-specific (internalized) or arise through broader social processes of learning and externalities. One direction in the newer trade literature centres on the multinational enterprise as an important source of superior technology or so-called ownership advantages that render technological leadership to those countries that foster them (home countries) (Markusen, 1995) and also depending on the technology transferred to those countries that host them. Another direction in new trade theory is the role attached to agglomeration economies or industry clusters that are the generators of long-term competitiveness through provision of virtuous circles of superior learning, thick factor markets, better infrastructure and hence better technologies (Ottaviano and Puga, 1998).

Finally, a third direction is somewhat related to both (neo-technology theories) and focuses on the location of innovation-driven industries (new or hi-tech) and how eventually spin-offs from these will diffuse to other locations over time (Vernon, 1966; Krugman, 1979). Table 1 lists the different theories and shows parallel examples in tourism for why countries may have comparative advantage in this activity according to the trade theories.

TABLE 1: Trade theories and their application to tourism

Trade theory	**Main explanation for trade**	**Tourism example**
Linder	Preferences (similarity)	Cultural affinity, such as pilgrim tourism
Ricardian theory	Technology/productive efficiency	Price competition among tourism destination countries
H-O theory	Natural endowments (capital, labour, land)	Sun, sand, sea and cultural heritage
Multinational firms	Ownership advantages (firm-specific technology)	International hotel chains
Neo-technology	Innovation/diffusion patterns	Adventure parks, internet marketing for tourism
Agglomeration	Externalities, infrastructure, chance	Tourism clusters, investment in tourism infrastructure

The trade theories can be applied in the service (or tourism) trade. Tourists choosing to visit one country may be because of cultural affinity like pilgrim tourism; they may be attracted by the natural endowment, such as sun, sand and sea, like the island tourism, or some cultural heritages. The relative price competitiveness of the tourism product at the destination country compared to other competing destination countries can also be the cause of tourism flows (one aspect where there is a clear overlap between demand models and Ricardian trade theory). Multinational tour operators and hotel chains (FDI in hotels in the destination countries) have advantages in terms of reputation, branding and product recognition to attract tourists to the countries where they invest. Nowadays more and more countries, especially in the developing parts of the world, have realized that better hotel facilities and the tourism infrastructure are important factors towards attracting more tourism. For many developing countries, the initially insufficient tourism products cannot meet the need for tourism development. They must invest to improve the quality of the tourism products. In other words, better and more hotels, restaurants, airports, roads, means of transportation, etc. will attract more tourists into the country. The new technology-oriented adventure parks, computer reservation system and internet marketing for tourism that make tourists convenient to travel in the destination countries, that also play a role in attracting the tourists.

4. TRADE IN SERVICES

The General Agreement on Trade in Services (GATS) classifies trade in services into four main modes of supply:

A. Cross-border supply:	A service is supplied from a supplier's country of residence to a consumer's country of residence.
B. Consumption abroad:	A service is supplied through the movement of a consumer to a supplier's country of residence.
C. Commercial presence:	A service is supplied through the movement of a commercial organization to a consumer's country of residence.
D. Presence of natural person:	A service is supplied through the movement of a natural person to a consumer's country of residence.

Compared to other types of services, such as banking (mode C), tourism is relatively more complicated to categorize. Only in rare cases does tourism classify to involve only one mode although the prevailing mode is arguably B above. However, tourism characteristic activities (i.e. sub-sectors) in the tourism satellite account (TSA) document (Eurostat /OECD/WTO/UN, 2001), are described much more broadly to include the sectors of: 1) hotels and similar, 2) second home ownership, 3) restaurants and similar, 4) railway passenger transport services, 5) road passenger transport services, 6) water passenger transport services, 7) air passenger transport services, 8) transport supporting services, 9) transport equipment rental, 10) travel agencies and similar, 11) cultural services, 12) sporting and other recreational services.

It is clear that all the above activities are likely to be involved in one (or two) supply modes of tourism services. For example, international air transport service involves cross-border supply (mode A). Many tour operator services could involve both modes A and B. The most internationalized commercial activities under tourism (mode C) involve hotels and restaurants. And finally tourist guide services often imply the involvement of mode D.

To make matters even more complicated, tourism also involves the consumption of many tangible goods categories in the destination country, such as food, textiles, handicrafts etc. Hence tourism is really a highly composite type of activity including major components of both commodities and services and these components may be provided equally by cross-

border supply, consumption abroad in combination with commercial presence and the presence of natural persons.

