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Determinants of International Tourism

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Determinants of International Tourism[1]

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Abstract

The paper estimates the impact of macroeconomic supply- and demand-side determinants of tourism, one of the largest components of services exports globally, and the backbone of many smaller economies. It applies the gravity model to a large dataset comprising the full universe of bilateral tourism flows spanning over a decade. The results show that the gravity model explains tourism flows better than goods trade for equivalent specifications. The elasticity of tourism with respect to GDP of the origin (importing) country is lower than for goods trade. Tourism flows respond strongly to changes in the destination country's real exchange rate, along both extensive (tourist arrivals) and intensive (duration of stay) margins. OECD countries generally exhibit higher elasticties with respect to economic variables (GDPs of the two economies, real exchange rate, bilateral trade) due to the larger share of business travel. Tourism to small islands is less sensitive to changes in the country's real exchange rate, but more susceptible to the introduction/removal of direct flights.

JEL Classification Numbers: F14, L83

Keywords: International Tourism, Gravity model, Real exchange rate, Small islands

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Contents Page

I. INTRODUCTION

A record one billion tourists crossed international borders in 2012, an event that was celebrated by the United Nations World Tourism Organization (UNWTO). The World Travel & Tourism Council (WTTC) estimates that travel and tourism accounts for 9 percent of global GDP from "direct and indirect activities combined". Even when measured more conservatively, international tourism is a major source of income and cross-country linkages.

In 2006–10, international tourism receipts represented about 6 percent of international trade of goods and services, and nearly 2 percent of the world's GDP.[2] In comparison, international trade in fuels accounts for 10 percent of total trade, while international remittances stand at ¾ percent of the world's GDP.[3] Global averages conceal the importance of international tourism for many economies. In 45 of the 191 countries and territories for which 2009 data was available, international tourism accounted for over 20 percent of total exports. And while the term "tourism-dependent economy" may first evoke images of paradise islands, tourism plays an important role for countries spanning the full spectrum of economic size and development. A number of OECD countries (Australia, Greece, New Zeeland, Portugal, Spain, Turkey) derive 14 to 25 percent of export earnings from foreign tourists, and even the extremely diversified economies of US, France and Italy are in the 8 to 10 percent range.[4]

Given the magnitude of tourism flows and the importance of the industry for the global economy, it would only be natural to investigate the drivers of tourism flows and the cross-border spillovers generated by these flows. To date, most studies on the subject attempt to answer these questions using small datasets covering one or a small group of tourism-dependent countries.[5] There are very few studies that analyze the universe of international tourism flows. This is in stark contrast to other components of the balance of payments. Goods trade, FDI and, more recently, remittances have been analyzed—usually in the framework of gravity models—using rich datasets spanning decades and encompassing most countries in the world. There are prolific streams of research focusing on important categories of goods trade (manufactured goods, fuels, other natural resources), with recent literature going as far as literally dissecting flows at the product level.

An important reason why tourism has not garnered the same level of attention is scarcity of cross-country data. This paper fills this gap by analyzing the determinants of international tourism flows and cross-border spillovers associated with tourism using an extensive panel

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[2] Statistics quoted in this paragraph are from IMF's International Financial Statistics (IFS) and World Bank's World Development Indicators (WDI).

[3] Tourism held a higher share of global trade than fuels prior to the rise in fuel prices at the turn of the millennium: 7.7 percent for tourism versus 6 percent for fuels in the years 1995-1999.

[4] Top tourist destinations (in absolute and relative terms) are presented in Table A1.

[5] For example, Archibald et al. (2008) apply the gravity model to 22 countries in the Caribbean.

dataset, constructed on the basis of UNWTO raw data, covering the universe of bilateral tourism flows over a decade. The paper makes several contributions to the literature on international tourism and the larger body of empirical research using the gravity model approach. The study presents results for equivalent specifications for tourism and merchandise trade, allowing for direct comparison between the two. It undertakes an in-depth analysis on the impact of the real exchange rate on tourism flows, and proposes a more robust way for introducing bilateral trade flows as an independent variable in the gravity estimations for non-merchandise flows. The paper estimates the impact on tourism of a number of non-traditional variables, such as presence of a direct flight, hotel rooms, climate and touristic attractions, and conflict magnitude. Finally, unlike previous studies which only focused on tourist arrivals, the paper also analyzes the determinants of the average length of stay. The remainder of this section summarizes the main results of the paper.

The gravity equation performs very well at explaining bilateral tourism arrivals. For some equivalent specifications, the fit of tourism gravity equations is in fact better than that for goods trade, despite the fact that the dataset is twice smaller. The fit is also considerably better than the one reported in the literature for FDI and remittances flows.

Macroeconomic variables and economic ties have a large impact on tourism arrivals. The elasticities of bilateral tourism with respect to the GDPs of the origin and destination countries are large, although smaller than the near-unitary elasticity estimated for goods trade. Strong trade ties are positively associated with higher tourism flows, a result that highlights the considerable share of business travelers in measured tourism flows; especially so in the case of intra-OECD travel. The real exchange rate has the expected effect: an appreciation of the origin's currency increases bilateral tourism, while the appreciation of the destination reduces it. This estimated elasticity is large and robust to a variety of estimation techniques and measures of the real exchange rate.

Traditional gravity variables have mostly the expected impact on tourism flows. Distance between the two countries has a negative impact on tourism with an elasticity that is nearly identical to that for merchandise flows. Language ties are more important for tourism than merchandise trade, while historical colonial relationships are less important. The presence of regional trade agreements between the two countries is associated with a small positive effect on tourism. Common currency is in fact associated with a *reduction* in both tourism *and* merchandise flows, a result that is fully driven by Eurozone countries. Unlike in the case of merchandise trade, economic remoteness of the destination country is associated with higher tourism flows, suggesting a premium placed by tourists on destinations off the beaten path.

The effect of two supply-side variables is analyzed: presence of direct flights and number of hotel rooms in the destination country. The presence of a direct flight is positively associated with tourism flows, but reverse causality dominates—a direct flight is added the year *after* bilateral tourism flows see an increase. The same positive relationship is observed between number of hotel rooms in the destination country and tourism inflows, but in this case reverse causality does not seem to play a role. Both supply variables are less important for intra-OECD tourism flows, suggesting that supply factors are not binding constraints to tourism in developed countries.

Several non-traditional variables are examined on the demand side. Tourists generally prefer travelling to regions with similar climates, but there is also a strong preference for travelling to warmer countries. Even after controlling for distance, time difference has a negative impact on tourism flows, suggesting that jet lag is a concern entering into the decision process. "Cultural capital" (as proxied by the number of UNESCO World Heritage sites) also plays a role in explaining tourism flows. Tourists avoid countries with ongoing conflicts.

Using a smaller dataset on tourist-nights, the study shows that tourism flows respond to changes in tourism determinants both through changes in the number of tourism arrivals, as well with a change in the average duration of stay. In particular, the real effective exchange rate has a strong effect on duration of stay—the real appreciation in the destination country is associated with both fewer tourists *and* shorter stays.

Finally, the study revisits the main findings for the case of small islands, many of which are tourism-dependent. In particular, it finds that—unlike in the case of other countries—the small island's own real exchange rate has little impact on tourism arrivals.

The paper is organized as follows. Section II discusses the data and presents some summary statistics, Section III discusses the empirical strategy, Section IV presents estimation results, and Section V concludes.

II. Data

The smaller volume of research on trade in tourism services is in part due to the lack of a true equivalent to the Comtrade database for tourism flows. In the case of Comtrade (IMF's Direction of Trade Statistics (DOTS), CEPII's BACI are derived from the same source), the quality of data on merchandise trade is ensured by the fact that variables of interest—quantity, value, origin or destination—are (i) collected in a centralized fashion at customs, (ii) codified using standardized nomenclatures (Harmonized System, SITC, etc.) and (iii) aggregated using standardized information systems (e.g., some flavor of ASYCUDA). Moreover, aggregators of trade in goods have the advantage of seeing the same transaction through recorder by both importing and exporting country, which allows for ex-post adjustments and corrections (as done in BACI).

Despite ongoing efforts by international organizations, such uniformity has not yet been achieved in the case of statistics of bilateral tourism flows. Countries don't record the destination of outbound tourists, so bilateral tourism data only comes from the destination country (the equivalent of the exporter in goods trade). Most countries measure tourist arrivals at the border, but some measure arrivals to hotels. Country practices differ in terms of who is counted (tourists or visitors[6]) and how they determine their country of origin (by nationality or residence). Important variables of interest—spending over the duration of the stay—are rarely collected and reported. The number of tourist-nights is only collected by about 40 percent of all countries.[7] Finally, many statistical offices of destination countries choose to group visitors from some countries into categories (e.g., “Other Africa”, “Benelux”, “other CIS”), which makes it sometimes impossible to positively identify the country of origin.

Despite heterogeneity in tourism data collected at the national level, UNWTO aggregates and publishes an annual compendium of all bilateral tourism flows. This data has seen relatively little use since the format in which data is published is not easily convertible into a standard panel dataset.[8] The electronic data is distributed in five year blocks, two of which were available, one for 1999–2004 and another one for 2005–2009.[9] The definition used in the collection of data is specified for each country: whether the data is collected at the border or at hotel establishments, whether it is a measure of tourists or visitors, and whether the origin country is determined based on nationality or residence.

Table 1. Dataset Summary Statistics

Tourist arrivals	Observations	Country-pairs	Destinations	Total tourist arrivals, millions	Observations kept, %	Arrivals kept, %
UNWTO full dataset	128,304	17,441	210	8,475	100.0	100.0
Country of origin unambiguously identified	118,115	15,839	204	7,812	92.1	92.2
Key variables (GDPs, distance) available	103,676	13,573	173	7,678	80.8	90.6
Minimum 100 tourists annually	67,673	7,966	173	7,672	52.7	90.5
Tourist-nights	**Observations**	**Country-pairs**	**Destinations**	**Total tourist-nights, millions**	**Observations kept, %**	**Tourist-nights kept, %**
UNWTO full dataset	32,152	4,208	93	19,460	100.0	100.0
Country of origin unambiguously identified	28,315	3,685	83	17,321	88.1	89.0
Key variables (GDPs, distance) available	24,904	3,139	71	17,064	77.5	87.7
Minimum 100 tourists annually	19,781	2,391	71	17,062	61.5	87.7

[6] UNWTO defines a “tourist” as an overnight visitor, whereas a “visitor” is a broader concept, which includes both tourist and same-day visitors (excursionists, e.g. cruise passengers). A detailed review of tourism statistical concepts can be found in (United Nations, 2010).

[7] Tourist-nights are the total number of nights spent by tourists from an origin country. It can be decomposed into the product of arrivals and average duration of stay measured in nights stayed.

[8] The UNWTO dataset covering 1995-2008 was used in Fourie and Santana-Gallego (2011), who apply similar estimation techniques to those presented in the paper. However, they primarily focus on African tourism and incorrectly specify the main gravity variables, by using per-capita GDPs of the origin and destination country instead of total GDPs.

[9] As of early 2014, the full UNWTO dataset covers years 1995 through 2012.

The resulting unbalanced panel dataset contains 128,304 observations, each observation containing the number of tourist arriving from the origin country to the destination country in a given year.[10] Of these, about 22 percent o observations had to be dropped because the country of origin was not unambiguously identified (8 percent) or because at least one key explanatory variable (GDPs, bilateral distance) was not available (14 percent). However, the impact on the share of tourism flows captured was smaller, as these observations accounted for only 11 percent of all tourism arrivals over the 10 years of data. To reduce noise in fixed effects and first differences regressions, I also eliminated all country-pairs for which the number of tourists from one country to the other in at least one year fell below 100.[11]

For the purpose of this study, the UNWTO dataset was then supplemented with a series of "gravity variables". Macroeconomic indicators come from WDI, the IFS and the Penn World Tables (PWT). In particular, PWT provides the widest country coverage and is therefore the preferred source of GDP data. Bilateral trade statistics comes from IMF's Direction of Trade Statistics (DOTS). A number of CEPII datasets provide standard gravity model variables, including bilateral distances, cultural, linguistic and colonial relationships. CEPII was also the source of data on common trade agreements and common currencies.[12]

Several standard measures of real exchange rates are used: (i) a bilateral real exchange rate (RER) computed from the IFS, (ii) real effective exchange rates (REER) of origin and destination countries reported by the IFS, (iii) PWT's PPP factors for origin and destination countries. The latter is a bilateral exchange rate in purchasing-power-parity (PPP) terms vis-à-vis the United States, i.e. it measures the amount of U.S. dollars that buys the same basket of goods that $1 bought in the U.S.[13] Imposing the restriction that changes in PPP factors in origin and destination have the same impact on tourism flows, a fourth measure of real exchange rate is introduced—the *PPP factor ratio* of the PPP factor of the destination to the PPP factor of the origin (an increase in the PPP factor indicates an appreciation—in dollar terms—of the destination vis-à-vis the origin).[14] Each of these measures has advantages. The bilateral real exchange rate is the most commonly used measure in the gravity literature but, by definition, it does not incorporate the effects of exchange rate

[10] Annex Table 2 provides totals and number of observations for each year in the dataset.

[11] As shown in Appendix Table 2, the average tourists spend around $836 per trip. Therefore, imposing a minimum of 100 tourists means that, on average eliminates country-pairs with flows generating less than US$84 thousand in receipts for the destination country.

[12] CEPII's dataset on trade agreements and currencies covers years through 2006. It was updated to reflect the expansion of the Euro area since then (Slovenia, Cyprus, Malta, Slovakia, Estonia).

[13] This is computed as $PPPRER = PPP/XRAT$ from PWT 7.2. It is identical to the variable p in the PWT (called the "price level of GDP"), and is the inverse of the real exchange rate used by Rodrik (2008). A PPP factor lower than 1 indicates that the country is "cheaper" than the US, and an increase indicates appreciation.

[14] Robustness checks (results available upon request) also included a similar measure computed from WDI (which also reports PPP factors). However, it is available for a smaller subset of country-years and has a weaker correlation with other exchange rate measures than the PWT-sourced measure.

movements vis-à-vis third countries. The REER appears to be the preferred option as it accounts for third-party trading partners. However, the weights used in the REER are heavily slanted towards merchandise trade, and therefore may be less relevant for the analysis of trade in tourism, especially in the case of tourism-dependent economies (e.g., small islands). The PWT-sourced measures benchmark country-pairs to a single reference country, which conceptually places it between bilateral RER and REER. The PPP factor ratio is the preferred measure through most of the paper with the exception of section IV.D, which specifically deals with the impact of real exchange rates on tourism.

I also introduce several non-standard gravity variables. First of all, I constructed a bilateral "climate similarity index", using a dataset published by Portland State University and based on the world climate map using the Koppen-Geiger classification.[15] The dataset shows the distribution of area and population (as of 1995) of each country across various climate zones. The climate similarity index varies between 0 (climates of the two country have no overlap) and 1 (countries have exactly the same climate zone composition), and is constructed in the same manner as the export similarity index, introduced by Finger and Kreinin (1979). Specifically, $Sim_{ij} = \sum_c Min(Zone_{ci}, Zone_{cj})$, where $Zone_{ci}$ and $Zone_{cj}$ are the shares of climate zone c in countries i and j respectively.

