

Artal-Tur, Andrés; Pallardó-López, Vicente J.; Requena-Silvente, Francisco

## Article

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## Examining the impact of visa restrictions on international tourist flows using panel data\*

*El impacto de la política de visados sobre los flujos internacionales de turistas: Un análisis con datos de panel*

ANDRÉS ARTAL-TUR\*\*

VICENTE J. PALLARDÓ-LÓPEZ\*\*\*

FRANCISCO REQUENA-SILVENTE\*\*\*\*

### Abstract

*Using newly panel data on visa restrictions for the years 2000 and 2010 in a theory-grounded gravity model, we find a robust, causal negative impact of visa restrictions on international tourist flows. By destination, the detrimental impact of this type of barrier is observed for tourists going to developing countries (with the exception of East and South Asia), but not for those to developed ones. By country of origin of tourists, the impact of visa restrictions appears to be the same for tourists coming from developed and developing countries. These findings have important consequences in policy terms for tourism management at a regional level.*

*Key words: International tourism, visa restrictions, panel data, gravity model, developing countries.*

JEL Classification: *F10, F15.*

### Resumen

*Con datos bilaterales de visados de turismo para los años 2000 y 2010, mediante un modelo de gravedad fundado en la teoría, observamos un efecto causal negativo de la existencia de políticas de visados restrictivas sobre los flujos internacionales de turistas. Por destinos, el efecto negativo de una política restrictiva de visados es importante para los turistas que visitan los países en desarrollo*

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\*\* Department of Economics, Technical University of Cartagena. Institute of International Economics (IEI-UV), Valencia, Spain. *E-Mail:* andres.artal@upct.es

\*\*\* Institute of International Economics (IEI-UV), Valencia, Spain. Email: vicente.pallardo@uv.es

\*\*\*\* [Corresponding author] Institute of International Economics (IEI-UV), Valencia. Department of Applied Economics II, Universitat de Valencia, Spain. Email: francisco.requena@uv.es

*(excepto los países de sudeste asiático) pero no para el resto de destinos. Por país de origen de los turistas, el impacto de las restricciones impuestas por la política de visados parece ser similar para los turistas que vienen tanto de los países desarrollados como de los países en desarrollo. Los resultados tienen importantes consecuencias en términos de gestión del turismo internacional.*

Palabras clave: *Turismo internacional, políticas de visado, panel de datos, ecuación de gravedad, países en desarrollo.*

Códigos JEL: *F10, F15.*

## 1. INTRODUCTION

Many countries use visa restrictions as a mechanism to limit entry to unwelcome travelers. The cost and hassle of obtaining a visa represent an important hurdle for many travelers, as it forces them to submit an application to the consular office of their intended destination, which can ask for processing fees, impose long waiting times, and possibly deny the visa with or without giving any reasons. This may explain that some travelers choose to change their destination elsewhere. Not surprisingly, tourist groups in several countries during the years of some of the most recent Olympic Games in the US, China and the UK complained about the tight restrictions on travel and visa requirements hitting the tourism industry hard, since many travelers decided to spend their holidays elsewhere (Song *et al.*, 2012; Thomas, 2012; UK Visa Bureau, 2012).

While general opinion agrees that visa restrictions actually reduce the flow of people, it remains an empirical question to evaluate how much. Neumayer (2006) started by developing an ambitious database on bilateral visa restrictions in year 2004. His main focus was in understanding how states regulate human mobility across territories by employing visa restrictions. Building on this dataset, Neumayer (2010) found that countries with visa restrictions reduce on average the bilateral flow of tourists by around 60 percent.<sup>1</sup> The novel feature of our approach lies in the use of a two-year panel data in order to introduce controls for country pair fixed effects when estimating the effect of visa restrictions on international tourism. For that purpose, we have constructed a new database of bilateral visa policies for the years 1999 and 2009 that will be used to estimate the determinants of bilateral tourist flows between 2000 and 2010.