Considerable researches have been made on FDI (as a substitute for trade) in banking (Enderwick, 1989; Erramilli, 1991; Erramilli and Rao, 1990; Moshirian, 2001; Mutinelli and Piscitello, 2001). The dimensional scale and the relevant endowment of resources, the international experience, knowledge and information about foreign markets have been shown to be important factors in explaining banks' international growth and hence competitive advantage. But trade in banking service is almost entirely dominated by mode C, defined as 'a service is supplied through the movement of a commercial organization to a consumer's country of residence'. It is not the same mode as tourism trade, as tourism flows are traditionally dominated by mode B through consumption abroad. However, it is also increasingly seen that tourist consumption abroad is satisfied by service providers originating from the same countries as the tourists. Many international providers of tourism services such as tour operators, hotels and restaurants are also increasingly paralleling the importance of mode C as in the rendering of international banking services.

There are plenty of tourism researches that concentrate on the role of tourism destination development. Murphy et al. (2000) relate the destination products to destination competitiveness. They conclude that several supply-side related aspects, such as quality, destination environment, destination infrastructure and value can influence the tourist intention to return. Dwyer and Forsyth (1994) analyse the impact of foreign investment in tourism and show that foreign investment plays a positive role in attracting foreign tourism flows and expenditure to the destination country. Dwyer et al. (2000) examine the price competitiveness of travel and tourism in the nineteen destination countries. The well-defined competitiveness indices (both the travel cost and ground cost) for travel to the destination countries are compared among these countries. The important feature in this research is that they use the efficiency and productivity (i.e. comparative advantage) to show the competitiveness among the destination countries, showing that also the destination has an important role in attracting tourism flows to the country. In his paper Prideaux (2000) shows that the transport system plays a role in destination development. He shows that transport is a significant factor in both destination development and the type of markets that destination compete in. Geyikdagi (1995) uses Turkey as a case study to investigate Turkish tourism demand from the main tourism markets. He applies the traditional tourism-demand model by

using real disposable per capita income in the original countries, the travel cost, and bilateral exchange rates among others. However, he adds one variable, i.e. the gross fixed investment in the Turkish tourism sector into the model to represent the supply variable. The results show that this supply variable has a greater impact on tourism flows than any of the other traditional demand-related variables. Through the upgrading of quality and quantity of accommodation establishments and the provision of new transport facilities (new airports and motorways) tourists have been attracted to Turkey in greater numbers according to these results.

The above examples of research results give us a strong support in applying a more supply-side oriented approach compared to traditional tourism-demand studies. It is confirmed that supply-side aspects often play an important role in attracting tourists.

5. DATA DESCRIPTION

The data used in this paper are compiled from two main sources: the World Tourism Organisation through their database[2] on tourism including two recent WTO statistical publications and the World Bank's *World Development Indicators* database[3]. The WTO database delimits the number of years and number of countries that we include in the original database. Furthermore some minor sources are used to complement these data, such as general FDI data from UNCTAD's online database[4], since UNCTAD also calculates estimates for the general FDI stock invested in each country. Finally, specific data on FDI and internationalisation of hotels and restaurants were compiled from the OECD (OECD, 2001) and from the UNCTAD statistics (UNCTAD, 2004).

The dependent variable in this study focuses singularly on tourism flows measured by number of tourist arrivals because of the data availability. In view of observing the actual comparative advantage of countries in tourism activities, there are some problems as discussed at length throughout this paper. First of all it is problematic that tourism flows do not control neither for the length nor the spending intensity (actual value consumed) of the tourist stay. Furthermore, in a world of increasing cross-border production it is also increasingly problematic to ascribe the income earned from the stay of tourists as accruing singularly to the destination country. Alternative data such as those provided both by the World Tourism

[2] It is made available by courtesy of the World Tourism Organisation in Madrid.
[3] It is available to subscribers and described on the following website: http://www.worldbank.org/data/wdi2004/index.htm.
[4] The data are downloadable via the website: www.unctad.org.

Organization (tourism spending) and the World Trade Organization (trade in travel services) are obvious complementary data to consider. However, both these types of data are insufficiently available to undertake estimations for a large panel of countries at present. The routine of collecting data on trade in travel services is of quite a recent date and only includes members of the World Trade Organization. Data on tourism spending also involve availability problems and on top of this they are often considered as highly inaccurate. Table 2 compares these three potential absolute advantage indicators for the 15 largest exporters of travel services according to the World Trade Organization in 2003. Only with the data on trade in travel services it is possible really to calculate comparative advantages because these data can be compared to other general export data.