Data on global bilateral passenger air travel flows was supplied by Diio, an aviation business intelligence company. Data on the number of hotel beds came from the UNWTO dataset itself. The list of World Heritage sites was downloaded from the UNESCO website. Data on conflicts comes from the Political Instability Task Force (PITF) and from the UCDP/PRIO Armed Conflict Dataset.

III. Empirical Strategy

The gravity model framework has been well tested and scrutinized during five decades of research on bilateral merchandise trade and, more recently, on other cross-border economic flows (FDI and remittances, in particular). It has been empirically established that trade between two countries is proportional to the economic size of the two countries and inversely proportional to a number of "trade resistance factors", chief among them transportation costs, which is usually proxied by the distance between the two countries. Other resistance factors often included in gravity model regressions are linguistic characteristics (countries speaking the same language trade more), historical ties (countries trade more if they have ever been in a colonial relationship or were ever part of a single country), common border (the "average" distance between the two countries becomes a misleading measure of transportation costs when border regions face effectively zero distance), membership in trade agreements and

[15] The dataset uses a version of the classification with 12 climate zones. For the purpose of constructing the index, it was aggregated to seven zones: tropical rainforest, tropical savannah, steppe, desert, temperate, cold and highland. The dataset is extended to include a number of small islands, most of them located in the tropics.

monetary unions. It is reasonable to assume that many of the same factors influence tourism flows.

The preferred specification of the gravity equation has gone through a number of changes over the years. The traditional regression specification used to estimate the gravity equation for tourism in the case of a panel dataset would take the following form:

$$ln\, T_{odt} = \beta_1\, ln\, Y_{ot} + \beta_2\, ln\, Y_{dt} + \beta_3\, ln\, D_{od} + \boldsymbol{\beta_A}'\boldsymbol{X_{odt}} + \eta_t + \varepsilon_{odt},\ \ t = 1 \dots T \qquad (1)$$

where T_{odt} is a measure of the tourism flow from country of origin o (importing country) to destination d (exporting country) in year t, Y_{ot} and Y_{dt} are the gross domestic products (measured in constant US$) of the origin and destination country respectively, D_{od} is the distance between the two countries, X_{odt} is a $1 \times k$ vector of other variables proxying other resistance factors; and η_t is a set of T year dummies capturing common time effects.

As pointed out by Anderson and van Wincoop (2003), this specification suffers from omitted variable bias. It only accounts for the individual characteristics of o and d, and doesn't recognize the fact that the flows from o to d also depend on the attractiveness of going from o to d compared to going from o to any other destination. In short, bilateral flows depend on multilateral parameters. The standard (and simplest) econometric approach for dealing with "multilateral resistance" is to introduce dummies for origin and for destination countries.[16] The estimated regression then becomes:

$$ln\, T_{odt} = \beta_1\, ln\, Y_{ot} + \beta_2\, ln\, Y_{dt} + \beta_1\, ln\, D_{od} + \boldsymbol{\beta_A}'\boldsymbol{X_{odt}} + \omega_o + \delta_d + \eta_t + \varepsilon_{odt} \qquad (2)$$

where ω_o and δ_d are origin and destination dummy variables. Note that this specification makes it impossible to estimate the coefficient on time-invariant country characteristics, such as geographical characteristics (exit to sea, climate zone, etc.). There is still scope for omitted variable bias in this specification. For example, the dataset holds no data on bilateral visa regimes, which can bias the estimated coefficient if the visa regime that a country faces is correlated with other regressors (e.g., own GDP level). This can be addressed by using a fixed effects specification where the panel variable is the country-pair or, equivalently, introducing country-pair dummies φ_{od}[17]:

$$ln\, T_{odt} = \beta_1\, ln\, Y_{ot} + \beta_2\, ln\, Y_{dt} + \beta_A{}' X_{odt} + \varphi_{od} + \eta_t + \varepsilon_{odt} \qquad (3)$$

Note that the introduction of origin-destination dummies makes it impossible to estimate coefficients on time-invariant variables such as distance, common cultural and historic ties. This regression will produce unbiased results under the assumption that the country's

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[16] Econometric arguments in favor of this specification are presented in Mátyás (1997) and Egger (2000). Early applications also include Hummels (1999).

[17] Effectively an OLS in which observation are demeaned for each country-pair.

multilateral resistance is constant over time (and therefore fully taken care of by country fixed effects).

Bayoumi and Eichengreen (1999) propose a first-differences specification for estimating the gravity equation, which produces unbiased results if disturbances follow a random walk, and which is particularly useful for investigating the impact of real exchange rates on trade flows:

$$\Delta \ln T_{odt} = \beta_1 \Delta \ln Y_{ot} + \beta_2 \Delta \ln Y_{dt} + \boldsymbol{\beta_A}' \boldsymbol{\Delta X_{odt}} + \eta_t + \varepsilon_{odt} \qquad (4)$$

The inability of the fixed effects and first differences specifications to estimate the impact of time-invariant variables on tourism can be addressed in two ways. First, one could use a random effects specification (with the country-pair as the panel unit). The main problem with a random effects specification is the fact that it doesn't account for multilateral resistance. A partial solution is to proxy it with a measure of economic remoteness, which is a GDP-weighted average of the distance to all other countries.[18] The second approach is to use the Hausman and Taylor (1981) estimator, which allows estimating coefficients on time-invariant variables by imposing assumptions on the endo-/exogeneity of each variable. This approach has been used in the gravity literature, among others, by Serlenga and Shin (2004).

Estimation results below rely on most estimation techniques discussed above. Baseline results use country fixed effects (CFE, equation 2) and country-pair fixed effects (CPFE, equation 3). Random effects (RE) and the Hausman-Taylor (HT) estimators allow analyzing a wider set of determinants, while the first differences specification (FD, equation 4) is well suited to estimate key macro-determinants (the importance exchange rate in particular).

IV. Estimation Results

A. Tourism Versus Merchandise Trade[19]

Benchmarking the effect of "traditional" gravity variables on tourism against merchandise trade using fixed effects regressions is a natural starting point for the analysis. I start by comparing the determinants of international tourism with those of merchandise trade using origin and destination fixed effects for tourism and, respectively, importer and exporter fixed effects for trade ("country fixed effects" or CFE for short). This model, which corresponds to equation 2 in Section III. , allows the estimation of coefficients for a number of time-

[18] A modified version of what Head and Mayer (2013) call $REM2$ is used, which is the inverse of the Harris market potential. In particular, for each country i, $Remoteness_{it} = \left(\sum_j \frac{Y_{jt}/Y_t^*}{Dist_{ij}}\right)^{-1}$, where j goes from 1 to 171 (countries in the dataset), and Y_{jt}/Y_t^* is the share of country j in the world's GDP in year t.

[19] The question of validity of comparing results for tourism (measured in people) to goods trade (measured in constant dollars) is addressed in the appendix. It establishes that tourism arrivals are in fact a good proxy for receipts, which supports the validity of comparisons in this section and validates the extrapolation of the paper's results to tourism receipts.

invariant variables, while at the same time accounting for multilateral resistance forces. The regressions cover the same time period with the exception of 2004, which is included in the trade regressions, but missing from the tourism dataset.

Two specifications of the gravity equation are estimated: a barebones specification with GDPs and distance, and an extended one with the usual geographical, historical and linguistic controls. In the case of tourism arrivals, the two specifications are estimated for the entire universe of bilateral flows (Table 2 regressions 1 and 2), as well as for the intra-OECD flows only (regressions 3 and 4). Unless indicated otherwise, the discussion focuses on estimates for the extended specification on the full sample (regression 2 for tourism and 6 for trade).

Table 2. Gravity Equation for Tourism and Trade with Country Fixed Effects

	Tourism				Trade			
	Full sample		Intra-OECD		Full sample		Intra-OECD	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Origin/Importer GDP	0.523***	0.557***	1.297***	1.077***	0.805***	0.946***	1.920***	1.849***
	(0.051)	(0.049)	(0.182)	(0.187)	(0.063)	(0.063)	(0.168)	(0.169)
Log Destination/Exporter GDP	1.051***	1.040***	1.134***	0.921***	1.032***	0.924***	1.425***	1.292***
	(0.050)	(0.047)	(0.165)	(0.166)	(0.053)	(0.054)	(0.158)	(0.157)
Log weighted distance	-1.916***	-1.589***	-1.274***	-1.073***	-1.812***	-1.541***	-1.272***	-1.131***
	(0.007)	(0.007)	(0.013)	(0.020)	(0.007)	(0.009)	(0.013)	(0.018)
Log Origin/Importer Population		-0.210**		1.097**		-0.769***		-2.756***
		(0.102)		(0.429)		(0.112)		(0.384)
Log Destination/Exporter Population		-0.171		-0.450		0.933***		-0.671*
		(0.134)		(0.415)		(0.093)		(0.367)
Common currency		-0.117***		0.177***		-0.364***		-0.020
		(0.034)		(0.027)		(0.038)		(0.024)
Members of regional trade agreement		0.316***		0.252***		0.396***		0.187***
		(0.016)		(0.039)		(0.017)		(0.032)
Common border		0.898***		0.201***		0.427***		-0.051
		(0.034)		(0.039)		(0.034)		(0.034)
Ever in a colonial relationship		0.898***		0.353***		1.093***		0.187***
		(0.035)		(0.042)		(0.031)		(0.048)
Comon colinizer post 1945		0.707***				0.913***		
		(0.020)				(0.022)		
Common official or primary language		0.874***		0.074		0.527***		0.067
		(0.022)		(0.047)		(0.025)		(0.046)
Same language spoken by at least 9%		0.233***		0.369***		0.141***		0.354***
		(0.022)		(0.045)		(0.025)		(0.046)
Were or are same country		0.177***		0.240***		0.439***		0.696***
		(0.043)		(0.068)		(0.048)		(0.068)
Country fixede effects	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	104,627	104,627	9,306	9,306	216,038	216,038	12,251	12,251
R^2	0.827	0.848	0.902	0.908	0.723	0.733	0.906	0.910

Note: Robust standard errors in parentheses. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

The first notable result is that the gravity equation works equally well for tourism and merchandise trade, as the R^2 is roughly the same for comparable specifications and samples. In fact, the fit for tourism regressions is slightly better (regression 1 vs. 5 and 2 vs. 6).[20]

Tourism and trade exhibit very similar responses to a number of factors. The sign on most "trade resistance" variables is the same. The magnitude of coefficients is also close in many instances. Most notable is the distance between the countries—the elasticities computed for comparable samples/specifications are 1.59 (regression 2) for tourism and 1.54 for trade (regression 6).

An important difference between tourism and goods trade is that the elasticity of tourism arrivals with respect to the origin's income is much lower than that of goods trade with respect to the importer's income. This result is robust to the sample used (worldwide vs. intra-OECD) and to the introduction of additional variables in the extended specification.[21] Results in regressions 1 and 2 contradict the conventional view that tourism is a superior good, which would imply an income elasticity above 1 for the origin country. The superior good hypothesis can be in principle reconciled with a sub-unit income elasticity of *arrivals* once it is recognized that growth in the origin country does not accrue uniformly to all residents. The elasticity of *tourism spending* with respect to origin GDP could still be one or higher if the upper segments of the distribution spend a higher share of their income on international tourism. However, this does not appear to be the case, as Appendix Table 4 shows that for countries with reliable balance of payments statistics the coefficient of arrivals on receipts is in fact 1 or slightly below. Once the sample is restricted to tourism/trade among OECD countries only (representing 51 percent of global tourist flows and 52 percent of global trade), the elasticity climbs to just above one (regression 3 and 4). Still, it remains considerably lower than for goods trade within the same group of countries (regressions 7 and 8), suggesting that tourism is less income-elastic than the average good. Clearly, there is nothing supporting the superior good hypothesis, although a definite answer probably needs to wait until data on bilateral tourism receipts becomes available.

Contiguity is much more beneficial for tourism than for trade—a common border leads to 150 percent larger number of tourists between two countries, compared to only 50 percent in

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[20] This is not trivial, as comparable specifications with country fixed effects for FDI and remittances exhibit a considerably lower fit. For intra-OECD FDI Gast and Herrmann (2008) report an overall R^2 (within + between) of 0.8 for a specification with country-pairs fixed effects (i.e. $N \times M$ dummies, versus $N + M$ dummies used here). Lueth and Ruiz-Arranz (2006) report an R^2 of 73 percent for remittances.

[21] In addition, the difference between the income elasticities is robust to the income measure used: using WDI-sourced GDP figures (be that in constant USD or in PPP-adjusted USD) produces equivalent results. The result is also robust to estimating the regression on a sample including OECD countries plus Brazil, China, India, Russia and South Africa. Estimation results are available upon request.

the case of goods flows.[22] Tourism also responds stronger to linguistic ties. On the flip side, historical ties (colonial relationship, common colonizer, whether the two countries were ever part of the same country) have a relatively stronger effect on trade than on tourism.

The one troubling result is the negative coefficient estimated for countries sharing a single currency for both tourism and trade flows. This contradicts most findings since Rose (2000) has ignited the debate on the magnitude (but not the sign) of the effect a common currency has on trade.[23] Restricting the sample on intra-OECD trade/tourism reverses this finding, but the reported magnitude is still lower than in previous studies.[24] Robustness checks show that the negative sign is driven by countries in the Eurozone; for non-Euro currency unions the estimated coefficient varies between 0.3 and 0.6 depending on the specification.

B. Non-traditional Determinants of International Tourism

Some variables which are natural candidates for a tourism gravity equation are time-invariant (geographical remoteness, climate, number of World Heritage sites, time zone difference) and therefore cannot be estimated using fixed-effect specifications. Two specifications discussed above are suitable to estimate the importance of time-invariant determinants of international tourism: country-pair random effects (RE) and the Hausman-Taylor (HT) estimatorIt should be noted that both the standard Hausman test and the Arellano (1993) test, which is robust to heteroskedasticity and autocorrelation of arbitrary form, reject the random effects specification. Nevertheless, RE results are presented here, as they serve as a natural comparator for HT results and allow for at least tentative conclusions on the impact of time-invariable variables on tourism. In addition, I augment the CFE specification with a number of country-pair characteristics (time-invariant variables describing relationships between the two countries but not country attributes).

Results for these three estimation techniques are summarized in Table 3. All specifications are estimated using the reduced sample, which excludes all country-pairs for which the flow drops below 100 tourists in at least one year.[25]

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[22] The effect of common border on goods trade is in line with past research: a meta-analysis of 157 research papers utilizing the gravity model in Head and Meyer (2012) reports a median coefficient of 0.49 for common border (translating into a 63 percent difference). Here and below the approximation $\exp((c)) - 1$ is used to interpret coefficients on dummy variables.

[23] However, there are exceptions. Pakko and Wall (2001) find a negative impact of common currency on trade in a specification with country-pair and year fixed effects.

[24] Head and Meyer (2012) report a median coefficient of 0.86 for common currency based on the meta-analysis of 157 papers estimating the gravity model for goods trade.

[25] Full results are presented in Table A5, which also include estimations for random effects regressions using for the full sample (including country-pairs that fall below the threshold of 100 tourists per year).