Most papers on the determinants of international tourist flows use either total number of arrivals to a country over a period of time (Zhang and Jensen, 2007) or a pooled of annual origin-to-destination arrivals (Eilat and Einav, 2004; Gil-Pareja *et al.*, 2008; Neumayer, 2010) as dependent variable. Baltagi *et al.* (2003) and Chen and Wall (2005) show that a standard gravity model of trade with cross-section of data or pooled data tends to be biased because of unob-

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<sup>1</sup> Using the same data, Neumayer (2011) and Bertoli & Fernández-Huertas (2012) found that countries with visa restrictions reduce on average the bilateral flow of exports and foreign direct investment by about 25 percent and the bilateral flow of immigrants by around 40 percent, respectively.

served or incorrectly specified heterogeneity issues. In the context of flows of tourists and visa restrictions, such bias could arise if there were, e.g., historical reasons for a low level of any type of bilateral exchange, included travellers, as well as for low level of political and diplomatic relationship between the two countries. It might also be that the measures of physical or cultural distance used in standard gravity models were biased measures of distance-related transaction costs. If unobserved components of political, historical, cultural and geographical proximity positively affect visa policy and international travel, OLS estimates would suffer from endogeneity bias and overestimate the true effect of visa restrictions on international travel.

We include visa restrictions into a theory-grounded gravity equation. The data has a time dimension that we exploit in order to take into account unobserved heterogeneity by differencing out unobserved country-pair specific characteristics. The advantages of this approach in the gravity context have been corroborated, among others, by Baier and Bergstrand (2007) and Head *et al.* (2010). Moreover, we are able to perform a regression-based test for strict exogeneity (Wooldridge, 2002).

We report three major results. First, failing to control for observed time variant heterogeneity and unobserved heterogeneity indeed leads to overestimation. When the estimation control for country pair fixed effects, the OLS estimate of the coefficient of visa restriction falls by more than 60 percent (from 0.61 to 0.23). Second, visa restrictions deter tourists going to developing countries, in particular to Eastern Europe, Central Asia, Africa and Middle East, but not those going to developed countries. Finally, the detrimental impact of visa restrictions is similar for tourists from both developed and developing countries.

The remainder of the paper is organized as follows. Section 2 presents the estimation approach and outlines the data, while Section 3 discusses the empirical results. Section 4 finally concludes.

## 2. METHODS

### 2.1. Econometric specification

A conventional fixed-effects gravity model estimating the link between  $NTA_{odt}$ , the annual number of tourists (arrivals) from origin country  $o$  to destination country  $d$  at time  $t$ , and  $VISA_{odt}$ , a binary dummy variable that takes value of one if citizens from country  $o$  need a visa to visit country  $d$  at time  $t$ , might be presented as follows:

$$(1) \quad \ln NTA_{odt} = \beta VISA_{odt} + \gamma PROX'_{od} + \gamma LINKS'_{odt} + \tau_{ot} + \varphi_{dt} + \varepsilon_{odt}$$

where the vector  $PROX'_{od}$  collects time-invariant dyadic indicators of geographic and cultural proximity, which can influence bilateral travel costs; and the vector  $LINKS'_{odt}$  collects time-variant dyadic measures of economic, political or historical links that stimulate the flow of people between countries, such as diplomatic representation, migrant networks or the intensity of trade relations. We include a comprehensive set of country-and-time effects  $\tau_{ot}$  and  $\varphi_{dt}$  to control for all origin and destination specific determinants, in particular for multilateral

resistance terms. Finally we impose the error structure  $\varepsilon_{odt} = \alpha_{od} + u_{odt}$  where  $\alpha_{od}$  is a dyad-effect and  $u_{odt}$  the usual idiosyncratic error term. In the presence of unobserved confounding factors, explanatory variables will be correlated with the error term  $u_{odt}$  so that OLS is invalid. In order to control for  $\alpha_{od}$  we can proceed by estimating equation (1) including country pair dummies to eliminate  $\alpha_{od}$ .

## 2.2. Data collection and analysis

Data for annual bilateral tourist arrivals (by country of origin and destination) are taken from the United Nations World Tourism Organization database (UNWTO, 2012b) and cover the years 2000 and 2010.<sup>2</sup>

TABLE 1  
WORLD TOURIST ARRIVALS AND DEPARTURES

	Arrivals in 2010 (millions)	Share (%)	Annual avg growth rate 2000- 2010 (%)	Departures in 2009 (millions)	Share (%)	Annual avg growth rate 2000-2009 (%)
WORLD	941.6	100	3.24	922.1	100	2.32
HIGH-INCOME COUNTRIES	558.6	59.3	1.72	532.2	57.7	1.00
East Asia and Pacific (EAs&Pac)	75.6	8.0	5.83	62.8	6.8	3.74
North America (N Am)	76.1	8.1	0.67	87.8	9.5	1.36
Western Europe (W Eur)	406.9	43.2	1.32	381.6	41.4	1.01
NO-HIGH INCOME COUNTRIES	383.0	40.7	6.15	409.0	44.4	7.33
Eastern Europe and Central Asia (EE&C As)	106.1	11.3	6.98	104.7	11.4	5.70
East Asia and Pacific (EAs&Pac)	117.8	12.5	6.31	na	na	na
Latin America and Caribbean (LA&CAR)	64.2	6.8	3.10	41.2	4.5	3.34
Middle East and Northern Africa (ME&N Af)	53.1	5.6	8.83	25.3	2.7	3.13
South Asia (S As)	9.4	1.0	6.68	20.1	2.2	10.41
Sub-Saharan Africa (S-SAf)	31.7	3.4	5.82	na	na	na

Source: Own elaboration using World Bank, World Development Indicators (WDI).