TABLE 2: Measuring comparative advantage in tourism, 2003

Top 15 exporters	**Exports of travel services (bil. USD)**	**RCA[3] in travel services**	**Arrivals (mil)/ Population (mil)**	**Tourism receipts (bil. USD)/ GDP (bil. USD)**
United States	84	1.43	40.4/291= 0.14	65.1/10,882 = 0.6%
Spain	42	3.17	52.5/41= 1.28	41.7/836 = 5%
France	37	1.31	75/60= 1.25	36.6/1,748 = 2%
Italy	31	1.48	39.6/58= 0.68	31.3/1,466 = 2%
Germany	23	0.44	18.4/83= 0.22	23/2,401 = 1%
United Kingdom	23	0.88	24.8/59= 0.42	19.4/1,795 = 1%
China	17	0.69	33/1,288= 0.03	17.4/1,410 = 1%
Austria	14	1.71	19.1/8= 2.38	13.6/251= 5%
Greece[1]	13	6.11	13/11= 1.18	10.7/173= 6%
Turkey[1]	13	3.49	13/71= 0.18	13.2/238= 6%
Canada[2]	11	0.58	17.5/32= 0.55	10/834= 1%
Australia[1)/2)]	10	1.93	5/20= 0.25	8/518= 2%
Mexico[2]	9	0.91	18.7/102= 0.18	9/626= 1%
Thailand[1)/2)]	8	1.40	11/62= 0.18	8/143= 6%
Hong-Kong[1)/2)]	7	0.45	17/7= 2.42	10/159= 6%

Notes: 1) Tourism arrivals refer to the year 2002, except Greece where data go back to 2000.
2) Tourism receipts refer to the year 2002, except Australia where data go back to 2000.
3**)** The Balassa index of revealed comparative advantage (RCA) is defined as follows: RCACj= (XCj / XC) / (XWj / XW) in which RCACj stands for the RCA of country C in sector j. XCj refers to the exports from sector j of country C. XC stands for the total exports of country C, and W refers to a group of reference countries here the World.

Source: WTO (2003): *International Trade Statistics*, World Trade Organisation, interactive database downloadable via www.wto.org/. WTO (2003, 2004): *World Tourism Barometer*, World Tourism Organisation, Madrid, downloadable via www.world-tourism.org/market_research/facts/menu.html.

The index of revealed comparative advantage relates the export of each country in the particular category of travel services to that of their general export activities with both weighted by the size of world trade in travel services and total world trade, respectively.

Hence the RCA shows to which extent countries are relatively specialised or in some cases also highly dependent on tourism activities in terms of generating export revenues. Next to the RCA is shown the most recent data for the same year (2003) on arrival/population ratios and tourism spending/GDP ratios. Despite the obvious superiority of both the RCA and tourism spending data in terms of measuring comparative advantage, both of which are also strongly overlapping among other revealed by the exact same rank of countries in terms of exports of travel services and tourism spending, however, with cross-border production involved, the two will not necessarily be the same – as best seen in the case of the US in Table 2. However, it is necessary to accept data on tourism flows (arrivals) as a dependent variable in some aspects less valid (it only weakly measures what should be measured), but in other aspects also more valid indicator (it quite accurately measures tourism flows). From Table 2 it is also clear that there are strong parallels between the RCA index and the traditional indicators of tourism once weighted (taking into account country size in terms of population or GDP).

The data on FDI stock are used as a substitute for specific information about FDI in hotels and restaurants since the latter is only available for a very limited number of countries in the larger sample. This is much inferior to using precise data on FDI by industry, but the correlation coefficients in the Appendix Table A1 indicate that the general level of FDI invested in a given country is a reasonable substitute for the hotel and restaurant FDI stock.

Combining these different sources a unique dataset is built including the variables as listed in Table 3. However, some variables are not available for all countries reducing the size of the sample available for regression analysis. From the original dataset we furthermore exclude some countries due to the insignificance of tourism activities. Countries that never during the period 1982-2001 attain an arrival/population ratio greater than 2% are excluded from the dataset including countries which contribute to a very unbalanced panel by offering less than six years of data availability. This narrows down the number of countries included from 214 in the original dataset to 101 countries in the unbalanced sample to 99 in the balanced sample. The number of years included in the regression analysis ranges from 6-15 years (1985-1999) in the unbalanced sample to 13 years in the balanced sample (1987-1999).

TABLE 3: Definition of data variables

ARRIVAL	The annual inflow (arrivals) of international tourists according to the WTO database.
RECEIPTS	The annual income earned per international tourist (income/arrivals) according to the WTO database.
POP	Population, measuring the sizes of the tourism destination countries. The greater the population size of the country, the more tourism flows are expected to the country.
GDPCAP	GDP per capita, measuring the level of economic development in the tourism destination country. The positive relations are expected between the GDP per capita and the tourism flows.
HOTELCAP	Hotel capacity, measuring the total number of hotel rooms available in the tourism destination countries. The larger the hotel capacity, the more tourism flows to the destination countries. The positive relations are expected between the capacity of hotels and the tourism flows.
FDIHR	Foreign direct investment (FDI) in hotel and restaurant sectors (stock) in the tourism destination countries.
FDIST	FDI (stock) in the tourism destination countries. The ideal variable should be the FDI in hotel and restaurant sectors, but data are not available for most countries. However, for those countries where the FDI stock in hotels and restaurants is available, it exhibits high positive correlation with the general FDI stock (see also the correlation matrix in the Appendix Table A1). FDI should have a positive effect on the tourism flows.
OPEN	Openness, measured as total exports plus total imports divided by the country's GDP. More international business activities will be involved; hence more tourism flows, when a country is more open to the outside world.
PPP	Purchase Power Parity, measured by the ratio of GDP in PPP to GDP by market exchange rate at the destination countries. The ratio represents the local relative price level. It is expected that the lower the local price level at the destination countries, the higher competitiveness and the more tourists will come to visit the destination.
ISLAND	Island is a dummy variable to capture the special dependence that small island economies may exhibit with respect to tourism.