Table 3. Summary of Regressions on Tourist Arrivals

	Random Effects			Origin/destination FE			Hausman-Taylor	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Origin GDP	0.658***	0.701***	0.676***	0.452***	0.454***	0.517***	0.516***	0.517***
	(0.011)	(0.022)	(0.022)	(0.058)	(0.055)	(0.056)	(0.023)	(0.026)
Log Destination GDP	0.589***	0.869***	0.611***	1.177***	1.181***	0.977***	1.170***	1.085***
	(0.010)	(0.023)	(0.026)	(0.056)	(0.053)	(0.057)	(0.023)	(0.027)
Log weighted distance	-1.292***	-1.026***	-0.773***	-1.614***	-1.279***	-0.979***	-1.013***	-0.721***
	(0.019)	(0.020)	(0.031)	(0.007)	(0.008)	(0.012)	(0.025)	(0.043)
Log Origin Population		-0.205***	-0.200***		0.083	-0.023	-0.110***	-0.108***
		(0.023)	(0.021)		(0.106)	(0.109)	(0.023)	(0.024)
Log Destination Population		-0.197***	-0.228***		-0.313**	-0.464***	-0.357***	-0.404***
		(0.023)	(0.021)		(0.144)	(0.158)	(0.023)	(0.024)
Common currency		0.071*	0.013		-0.088***	-0.079***	0.028	-0.008
		(0.037)	(0.032)		(0.028)	(0.025)	(0.033)	(0.034)
Members of regional trade agreement		0.074***	0.085***		0.298***	0.180***	0.012	0.022*
		(0.021)	(0.021)		(0.015)	(0.015)	(0.012)	(0.012)
Common border		1.393***	1.423***		1.079***	1.146***	1.323***	1.424***
		(0.098)	(0.098)		(0.029)	(0.029)	(0.104)	(0.104)
Log Origin Remoteness		-0.340***	-0.288***				-0.585***	-0.445***
		(0.035)	(0.031)				(0.040)	(0.042)
Log Destination Remoteness		0.165***	0.121***				0.451***	0.411***
		(0.037)	(0.034)				(0.042)	(0.042)
Log Bilateral trade (residuals)			0.057***			0.200***		0.054***
			(0.005)			(0.004)		(0.003)
Log PPP Factor ratio			-0.157***			-0.193***		-0.202***
			(0.020)			(0.027)		(0.011)
Direct flight			0.272***			0.869***		0.201***
			(0.015)			(0.012)		(0.009)
Log Destination Hotel rooms			0.265***			0.143***		0.124***
			(0.020)			(0.031)		(0.011)
Time difference in hours			-0.044***			-0.018***		-0.062***
			(0.008)			(0.003)		(0.011)
Climate Similarity Index, population-based			0.367***			0.221***		0.375***
			(0.048)			(0.017)		(0.068)
Destination conflict magnitude			-0.079***			-0.083***		-0.056***
			(0.011)			(0.016)		(0.008)
Origin World Heritage sites in 2011			0.014***					0.023***
			(0.002)					(0.003)
Destination World Heritage sites in 2011			0.012***					-0.004
			(0.003)					(0.003)
Additional geographical controls		YES	YES		YES	YES	YES	YES
Historic and linguistic ties		YES	YES		YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	67,673	67,673	55,438	67,673	67,673	55,438	67,673	55,438
Country-pairs	7,966	7,966	7,160	7,966	7,966	7,160	7,966	7,160
Minimum arrivals in all years	100	100	100	100	100	100	100	100
R^2 within	0.308	0.314	0.317					
R^2 between	0.517	0.605	0.681					
R^2	0.524	0.605	0.675	0.755	0.791	0.829		

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively. Additional geographical controls include: Log areas of the two coutnries, origin/destination landlocked dummies and destination small island dummy. Historic and liguistic ties include: Ever in a colonial relationship, comon colinizer post 1945, common official or primary language, same language spoken by at least 9%, were the same country. Full results are presented in Table A5.

The basic gravity equation with only GDPs of the two countries and the distance between them is estimated in regressions 1 (RE) and 4 (CFE). Origin's income elasticity is estimated at well below one, a result discussed in previous section and that is reversed for the OECD subsample. Also, even with this extremely limited specification, the equation explains over half of the variance in the case of random effects and over three-quarters in the case of the fixed effects specification.

Regressions 2 (RE), 5 (CFE) and 7 (HT) in Table 3 estimate a fairly typical extended gravity equation specification, which include a number of geographical, historic and linguistic controls. Negative coefficients for the populations of the two countries indicate that residents of rich countries travel more, and that tourists prefer travelling to richer countries. The random effects and HT specifications also allow for measuring the impact of economic remoteness. While the remoteness of the origin country is negative (as expected), both RE and HT find a *positive* coefficient on the destination's remoteness – the opposite of the standard finding in the goods trade literature. This suggests that tourists may in fact place a premium on destinations that are "off the beaten path", i.e. relatively far from larger economic centers. The negative coefficient on the common currency union estimated in fixed effects and HT regression has been discussed in the previous section.

Regressions 3, 6 and 8 add a number of gravity variables not usually featured in the goods trade literature in an attempt to quantify demand and supply forces specifically driving tourism flows.

First, I introduce bilateral goods trade as a proxy for bilateral economic activity and therefore a control for business tourism. Bilateral trade has been previously used as explanatory variable in gravity equation studies pertaining to migration, FDI and tourism.[26] However, since goods trade is driven by the very same gravity forces, the introduction of bilateral trade as an explanatory variable for tourism will inevitably bias down the coefficients on gravity variables (GDPs, distance, colonial and language relationships, etc.). To avoid this downward bias, a two-step approach is used. The first step consists in computing the residuals from the trade gravity equation estimated in Table 2 equation 6. These residuals are then used as an independent variable in the tourism gravity equation. As results in regressions 3, 6 and 8 show, trade enters with the expected sign and is highly significant. This confirms that economic relations between two countries represent an important determinant of tourism flows. The introduction of trade flows allows to some extent to control for business travel, ensuring that the estimated GDP elasticities for origin and destination countries apply, in fact, to leisure travel (i.e., "proper" tourism) as well.

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[26] See, for example, Dabla-Norris et al. (2010) for FDI, Lueth and Ruiz-Arranz (2006) for remittances, Fourie and Santana-Gallego (2011) for tourism.

Second, I introduce the PPP factor ratio of the destination and origin countries as a measure of the real exchange rate. A one percent real appreciation of the destination country vis-à-vis the origin reduces arrivals by around 0.18 percent as estimated by the country fixed effects regression, with other models providing estimates which are slightly lower (0.16 for the RE regression) or slightly higher (0.2 for the HT regression). The result is significant at the 1 percent confidence interval for all three estimation methods.

I also look at the effect of two supply-side variables. The presence of a direct flight between countries is associated with a large increase in tourism, although the estimates vary significantly depending on methodology: from 20 percent (HT) to 80 percent (CFE). I also find a strong positive correlation between the number of hotel beds and tourist arrivals. However, it is impossible at this stage to ascertain causality in the case of either variable—the airline and hotel industries may be merely responding to increased demand.

Even controlling for distance and other geographical variables, tourism decreases with the difference in time zones, suggesting that jet lag plays a role when choosing a destination. Tourists avoid armed conflicts, as measured by the conflict magnitude in the PRIO dataset.

The number of UNESCO World Heritage sites (WHSs) in both origin and destination countries is introduced as proxy for the stock of "cultural/historical" capital.[27] One would expect that tourists are drawn to countries with a larger stock of "cultural capital", The expected sign on the origin country WHS is less certain. Residents of countries with relatively abundant cultural capital may have a lower impetus to travel abroad. But since they have been already exposed to cultural capital at home, they may also be more interested in discovering it abroad. Using the full sample, residents of *origin* countries with more WHSs tend to travel more, a result that is robust across specifications. Results for the destination's cultural capital are mixed: number of WHSs enters positively and is significant in the RE specification (each WHS is associated with 1 percent higher arrivals), but the HT estimator finds no statistically significant effect.

I test whether tourists prefer visiting countries with a different climate than that of their home country. Arguments could be made both ways. If tourists are guided primarily by "love of variety" preferences, then the coefficient on the climate similarity index should be negative. If, however, tourists prefer the familiar (at least in terms of climate), a positive coefficient is to be expected. Results across specifications indicate that the second effect dominates—there is a positive and significant correlation between bilateral tourism and climate similarity.

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[27] The number of UNESCO WHSs at end 2012 is used, not the number of sites recognized as of each year of the dataset. While numbers of heritage sites have increased over time, this process primarily reflects the recognition of already existing cultural/touristic attractions, which were likely known internationally (and therefore affected tourists' decision) well before they were added to UNESCO's list.

The remainder of this section discusses robustness checks, results of which are presented in annex tables. Table A5 features random effects results for the full sample (not restricted to country-pairs with over 100 tourists per year), Table A6 looks at intra-OECD tourism, and Table A7 looks at alternative specifications.

Results for the full sample (Table A5 regressions 9 through 11) are broadly in line with baseline results. The coefficient on GDPs is closer to one, but the magnitude and significance of other key variables are broadly unchanged.

Economic variables have much larger effects in the intra-OECD sample (Table A6): GDP elasticities are close to one, the impact of the real exchange rate jumps to nearly 0.3 (from less than 0.2 estimated for the world), the coefficient on bilateral trade is between 0.13 and 0.3 across specifications (up from the 0.05 to 0.2 range for the world). Results for intra-OECD tourism also solve the World Heritage Sites puzzle: each WHS is associated with 2–4 percent higher arrivals to the destination, while the coefficient on origin WHSs is negative.[28]

Table A7 tests a few additional specifications. Regressions 1 and 3 decompose the currency dummy into a Eurozone dummy and non-Eurozone currency dummy. I find that the negative coefficient on currency union in Table 3 is driven by the Eurozone, while the coefficient for non-Eurozone currency areas is positive and significant. The negative result for the Eurozone may be explained by the relatively higher prevalence of same-day visitors in Schengen countries, at the expense of a relatively smaller number of multi-day visitors. Same-day visitors are not classified as tourists according to UNWTO definition, but nonetheless play a similar economic role. For random effects, an alternative specification for climate variables is tested in regression 3. Although the overall finding remains the same—tourists prefer travelling to countries with a similar climate to their own—some additional relationships can be teased out. Tourists travel less to cold countries and more to warm countries, while tourists from cold countries travel more. As a preview to Section E below, regression 6 decomposes the PPP factor ratio into origin and destination PPP factors for the CFE estimator. The two enter with the expected sign: the origin's PPP factor enters positively while that of the destination country enters negatively. Both are statistically significant at the 5 percent level. However, the coefficient on the origin PPP factor is about twice larger than on the destination's PPP factor.

[28] Two factors have likely contributed to the unexpected positive coefficient on origin WHSs in Table 3 results. First, the number of WHSs is highly correlated with the country's GDP: the correlation coefficient is 0.66, and the 34 OECD countries account for nearly half of all World Heritage sites (405 out of 858). Second, the discussion in the appendix and regression results for the intra-OECD sample suggest that measurement error for tourism flows in poorer countries is likely biasing down the elasticity of bilateral tourism with respect to origin GDP in the full sample. As a result, the coefficient on origin WHSs in Table 3 is picking up part of the correlation that, in the absence of measurement error, should have been attributed to origin GDP.

C. Country-pair Fixed Effects and First Differences Regressions

As discussed in section III, country-pair fixed effects and first differences regressions are better equipped to handle multilateral trade resistance at the expense of preventing the estimation of the impact of *all* time-invariant variables. I revisit results in the previous two sections using these two estimating techniques.

Table 4 compares gravity equation results for tourism and goods trade using country-pair fixed effects (CPFE, corresponding to equation 3 in section III). Results are broadly in line with those in Table 2. Origin's GDP is less important for tourism than importer's GDP for goods trade. The hypothesis that tourism is a superior good gains some support when looking at intra-OECD tourism only: the elasticity of tourism with respect to the origin's GDP is significantly above 1 (regressions 3 and 4), but still remains lower than the importer GDP elasticity estimated for goods trade (regressions 7 and 8). Regional trade agreements (RTA) and currency unions become irrelevant for tourism, but have the expected sign and a high level of significance for goods trade (regression 6). Surprisingly, the results for intra-OECD (regression 8) suggest a negative impact of regional trade agreements on goods trade.

Table 4. Gravity Equation for Tourism and Trade with Country-pair Fixed Effects

	Tourism				Trade			
	Full sample		Intra-OECD		Full sample		Intra-OECD	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Origin/Importer GDP	0.610***	0.668***	1.404***	1.368***	0.946***	1.047***	1.930***	2.052***
	(0.041)	(0.043)	(0.181)	(0.187)	(0.065)	(0.066)	(0.169)	(0.167)
Log Destination/Exporter GDP	1.124***	1.127***	0.998***	1.028***	1.279***	1.169***	1.426***	1.500***
	(0.040)	(0.041)	(0.168)	(0.178)	(0.051)	(0.053)	(0.164)	(0.162)
Log Origin/Importer Population		-0.421***		0.525		-0.604***		-2.723***
		(0.097)		(0.454)		(0.114)		(0.397)
Log Destination/Exporter Population		0.044		-1.192***		0.913***		-0.698*
		(0.114)		(0.418)		(0.096)		(0.401)
Common currency		0.020		0.032		0.231***		0.070
		(0.041)		(0.050)		(0.051)		(0.052)
Members of regional trade agreement		0.003		-0.012		0.190***		-0.084**
		(0.024)		(0.052)		(0.030)		(0.042)
Country-pair fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	104,627	104,627	9,306	9,306	216,038	216,038	12,251	12,251
Country-pairs	13,573	13,573	997	997	24,545	24,545	1,116	1,116
R^2	0.199	0.200	0.289	0.293	0.076	0.078	0.446	0.461

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

A comparison of reported within-group R^2 suggests that the gravity equation may be in fact better at explaining tourism than trade flows. For the full sample, the R-squared is higher for tourism (around 20 percent) than for trade (around 8 percent). However, the ranking flips when comparing intra-OECD flows only.

The impact on bilateral tourism of non-traditional gravity variables is estimated in Table 5 using both CPFE and first-difference (FD, corresponding to equation 4 in section III) regressions. The sample is again restricted to include only country-pairs for which flows exceeded 100 tourists per year in all years.

The coefficients obtained from the first differences model for key macroeconomic variables are virtually identical to other estimators. The elasticity with respect to the origin GDP remains in the 0.5–0.6 range; the elasticity with respect to the real exchange rate (as measured by the PPP factor ratio) is around 0.2. Despite the loss of efficiency associated with the first differences estimator, standard errors for these variables remain small.