Note: "na" means not available. Data on departures are not yet available for year 2010 in WDI.

<sup>2</sup> According to UNWTO, a visitor is a traveller taking a trip to a main destination outside her usual environment, for less than a year, for any main purpose other than to be employed by a resident entity in the country or place visited. A visitor is classified as a tourist (or overnight visitor), if the trip includes an overnight stay at the destination country (IRTS, 2008). In this paper we employ data on international tourist arrivals taken from UNWTO database (2012). Unfortunately we are not being able to distinguish the purpose of the visit (leisure, business or personal).

Table 1 describes the geographical pattern and recent evolution of the total number of arrivals and departures. In 2000 there were 681.1 million people traveling from one country to another; ten years later, the number was 941.6 million, which implies an average annual growth around 3.2 percent. Whereas it is a positive trend, this rate shows a lower dynamism than that of international trade (5.1%) for the same period. In both cases, the so-called Great Recession (i.e., the current economic crisis which started in the summer of 2007 and had its main impact for 2008 and 2009) caused a serious slowdown in these international flows.

High income countries represented in 2010 almost 60 percent of the destination of total international tourists, mostly concentrated in Western Europe (43 percent). However, on average the number of travelers grew at faster rate in non-high income countries- the exception being the high income countries in the East and Pacific region. The region with the highest annual growth rate of arrivals between 2000 and 2010 was Middle East and Northern Africa (8.8 percent), followed by Eastern Europe and Central Asia (6.9 percent). In contrast, arrivals to countries in North America only grew on average 0.6 percent per annum. Both the current distribution and the recent trend in the flows of people reflected in Table 1 are notoriously similar to those of international trade.

Information on bilateral visa policies is obtained from the Travel Information Manual, a monthly publication of the International Air Transport Association, IATA. We expand the Neumayer (2006) dataset, which refers to November 2004. Our data refers to September 1999 and September 2009, so we can track changes in visa restrictions over time. We built a dichotomous variable signaling whether the citizens of one country are requested to have a visa for entering into another country or they benefit from a visa waiver. Visas upon arrival are considered as visa waivers because they need not to be requested before traveling. The dataset contains 179 countries of destination and 188 countries of origin. Graphic 1 offers a global landscape, grouped by main geographical areas, of visa restrictions and its evolution for the 2000-2010 period, both from the perspective of visa imposed to visitors to a particular region (Panel A) and from that of the number of countries which set visa to the citizens of that region (Panel B).<sup>3</sup>

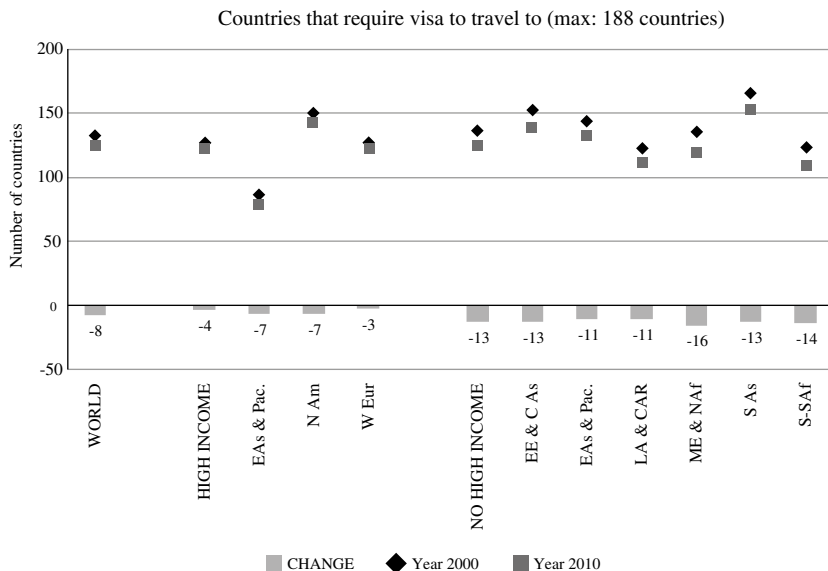
The number of changes to visa restrictions is relatively small compared to the total number of restrictions in place. However, data show a unanimous trend towards the reduction of visa requirements, whatever the region considered<sup>4</sup>. This general pattern stands, for the average country in any area, both for the

<sup>3</sup> Our “visa restrictions” takes only two values: 1 if required visa and 0 if no visa, eVisa or visa on arrival. It would be desirable to collect more information about visas in order to construct a measure of “requirements intensity”. We are not aware of any individual or organisation that has elaborated a database with such detailed information.