Some descriptive statistics (arrival/population ratio) by country are given in the Appendix Table A2 and from this table the exact country sample is also clear (countries for which a fixed effect is available in the last column are included in the estimations for the unbalanced sample). In the Appendix Table A2 data availability is also listed by the six major country groupings that the data are divided into: developing Africa *DAF*, developing America *DAM*,

developing Asia *DAS*, developing Middle East *DME* and European Transition Countries *ETC*, and finally the most highly developed countries belonging to the *OECD*[5] .

Finally, to the dataset is added besides country groupings a dummy for small island economies owing to their often strong dependence on tourism with very high annual arrival/population ratios, their specific economic situation including scarcity of many typical consumption goods which tend to increase the income leakages related to the tourism economy. All the countries included in the data and their groupings are shown in the Appendix Table A2 including their average arrival/population ratio.

6. THE MODEL

We test the data using both an ordinary OLS[6] assuming that the intercept and slopes are the same for all countries in the model. However, in this simple OLS we do allow for independent regional intercepts (not shown here):

$$Arrival_{it} = \alpha + \beta_1 POP_{it} + \beta_2 GDPCAP_{it} + \beta_3 HOTELCAP_{it} + \beta_4 FDIST_{it} + \beta_5 OPEN_{it} + \beta_6 PPP_{it} + \delta T_t + \varepsilon_{it}$$

This model is compared with a panel data model that instead assumes both countries *i* and time *t* varying that gives influences on the intercept of the model (the two-way fixed effects model[7]).

Overall, the advantage of using panel data in either type of the model is that the individual differences for the explanatory variables across countries can be used to reduce problems of collinearity. Furthermore, the advantage of the panel data model over the simple OLS model is that the problems of omitted variables are reduced by introducing country specific effects

[5] Hence our country groupings reflect both income differences and major geographic, cultural and institutional differences. It is discussable whether Mexico and several East European Transition countries including some Newly Industrialised Asian economies all belonging to the group of middle-income countries according to the World Bank Atlas should be classified as OECD or developing countries. Hence separate tests are also tried out for a differently grouped dataset of high, medium and low income countries or *HIM*, *MIM* and *LIM*, respectively, when doing this we follow the income groups given in the World Bank Atlas (www.worldbank.org/atlas).

[6] $y_{it} = \alpha^* + \sum_{k=1}^{K} \beta_k X_{kit} + \mu_{it}$

[7] $y_{it} = \alpha_{it} + \sum_{k=1}^{K} \beta_k X_{kit} + \mu_{it}$

(Hsiao, 1986). The country specific effects capture many of the factors that are relatively stable over time, but they strongly affect the ability of countries to attract tourists according to our hypothesis. Besides, we take other factors into account, such as cultural and natural attractions including climatic advantages of some destinations. However, other time invariant factors such as institutions (e.g. related to Visa control) and geography are likely also to affect these fixed effects which may render them difficult to interpret.

Finally, we also estimate the panel model for individual regions to test whether regional heterogeneity may be affecting the results. In this way it is possible also to observe something like "within region" and "between regions" effects that affect the results. The panel data model is also tested both for the whole data set according to the selection criteria described above and for a smaller part of this data set only including a balanced sample. The latter is necessary to test the robustness of results obtained from an unbalanced sample in relation to the selected availability of data that may have on the results over time.

7. RESULTS

Results for the pooled version of the model explaining tourism flows are shown in Table 4. Two variations of the dependent variable are used, one where the country size is controlled for on the right hand side of the equation as explanatory factor and one where the population weighted tourism inflows are used instead.

The latter model is statistically stricter and potentially reduces spurious effects associated with country size including possible problems of multicollinearity associated with using country size and other size-related explanatory factors in the same equation[8]. However, the initial results show little difference with regard to the sign and significance of most of the explanatory variables using either of the dependent variables.

[8] Checking for multicollinearity we estimate the condition index (CI) using the COLLIN procedure in SAS. When the condition index is greater than 10 there is weak evidence of collinearity and when it is greater than 100 strong. We find only potential problems of collinearity with the simple OLS models associated with the region dummies, and especially for the time trend the condition index is close to 100 in the first model. This suggests that the time trend is not the best way to control for time. However, this same problem is considerably reduced in the population-weighted model.