Table 5. Regressions on Tourist Arrivals, Country-pair Fixed Effects and First Differences

	Country-pair fixed effects				First differences			
	Full sample		Intra-OECD		Full sample		Intra-OECD	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Origin GDP	0.580***	0.610***	1.263***	0.842***	0.550***	0.587***	1.190***	0.953***
	(0.046)	(0.051)	(0.174)	(0.178)	(0.045)	(0.050)	(0.149)	(0.154)
Log Destination GDP	1.173***	1.050***	0.981***	0.977***	0.804***	0.694***	0.567***	0.768***
	(0.049)	(0.048)	(0.177)	(0.179)	(0.041)	(0.047)	(0.145)	(0.149)
Log Origin Population	-0.156	-0.092	0.611	1.235***	0.066	0.026	0.815	1.026*
	(0.097)	(0.099)	(0.428)	(0.447)	(0.094)	(0.100)	(0.519)	(0.544)
Log Destination Population	-0.103	-0.569***	-1.210***	-0.979**	0.185	-0.419***	-1.728***	-1.839***
	(0.120)	(0.137)	(0.406)	(0.384)	(0.119)	(0.161)	(0.609)	(0.597)
Common currency	0.041	0.003	0.039	-0.051	0.008	0.013	0.017	-0.000
	(0.040)	(0.036)	(0.050)	(0.054)	(0.022)	(0.022)	(0.029)	(0.031)
Members of regional trade agreement	0.014	0.023	-0.049	-0.044	-0.034*	-0.033	-0.023	-0.009
	(0.022)	(0.022)	(0.048)	(0.046)	(0.019)	(0.021)	(0.052)	(0.056)
(Contiguous) X (Log Origin GDP)		-0.113		-0.417		-0.110		-0.378
		(0.127)		(0.365)		(0.131)		(0.304)
Log Bilateral trade (residuals)		0.050***		0.161***		0.012***		0.057***
		(0.006)		(0.050)		(0.004)		(0.020)
Log PPP Factor ratio		-0.197***		-0.291***		-0.218***		-0.449***
		(0.022)		(0.060)		(0.017)		(0.040)
Direct flight		0.200***		0.078**		0.040***		-0.002
		(0.015)		(0.031)		(0.010)		(0.013)
Log Destination Hotel rooms		0.138***		-0.028		0.246***		0.019
		(0.026)		(0.116)		(0.026)		(0.091)
Destination conflict magnitude		-0.057***		-0.226***		-0.066***		-0.129***
		(0.012)		(0.066)		(0.010)		(0.039)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	67,673	55,438	9,230	8,638	52,870	42,479	7,353	6,795
Country-pairs	7,966	7,160	987	986	7,823	6,779	986	974
Threshold	100	100	100	100	100	100	100	100
R^2	0.304	0.316	0.296	0.324	0.032	0.042	0.065	0.088

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

While CPFE and FD cannot directly estimate the impact of geographical variables, it is possible to measure their impact on the sensitivity of other variables. Table 5 introduces an interaction effect between the origin GDP and the common border dummy. The hypothesis tested is that at least some local border traffic is driven by factors of non-economic nature (e.g., visiting relatives across borders), which should result in a lower sensitivity to GDP variations in the origin country. I find the expected negative sign on the interaction effect, but it is not statistically significant.

A number of variables lose magnitude and/or significance in the FD specification. Changes in bilateral trade are still associated with high (presumably business-related) tourism, but the coefficient is much smaller: 0.01, compared to 0.05 for the CPFE and HT (in Table 3). Common currency and RTA come out as completely irrelevant. The results for origin and destination population growth are somewhat ambiguous,—the signs and magnitude of the coefficients are sensitive to the introduction of additional controls, sample (full vs. intra-OECD) and model (CPFE vs. FD). However, there is relatively strong evidence that tourists prefer richer countries (a negative sign on the destination population).

A comparison of CPFE and FD results sheds light on the importance of the two supply side factors: presence of a direct flight and number of hotel beds. First, coefficients on both of these variables are large and highly significant for the full sample, but small and insignificant for the intra-OECD sample. This suggests that the presence travel routes and accommodation capacity do not represent a binding constraint for developed OECD countries, but both are relevant issues for other countries.

Second, CPFE and FD results can help sort out causality of these variables—does tourism respond to an increase in hotel rooms and addition of flights or do airlines and hotel expand when they observe larger tourism flows? In the case of direct flight, CPFE results for the full sample (regression 2) show the presence of a direct flight is associated with 22 percent higher bilateral tourism flows (computed as $\exp(0.2) - 1$), while FD (regression 6) reports that the addition of a flight is associated with a 4 percent increase in tourism. The difference in coefficients could be interpreted in two ways: (i) establishment of a direct route does not significantly boost tourism in the year the route is established, but may be associated with increased tourism over longer time horizons[29] or (ii) the causality goes in the opposite direction, with increased tourism leading to the subsequent establishment of direct routes, which is then measured by other econometric models (CPFE or CFE in Table 3). The first hypothesis should produce a positive coefficient the addition of a direct flight in the past, whereas the second hypothesis suggests a positive coefficient for the addition of a flight in the future. Regressions using both forward and lag of direct flight are presented in Table A8, regressions 2 though 4 (regression 1 is identical to regression 6 in Table 5 above). Clearly, both the lag and forward are highly significant, but the coefficient on the forward is higher in

[29] Particularly relevant if a new flight is launched late in the year.

magnitude; it is in fact equivalent in magnitude to the coefficient on direct flight at time t.[30] In short, while causality goes both ways, the addition of a direct flight *follows* the increase in bilateral tourism.[31]

Results for hotel rooms are very different. The coefficient reported by the FD model (Table 5 regression 6) is twice higher than that reported by CPFE (regression 2), suggesting that the short-lived effect of adding new hotel rooms (as measured by same-year elasticity in the FD regression) is larger than the effect over the longer period of time (measured by CPFE). One potential explanation is that new hotels often run deeply discounted opening promotions. Once these promotions end, arrivals drop somewhat. There is little doubt that causality in this case goes from accommodation capacity to tourism, since the decision to add hotel rooms can rarely be implemented within the same year. These conclusions are also corroborated by results regressions 6 through 9 in Table A8, which suggest that the coefficients on hotel rooms in $t-1$ and $t+1$ are close to zero and not statistically significant.

D. Tourist Arrivals and the Real Exchange Rate

Every result in the preceding section suggests a strong correlation between the bilateral real exchange rate and tourism arrivals. However, most results relied on a single, somewhat unconventional, metric of the real exchange rate—the ratio of PPP factors from the Penn World Tables. Moreover, to achieve parsimony, this metric combines the real exchange rates of both origin and destination countries. From the point of view of tourist destinations, it is the impact of the destination's exchange rate on tourism that is of most interest. This section test alternative some measures of real exchange rates. The econometric specification of the gravity equation uses the first difference estimator, following Bayoumi and Eichengreen (1999).

Regression 1 in Table 6 serves as the baseline—it utilizes the preferred measure of real exchange rate, the PPP factor ratio—and drops all gravity variables except the GDPs of the two countries.

Regression 2 splits the PPP factor ratio into the origin and destination PPP factors. Results are in line with robustness checks discussed at the end of section III.C—the signs of the two exchange rates are in line with expectation and both coefficients are significant at the 1

[30] Note that the combined effect of lagged, contemporaneous and forward direct flights in regression 4 is equal to 20.1 percent ($\exp(0.072) \times \exp(0.039) \times \exp(0.072) - 1$) , which closely matches the 22 percent reported by the CPFE regression in Table 5 regression 2. This suggests that the interplay of tourism and direct flight plays out in full within the years immediately surrounding the addition/removal of a flight.

[31] Regression 5 in Table A8 also shows that the effects of adding and removing a direct flight are not fully symmetrical—the removal of a direct flight is associated with a smaller drop in tourism arrivals than the positive effect of adding a flight.

percent level. However, the origin's exchange rate is estimated to be three times larger, in absolute magnitude, than that of the destination country (0.266 vs. 0.84).

Table 6. First Differences Regressions with Alternative Measures of Real Exchange Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log Origin GDP	0.523***	0.504***	0.545***	0.542***	0.534***	0.581***	0.565***	0.608***	0.594***	0.595***
	(0.044)	(0.044)	(0.044)	(0.045)	(0.045)	(0.048)	(0.048)	(0.048)	(0.050)	(0.051)
Log Destination GDP	0.838***	0.820***	0.807***	0.866***	0.848***	0.690***	0.672***	0.649***	0.712***	0.695***
	(0.041)	(0.041)	(0.041)	(0.043)	(0.043)	(0.047)	(0.047)	(0.047)	(0.049)	(0.049)
Log PPP factor ratio	-0.182***					-0.217***				
	(0.016)					(0.017)				
Log Origin PPP factor		0.266***					0.280***			
		(0.022)					(0.024)			
Log Destination PPP factor		-0.084***					-0.142***			
		(0.021)					(0.022)			
Log Origin PPP factor misalignment			0.266***					0.280***		
			(0.022)					(0.024)		
Log Destination PPP factor misalignment			-0.083***					-0.142***		
			(0.021)					(0.022)		
Log Bilateral real exhange rate				-0.186***					-0.213***	
				(0.015)					(0.016)	
Log Origin REER					0.274***					0.285***
					(0.023)					(0.027)
Log Destination REER					-0.106***					-0.156***
					(0.025)					(0.024)
Log Bilateral trade (residuals)						0.012***	0.011***	0.011***	0.015***	0.014***
						(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Direct flight						0.040***	0.040***	0.040***	0.039***	0.040***
						(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Log Destination Hotel rooms						0.241***	0.241***	0.242***	0.238***	0.236***
						(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Destination conflict magnitude						-0.066***	-0.064***	-0.064***	-0.068***	-0.068***
						(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	53,240	53,240	53,240	50,616	50,249	42,479	42,479	42,479	40,691	40,426
Country-pairs	7,938	7,938	7,938	7,533	7,519	6,819	6,819	6,819	6,515	6,501
Minimum arrivals in all years	100	100	100	100	100	100	100	100	100	100
R^2	0.035	0.036	0.036	0.036	0.036	0.041	0.042	0.042	0.041	0.042

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

Regression 3 utilizes a measure of the origin and destination real exchange rate misalignment proposed by Rodrik (2008)—PPP factors adjusted for the Balassa-Samuelson effect.[32] Both coefficients and standard errors on the exchange rate variables are identical to those in regression 2 all the way through the third or even fourth decimal. However, the coefficients

[32] The PPP factor misalignment is constructed two stages. First, the log of the PPP factor is regressed on log per capita GDP and a full set of year dummies using the 1995-2010 sample. The misalignment is then computed as the residual from this regression. The coefficient from the regression is estimated at 0.16 and the t-statistics at 24, broadly in line with numbers reported by Rodrik. This parsimonious method for measuring real exchange rate misalignment has been gaining traction, and has been most recently used in Eichengreen and Gupta (2012).

on the GDPs change—the coefficient on the origin's GDP goes up (from 0.504 to 0.545), while that on the destination's GDP goes slightly down (from .82 to .807). This is in line with expectations. Origin GDP and origin's PPP factor (not adjusted for the Balassa-Samualson effect) are positively correlated, and both are positively correlated with tourism. When both variables are included in the regression, the coefficient on origin GDP is biased downward. The PPP factor misalignment, on the other hand, is stripped of the effect of growth on the real exchange rate. When entered into the regression with together with the GDP, this exchange rate measure no longer exerts a negative bias on the estimated coefficient for the origin GDP. Similarly, the destination's unadjusted PPP factor and GDP are positively correlated, but have opposite correlations with tourism (negative with the PPP factor, positive with GDP). Therefore, the coefficient on destination GDP estimated in regression 2 is biased upward by the unadjusted real exchange rate, which is then corrected in regression 3.

Regression 4 uses the bilateral real exchange rate between the two countries, computed by adjusting the nominal bilateral exchange rate by the inflation rates in the two countries. Regression 5 uses IFS REER calculations, which weight bilateral real exchange rates by the trade shares (primarily goods trade shares) of trading partners. The results are remarkably close to those obtained in equations 2 and 3 despite fairly different methodologies for computing the exchange rates—the coefficient on origin's REER is around 0.27, which is nearly three times larger than that of the destination's REER.

Regressions 6 through 10 reuse the same five measures of real exchange rate, but include a set of additional variables. The introduction of these controls unambiguously raises the magnitude of the impact of real exchange rates on tourism. The elasticity of tourism arrivals with respect to the origin's real exchange rate is close to 0.3, while the elasticity with respect to the destination's real exchange rate is around 0.14–0.15.

Table A9 presents the results for the same specifications for intra-OECD tourism flows. Across specifications, the elasticities with respect to the various measures of the real exchange rate are about twice higher than for the full sample. The elasticity with respect to the destination's own real exchange rate is more than twice larger than for the full sample. As tourists' consumption basket in these countries is more heavily weighted towards domestic products (partly as a result of the Balassa-Samuelson effect, which makes non-tradables more expensive), changes in the country's real exchange rate will have a tangible impact on the costs faced by the potential tourist, and therefore on her decision to undertake the trip.[33]

While the specifications above test the robustness of various measures of real exchange rate, they do not address the possibility of reverse causality. As noted by Rodrik (2008), a conventional instrumental variables approach is ruled out—there are no exogenous regressors

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[33] Compare this to the other extreme—small islands, where most of the tourist's consumption basket and inputs of the tourism industry are import-heavy. See discussion in section IV.F.

that would affect tourism only via the destination's real exchange route. A strong case could be made for the use of difference or system GMM, introduced by Arellano and Bond 1991 and Blundell and Bond (1998) respectively. I attempted both approaches, but lagged differences/levels turn out to be poor instruments for the real exchange rate, as the Hansen test of overidentifying restrictions was consistently estimated at, or very close to, zero.

However, reverse causality should not be a major issue for the destination's real exchange rate. If causality went primarily from tourism to exchange rate, one would expect to find a positive sign on the exchange rate. Because this reverse causality channel does in fact operate, the coefficient obtained on the destination's real exchange rate is likely to underestimate the impact of the real exchange rate on tourism. One could plausibly hypothesize that the coefficient measured for the origin country (around 0.28) provides the upper bound for the true coefficient on the destination's real exchange rate.

E. Tourist-nights Versus Tourist Arrivals

The analysis above was based on regressions with tourist arrivals as the dependent variable. The UNWTO dataset also provides data on tourist-nights (or visitor-nights), albeit for a smaller sample of countries. Conceptually, tourist-nights are a closer proxy for tourism revenues, and it is possible that tourists adjust their behavior across both the extensive margins (to travel to a particular country or not) and the intensive margin (for how long).

Destination countries for which tourist-night data is available differ along several dimensions from the larger sample of countries for which tourist arrivals data is available. These countries receive more tourists, are richer and, by consequence, more expensive (Table 7).

Table 7. Destination Countries Reporting Tourist-nights vs. Reporting Tourist Arrivals, 2009

	Tourist-nights				Tourist arrivals			
	Destinations	Mean	Median	Std. Dev.	Destinations	Mean	Median	Std. Dev.
Arrivals, thousand	69	6,946	1,685	13,200	174	5,275	871	13,700
GDP/capita, US$	61	18,761	16,086	15,329	151	13,910	8,398	13,917
PPP factor	58	0.79	0.73	0.31	143	0.67	0.58	0.26

Table 8 presents the results of a subset of first differences specifications from Table 6.[34] To correct for t sample bias discussed above, I first estimated the regressions for arrivals, limiting the sample to those observations that also have tourist-nights data (regressions 1

[34] To avoid clutter, Table 8 omits regressions using PPP factors and REERs of the two countries. As discussed in section IV.D, coefficients on RER misalignment (PPP factors corrected for the Balassa-Samuelson effect) are nearly identical to PPP factors and are very close to those of REER.

through 3).[35] Regressions 4 through 6 present corresponding results for tourist-nights. Tourist-nights are more sensitive to real exchange rate movements in the destination country, but exhibit lower correlations with the destination's GDP and bilateral trade. The magnitude of the intensive margin can be computed by subtracting the corresponding coefficient on arrivals (the extensive margin) from that on tourist nights. For example, a comparison of coefficients on the destination's PPP misalignment in regressions 2 and 5, suggest that the intensive margin on the real exchange rate is around 0.41 (0.744–0.333).