<sup>4</sup> Several examples proving this trend, among many others and coming from countries in different continents and with an uneven degree of development could be underlined: since 2001, EU citizens except from the UK and Ireland are exempted from the visa requirement when travelling to Albania. Since 2007, Cambodia allows all foreign visitors to obtain a tourist visa upon arrival at the airport. Also since 2007, Philippines granted visa free to Indians nationals. Since 2008, Ecuador allows tourists from all countries but 10 to stay for up to 90 days without a visa on their arrival. However, that is not a unanimous trend, and there are cases of stricter visa policy. For example, in application of the Schengen

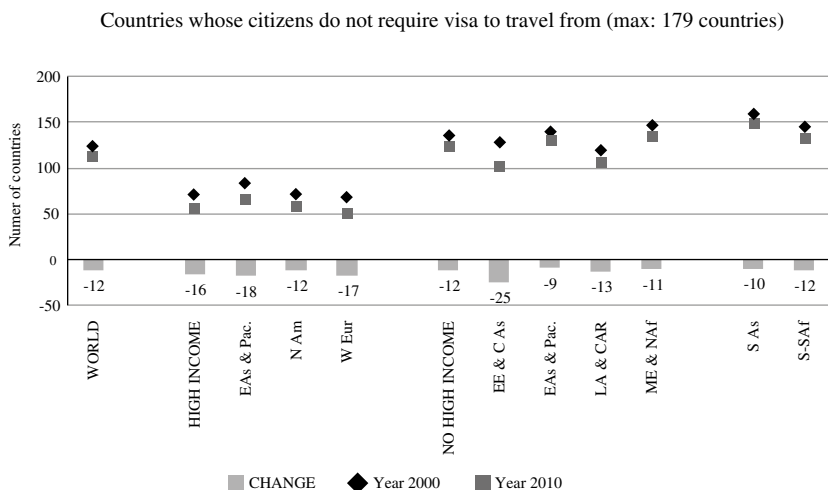
GRAPHIC 1  
VISA RESTRICTIONS IN THE WORLD

PANEL A



Source: Own calculations. Note on data interpretation: each value means that, on average, a particular region imposes visa restrictions on citizens coming for that number of countries (e.g.; for the world as a whole, the average diminishes by 8, i.e., from 133 in year 2000 to 125 on year 2010).

PANEL B



Source: Own calculations. Note on data interpretation: each value means that, on average, a citizen of a particular region suffers visa restrictions when traveling to that number of countries (e.g.; for the world as a whole, the average diminishes by 12, i.e., from 124 in year 2000 to 112 on year 2010).

number of restrictions imposed to foreign visitors and for the quantity of visas limiting that average country's citizen freedom to travel abroad.

Taking into account the countries where information is available for the 2000-2010 period, the net reduction in the number of visa restrictions is slightly lower than 10 percent (from the initial level in 2000), and that trend towards a cut in this kind of barrier sped up between 2005 and 2010 with respect to the previous five-year period. A stronger path towards more flexibility appears among non-high income countries than among high income ones. The reduction in the average number of visa restrictions in the first set of countries tripled that in the rich countries. As a result, at the end of the period, the number of countries under visa requirements set by the average developed country (123) was essentially equal to the number of those affected by restrictions set by the average non-high income economy (124).

On the other hand, the high income countries enjoyed a larger decrease in the number of visa imposed to their citizens, even if the reduction was also visible for less developed and emerging countries<sup>5</sup>. Indeed, in 2010, an average high income country's citizen had to deal with less than half of visa restrictions than an average non-high income country's one.

Finally, reciprocity has been a common feature in the global process of cutting the number of visa restrictions (i.e., a more liberal approach by a country with respect to travelers coming from another country is answered with a similar change by the partner), since about half of the total number of cuts are reciprocal.