TABLE 4: Results for the pooled dataset – OLS and fixed effect

Dependent variable is log (ARRIVALS) or (ARRIVALS/POPUL)		
	OLS	OLS (pop weighted)
(t-values in parenthesis)		
INTERCEPT	3.611***	-0.326**
	(5.83)	(-2.38))
Log POPUL	0.182***	-
	(5.25)	
Log GDPCAP	0.161***	0.000
	(3.70)	(0.66)
Log HOTELCAP	0.478***	66.65***
	(17.39)	(18.93)
Log FDIST	0.118***	31.059***
	(5.13)	(3.79)
OPEN	0.006***	0.001**
	(9.30)	(2.15)
PPP	0.001***	-0.000
	(3.49)	(-1.29)
DAF	-0.670***	0.254**
	(-6.75)	(2.50)
DAM	-0.887***	0.156*
	(-11.22)	(1.76)
DAS	-0.662***	0.851***
	(-6.91)	(7.73)
DME	-0.466***	0.214
	(-3.19)	(1.28)
ETC	-0.301***	0.124
	(-2.88)	(1.01)
Time trend	0.012**	0.003
	(2.34)	(0.62)
N	1129	1129
R^2	0.857	0.409
CI>10	time and region	time

The parameter estimate is significant at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Across both equations it is found that hotel capacity, openness and FDI are positive and significant explanatory variables. However, with respect to other explanatory variables such as income per capita and regional dummies, there is quite a large difference in the results most likely caused by multicollinearity associated with regional income differences in both models. In subsequent models the simple dependent variable for tourism flows is used as

jumping to a panel data model solves some of these potential issues of multicollinearity[9] which seems to be the main reason for differences in the results using the simple and weighted dependent variables.

Results for the panel model are shown in Table 5. Including the fixed effects it confirms and increases the robustness of the results obtained from the pooled model. All the explanatory variables are significant and have the expected signs, except for the variable capturing the relative price competitiveness of the local tourism product which is very small and barely significant. The fixed effects are as expected and also highly significant, pointing to the importance both of general factors in explaining tourism flows (such as for example investment in infrastructure) and country specific factors (such as natural endowments)[10].

In Table 5 the results for the balanced and unbalanced sample are compared. Unbalanced panels may produce highly biased results, for example, if certain years (later or earlier) are over-represented for some countries this may strongly affect the results. Comparing the results in the two columns in Table 5, it shows that the estimated coefficients are quite stable across the two panels with the exception of the PPP variable, since it is not possible to estimate within a balanced data sample when including this variable – simply due to poor data availability.

Results for the panel model are also checked by estimating the model by region to further account for heterogeneity in the data. The results hereof are shown in the Appendix Table A3. Most of the explanatory variables are not stable across regions from the regional estimation results. The level of development is still significant for most regions; hotel capacity and openness are significant in the regions of developing Africa, America and Asia, but FDI is significant only in the developing America and the OECD regions. This confirms that the different supply variables are relevant to tourism flows in the different economic environment.

[9] In the two-way fixed effect model the multicollinearity problem is reduced by alternatively including instead of region dummies and time trend, more correctly for the panel, individual dummies for countries and years.

TABLE 5: Comparing results for the panel model (unbalanced and balanced sample)
Dependent variable is log (ARRIVALS)

	TWOFIX	TWOFIX (balanced sample)
(t-values in parenthesis)		
Log POP	1.276***	1.317***
	(6.38)	(6.12)
Log GDPCAP	0.694***	0.700***
	(7.98)	(7.62)
Log HOTELCAP	0.100***	0.107***
	(3.86)	(3.81)
Log FDIST	0.068***	0.065***
	(4.51)	(4.21)
OPEN	0.003***	0.003***
	(4.62)	(4.54)
PPP	0.000	-
	(1.50)	
Country dummies	Yes (-)***	Yes (-)***
Time dummies	Yes (-/+)	Yes (-/+)
N	1129	933
-2RESLOGLI	312.6	R^2: 0.999

* The parameter estimate is significant at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

It is not easy to interpret precisely the fixed effects with these models (for an overview of the exact ranking of countries by fixed effects see the appendix Table A2). Different groupings emerge, where only some countries seem to hold comparative advantage in tourism because of natural endowments. Other groupings of countries could equally be penalised for poor institutions in the area of tourism (especially those that may constrain or provide barriers to tourism such as visa laws) or their geographic position in relation to the main origin countries in each region. Hence the panel results only confirm that country fixed effects are highly relevant, but it is not possible to fully demonstrate that this is because of natural endowments or cultural heritage related to tourism.