Table 8. First Differences Regressions on Arrivals, Tourist-nights and Average Tourist Stay

	Arrivals (non-missing nights)			Tourist-nights			Average tourist stay, nights		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)
Log Origin GDP	0.895***	0.946***	0.977***	0.880***	0.993***	1.019***	-0.066	-0.001	-0.029
	(0.080)	(0.080)	(0.084)	(0.096)	(0.096)	(0.107)	(0.075)	(0.073)	(0.078)
Log Destination GDP	0.723***	0.681***	0.683***	0.389***	0.363**	0.296**	-0.370***	-0.345***	-0.406***
	(0.112)	(0.111)	(0.116)	(0.142)	(0.141)	(0.149)	(0.116)	(0.115)	(0.123)
Log PPP factor ratio	-0.310***			-0.515***			-0.201***		
	(0.033)			(0.043)			(0.039)		
Log Origin PPP factor misalignment		0.292***			0.342***			0.018	
		(0.043)			(0.047)			(0.038)	
Log Destination PPP factor misalignment		-0.333***			-0.744***			-0.437***	
		(0.049)			(0.076)			(0.070)	
Log Bilateral real exhange rate			-0.344***			-0.453***			-0.136***
			(0.033)			(0.042)			(0.037)
Log Bilateral trade (residuals)	0.036***	0.036***	0.036***	0.010	0.014	0.011	-0.023***	-0.018***	-0.022***
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.010)	(0.007)	(0.007)	(0.007)
Direct flight	0.018	0.018	0.018	0.044***	0.046***	0.044***	0.020	0.021*	0.020
	(0.014)	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Log Destination Hotel rooms	0.230***	0.230***	0.226***	0.270***	0.265***	0.269***	0.032	0.027	0.031
	(0.045)	(0.045)	(0.046)	(0.047)	(0.045)	(0.049)	(0.036)	(0.036)	(0.038)
Destination conflict magnitude	-0.040*	-0.040*	-0.055**	-0.020	-0.018	-0.036	0.039***	0.042***	0.039***
	(0.023)	(0.023)	(0.023)	(0.026)	(0.026)	(0.025)	(0.013)	(0.013)	(0.012)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	13,592	13,592	13,370	13,561	13,561	13,347	13,271	13,271	13,059
Country-pairs	2,219	2,219	2,175	2,246	2,246	2,203	2,210	2,210	2,167
Minimum arrivals in all years	100	100	100	100	100	100	100	100	100
R^2	0.048	0.048	0.048	0.048	0.051	0.044	0.012	0.018	0.009

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

A more straightforward way to measure the intensive margin is to use as dependent variable the average tourist stay (the ratio of tourist-nights to tourist arrivals); results are presented in regressions 7 through 9. Several findings stand out:

[35] These results suggest much higher GDP and exchange rate elasticities than corresponding results in Table 6. This, however, is not an issue for results discussed here—as long as there are differences between results for arrivals and nights using the same sample, one can safely extrapolate that these differences will apply to the larger sample, although the magnitude of these differences is less certain (likely smaller).

- The intensive margin of bilateral tourism on account of the origin's GDP and real exchange rate is nil. When a country becomes richer (whether because of real growth or appreciation), it imports more tourism services by having more residents travelling abroad and/or by having old tourists travel to new destination, *not* by having tourists travel for longer periods of time to the same destinations.

- Tourists respond to an increase in the real exchange rate of the destination country by reducing the length of stay. When prices in the destination country go up, some may not travel at all, whereas others cushion the price increase with shorter stays.

- As destination countries grow, the average duration of the stay goes down. This can be linked to the dominance of business travel over leisure travel for richer countries.

- The stronger the trade connections, the shorter the duration of stay. This is likely due to the fact that travel for business is generally much shorter than leisure tourism.

Regression 5 suggests that the overall impact of a 1 percentage change in the destination's real exchange rate on tourism flows exceed 0.7 (as measured by the combined effect on the number of tourists, but also on their length of stay). Regression 6, which focuses on the bilateral real exchange rate, reports an elasticity of 0.45. Both estimates are considerably higher than that the 0.15 estimated by Eichengreen and Gupta (2012) for the impact of real exchange rates on "traditional service exports" which, in their definition, include tourism.

F. Tourism to Small Island States

A cursory look at Table A1 reveals that most of the tourist-dependent economies are small island states. Therefore, policymakers in these countries are particularly interested in identifying and quantifying drivers of tourism. The two main issues is the sensitivity of tourism to changes in origin GDP and changes in exchange rates. Tourism is a primary channel through which these countries are exposed to external shocks and, indeed, many of them have seen sharp drops in tourism arrivals following the global financial crisis. The impact on tourism of the exchange rate (both the regime and the particular level) is a subject of perennial policy debates in these countries. Results presented above quantify the magnitude of these forces for the entire world (and the OECD sample). However, the very large exposure of small islands to tourism combined with a very specific economic structure of these countries warrant a separate look.

Table 9 presents results of first differences regressions similar to those in section E, but adding several interaction effects with the "small island destination" dummy.[36]

[36] For brevity, some explanatory variables are excluded. They are reintroduced in Table A10, which estimates coefficients separately for small islands and other countries. The conclusions remain unchanged.

Table 9. First Differences Regressions on Tourist Arrivals with Small Islands Interaction Effect

	(1)	(3)	(2)	(4)	(5)	(6)	(7)
Log Origin GDP	0.591***	0.549***	0.552***	0.573***	0.545***	0.585***	0.577***
	(0.047)	(0.045)	(0.046)	(0.045)	(0.046)	(0.046)	(0.046)
Log Destination GDP	0.798***	0.823***	0.856***	0.812***	0.845***	0.798***	0.811***
	(0.042)	(0.042)	(0.044)	(0.042)	(0.045)	(0.042)	(0.043)
Log Bilateral trade (residuals)	0.012***	0.013***	0.015***	0.011***	0.014***	0.012***	0.012***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Direct flight	0.042***	0.041***	0.041***	0.041***	0.042***	0.037***	0.036***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
(Island destination) X (Log Origin GDP)	-0.120						-0.054
	(0.108)						(0.103)
Log PPP factor ratio		-0.188***					
		(0.016)					
(Island destination) X (Log PPP Factor ratio)		-0.074					
		(0.057)					
Log bilateral real exchange rate			-0.186***				
			(0.016)				
(Island destination) X (Log Bilateral RER)			-0.148**				
			(0.066)				
Log origin PPP factor overvaluation				0.243***			0.244***
				(0.023)			(0.023)
(Island destination) X (Log origin PPP Factor overvaluation)				0.391***			0.391***
				(0.077)			(0.077)
Log Destination PPP factor overvaluation				-0.124***			-0.124***
				(0.022)			(0.022)
(Island destination) X (Log destination PPP Factor overvaluation)				0.200***			0.198***
				(0.061)			(0.061)
Log Origin REER					0.251***		
					(0.024)		
(Island destination) X (Log origin REER)					0.459***		
					(0.090)		
Log destination REER					-0.142***		
					(0.026)		
(Island destination) X (Log destination REER)					0.140*		
					(0.085)		
(Island destination) X (Direct flight)						0.065**	0.067**
						(0.031)	(0.032)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES
Observations	49,790	49,790	47,888	49,790	47,574	49,790	49,790
Country-pairs	7373	7373	7064	7373	7050	7373	7373
Minimum arrivals in all years	100	100	100	100	100	100	100
R^2	0.034	0.038	0.038	0.039	0.039	0.034	0.039

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

The elasticities of tourism arrivals with respect to origin GDP are slightly smaller than for non-islands (regression 1), but the difference falls within the confidence interval.

Measures of the real effective exchange rate that do not discriminate between the origin and the destination (the PPP factor ratio in regression 2 and the bilateral real exchange rate in regression 3) could be interpreted as suggesting that tourism to small islands is more price-sensitive—the coefficients on the interaction terms of the respective exchange rate measures with the small island dummy are negative (and significant in the case of the bilateral RER). A more in depth examination leads to a different conclusion.

Regressions 4 and 5 disentangle the effect of origin and destination real exchange rates, as measured respectively by the PPP factor misalignment and REER. Small islands are more sensitive to changes in the real exchange rate in the origin country—the coefficients reported for the interaction term with the origin PPP factor are large and highly significant. However, policymakers and the tourism industry in small island states are most interested in the effect on tourism of their *own* real exchange rate. The coefficient of the corresponding interaction term in regression 4 is *positive* and highly significant. Computing the marginal effect results in an elasticity of on tourism arrivals to small islands with respect to the destination's exchange rate of 0.08 (–0.124+0.200), with a standard error of 0.056 (t-stat=1.35). In short, the elasticity is close to nil. Regression 5 reaches the same conclusions using the more traditional REER measure.[37] There are at least two potential mechanisms at work. First, it is much harder to engineer a real exchange rate movement for the basket of goods consumed by tourists to small islands, since it is even more import-dominated than that of locals. Second, the heavy reliance of packaged vacations (prices for which are usually set in foreign currency and negotiated by tour operators on an annual basis) limit the extent to which tourists benefit (or lose) from real exchange movements. This does not mean that a real exchange movement would not affect the current account of a small island in the expected direction, but in the short run, most of the impact will likely come from the import side, not tourism exports. In the longer run, however, a depreciated currency should—at least in theory—help expand tourism-related services (i.e., increase the domestic component of the tourist's consumption basket).

A final point is that small islands are more susceptible to the addition/removal of direct flights than other destinations. The coefficient on the interaction term with the direct flight in regression 7 is positive and significant, implying a marginal effect of 0.1 (with a standard error of 0.03, significant at the 1 percent level) i.e., the addition or removal of a direct flight is associated with 10 percent higher/lower tourism arrivals from the respective market. This is in line with expectations, as small islands are more dependent on air transportation. It also explains why foreign airlines often obtain advantageous terms with small islands—a threat to terminate direct service may have a stronger impact on tourism and the economy.[38]

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37 The marginal effect is measured at 0.02 with a standard error of 0.08 (t-stat=0). Table A10 also reports near-zero elasticities for both destination PPP misalignment and the destination REER for the small islands sample.

38 For example, Dominica pays a US carrier a lump sum to continue direct flights. It should be noted that reverse causality issues discussed in section IV.D and the asymmetric effect of adding/removing a flight (see footnote 31 and Table A8) suggest that the effect from flight to tourism is smaller than 10%. However, it is still much larger than for other destinations.

V. CONCLUSIONS AND POLICY IMPLICATIONS

The paper uses the gravity model to analyze the impact of dozens of variables on tourism; this section focuses only on a few key findings.

The gravity model does an excellent job at explaining tourism flows, often explaining a higher share of variation than equivalent specifications for international goods flows.

Tourism mostly responds in expected ways to standard gravity variables, although their relative importance often differs compared to goods trade. Most importantly, tourism flows exhibit a lower elasticity with respect to origin country GDP—around 0.6 compared to the unit elasticity commonly found (and confirmed here) for goods trade. The elasticity climbs back to around one for intra-OECD tourism, but remains lower than the one measured for goods trade. In short, the paper finds little support for the view that tourism is a superior good. Results from regressions on tourist-nights also suggest that tourists do not adjust their duration of stay in response to changes in real income.

Tourism and trade also go together—bilateral tourism is high where bilateral trade is higher than the gravity equation predicts. The relationship is particularly strong for intra-OECD flows, suggesting that a larger share of travel within these countries is driven by business travel.

One of the main objectives of the paper was to quantify the relationship between tourism and the real exchange rate—a topic that is hotly disputed in a number of tourism-dependent countries. First, tourism does react strongly to change in the real exchange rate, regardless of the chosen measure (bilateral, multilateral or with respect to a third country). The elasticity of tourism arrivals with respect to bilateral exchange rate is around 0.2. When focusing on the effect of the destination's real exchange, the elasticity drops somewhat to around 0.15, i.e. a ten percent real depreciation is associated with a 1.5 percent increase in tourism arrivals. Using the set of destinations that also report data on tourist-nights, the paper finds that tourists also respond to changes in real exchange by adjusting the duration of stay. This as much as doubles the overall elasticity of tourism (when measured in tourist-nights) with respect to the destination's real exchange rate. The magnitude of the impact varies across countries: intra-OECD tourism is much more sensitive to the real exchange rate (the elasticity w.r.t. the destination's real exchange rate is around 0.35–0.4 after controlling for bilateral trade flows), while small islands exhibit a negligible response of tourism flows to changes in their own real exchange rate.

The paper looked at two supply side variables. The presence of a direct flight is associated with a large increase in bilateral tourism. However, much of this effect is driven by reverse causality—new flights are established wherever bilateral tourism increases. Reverse causality does not seem to affect the similarly strong correlation between tourism and number of hotel rooms. Again, the effect of these variables differs by country group: tourism to OECD countries is not capacity-constrained (both in terms of air connections and accommodations), whereas small islands exhibit a larger response to the addition/removal of a direct flight.

The policy implications are particularly strong with respect to market diversification and the exchange rate. In general, the lower sensitivity of tourism arrivals to GDP swings in origin countries can be a blessing if origin countries are experiencing a downturn. At the same time, reorienting tourism to fast-growing origin countries (e.g., China) is likely to be the best response to a slump in traditional markets (e.g., Europe in the case of Seychelles). Exchange rates play an important role in driving tourism flows, but the effect is not uniform across countries. In particular, when the basket of goods consumed by tourists and, more broadly, the inputs of the tourism sector are import-heavy (as is largely the case in small island states, for example), a real depreciation is unlikely to meaningfully lower the prices faced by tourists, and therefore attract them in greater numbers. In the long run, the depreciation may help increase tourism receipts even in a small island, as it could spur investment in tourism-related services, but the short-term improvement of the external balance is likely to come from the import side.

Future research could focus on utilizing the complete version of the same dataset (1995–2011). In particular, it could help understand whether tourism respondent differently to the drop in global demand during global financial crisis than during normal times—many small tourism-dependent economies saw larger dips in tourist arrivals than the sub-unit elasticities estimated here would suggest. A longer dataset without a gap year (2004 is missing from the dataset used in this paper) may also help address issues encountered when attempting to estimate dynamic/system GMM models. Future research could also expand the analysis to cover additional factors affecting international tourism—such as visa requirements (relevant for tourism to advanced economies) and natural disasters (relevant for small tourism-dependent countries)—which have not been incorporated here due to data limitations.

