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IMPACT OF VISA RESTRICTIONS ON INTERNATIONAL TOURISM ARRIVALS

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Master's Degree in Tourism Economics

(Specialization/Pathway *Monitoring and Evaluation*)

Centre for Postgraduate Studies

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ABSTRACT

This research evaluates the impact of visa restrictions on international tourism arrivals for the period 2017-2019. Despite the relevance of the topic, surprisingly there are just few studies in the economic literature analyzing the extent to which visa restrictions reduce the flow of travelers between countries; due to the scarcity of studies and the visa restriction significance as an important barrier for tourism movements and to achieve economic growth and to reduce unemployment, through the development of the tourism sector. The main objective of this research is to explore the effect of visa restriction on tourism, contemplating different types of visas, by answering these questions: how is the detrimental effect on tourist flow? And which type of visa could be the best alternative for governments? providing this way more information to facilitate decision-making on government visa policy. To address these questions, the present study classifies types of visa restrictions into traditional (visa required), electronic visa (eVisa) and visa obtained at any access point into the state (Visa on arrival), using a gravity model to estimate bilateral tourism movements with OLS and PPML estimations in three different models: first model considers origin, destination, and year fixed effects, while second specification adds multilateral resistance terms and, the last one handle multilateral resistance term with pair fixed effect. Regarding the variables of interest visa required has a higher damage on international tourist arrival in 21.2%. Visa arrival is the type of visa with least negative effects on international tourist flow in both methods, 10.7% in OLS and 13.1% in PPML. Demonstrating in other words, that governments must evaluate the costs of visa policy, the type of visa they require from international tourists, analyze the benefits of visa applications flexibility evaluating the advantages against the disadvantages of visa restrictions.

INTRODUCTION

According to the World Travel and Tourism Council (WTTC, 2019) the tourism sector is one of the world's most high-powered economic sector, contributing to economic growth, development, and job generation. According to the World Travel and Tourism Council (WTTC, 2019) and Oxford Economics (2022), the travel and tourism sector contributed a 10.3% of global GDP in 2019 and US\$ 333 million total travel and tourism jobs were created (including direct and indirect travel and tourism impact). In addition, the tourism sector was the fastest growing sector in 2018 with a 3,9% GDP increase rate forward Automotive manufacturing with 3,7% and Health with 3,3% (WTTC, 2019).

International tourist arrivals increased by 5% in the first nine months of 2018 over the same period last year, representing a strong and persistent global economic situation (UNWTO,2018), by the way according with the UNWTO, international tourist arrivals grew by a 4% from January to September 2019 compared to the same period the previous year, leaded by The Middle East and followed by Asia and the Pacific and Africa. All the regions increased tourist flow and was the tenth consecutive year of sector growth, nevertheless expansion was slower in 2019 compared to 2017 growth rates (7%) and 2018 (5%).

In 2020, international tourist arrivals fell by 72% due to COVID-19 pandemic (UNWTO, 2020) but in 2022 tourism sector is recovering from the pandemic. Destinations welcomed almost three times international tourist arrivals as in the same period of 2021, with Europe as the region with the highest recovery of international tourist arrivals increasing by 350% compared to 2021 in the first five months of the year. Although this recovery faced during the first semester of 2022, tourism figures in 2022 remained a 61% below to 2019 levels (UNWTO,2022).

Consequently, since visa restriction is an important barrier for tourism movements, visa facilitation is crucial to achieve economic growth and to reduce unemployment, through the development of the tourism sector. Visa restrictions are imposed by the vast majority of nations to control security and immigration (Neumayer,2010); however, they have also turned into an obstacle to travel and for the development of the tourism sector.

According to UNWTO (2015), between 2010 and 2015 a total of 54 destinations have adjusted their visa policy for citizens from more than 30 nations, going from traditional visa requirements (visa required) to either electronic Visa (eVisa), visa on arrival or no visa require. These shifts have significantly simplified they visa procurement process. In particular, between 2014 to 2015 most changes were from visa required to eVisa, but between 2010 and 2015 the most common shift was from visa required to visa on arrival, representing a 62% of all changes.

Just to give some examples of the impact on tourism movements of these changes, tourist arrivals and receipts to Central and Eastern Europe destinations grew by a 5% in 2018 due to simpler visa procedures for Chinese tourists (UNWTO, 2019), also enhanced visa facilitation continued to push travel in 2018 within and outside Asia and the Pacific region in 7% for international tourism arrival and international tourism receipts (UNWTO, 2019).

Research by UNWTO (2015, 2019) and the WTTC (2012) exhibit that enhancing visa process could have generated an additional US\$ 206 billion in tourism receipts and around 5.1 million jobs by 2015 in the G20 economies, noting that travel facilitation is narrowly interlaced with tourism and economic development.