Data on income and population in 2000 and 2010 are taken from World Bank (2012). Time-invariant dyadic explanatory variable such as distance, contiguity, common language, colonial relationship and same continent are obtained from Head *et al.* (2010). We draw on several sources for the time-variant dyadic variables: the sum of bilateral migration stocks in 1990 and 2000 are from Ozden *et al.* (2011); the sum of bilateral trade flows in 1995 and 2005 are from Head *et al.* (2010) CEPII gravity database; the sum of the sending diplomatic contacts and receiving diplomatic contacts in 1995 and 2005 is obtained from Rahmet *et al.* (2010) Diplomatic Contacts (DIPCON) database; the common membership in a economic integration agreement (EIA) in 1995 and 2005 is obtained from Baier and Bergstrand (2007).<sup>6</sup>

Summary statistics of the variables are displayed in Appendix Table A.1, and a list of the countries of destination included in the analysis is displayed in Appendix Table A.2.

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visa policy, Spain recently introduced a tourist visa to Colombia (2002), Ecuador (2004), Chile, Peru, Argentina and Bolivia (2007), and the rest of Latin America (2009).

<sup>5</sup> The reduction in the number of visa requirements was distinctively intense for the Eastern Europe and Central Asia region, mainly as a result of the accession of several Eastern Europe countries to the European Union during this period.

<sup>6</sup> The web link for publicly available databases are: DIPCON database: <http://www.u.arizona.edu/~volgy>; EIA database: <http://kellogg.nd.edu/faculty/fellows/bergstrand.shtml>; WB-GBM database: <http://data.worldbank.org/data-catalog/global-bilateral-migration-database>; CEPII gravity dataset: <http://www.cepii.fr/anglaisgraph/bdd/gravity.asp>



### 3. RESULTS

Table 2 contains the estimation results. To start with, all the estimations include year-specific country dummies so we control for all possible observable and unobservable country-specific characteristics. Column (1) replicates the preferred specification of Neumayer (2010) paper using data for the years 2000 and 2010. The estimation excludes time-variant explanatory variables ( $LINKS'_{odt}$ ) in equation (1). All the time-invariant dyadic control variables ( $PROX_{od}$ ) exhibit the expected sign and are statistically significant at conventional levels. Geographical and cultural proximity demonstrate a very strong effect on international tourism. For example, pairs of countries that share a common border or speak the same language on average exhibit bilateral tourist flows three times greater than pairs of countries that do not. Turning to the variable of interest, visa restrictions, the estimated coefficient suggest that the existence of a visa requirement reduces the bilateral flows of tourists by 55 percent, close to impact that Neumayer (2010) found using data for travellers in year 2005 (between 60 and 63 percent).<sup>7</sup>

In the second column of Table 2 we introduce a vector of time-variant explanatory variables ( $LINKS'_{odt}$ ). The new variables measuring economic and political links exhibit the expected sign and are statistically significant at conventional levels. The impact of diplomatic relations on international flows of tourists is positive: the presence of an embassy in the country of destination of visitors increases arrivals by 57 percent. In a similar way, if both countries are members of a regional economic agreement, arrivals increase by 13 percent. Moreover, the higher the intensity of exchanges of goods and migrants in the past, the larger the impact on international travel: bilateral travel flows increase by more than 1 percent when either bilateral trade or bilateral migration increases by 10 percent.

In addition to their own explicative role, the inclusion of time-variant control variables,  $LINKS'_{odt}$ , have relevant implications on the estimated magnitude of the coefficients of the rest of variables, included our variable of interest. All the coefficients but one (the one of same region) are much smaller than those reported in Column (1). For example, the coefficient on distance falls by nearly half (from -1.44 to -.787) and the one on colonial link falls by nearly two-thirds (from 0.90 to 0.38). With respect to our variable of interest, the existence of a visa requirement reduces the bilateral flows of visitors by 46 percent.

The third column of Table 2 presents our preferred specification. When the estimation controls for country pair fixed effects, a key ingredient in our analysis, the estimate of visa restrictions dummy falls by nearly two-thirds (from 0.61 to 0.23). The effect of visa restrictions is estimated at 20 percent, i.e. a much smaller impact than the one reported by Neumayer (2010) or our previous estimates. In the same line of argument, after controlling for dyad fixed effects, the positive impact of embassies on international travel flows is approximately 8 percent, i.e. much smaller than the one found without controlling for dyad

<sup>7</sup> Since there is a unanimous trend towards the reduction of visa requirements, we are not to discuss the impact of increasing the number of visa requirements. In other words, we cannot test the hypothesis of a symmetric effect between a reduction and an increase in visa requirements.