Table A1. Top Tourist Destinations, 2011

Rank	By absolute tourist arrivals			By share of tourism receipts in total exports of G&S		By share of tourism receipts in GDP	
	Country/territory	Arrivals, millions	Percent of world arrivals		percent exports		percent GDP
1	France	81.4	8.1	Maldives	80.3	Maldives	91.2
2	United States	62.7	6.3	Vanuatu	71.2	Seychelles	35.7
3	China	57.6	5.9	Samoa	68.2	Vanuatu	33.2
4	Spain	56.7	5.8	Bahamas, The	66.0	Bahamas, The	29.1
5	Italy	46.1	4.7	Dominica	58.9	St. Lucia	25.2
6	Turkey	34.0	3.0	Grenada	57.0	Cape Verde	23.1
7	United Kingdom	29.3	3.0	St. Lucia	56.7	Samoa	21.1
8	Greece	16.4	2.9	Cape Verde	55.9	Dominica	20.2
9	Germany	28.4	2.9	Sao Tome and Principe	54.2	Montenegro	18.4
10	Malaysia	24.7	2.5	Albania	48.5	Lebanon	17.6
11	Mexico	23.4	2.4	St. Vincent and the Gr.	48.3	Belize	17.4
12	Austria	23.0	2.3	Jamaica	48.1	Malta	16.6
13	Russian Federation	24.9	2.3	Montenegro	45.1	Mauritius	16.0
14	Hong Kong SAR, China	22.3	2.3	St. Kitts and Nevis	40.8	Fiji	15.7
15	Ukraine	21.4	2.2	Croatia	36.6	Croatia	15.4
16	Thailand	19.2	1.9	Seychelles	34.6	Liberia	15.0
17	Saudi Arabia	17.5	1.8	Ethiopia	34.4	Jamaica	14.3
18	Canada	16.0	1.6	Bermuda	32.7	Albania	14.1
19	Poland	13.4	1.4	Gambia, The	32.4	Cambodia	14.0
20	Macao SAR, China	12.9	1.3	Dominican Republic	31.4	Hong Kong SAR, China	13.5
All countries							
Mean		6.7			14.8		6.4
Median		1.8			7.5		3.0
Std. dev.		12.6			17.0		9.8

Source: UNWTO, World Development Indicators

Table A2. Arrivals, Nights and Number of Observations by Year

Year	Arrivals				Nights			
	Million		Bilateral flows (no. of observations)		Millions		Bilateral flows (no. of observations)	
	Total	Country of origin identified	Total	Country of origin identified	Total	Country of origin identified	Total	Country of origin identified
1999	692.1	623.9	11,655	10,617	1,676.5	1,504.9	2,712	2,329
2000	755.0	683.1	12,635	11,599	1,877.6	1,683.8	3,195	2,802
2001	763.3	693.5	12,574	11,504	1,869.6	1,682.8	3,273	2,863
2002	784.3	714.9	12,059	11,034	1,797.4	1,613.2	3,200	2,792
2003	752.6	683.3	11,388	10,427	1,709.4	1,513.2	3,046	2,690
2005	912.3	821.8	13,738	12,665	2,001.7	1,773.1	3,323	2,926
2006	923.8	870.9	13,846	12,792	2,104.5	1,870.1	3,359	2,967
2007	986.3	923.9	13,932	12,876	2,175.3	1,915.4	3,410	3,023
2008	985.8	929.7	13,590	12,618	2,184.3	1,932.4	3,327	2,967
2009	919.6	866.8	12,887	11,960	2,065.2	1,832.3	3,307	2,956
Total			128,304	118,092			32,152	28,315

Source: UNWTO, author's calcualtions

Note: "Country of origin identified" refers to those arrivals that can be unambiguously associated with an origin country. This is not always the case, as many destinations lump tourists from smaller markets into groups (e.g., "CIS countries", "Other Africa", "Benelux").

Table A3. Countries and Territories in Dataset and Data Availability

	1999	2000	2001	2002	2003	2005	2006	2007	2008	2009
Albania	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Algeria	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
American Samoa	◆	◆	◆			◆	◆			
Andorra	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Angola	●	●	●	◆	●	◆	◆	◆	◆	◆
Anguila	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Antigua and Barbuda						◆	◆	◆	◆	◆
Argentina	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Armenia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Aruba	●	●	●	●	●	●	●	●	●	●
Australia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Austria	●	●	●	●	●	●	●	●	●	●
Azerbaijan	◆	◆	◆	◆	◆	●	●	●	●	●
Bahamas, The	◆	●	●	●	●	●	●	●	●	●
Bahrain	◆	◆	◆	◆		◆	◆	◆		
Bangladesh	◆	◆	◆	◆	◆	◆	◆	◆		
Barbados	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Belarus	◆	◆	◆		◆	◆	◆	◆	◆	◆
Belgium	●	●	●	●	●	●	●	●	●	●
Belize	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Benin	●	●	●	●		◆	◆	◆	◆	◆
Bermuda	●	●	●	●	●	●	●	◆	◆	◆
Bhutan	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Bolivia	●	●	●	●	●	●				
Bonaire	●	●	●	●	●	●	●	●	●	●
Bosnia and Herzegovina	●	●	●	●	●	●	●	●	●	●
Botswana	◆	◆	◆	◆	◆		◆	◆		
Brazil	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
British Virgin Islands	◆	◆	◆	◆		◆				
Brunei Darussalam	◆	◆	◆			◆	◆	◆	◆	◆
Bulgaria	●	●	●	●	●	●	●	●	●	●
Burkina Faso	●	●	●	●	●	●	●	●	●	●
Cambodia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Cameroon	●	●	●	●		●	●			
Canada	●	●	●	●	●	●	●	●	●	●
Cape Verde		◆	●	●		●	●	●	●	●
Cayman Islands		◆	◆	◆	◆	◆	◆	◆	◆	◆
Central African Republic						◆	◆	◆	◆	◆
Chad	●	●	●	●	●	●	●	●	◆	◆
Chile	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
China	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Colombia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Comoros	●	●	●	●		◆	◆	◆		
Congo, Dem. Rep.	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Congo, Rep.	●	●	●	●		◆	◆	◆	◆	◆
Cook Islands	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Costa Rica	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Croatia	●	●	●	●	●	●	●	●	●	●
Cuba	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Cyprus	◆	◆	◆	◆	◆	●	●	●	●	●
Czech Republic	●	●	●	●	●	●	●	●	●	●
Denmark	●	●	●	●	●	●	●	●	●	●
Dominica	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Dominican Republic	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Ecuador	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Egypt, Arab Rep.	●	●	●	●	●	●	●	●	●	●
El Salvador	●	●	●	●	●	●	●	●	●	◆
Eritrea	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Estonia	◆	◆	●	●	●	●	●	●	●	●
Ethiopia	◆	◆	◆	◆	◆	◆	◆	◆	◆	
Fiji	●	●	●	●	●	●	●	●	●	●
Finland	●	●	●	●	●	●	●	●	●	●
France	●	●	●	●	●	●	●	●	●	●
French Guiana				◆		◆		◆		
French Polynesia	●		●	●	●	●	●	●	●	●
Gambia, The	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Georgia	●	●	●	●		◆	◆	◆	◆	◆
Germany	●	●	●	●	●	●	●	●	●	●
Ghana	◆	◆	◆	◆		◆	◆			
Greece	◆	◆	◆	◆		●	●	●	●	●
Grenada	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Guadeloupe	●	●			●	◆				◆
Guam	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Guatemala	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Guinea	◆	◆	◆		◆	◆	◆	◆		
Guinea-Bissau			◆			◆	◆	◆		
Guyana		◆	◆	◆	◆	◆	◆	◆	◆	◆
Haiti	◆	◆	◆			◆	◆	◆	◆	
Honduras	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Hong Kong SAR, China	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Hungary	●	●	●	●	●	●	●	●	●	●
Iceland	●	●	●	●	●	●	●	●	●	●
India	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Indonesia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Iran, Islamic Rep.	◆									
Iraq	◆	◆	◆						◆	◆
Ireland	●	●	●	●	◆	●	●	●	●	●
Israel	●	●	●	●	●	●	●	●	●	●
Italy	●	●	●	●	●	●	●	●	●	●
Jamaica	●	●	●	●	●	●	●	●	●	●
Japan	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Jordan	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Kazakhstan		◆	◆	◆	◆	◆	◆	◆	◆	
Kenya	●	●	●	●	●	■	■	■	■	■
Kiribati	◆	◆	◆	◆		◆	◆	◆	◆	◆
Korea, Rep.	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Kuwait	◆	◆	◆			◆	◆	◆	◆	◆
Kyrgyz Republic			◆	◆		◆	◆	◆	◆	◆
Latvia	●	●	●	●	●	●	●	●	●	●
Lebanon	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Lesotho	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Libya	◆	◆	◆	◆	◆		◆	◆		
Liechtenstein	●	●	●	●	●	●	●	●	●	●
Lithuania	●	●	●	●	●	●	●	●	●	●
Luxembourg	●	●	●	●	●	●	●	●	●	●
Macao SAR, China						●	●	●	●	●
Macedonia, FYR	●	●	●	●	●	●	●	●	●	●
Madagascar	●	●	●	●		●	●	●	●	●
Malawi	●	●	●	●	●	●	●	●	●	●
Malaysia	●	●	●	●	◆	◆	◆	◆	◆	◆
Maldives	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Mali	●	●	●	●	●	●	●	●	●	●
Malta	●	●	●	●	●	●	●	●	●	●
Marshall Islands	◆	◆	◆	◆	◆	●	●	●	●	●
Martinique	●	●	●	●	●	●	●	●	●	●
Mauritius	●	●	●	●	●	●	●	●	●	●
Mexico	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Micronesia, Fed. Sts.	◆	◆	◆	◆	◆	◆	◆	◆	◆	
Moldova	◆	◆	◆	◆	◆	●	●	●	●	●
Monaco	●	●	●	●	●	●	●	●	●	●
Mongolia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Montenegro						●	●	●	●	●
Montserrat	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Morocco	●	●	●	●	●	●	●	●	●	●
Mozambique			◆	◆	◆	◆	◆	◆	◆	◆
Myanmar	●	●	●	●	●	●	●	●	◆	●
Namibia			◆	◆	◆	◆	◆	◆	◆	
Nepal	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Netherlands	●	●	●	●	●	●	●	●	●	●
New Caledonia	●	●	●	●	●	●	●	●	●	●
New Zealand	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Nicaragua	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Niger	◆	◆	◆	◆		◆	◆	◆	◆	◆
Nigeria	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Niue	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Northern Mariana Islanc	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Norway	●	●	●	●	●	●	●	●	●	●
Oman	◆	◆	◆	●	●	●	●	●	●	◆
Pakistan	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Palau	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Panama	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Papua New Guinea	◆	◆	◆	◆	◆	◆	◆	◆	◆	
Paraguay	●	●	●	●	◆	◆	◆	◆	◆	◆
Peru	●	●	●	●	●	●	●	●	●	●
Philippines	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Poland	●	●	●	●	●	●	●	●	●	●
Portugal	●	●	●	●	●	●	●	●	●	●
Puerto Rico	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Reunion	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Romania	●	●	●	●	●	●	●	●	●	●
Russian Federation	◆	◆	◆	◆	◆	◆	◆	◆	◆	
Rwanda		◆	◆							◆
Saba	◆	◆	◆			◆	◆	◆	◆	◆
Saint Eustatius	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Saint Maarten	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Samoa	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
San Marino						◆	◆	◆	◆	
Sao Tome and Principe			◆			◆	◆	◆	◆	
Saudi Arabia		◆	◆	◆	◆	◆	◆	◆	◆	◆
Senegal	●	●	●	●	●	●	●	●		
Serbia						●	●	●	●	●
Seychelles	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Singapore	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Slovak Republic	●	●	●	●	●	●	●	●	●	●
Slovenia	●	●	●	●	●	●	●	●	●	●
Solomon Islands	◆					◆	◆	◆	◆	◆
South Africa	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Spain	●	●	●	●	●	●	●	●	●	●
Sri Lanka	●	●	●	●	●	●	●	●	●	●
St. Kitts and Nevis	◆		◆	◆		◆	◆	◆	◆	◆
St. Lucia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
St. Vincent and the Grenc	◆		◆	◆	◆	◆	◆	◆	◆	◆
Suriname								◆	◆	◆
Swaziland	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Sweden	■	■	●	●	●	●	●	●	●	●
Switzerland	●	●	●	●	●	●	●	●	●	●
Syrian Arab Republic	●	●	●	●	◆	●	●	●	●	●
Taiwan, China	●	●	●	●	●	●	●	●	●	●
Tajikistan	◆	◆	◆						◆	
Tanzania	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Thailand	●	●	●	◆	◆	◆	◆	◆	◆	◆
Timor-Leste							◆	◆	◆	◆
Togo	●	●	●	●	●	●	●	●	●	●
Tonga	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Trinidad and Tobago	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Tunisia	●	●	●	●	●	●	●	●	●	●
Turkey	●	●	●	●	●	●	●	●	●	●
Turkmenistan						◆	◆	◆		
Turks and Caicos Islands	◆	◆	◆	◆		◆	◆			
Tuvalu	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Uganda	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Ukraine	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
United Arab Emirates	●	●	●	●	●					
United Kingdom	●	●	●	●	●	●	●	●	●	●
United States	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Uruguay	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Vanuatu	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Venezuela, RB	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Vietnam	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Virgin Islands (U.S.)	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Yemen, Rep.	◆	●	●	●	●	●	●	●	●	●
Yugoslavia	●	●	●	●	●					
Zambia	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Zimbabwe	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

◆ Both arrivals and nights
● Arrivals only
■ Nights only
Small island states in italics

Table A4. Summary Statistics

	Observations	Mean	Std. Dev.	Min	Max	Source
Dependent variables						
Tourist arrivals, thousand	118,092	66.2	817.5	0.0	78,400.0	UNWTO, author calculations
Tourist nights, thousand	28,305	611.9	3,773.1	0.0	113,000.0	UNWTO, author calculations
Goods imports, million constant US$	261,763	748.0	5,580.0	0.0	285,000.0	Comtrade, author calculations
Destination/exporter characteristics						
GDP, billion constant PPP $	112,588	592.1	1,804.8	0.2	13,100.0	PWT 7.2
Population, million	117,186	62.0	201.0	0.0	1,330.0	WDI
area, thousand km2	116,655	1,275.1	3,044.2	0.0	17,100.0	CEPII
Remoteness, km	114,212	4,699.8	2,345.3	72.6	11,199.3	author calculations
small island dummy	118,595	0.1	0.3	0	1	CEPII
landlocked dummy	116,655	0.1	0.3	0	1	CEPII
REER	108,835	1.0	0.2	0.3	3.8	IFS
PPP factor	112,588	0.6	0.3	0.2	2.1	PWT 7.2
PPP factor (overvaluation)	112,588	1.0	0.3	0.4	6.4	author calculations
Population in cold zones, share (1995)	112,848	0.1	0.3	0.0	1.0	Koppen-Geiger
Population in tropics, share (1995)	112,848	0.3	0.4	0.0	1.0	Koppen-Geiger
Conflict magnitude	118,595	0.1	0.6	0.0	4.0	UCDP/PRIO
Hotel rooms, thousand	102,797	181.7	647.6	0.1	4,762.1	UNWTO
World Heritage sites (2012)	118,595	5.9	7.9	0.0	43.0	UNESCO
Origin/importer characteristics						
GDP, billion constant PPP $	111,293	636.6	1,699.3	0.2	13,100.0	PWT 7.2
Population, total	114,978	51.4	164.0	0.0	1,330.0	WDI
Area, thousand km2	116,708	1,060.4	2,591.8	0.0	17,100.0	CEPII
Remoteness, km	114,212	4,538.7	2,569.5	72.6	11,577.5	CEPII
REER	107,950	1.0	0.2	0.3	5.4	IFS
PPP factor	111,293	0.7	0.3	0.1	2.1	PWT 7.2
PPP factor (overvaluation)	111,293	1.1	0.4	0.2	6.4	author calculations
Land area in tropics, share	112,344	0.3	0.4	0.0	1.0	Koppen-Geiger
Population in cold zones, share (1995)	112,344	0.1	0.2	0.0	1.0	Koppen-Geiger
World Heritage sites (2012)	118,595	7.4	9.8	0.0	43.0	UNESCO
Destination-origin characteristics						
Weighted distance (pop-wt, km)	114,212	6,760.9	4,577.1	35.6	19,780.3	CEPII
Common border dummy	118,595	0.0	0.2	0	1	CEPII
PPP Factor ratio	105,667	1.1	0.7	0.1	7.9	PWT 7.2 / author calculations
Bilateral real exchange rate	100,223	2.0	14.2	0.0	559.3	IFS / author calculations
Common currency dummy	114,212	0.0	0.1	0	1	CEPII
Both countries in Eurozone dummy	118,595	0.0	0.1	0	1	CEPII
Non-Euro common currency dummy	118,595	0.0	0.1	0	1	CEPII
Members of regional trade agreement dummy	114,212	0.1	0.3	0	1	CEPII
Ever in a colonial relationship dummy	114,212	0.0	0.1	0	1	CEPII
Common colinizer post 1945 dummy	114,212	0.1	0.3	0	1	CEPII
Same language spoken by at least 9% dummy	114,212	0.2	0.4	0	1	CEPII
Common official or primary language dummy	114,212	0.2	0.4	0	1	CEPII
Were or are same country dummy	114,212	0.0	0.1	0	1	CEPII
Direct flight dummy	118,330	0.3	0.4	0	1	DIIO
Time difference in hours	114,212	4.1	3.4	0.0	12.0	CEPII
Climate Similarity Index, population-based	118,236	0.3	0.4	0.0	1.1	Koppen-Geiger / author calc.