Furthermore, the region specific models (Appendix Table A3) show that the fixed effects are more a "between regions" than "within region" phenomenon. This may be due to the often

[10] Note also the change in explanatory power of the independent variables' change going from Table 4 to Table 5. The high R^2 in the second column of Table 5 is due to the fixed effect. This is not untypical in fixed effect models where the variation between countries is large and the variation within a country is small (due to a short time series). In these cases the explanatory power of the model will be unusually high as seen in Table 5 for the R^2 statistics in the second column (statistics are only available for the balanced sample model due to the different procedures used in SAS).

very similar underlying characteristics related to economic development within each region. The obtained log likelihood statistics confirm that regions are much more homogenous in terms of the present data. Hence for some regions and especially the less developed ones the fixed effect associated with natural endowments and other country fixed effects as discussed above is more important in explaining the ability to attract tourists compared to the time-varying explanatory factors which oppositely are associated with created assets such as infrastructure and tourist attractions. However, when going from the pooled to regional estimation results the summary results in Table 6 show that the fixed effects are only important as a "within region" phenomenon among the OECD countries – suggesting that within this group there is great variation in the relative importance of natural endowments and created assets. (Note that the number of countries for which data are available within the Middle East is really too low to place much emphasis on the fixed effects in the regional results.)

TABLE 6: Fixed effects, pooled data and regional estimations compared

	Pooled results		Regional results	
	Significance	Average rank	Significance	Average rank
Developing Africa (DAF)	Yes	1	No	4
Developing Americas (DAM)	Yes	2	No	3
Developing Asia (DAS)	Yes	5	No	2
Developing Middle East (DME)	Yes	4	Yes	6
European Transition C. (ETC)	Yes	3	No	1
OECD Countries (OECD)	Yes	6	Yes	5

8. CONCLUSIONS AND DISCUSSION

The purpose of the paper is to relate the tourism-demand model with the traditional theories that explain international trade flows. In the existing tourism literature, tourism flows and tourism demand forecasts are typically explained by the demand-side variables, however, in the traditional trade theories, international trade flows are explained from the supply-side variables, i.e. the comparative advantage of the exporting countries. In this paper we stress that tourism flows are also trade flows, but in the form of people travelling to get the goods and services from the tourism destination countries. Would such comparative advantages play a role in determining the tourism flows?

A model is proposed in the paper, trying to explain in a modern and global economy, the factors that from a supply-side perspective can decide the comparative advantage of countries in a certain type of service activities. Given availability of data for a panel of 133 countries

and 14 years, we are able to test the model with secondary empirical data combining data from the World Bank and the World Tourism Organization.

The preliminary results render a strong support for the relevance of certain supply-side factors in explaining international tourism flows such as both natural endowments and created assets associated with foreign investments, hotel capacity and level of development. The price competitiveness of the tourism product *PPP* is the only variable for which robust results across countries in the fixed effect models is not obtained.

The two-way fixed effect model is preferred to the pooled panel model, as it gives us stable estimation results, at the same time it also proves that country fixed effects are highly relevant. Comparing the results from the "between regions" and "within region" estimations, it is possible to show that the obtained pooled results to a great extent are owing to the large differences between regions, while the differences within the regions in the same explanatory factors including the fixed effects appear to be mostly relevant in the regional estimation for the OECD countries. This latter result suggests that developing countries still rely in great extent on their natural endowments whereas the OECD countries as a group are much more diversified in terms of tourism development strategies and have achieved a much more differentiated tourism products based on created assets.

This paper analyses tourism flows from another angle, i.e. from the supply-side of tourist products. It gives some explanations for the importance of tourism destination development and the competitiveness between the tourism destinations For the further investigation in this area, it would be desirable to find ways in which to decompose the fixed effect into the different time invariant elements (such as natural endowments, geography and institutions) that are obviously playing a role in the present results for the fixed effects.

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APPENDIX

TABLE A1: PEARSON CORRELATION COEFFICIENTS

	ARRIVAL	RECEIPTS	FDIHR	FDIST	GDPCAP	HOTELCAP	ISLAND	OPEN	POPUL	PPP
ARRIVAL	1									
RECEIPTS	0.087***	1								
FDIHR	0.506***	0.352***	1							
FDIST	0.837***	0.275***	0.562***	1						
GDPCAP	0.556***	0.396***	0.382***	0.575***	1					
HOTELCAP	0.857***	0.273***	0.433***	0.803***	0.497***	1				
ISLAND	-0.472***	0.240***	-0.088	-0.472***	-0.090***	-0.417***	1			
OPEN	-0.262***	-0.041	-0.412	-0.247***	-0.022	-0.434***	0.197***	1		
POP	0.692***	-0.017	0.531***	0.654***	0.033*	0.730***	-0.638***	-0.483***	1	
PPP	-0.346***	-0.349***	-0.324***	-0.398***	-0.738***	-0.317***	0.015	-0.013	0.094***	1