TABLE 2  
ESTIMATION RESULTS

Dependent variable	(1)	(2)	(3)	(4)	(5)
Method estimation	ln arrivals OLS	ln arrivals OLS	ln arrivals OLS	arrivals POISSON	arrivals POISSON
Visa restriction odt	-0.789*** [0.0377]	-0.612*** [0.0328]	-0.232*** [0.0563]	-0.635*** [0.0627]	-0.365** [0.163]
ln distance od	-1.441*** [0.0270]	-0.787*** [0.0289]		-0.703*** [0.0702]	
Contiguity od	1.075*** [0.0970]	0.775*** [0.0784]		0.490*** [0.0987]	
Colonial link od	0.900*** [0.111]	0.381*** [0.0871]		0.0944 [0.0884]	
Common language od	1.093*** [0.0431]	0.696*** [0.0388]		0.290*** [0.0634]	
Same region od	0.208*** [0.0417]	0.243*** [0.0369]		0.321*** [0.0754]	
Economic integration agreement odt		0.122*** [0.0370]	-0.041 [0.0373]	0.100* [0.0563]	0.138 [0.123]
Diplomatic relations odt		0.452*** [0.0304]	0.0867** [0.0414]	0.0916 [0.0625]	0.153 [0.100]
ln bilateral trade odt		0.134*** [0.00698]	0.0179* [0.00915]	0.203*** [0.0514]	0.252*** [0.0689]
ln bilateral migration odt		0.193*** [0.00650]	0.399*** [0.0137]	0.196*** [0.0136]	0.128*** [0.0380]
country pair fixed effects			yes		yes
Observations	17,259	16,268	16,268	16,268	16,268
R-squared	0.862	0.887	0.981	0.912	0.933

Note: Robust standard errors in parenthesis. \*, \*\* and \*\*\* indicate significance at 10%, 5% and 1%. All regressions include country-and-year effects and a constant.

fixed effects in this paper (column 2: 56 percent) or in Gil-Pareja *et al.* (2007) (table 1, column 4: 29 percent).

As robustness check we estimate equation (1) using a Poisson estimator with clustered standard errors (Santos Silva and Teneyro, 2006). The results are presented in columns 4 and 5 in Table 2. Results are very similar for our variable of interest: once we control for country pair fixed effects, the detrimental impact of visa restrictions is about 30 percent<sup>8</sup>. Overall we can conclude that the lack

<sup>8</sup> As a final robustness check we also took first differences of equation (1). As suggested by Wooldridge (2002; page 285), in a two-period framework we can test whether the difference version of equation (1) satisfies the assumption of strict exogeneity  $E[\Delta u | \Delta X] = 0$  where  $\Delta X$  is the vector of first differences of all time-variant explanatory variables. When we implemented the differenced version of equation (1) and perform a F-test for joint significance, in all the specifications we could not reject strict exogeneity.

of control for country pair fixed effects introduces a severe upward bias in the impact of visa restrictions on international tourist (and travel) flows.

Next we analyze whether the effect of visa restrictions differs across groups of countries. To test for this, we have interacted the visa restrictions variable with various dummy variables for country groups. The results are displayed in Table 3. To start with, visa restrictions have a more damaging effect on bilateral arrivals to developing countries than to developed countries. Whereas such restrictions reduce bilateral tourist flows by approximately 20 percent to developing countries, the effect is statistically not significantly different from zero on flows to developed countries. The reason is more likely that traveling to developed countries on average is more beneficial for potential tourists than doing it to developing countries (cities, monuments, cultural supplies, entertainment, nightlife, business opportunities, etc.); as a consequence, the existence of visa restrictions does not constitute an impediment to travel to developed countries. Among the more advanced economies, we find that visa restrictions have statistically not significant impact to travel to any of the high-income countries located in East Asia and Pacific (Japan, Australia, New Zealand), North America (Canada and USA) and Western Europe. Among the developing countries, visa restrictions have the largest effect on flows to countries in Eastern Europe and Central Asia (-29 percent), followed by Middle East and Northern Africa (-23 percent), Latin America and the Caribbean (-21 percent) and Sub-Saharan Africa (-20 percent). The effect on travel to low or middle-income eastern Asia and the Pacific, and to South Asia is negative but statistically insignificant. Note that these areas enjoyed the highest level of economic growth in the decade under consideration, which could make more profitable (on average) visiting those countries for business purposes for example (India, Vietnam, Singapore, Malaysia), also being important destinations for leisure tourism (Thailand, Nepal, Maldives). Again, if it was the case, it may explain the lower impact of visa restrictions on tourist arrivals with respect to the rest of less developed and emerging world.