Table A5. Regressions on Tourist Arrivals, Detailed Results

	Minimum 100 tourists/year								Full sample		
	Random Effects			Origin/destination FE			Hausman-Taylor		Random Effects		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Log Origin GDP	0.658***	0.701***	0.676***	0.452***	0.454***	0.517***	0.516***	0.517***	0.855***	0.898***	0.829***
	(0.011)	(0.022)	(0.022)	(0.058)	(0.055)	(0.056)	(0.023)	(0.026)	(0.008)	(0.018)	(0.019)
Log Destination GDP	0.589***	0.869***	0.611***	1.177***	1.181***	0.977***	1.170***	1.085***	0.731***	0.901***	0.565***
	(0.010)	(0.023)	(0.026)	(0.056)	(0.053)	(0.057)	(0.023)	(0.027)	(0.009)	(0.020)	(0.026)
Log weighted distance	-1.292***	-1.026***	-0.773***	-1.614***	-1.279***	-0.979***	-1.013***	-0.721***	-1.656***	-1.345***	-1.063***
	(0.019)	(0.020)	(0.031)	(0.007)	(0.008)	(0.012)	(0.025)	(0.043)	(0.020)	(0.020)	(0.032)
Log Origin Population		-0.205***	-0.200***		0.083	-0.023	-0.110***	-0.108***		-0.247***	-0.256***
		(0.023)	(0.021)		(0.106)	(0.109)	(0.023)	(0.024)		(0.020)	(0.020)
Log Destination Population		-0.197***	-0.228***		-0.313**	-0.464***	-0.357***	-0.404***		-0.058***	-0.118***
		(0.023)	(0.021)		(0.144)	(0.158)	(0.023)	(0.024)		(0.021)	(0.020)
Common currency		0.071*	0.013		-0.088***	-0.079***	0.028	-0.008		0.124***	-0.007
		(0.037)	(0.032)		(0.028)	(0.025)	(0.033)	(0.034)		(0.040)	(0.035)
Members of regional trade agreement		0.074***	0.085***		0.298***	0.180***	0.012	0.022*		0.115***	0.101***
		(0.021)	(0.021)		(0.015)	(0.015)	(0.012)	(0.012)		(0.023)	(0.024)
Common border		1.393***	1.423***		1.079***	1.146***	1.323***	1.424***		1.351***	1.274***
		(0.098)	(0.098)		(0.029)	(0.029)	(0.104)	(0.104)		(0.124)	(0.121)
Ever in a colonial relationship		1.115***	0.905***		0.856***	0.700***	1.186***	0.971***		1.302***	0.813***
		(0.102)	(0.104)		(0.030)	(0.030)	(0.119)	(0.119)		(0.122)	(0.125)
Comon colinizer post 1945		0.469***	0.573***		0.549***	0.503***	0.503***	0.600***		0.482***	0.624***
		(0.066)	(0.066)		(0.023)	(0.023)	(0.080)	(0.080)		(0.065)	(0.066)
Common official or primary language		0.769***	0.675***		0.521***	0.554***	0.742***	0.679***		1.367***	1.074***
		(0.070)	(0.070)		(0.023)	(0.023)	(0.090)	(0.091)		(0.074)	(0.072)
Same language spoken by at least 9%		0.229***	0.354***		0.361***	0.296***	0.270***	0.396***		0.164**	0.507***
		(0.067)	(0.066)		(0.022)	(0.022)	(0.085)	(0.086)		(0.072)	(0.068)
Were same country		0.145	0.145		0.094**	0.169***	0.144	0.247*		0.544***	0.401***
		(0.120)	(0.118)		(0.037)	(0.036)	(0.140)	(0.139)		(0.146)	(0.134)
Log Origin Area		0.085***	0.073***				0.129***	0.091***		0.099***	0.078***
		(0.013)	(0.012)				(0.015)	(0.016)		(0.012)	(0.012)
Log Origin Remoteness		-0.340***	-0.288***				-0.585***	-0.445***		-0.528***	-0.433***
		(0.035)	(0.031)				(0.040)	(0.042)		(0.037)	(0.034)
Log Destination Area		-0.102***	-0.103***				-0.141***	-0.128***		-0.138***	-0.171***
		(0.011)	(0.010)				(0.014)	(0.014)		(0.010)	(0.010)
Log Destination Remoteness		0.165***	0.121***				0.451***	0.411***		-0.008	0.108***
		(0.037)	(0.034)				(0.042)	(0.042)		(0.036)	(0.037)
Destination landlocked		0.199***	0.152***				0.359***	0.233***		-0.197***	0.012
		(0.053)	(0.052)				(0.066)	(0.066)		(0.052)	(0.052)
Destination small island state		0.108	-0.248***				0.255***	0.020		0.202***	-0.449***
		(0.072)	(0.073)				(0.089)	(0.093)		(0.063)	(0.067)
Log Bilateral trade (residuals)			0.057***			0.200***		0.054***			0.040***
			(0.005)			(0.004)		(0.003)			(0.004)
Log PPP Factor ratio			-0.157***			-0.193***		-0.202***			-0.113***
			(0.020)			(0.027)		(0.011)			(0.021)
Direct flight			0.272***			0.869***		0.201***			0.317***
			(0.015)			(0.012)		(0.009)			(0.016)
Log Destination Hotel rooms			0.265***			0.143***		0.124***			0.382***
			(0.020)			(0.031)		(0.011)			(0.020)
Time difference in hours			-0.044***			-0.018***		-0.062***			-0.031***
			(0.008)			(0.003)		(0.011)			(0.007)
Climate Similarity Index, population-based			0.367***			0.221***		0.375***			0.498***
			(0.048)			(0.017)		(0.068)			(0.050)
Destination conflict magnitude			-0.079***			-0.083***		-0.056***			-0.093***
			(0.011)			(0.016)		(0.008)			(0.012)
Origin World Heritage sites in 2011			0.014***					0.023***			0.031***
			(0.002)					(0.003)			(0.002)
Destination World Heritage sites in 2011			0.012***					-0.004			0.030***
			(0.003)					(0.003)			(0.003)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	67,673	67,673	55,438	67,673	67,673	55,438	67,673	55,438	104,627	104,627	78,571
Country-pairs	7,966	7,966	7,160	7,966	7,966	7,160	7,966	7,160	13,573	13,573	11,237
Minimum arrivals in all years	100	100	100	100	100	100	100	100	0	0	0
R^2	0.524	0.605	0.675	0.755	0.791	0.829			0.626	0.694	0.734

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

Table A6. Summary of Regressions on Tourist Arrivals, Intra-OECD Tourism Only

	Random Effects			Origin/destination FE			Hausman-Taylor	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Origin GDP	0.906***	1.479***	1.331***	1.134***	0.902***	0.253	1.079***	0.580***
	(0.026)	(0.109)	(0.106)	(0.173)	(0.175)	(0.181)	(0.091)	(0.101)
Log Destination GDP	0.727***	1.164***	0.708***	1.043***	0.844***	0.510***	1.165***	1.105***
	(0.028)	(0.125)	(0.115)	(0.162)	(0.163)	(0.181)	(0.083)	(0.099)
Log weighted distance	-1.087***	-1.200***	-1.136***	-1.265***	-1.060***	-1.138***	-1.149***	-0.953***
	(0.033)	(0.044)	(0.085)	(0.013)	(0.020)	(0.030)	(0.073)	(0.142)
Log Origin Population		-0.649***	-0.463***		1.245***	2.321***	-0.376***	0.025
		(0.088)	(0.082)		(0.411)	(0.402)	(0.082)	(0.093)
Log Destination Population		-0.372***	-0.395***		-0.551	0.325	-0.448***	-0.538***
		(0.096)	(0.081)		(0.406)	(0.380)	(0.078)	(0.086)
Common currency		0.052	-0.040		0.204***	-0.004	0.039	-0.053
		(0.046)	(0.048)		(0.027)	(0.027)	(0.034)	(0.035)
Members of regional trade agreement		0.007	-0.007		0.244***	0.095***	-0.046**	-0.035
		(0.044)	(0.043)		(0.038)	(0.036)	(0.022)	(0.022)
Common border		0.050	0.112		0.220***	0.456***	0.086	0.218
		(0.131)	(0.130)		(0.038)	(0.040)	(0.295)	(0.275)
Log Origin Remoteness		0.291**	0.270**				-0.253	-0.543***
		(0.122)	(0.110)				(0.169)	(0.176)
Log Destination Remoteness		0.606***	0.657***				0.514***	0.414***
		(0.115)	(0.114)				(0.157)	(0.157)
Log Bilateral trade (residuals)			0.103**			0.368***		0.148***
			(0.044)			(0.014)		(0.014)
Log PPP Factor ratio			-0.259***			-0.266***		-0.287***
			(0.062)			(0.064)		(0.030)
Direct flight			0.123***			0.369***		0.086***
			(0.030)			(0.021)		(0.017)
Log Destination Hotel rooms			0.486***			0.239**		0.002
			(0.071)			(0.105)		(0.051)
Time difference in hours			-0.008			-0.021***		-0.051
			(0.020)			(0.006)		(0.040)
Climate Similarity Index, population-based			0.323***			0.291***		0.640***
			(0.091)			(0.044)		(0.183)
Destination conflict magnitude			-0.252***			-0.292***		-0.228***
			(0.058)			(0.065)		(0.026)
Origin World Heritage sites in 2011			-0.008**					-0.003
			(0.004)					(0.007)
Destination World Heritage sites in 2011			0.019***					0.036***
			(0.005)					(0.007)
Additional geographical controls		YES	YES		YES	YES	YES	YES
Historic and linguistic ties		YES	YES		YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,230	9,230	8,638	9,230	9,230	8,638	9,230	8,638
Country-pairs	987	987	986	987	987	986	987	986
Minimum arrivals in all years	100	100	100	100	100	100	100	100
R^2	0.724	0.791	0.836	0.902	0.909	0.922		

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively. Additional geographical controls include: Log areas of the two coutnries, origin/destination landlocked dummies and destination small island dummy. Historic and liguistic ties include dummies for: Ever in a colonial relationship, common colonizer post 1945, common official or primary language, same language spoken by at least 9%, ever parts of the same country.

Table A7. Summary of Regressions on Tourist Arrivals, Alternative Specifications

	Random Effects		Origin/destination FE	
VARIABLES	(1)	(2)	(3)	(4)
Log Origin GDP	0.703***	0.704***	0.452***	0.487***
	(0.022)	(0.021)	(0.055)	(0.056)
Log Destination GDP	0.872***	0.669***	1.179***	0.933***
	(0.023)	(0.026)	(0.053)	(0.058)
Log weighted distance	-1.023***	-0.824***	-1.278***	-0.980***
	(0.020)	(0.031)	(0.008)	(0.012)
Log Origin Population	-0.204***	-0.169***	0.081	0.052
	(0.023)	(0.024)	(0.106)	(0.111)
Log Destination Population	-0.196***	-0.280***	-0.319**	-0.292*
	(0.023)	(0.023)	(0.144)	(0.161)
Common currency		0.029		-0.080***
		(0.032)		(0.025)
Non-Euro common currency	0.575***		0.099*	
	(0.134)		(0.058)	
Both countries in Eurozone	0.048		-0.179***	
	(0.038)		(0.031)	
Members of regional trade agreement	0.074***	0.091***	0.300***	0.179***
	(0.021)	(0.021)	(0.015)	(0.015)
Log Bilateral trade (residuals)		0.056***		0.199***
		(0.005)		(0.004)
Log PPP Factor ratio		-0.162***		
		(0.020)		
Log Origin PPP factor				0.291***
				(0.036)
Log Destination PPP factor				-0.077**
				(0.038)
Direct flight		0.272***		0.869***
		(0.015)		(0.012)
Log Destination Hotel rooms		0.262***		0.141***
		(0.020)		(0.031)
Climate Similarity Index, population-based		0.385***		0.221***
		(0.050)		(0.017)
Origin % land area tropics		-0.049		
		(0.048)		
Origin %1995 population in cold zones		0.123**		
		(0.062)		
Destination % 1995 pop in tropics		0.244***		
		(0.047)		
Destination %1995 pop in cold zones		-0.669***		
		(0.074)		
Destination conflict magnitude		-0.085***		-0.083***
		(0.011)		(0.016)
Additional geographical controls	YES	YES	YES	YES
Historic and linguistic ties	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES
Observations	67,673	55,438	67,673	55,438
Country-pairs	7,966	7,160	7,966	7,160
Minimum arrivals in all years	100	100	100	100
R^2	0.606	0.685	0.791	0.832

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively. Additional geographical controls include: Log areas of the two coutnries, remoteness of the two countries, landlocked dummies of the two countries, time zone difference, and destination small island dummy. Historic and liguistic ties include dummies for: ever in a colonial relationship, common colonizer post 1945, common official or primary language, same language spoken by at least 9%, ever parts of the same country. Cold zones inlcude zones Df, DW and E of the Koppen-Geiger climate classification. Tropics include zones Af, Am and Aw.