TABLE A2: COUNTRIES AND GROUPINGS INCLUDED IN THE DATA

Country	Grouping 1 (Combined)	Grouping 2 (Income-based)	Arrival/popul ratio (1999)	Small island economy	Fixed effect (rank)
Algeria	DAF	MIM	0.03	No	86
Benin	DAF	LIM	0.03	No	46
Botswana	DAF	MIM	0.51	No	15
Cape Verde	DAF	LIM	0.16	Yes	17
Gabon	DAF	MIM	0.14	No	61
Sao Tome and P.	DAF	LIM	0.04	Yes	-
Comoros	DAF	LIM	0.04	Yes	22
Djibouti	DAF	MIM	0.03	No	-
Gambia	DAF	LIM	0.08	No	12
Kenya	DAF	LIM	0.03	No	59
Lesotho	DAF	LIM	0.09	No	20
Malawi	DAF	LIM	0.03	No	42
Mauritius	DAF	MIM	0.49	Yes	18
Morocco	DAF	MIM	0.14	No	51
Namibia	DAF	MIM	0.40	Yes	24
Senegal	DAF	LIM	0.04	No	55
Seychelles	DAF	MIM	1.56	Yes	-
South Africa	DAF	MIM	0.14	No	85
Swaziland	DAF	MIM	0.28	No	11
Togo	DAF	LIM	0.02	Yes	54
Tunisia	DAF	MIM	0.51	No	29
Zambia	DAF	LIM	0.04	No	70
Zimbabwe	DAF	LIM	0.17	No	34
Antigua	DAM	HIM	3.56	Yes	2
Argentina	DAM	MIM	0.08	No	90
Bahamas	DAM	HIM	5.26	Yes	-
Barbados	DAM	HIM	1.93	Yes	9
Belize	DAM	MIM	0.78	No	7
Bolivia	DAM	MIM	0.04	No	67
Brazil	DAM	MIM	0.03	No	100
Chile	DAM	MIM	0.11	No	76
Colombia	DAM	MIM	0.01	No	93
Costa Rica	DAM	MIM	0.28	No	41
Cuba	DAM	LIM	0.14	Yes	-
Dominica	DAM	MIM	1.03	Yes	5
Dominican R.	DAM	MIM	0.32	Yes	32
Ecuador	DAM	MIM	0.04	No	-
El Salvador	DAM	MIM	0.11	No	64
Grenada	DAM	MIM	1.28	Yes	4
Guatemala	DAM	MIM	0.07	No	68
Guyana	DAM	MIM	0.10	No	26
Haiti	DAM	LIM	0.02	Yes	60
Honduras	DAM	MIM	0.06	No	49
Jamaica	DAM	MIM	0.49	Yes	16
Nicaragua	DAM	LIM	0.09	No	37
Panama	DAM	MIM	0.16	No	47
Paraguay	DAM	MIM	0.05	No	48
Peru	DAM	MIM	0.04	No	95
Puerto Rico	DAM	HIM	0.80	Yes	-
St. Kitts and N.	DAM	MIM	1.96	Yes	1
St. Vincent	DAM	MIM	0.60	Yes	8
Suriname	DAM	MIM	0.14	No	-
Trinidad and T.	DAM	MIM	0.26	Yes	35
Uruguay	DAM	MIM	0.63	No	19
US Virgin Isl.	DAM	HIM	4.48	Yes	-
Venezuela	DAM	MIM	0.02	No	94

TABLE A2: COUNTRIES AND GROUPINGS INCLUDED IN THE DATA (cont'd…)

Country	Grouping 1 (Combined)	Grouping 2 (Income-based)	Arrival/popul ratio (1999)	Small island economy	Fixed effect (rank)
Brunei	DAS	HIM	3.00	No	-
Cambodia	DAS	LIM	0.03	No	63
China	DAS	MIM	0.02	No	99
Fiji	DAS	MIM	0.51	Yes	14
French P.	DAS	HIM	0.91	Yes	-
Guam	DAS	HIM	7.64	Yes	-
Hong Kong	DAS	HIM	1.71	No	53
Indonesia	DAS	LIM	0.02	No	97
Kiribati	DAS	MIM	0.01	Yes	-
Lao	DAS	LIM	0.05	No	-
Macau	DAS	MIM	11.63	No	3
Malaysia	DAS	MIM	0.35	No	58
Maldives	DAS	MIM	1.61	Yes	-
Marshall Islands	DAS	MIM	0.10	Yes	-
Mongolia	DAS	LIM	0.07	No	-
Nepal	DAS	LIM	0.02	No	-
New Caledonia	DAS	HIM	0.48	Yes	-
Philippines	DAS	MIM	0.03	No	89
Samoa	DAS	MIM	0.50	Yes	6
Singapore	DAS	HIM	1.58	No	-
Solomon Islands	DAS	LIM	0.05	Yes	-
Sri Lanka	DAS	MIM	0.02	Yes	83
Thailand	DAS	MIM	0.14	No	80
Tonga	DAS	MIM	0.31	Yes	-
Vanuatu	DAS	MIM	0.26	Yes	10
Bahrain	DME	HIM	3.08	No	-
Egypt	DME	MIM	0.07	No	82
Jordan	DME	MIM	0.28	No	30
Kuwait	DME	HIM	0.04	No	-
Lebanon	DME	MIM	0.16	No	45
Oman	DME	MIM	0.21	No	-
Quatar	DME	HIM	0.83	No	-
Saudi Arabia	DME	MIM	0.18	No	-
Syria	DME	MIM	0.06	No	-
Azerbaijan	ETC	LIM	0.08	No	44
Bulgaria	ETC	MIM	0.30	No	-
Croatia	ETC	MIM	0.87	No	25
Cyprus	ETC	HIM	3.22	Yes	-
Estonia	ETC	MIM	0.69	No	21
Israel	ETC	HIM	0.38	No	65
Latvia	ETC	MIM	0.20	No	28
Lithuania	ETC	MIM	0.40	No	27
Malta	ETC	HIM	3.13	Yes	-
Romania	ETC	MIM	0.14	No	52
Russsia	ETC	MIM	0.13	No	91
Slovenia	ETC	HIM	0.45	No	40
Ukraine	ETC	MIM	0.08	No	69