Testing conversely for differential effects of visa restrictions on tourists coming from certain groups of countries, we find that such restrictions have the same effect on those coming from developed (-19 percent) and from developing countries (-20 percent). This result suggest that after controlling for unobserved time-invariant dyad factors, the level of income of the countries does not matter in order to overcome the hassle and economic costs of obtaining a visa for tourists. Nevertheless, we have large heterogeneity in the impact of visa restrictions by geographic regions. Among developed countries, the most strongly affected tourists are those from Western Europe (-26 percent) and North America (-21 percent), whereas flows from East Asia and the Pacific are not statistically affected. Among the various regions of the developing world, visa restrictions have the strongest negative effect on international arrivals from Sub-Saharan Africa (-34 percent) and Eastern European and Central Asia (-21 percent). International tourists coming from low-income countries of Latin America, East Asia, South Asia and Northern Africa not appear to be statistically significantly affected.

As a whole, and apart from the referred differences among particular regions, the results showed in Table 3 strengthen the key message coming from the main estimation (Table 2): visa restrictions have a relevant impact on the number of tourist flows around the world, with potentially serious implications in terms of receipts and related economic activity.

**TABLE 3**  
**IMPACT OF VISA RESTRICTIONS ON INTERNATIONAL TOURIST FLOWS**  
**BY GROUPS OF COUNTRIES**

	(1) Tourists to (income group)	(2) Tourists to (region group)	(3) Tourists from (income group)	(4) Tourists from (region group)
VISA * Dummy (origin or destination country group)				
High income countries	-0.0885 [0.0912]		-0.238*** [0.0777]	
East Asia and Pacific		-0.0829 [0.169]		-0.171 [0.133]
North America		0.187 [0.142]		-0.239** [0.121]
Western Europe		-0.371 [0.279]		-0.304*** [0.0624]
Non-high income countries	-0.227*** [0.0728]		-0.206*** [0.0689]	
Eastern Europe and Central Asia		-0.347** [0.140]		-0.245** [0.114]
East Asia and Pacific		-0.111 [0.168]		-0.0401 [0.178]
Latin America and Caribbean		-0.242** [0.0972]		-0.228 [0.152]
Middle East and Northern Africa		-0.262** [0.126]		-0.108 [0.149]
South Asia		-0.0693 [0.161]		0.104 [0.232]
Sub-Saharan Africa		-0.226** [0.116]		-0.420* [0.221]
Economic integration agreement odt	-0.0403 [0.0499]	-0.0386 [0.0499]	-0.0409 [0.0499]	-0.0372 [0.0500]
Diplomatic relations odt	0.0862** [0.0414]	0.0871** [0.0415]	0.0866** [0.0414]	0.0873** [0.0414]
In bilateral trade odt	0.0176* [0.00913]	0.0174* [0.00917]	0.0178* [0.00915]	0.0179** [0.00913]
In bilateral migration odt	0.0394*** [0.0137]	0.0391*** [0.0138]	0.0396*** [0.0137]	0.0389*** [0.0138]
country pair fixed effects	yes	yes	yes	yes
Number of observations	16,292	16,292	16,292	16,292
R squared	0.981	0.981	0.981	0.981

*Note:* Robust standard errors in parenthesis. \*, \*\* and \*\*\* indicate significance at 10%, 5% and 1%. All regressions include country-and-year effects and a constant.

#### 4. CONCLUSIONS

In this paper, we have shown that visa restrictions have a remarkable impact in the flows of international travelers. However, this effect is much lower (slightly over 20%) than suggested in previous estimations. The main reason for that difference lies in our controlling for country pair fixed effects to overcome an estimation limitation common in the literature on this topic (i.e. lack of control for unobservable heterogeneity across pairs of countries). But, even taking into account this caution, relevant costs in terms of economic activity could still arise from tourist visa restrictions.

Additionally, when analyzing the origin of travelers, we find evidence of a negative and quantitatively similar impact of visa restrictions on people coming from developed and from developing and emerging countries. On the other hand, when studying the destination of international travelers, the detrimental impact of this type of restriction appears to be really significant for visitors to non-high income countries, with the exception of East and South Asia. On the contrary, no relevant effect is detected with respect to travelers going to rich countries. It could be suggested that economic areas with a higher level (developed countries) or a higher growth (East and South Asia) of economic activity maintain the flow of visitors even when visa restrictions exist, since there are larger business opportunities.