Table A8. First Differences Regressions on Tourist Arrivals, Alternative Specifications for Supply-side Variables

	Direct flight					Hotel rooms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log Origin GDP	0.587***	0.557***	0.622***	0.590***	0.586***	0.587***	0.574***	0.723***	0.677***
	(0.050)	(0.051)	(0.056)	(0.057)	(0.050)	(0.050)	(0.054)	(0.068)	(0.081)
Log Destination GDP	0.694***	0.648***	0.710***	0.652***	0.694***	0.694***	0.640***	0.729***	0.658***
	(0.047)	(0.048)	(0.056)	(0.058)	(0.047)	(0.047)	(0.050)	(0.068)	(0.078)
Log Origin Population	0.026	0.102	-0.091	-0.013	0.027	0.026	0.188	-0.104	0.093
	(0.100)	(0.102)	(0.107)	(0.110)	(0.100)	(0.100)	(0.119)	(0.116)	(0.148)
Log Destination Population	-0.419***	-0.373**	-0.354**	-0.320*	-0.418***	-0.419***	-0.360*	-0.189	-0.012
	(0.161)	(0.168)	(0.175)	(0.185)	(0.161)	(0.161)	(0.197)	(0.211)	(0.274)
Common currency	0.013	0.014	0.030	0.029	0.013	0.013	0.002	0.028	0.020
	(0.022)	(0.022)	(0.026)	(0.026)	(0.022)	(0.022)	(0.024)	(0.026)	(0.030)
Members of regional trade agreement	-0.033	-0.038	-0.034	-0.040	-0.033	-0.033	-0.025	-0.063**	-0.073*
	(0.021)	(0.025)	(0.021)	(0.025)	(0.021)	(0.021)	(0.026)	(0.027)	(0.039)
(Contiguous) X (Log Origin GDP)	-0.110	-0.045	-0.116	-0.052	-0.112	-0.110	-0.261	-0.244	-0.591*
	(0.131)	(0.136)	(0.142)	(0.149)	(0.130)	(0.131)	(0.211)	(0.172)	(0.335)
Log Bilateral trade (residuals)	0.012***	0.009**	0.011***	0.008	0.012***	0.012***	0.009**	0.013**	0.008
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)
Log PPP Factor ratio	-0.218***	-0.235***	-0.223***	-0.242***	-0.218***	-0.218***	-0.222***	-0.209***	-0.216***
	(0.017)	(0.018)	(0.018)	(0.019)	(0.017)	(0.017)	(0.019)	(0.022)	(0.026)
Direct flight	0.040***	0.048***	0.055***	0.072***		0.040***	0.031***	0.046***	0.035***
	(0.010)	(0.010)	(0.010)	(0.010)		(0.010)	(0.010)	(0.011)	(0.011)
Direct flight (t-1)		0.026***		0.039***					
		(0.008)		(0.009)					
Direct flight (t+1)			0.054***	0.072***					
			(0.010)	(0.013)					
Direct flight added					0.051***				
					(0.014)				
Direct flight removed					-0.031***				
					(0.012)				
Log Destination Hotel rooms	0.246***	0.246***	0.226***	0.221***	0.246***	0.246***	0.234***	0.236***	0.160***
	(0.026)	(0.027)	(0.028)	(0.030)	(0.026)	(0.026)	(0.028)	(0.035)	(0.038)
Log Destination Hotel rooms (t-1)							0.034		0.041
							(0.029)		(0.039)
Log Destination Hotel rooms (t+1)								-0.005	0.049*
								(0.026)	(0.029)
Destination conflict magnitude	-0.066***	-0.089***	-0.055***	-0.074***	-0.066***	-0.066***	-0.126***	-0.058***	-0.134***
	(0.010)	(0.011)	(0.010)	(0.010)	(0.010)	(0.010)	(0.012)	(0.011)	(0.013)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	42,479	37,476	37,382	32,379	42,479	42,479	30,703	30,592	19,620
Country-pairs	6819	6776	6704	6656	6819	6819	6374	6374	6017
Minimum arrivals in all years	100	100	100	100	100	100	100	100	100
R^2	0.042	0.046	0.035	0.040	0.042	0.042	0.043	0.036	0.040

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

Table A9. First Differences Regressions on Tourist Arrivals, Alternative Measures of Real Exchange Rate, Intra-OECD Tourism only

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log Origin GDP	1.015***	0.944***	1.029***	1.023***	0.969***	0.981***	0.938***	1.020***	0.989***	0.966***
	(0.148)	(0.148)	(0.147)	(0.148)	(0.149)	(0.154)	(0.155)	(0.154)	(0.155)	(0.156)
Log Destination GDP	0.749***	0.681***	0.638***	0.736***	0.693***	0.717***	0.679***	0.624***	0.704***	0.696***
	(0.131)	(0.126)	(0.129)	(0.131)	(0.128)	(0.138)	(0.135)	(0.137)	(0.139)	(0.136)
Log PPP factor ratio	-0.405***					-0.432***				
	(0.038)					(0.040)				
Log Origin PPP factor		0.539***					0.519***			
		(0.057)					(0.060)			
Log Destination PPP factor		-0.276***					-0.350***			
		(0.048)					(0.051)			
Log Origin PPP factor misalignment			0.542***					0.521***		
			(0.057)					(0.061)		
Log Destination PPP factor misalignment			-0.280***					-0.354***		
			(0.048)					(0.051)		
Log Bilateral real exhange rate				-0.383***					-0.410***	
				(0.036)					(0.039)	
Log Origin REER					0.527***					0.501***
					(0.058)					(0.060)
Log Destination REER					-0.327***					-0.398***
					(0.058)					(0.061)
Log Bilateral trade (residuals)						0.060***	0.054***	0.054***	0.059***	0.057***
						(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Direct flight						-0.001	-0.001	-0.002	-0.001	-0.001
						(0.013)	(0.014)	(0.014)	(0.013)	(0.014)
Log Destination Hotel rooms						0.036	0.034	0.034	0.041	0.010
						(0.090)	(0.090)	(0.090)	(0.090)	(0.089)
Destination conflict magnitude						-0.151***	-0.147***	-0.147***	-0.156***	-0.151***
						(0.043)	(0.043)	(0.043)	(0.043)	(0.044)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	7,353	7,353	7,353	7,353	7,353	6,795	6,795	6,795	6,795	6,795
Country-pairs	986	986	986	986	986	985	985	985	985	985
Minimum arrivals in all years	100	100	100	100	100	100	100	100	100	100
R^2	0.079	0.081	0.081	0.078	0.080	0.085	0.085	0.085	0.084	0.085

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

Table A10. First Differences Regressions on Tourist Arrivals, Small Island Destinations vs. the Rest

	Small island destinations				Other destinations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Origin GDP	0.485***	0.556***	0.562***	0.498***	0.578***	0.587***	0.607***	0.594***
	(0.131)	(0.134)	(0.127)	(0.132)	(0.051)	(0.053)	(0.051)	(0.054)
Log Destination GDP	0.231**	0.320***	0.348***	0.353***	0.774***	0.794***	0.730***	0.777***
	(0.092)	(0.095)	(0.097)	(0.097)	(0.054)	(0.057)	(0.053)	(0.057)
Log Bilateral trade (residuals)	0.016**	0.014**	0.015**	0.012*	0.011**	0.014***	0.010**	0.014***
	(0.007)	(0.006)	(0.007)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Direct flight	0.096***	0.101***	0.098***	0.103***	0.036***	0.034***	0.036***	0.035***
	(0.031)	(0.032)	(0.032)	(0.032)	(0.010)	(0.011)	(0.010)	(0.011)
Log Destination Hotel rooms	-0.098	-0.034	-0.054	-0.046	0.261***	0.257***	0.261***	0.254***
	(0.072)	(0.069)	(0.070)	(0.069)	(0.027)	(0.028)	(0.028)	(0.028)
Destination conflict magnitude	0.030	0.010	0.031	0.022	-0.072***	-0.073***	-0.071***	-0.074***
	(0.023)	(0.023)	(0.022)	(0.023)	(0.011)	(0.011)	(0.011)	(0.011)
Log PPP factor ratio	-0.356***				-0.215***			
	(0.060)				(0.018)			
Log Bilateral real exhange rate		-0.452***				-0.203***		
		(0.071)				(0.017)		
Log Origin PPP factor misalignment			0.640***				0.252***	
			(0.076)				(0.025)	
Log Destination PPP factor misalignment			-0.028				-0.170***	
			(0.065)				(0.024)	
Log Origin REER				0.748***				0.253***
				(0.092)				(0.027)
Log Destination REER				-0.099				-0.166***
				(0.099)				(0.025)
Year fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,552	3,474	3,552	3,474	38,927	37,217	38,927	36,952
Country-pairs	522	511	522	511	6297	6004	6297	5990
Minimum arrivals in all years	100	100	100	100	100	100	100	100
R^2	0.064	0.071	0.076	0.079	0.041	0.041	0.041	0.041

Note: Standard errors in parentheses are robust and clustered by country-pair. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

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Appendix. Tourist Arrivals Versus Tourism Receipts

Unlike the empirical literature on merchandise trade, where flows are measured in monetary terms, the remainder of this study measures tourism flows in numbers of tourists or tourist-nights. This reflects data limitations, as data on bilateral tourism receipts is not compiled. It can actually be viewed as an advantage—tourism flows are already in "real" terms, whereas the goods trade literature usually has to resort to the imperfect procedure of using US CPI to deflate dollar values. Nevertheless, policymakers and the industry are ultimately interested in tourism earnings, so it is useful to establish that there is a strong correlation between arrivals and receipts.

WDI contains annual data on international tourism receipts of each country, as well as the number of tourists visiting each country. Tourism arrivals data come from the same UNWTO dataset as the bilateral data used below, but cover a longer time period from 1995 to 2011.

Table 1. Regressions on log Tourism Receipts (in constant 2000 US dollars)

	Pooled OLS (1)	Fixed Effects (2)	First Differences (3)
Log Tourist arrivals	1.020***	0.670***	0.463***
	(0.031)	(0.057)	(0.068)
Constant	6.066***	10.846***	0.022***
	(0.437)	(0.772)	(0.006)
Observations	2,650	2,650	2,444
Countries	186	186	183
R-squared	0.828	0.396	0.085

Note: Standard errors in parentheses are robust and clustered by country. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively. Standard errors are robust and clustered at country-pairs.

The correlation coefficient between log tourism receipts (in constant 2000 US dollars) and log tourist arrivals is estimated at 0.921. Table 1 shows the results of simple log-log regressions of tourism receipts on tourist arrivals using pooled OLS, country fixed effects and first differences. Assuming spending per tourist are fairly constant in real terms, the expected coefficient on tourist arrivals is one, and the regression should have a good fit.

The results of the pooled OLS regression are in line with expectations—the coefficient on tourist arrivals is not statistically different from one and the R^2 is high. However, the good fit is primarily explained by cross-country (between) variance, as shown by the less encouraging results of the fixed effects regression and, to an even larger extent, the first differences regression (equivalent to regressing growth rates on growth rates). Clearly, the assumption of constant spending per tourist does not hold well for the full sample. Table 2 summarizes data on per-tourist spending. The coefficient of variation of per-tourist spending across years for each country is measured at around 28 percent. At the same time, the top decile of tourism earners reports a much lower coefficient of variation of per-tourist spending.

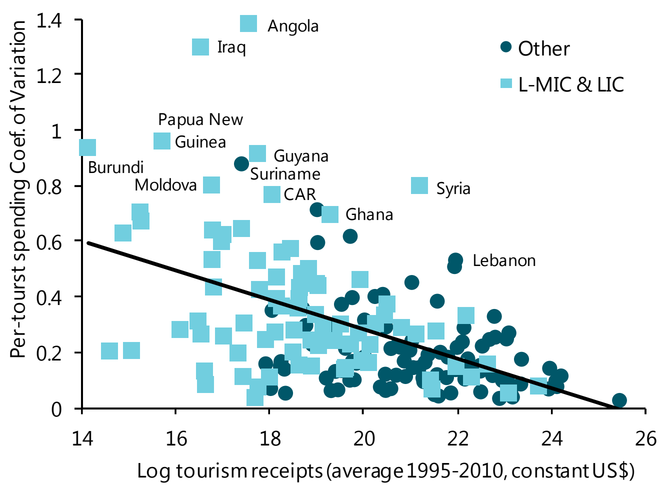
Table 2. Per-tourist Spending, Summary Statistics

Variable	Observations	Countries	Mean	Std. Dev.	Min	Max
Spending per tourist, constant 2000 US$	2966	177	836.5	705.9	24.4	5249.8
Coefficient of variation (normalized by country)	2949	172	0.277	0.224	0.026	1.384
Top decile of tourism export earners						
Spending per tourist, constant 2000 US$	306	17	1084.8	647.0	441.4	2846.8
Coefficient of variation (normalized by country)	306	17	0.103	0.068	0.026	0.269
Bottom nine deciles						
Spending per tourist, constant 2000 US$	2660	160	808.0	706.9	24.4	5249.8
Coefficient of variation (normalized by country)	2643	155	0.297	0.227	0.037	1.384

Note: Top decile of tourism receipt earners include: United States, France, Spain, United Kingdom, Italy, Germany, China, Hong Kong SAR (China), Australia, Austria, Canada, Turkey, Thailand, Netherlands, Japan, Mexico, Switzerland.

Figure 1 shows that countries reporting highly variable per-tourist spending are predominantly smaller, lower income countries, which also rank relatively low in the global ranking of tourism receipt earners.

Figure 1. Coefficient of Variation of per-tourist Spending



Note: L-MIC and LIC stands for Lower-Middle Income countries and Low Income Countries respectively.

There are at least two potential factors driving this pattern. First, smaller tourist destinations are more likely to see larger fluctuations from year to year in the geographic composition of incoming tourists, which can result in large changes in average per-tourist spending (tourists from different countries having different purchasing powers, spending habits when travelling abroad and/or different durations of stay). This issue does not pose problems for the paper's findings, as the analysis is at the level of bilateral flows. Second, highly variable per-tourist spending could be the result of poor quality data of international tourism receipts statistics—

a likely problem in a number of low income countries. Simple OLS regressions in Table 3 show that both factors are likely to be in play: the coefficient of variation of per-tourist spending goes down with mean tourism receipts and is higher for lower middle income and low income countries.

Table 3. Coefficient of Variation of per-tourist Spending (OLS regression)

	(1)	(2)
Log Tourism receipts	-0.066***	-0.057***
	(0.008)	(0.009)
LIC or Lower MIC		0.070**
		(0.034)
Constant	1.642***	1.433***
	(0.178)	(0.194)
Observations	169	169
R-squared	0.326	0.339

Note: Standard errors in parentheses are robust and clustered by country. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively.

Table 4 presents the regressions of tourism receipts on tourist arrivals for a sample restricted to the top decile of tourism receipt earners, a group of 17 countries which account for 69 percent of global tourism receipts. As expected, the coefficient on tourist arrivals is now at a much more plausible level of 0.87 as estimated by the first differences regression. The explanatory power of these regressions is also reasonably high.

Table 4. Regressions on log Tourism Receipts, top Decile Tourism Receipts Earners only (in logs)

	Pooled OLS (1)	Fixed Effects (2)	First Differences (3)
Log Tourist arrivals	0.641***	0.844***	0.869***
	(0.152)	(0.160)	(0.061)
Constant	12.839***	9.442***	-0.001
	(2.498)	(2.686)	(0.004)
Observations	285	285	267
Countries	17	17	17
R-squared	0.542	0.698	0.407

Note: Standard errors in parentheses are robust and clustered by country. *, **, *** indicate that coefficients are significant at 10, 5 and 1 percent levels respectively. Top decile of tourism receipt earners include: United States, France, Spain, United Kingdom, Italy, Germany, China, Hong Kong SAR (China), Australia, Austria, Canada, Turkey, Thailand, Netherlands, Japan, Mexico, Switzerland.

In conclusion, international tourist arrivals are indeed a good predictor for tourism export receipts, and therefore the findings of the paper can be extended to tourism receipts.