TABLE A2: COUNTRIES AND GROUPINGS INCLUDED IN THE DATA (cont'd…)

Country	Grouping 1 (Combined)	Grouping 2 (Income-based)	Arrival/popul ratio (1999)	Small island economy	Fixed effect (rank)
Australia	OECD	HIM	0.24	No	88
Austria	OECD	HIM	2.16	No	31
Belgium	OECD	HIM	0.62	No	74
Canada	OECD	HIM	0.64	No	75
Czech Rep.	OECD	MIM	0.55	No	50
Denmark	OECD	HIM	0.38	No	73
Finland	OECD	HIM	0.48	No	71
France	OECD	HIM	1.25	No	72
Germany	OECD	HIM	0.21	No	96
Greece	OECD	HIM	1.15	No	38
Hungary	OECD	MIM	1.43	No	13
Iceland	OECD	HIM	0.95	Yes	23
Ireland	OECD	HIM	1.71	No	33
Italy	OECD	HIM	0.63	No	79
Japan	OECD	HIM	0.04	No	101
Korea	OECD	HIM	0.10	No	92
Luxembourg	OECD	HIM	1.94	No	-
Mexico	OECD	MIM	0.20	No	77
Netherlands	OECD	HIM	0.63	No	78
New Zealand	OECD	HIM	0.42	No	62
Norway	OECD	HIM	1.00	No	66
Poland	OECD	MIM	0.46	No	39
Portugal	OECD	HIM	1.16	No	36
Slovakia	OECD	MIM	0.18	No	57
Spain	OECD	HIM	1.16	No	56
Sweden	OECD	HIM	0.29	No	84
Switzerland	OECD	HIM	1.50	No	43
Turkey	OECD	MIM	0.10	No	81
United Kingdom	OECD	HIM	0.43	No	87
United States	OECD	HIM	0.17	No	98

Source: WTO and *World Development Indicators* databases.

TABLE A3: REGIONAL-LEVEL RESULTS FOR THE PANEL MODEL

Dependent variable is log (ARRIVALS)							
	Pooled sample	DAF	DAM	DAS	DME	ETC	OECD
(t-values in parenthesis)							
Log POP	1.276***	2.110*	0.500	-0.441	4.929***	-0.733	3.946***
	(6.38)	(1.79)	(1.60)	(-0.31)	(2.83)	(-0.40)	(9.12)
Log GDPCAP	0.694***	0.216	0.522***	0.897**	2.562***	-0.963	0.834***
	(7.98)	(0.75)	(3.64)	(2.23)	(3.28)	(-1.67)	(4.66)
Log HOTELCAP	0.100***	0.408***	0.116***	0.252**	-0.111	0.114	0.036
	(3.86)	(3.17)	(3.07)	(2.07)	(-0.27)	(0.95)	(1.44)
Log FDIST	0.068***	-0.072	0.128***	0.102	0.269*	-0.081	0.108***
	(4.51)	(-1.02)	(3.38)	(0.96)	(2.02)	(-1.37)	(4.84)
OPEN	0.003***	0.012***	0.006***	-0.004**	0.010*	-0.004	-0.000
	(4.62)	(3.17)	(6.03)	(2.13)	(1.79)	(-0.65)	(-0.23)
PPP	0.000	0.000	-0.000	0.000	0.001	0.000	-0.001
	(1.50)	(0.82)	(-0.70)	(1.16)	(0.70)	(0.08)	(-3.03)
Country dummies	Yes (-)***	Yes (-)	Yes (-)	Yes (+)	Yes (-)***	Yes (+)	Yes (-)***
Time dummies	Yes (?)	Yes (+)	Yes (+)	Yes (-)	Yes (+)	Yes (-)***	Yes (+)**
N	1129	221	369	128	32	71	308
-2RESLOGLI	312.6	204.1	-9.2	91.7	2.2	72.6	-130.5

* The parameter estimate is significant at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level