The current growing concern about terrorism and national security, particularly intense among developed countries, is providing a basis for an increase in entry requirements, in terms of both the number and the severity of these barriers, including visa restrictions (US Office of Immigration Statistics, 2010). This process, which is working even for pairs of countries not particularly associated with the origin or the main focus of international terrorism, runs against a clear and global –even if slow– path towards the reduction in the number of visa requirements during the last decades.

In this context, the noteworthy difference among regions we find in this paper may support the idea that the new set of visa –and other types of– restrictions settled out by the most developed countries as a result of national security concerns could cause a limited damage in terms of decreasing economic activity. However, if the general trend (towards less visa restrictions) turned around and the number of these kinds of limitations grew worldwide, it could be particularly negative for most of less developed and emerging countries.

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## APPENDIX

TABLE A.1  
DATA DESCRIPTIVES

Data for year 2000	Number	Mean	s.d.	min	max
ln arrivals	9010	6,86	3,44	0	17,89
visa restriction	8643	0,55	0,50	0	1
ln distance	8984	8,48	0,94	4,29	9,89
contiguity	9010	0,04	0,20	0	1
colonial link	9010	0,02	0,15	0	1
common language	9010	0,20	0,40	0	1
same region	9010	0,36	0,48	0	1
regional economic agreement 1995	9010	0,14	0,34	0	1
diplomatic relations 1995	8461	0,44	0,50	0	1
ln bilateral trade 1995	8726	9,31	4,22	0	19,74
ln bilateral migration 1990	8881	5,21	3,48	0	16,10

Data for year 2010	Number	Mean	s.d.	min	max
ln arrivals	9010	7,53	3,09	0,69	18,19
visa restriction dummy	8648	0,48	0,50	0	1
ln distance	8984	8,79	0,94	4,29	9,89
contiguity	9010	0,04	0,20	0	1
colonial link	9010	0,20	0,40	0	1
common language	9010	0,02	0,15	0	1
same region	9010	0,36	0,48	0	1
regional economic agreement 2005	9010	0,14	0,35	0	1
diplomatic relations 2005	8461	0,50	0,50	0	1
ln bilateral trade 2005	8726	10,24	4,51	0	19,97
ln bilateral migration 2000	8881	5,69	3,47	0	16,09

TABLE A.2  
LIST OF COUNTRIES OF DESTINATION

Geographic regions	Included in panel	Countries of destination (code ISO3)																			
East Asia and Pacific (high income)	8	AUS	FJI	HKG	JPN	KOR	NZL	SGP	TWN												
North America	3	CAN	MEX	USA																	
Western Europe	20	AUT	BEL	CHE	CYP	DEU	DNK	ESP	FIN	FRA	GBR										
		GRC	IRL	ISL	ITA	MLT	NLD	NOR	PRT	SVN	SWE										
Eastern Europe and Central Asia	20	ALB	ARM	AZE	BGR	BIH	BLR	CZE	EST	GEO	HRV										
		HUN	KAZ	KGZ	LTU	LVA	MDA	POL	ROM	RUS	SRB										
		SVK	TJK	TKM	UKR	UZB															
East Asia and Pacific (low income)	9	CHN	IDN	KHM	LAO	MMR	MNG	MYS	PHL	PNG	THA										
Latin America and Caribbean	31	AIA	ARG	ATG	BHS	BLZ	BMU	BOL	BRA	BRB	CHL										
		CRI	CUB	CYM	DMA	DOM	ECU	GRD	GTM	HND	HTI										
		NIC	PAN	PER	PRI	PRY	SIL	TTO	URY	VEN											
Middle East and Northern Africa	13	ARE	BHR	DZA	EGY	IRN	IRQ	ISR	JOR	KWT	LBN										
		MAR	OMN	QAT	SAU	SYR	TUN	TUR	YEM	AFG	BDI										
		IND	LKA	NPL	PAK																
South Asia		AGO	BDI	BEN	BFA	BWA	CAF	CIV	CMR	COG	COM										
Sub-Saharan Africa	28	DJI	ERI	ETH	GAB	GHA	GIN	GMB	GNB	GNQ	KEN										
		LBR	LCA	LSO	MDG	MLI	MOZ	MRT	MSR	MTQ	MUS										
		NAM	NGA	REU	RWA	SDN	SEN	SLE	SOM	STP	SWZ										
		TGO	TZA	UGA	ZAF	ZMB	ZWE														

Note: "Underlined" ISO3 countries mean countries with lack of information either in 2000 or 2010; therefore they are excluded from the panel regression analysis.