As a matter of fact, the UNWTO (2012) points out that to take full advantage of the socioeconomic benefits that international tourism can bring to a country, it is necessary to establish some conditions that make the country competitive, among which most essentially is to make it easy to visit. This also could also help to solve recent troubles, such as personnel shortage and severe airport congestion (UNWTO, 2022).

Surprisingly, in spite of the relevance of the topic, there are just few studies in the economic literature analyzing the extent to which visa restrictions affect the flow of travelers between countries. Neumayer (2010) is the first author who analyzed visa restriction's effect on international trips, finding that visa regulation scales down bilateral movement of travelers in more than 50%. Later, Artal-Tur, Lopez and Silvente (2016) and Mau, Gulzau, Laube and Zaun (2015) have also tried to provide empirical evidence of the impact of visa regulations and a common result to these works is the detrimental impact of border constraint on tourism and trade, notwithstanding the fallout are not the same in all regions around the world.

Even though visa restraint exists in a great majority of nations, there are an imbalance access to abroad space, mostly affecting developing countries, since ironically, citizens from richer a country are who pay less to travel abroad (Recchi, Deutschmann, Gabrielli and Kholmatova, 2021). For instance, Africa is one of the regions in the world with the highest restrictions, and African citizens pay a lot of charges (in term of money and time) to travel abroad.

Further, the asymmetry can also be found in the types of visas that exist in terms of easiness to travel. The UNWTO (2019), provides visa requirement data and it shows that in 1980, the world population affected for traditional visa was 75%, 5% for visa on arrival and 2% eVisa. Certainly, in 2018 there is proof of visa requirement diversification, although traditional visa is still the most requested. World population affected for traditional visa was 53%,16% for visa on arrival, 10% eVisa and 21% no visa required. Consequently, although visa restrictions still exist, it seems that the procedures to obtain a visa are now more flexible.

There are qualitative studies, such as the review by Cakar, Kalbaska, Inanir and Sahin Oren. (2018), who identified eVisa positive impact on destination's image

and tourist's return intentions in Turkey. However, there is not a single study that empirically analyses the effect of different types of travel visa on bilateral tourist arrivals. Moreover, most of the papers that exist on this topic focus on the impact of changes in visa policy for a particular country. Therefore, due to the scarcity of studies about the impact of visa restriction on tourism, the present research contributes to the existing literature by (i) exploring the aggregate effect of visa restriction on tourism, (ii) contemplating different types of visas and (iii) using a database that comprises worldwide tourism movements. This analysis would provide more information to facilitate decision-making process on government visa policy, by answering two questions: how is the detrimental effect on tourist flow? And which type of visa could be the best alternative for governments?

To address these questions, the present study classifies types of visa restrictions into traditional (visa required), electronic visa (eVisa) and visa obtained at any access point into the state (Visa on arrival). To appraise and estimate the effect of visa on tourist arrivals, the research defines a gravity model for worldwide bilateral tourism movements. This model has been adopted to assess the impact on a variety of policy issues (Cheng and Wall, 2005). For the empirical analysis, the research applies different specifications and econometric procedures. The first model considers origin, destination, and year fixed effects, while second specification adds multilateral resistance terms and, the last one handle multilateral resistance term with pair fixed effect.

The rest of the paper is organized as follows: the section 2 presents general literature review. Section 3 describes methodology and data. Section 4 discusses the results and section 5 concludes.

LITERATURE REVIEW

The main antecedents for the analysis of the impact of visa restrictions can be found on the trade and migration literature. Trade, migration, and tourism imply a movement from one country to another, in the first case of goods and in the latter cases of people. To ensure people movements, permanently as in the case of migration or temporary as in the case of tourism, a visa could be required depending on the origin and destination nations, which leads to additional costs, effort, and time, turning into an obstacle for trips.

Empirical evidence indicates that visa restrictions negatively affect trade. For instance, Neumayer (2011) estimates an effect of visa on trade of 17.5% in unilateral visa control and by 25% if it is bilateral regulation. Similarly, Czaika and Neumayer (2017) find an adverse effect of visa restrictions on bilateral trade, but smaller than in Neumayer (2011), of a 20%.

Yasar, Lisner, and Rejesus (2012) assess the effect of the United States Visa Waiver Program (VWP) on bilateral trade. The visa waiver program on bilateral trade authorizes citizens from several countries to enter the nation as temporary visitors, for business or tourism intent, without the need to visit a US consulate abroad. As main findings the authors detect that this program has pushed economic benefit of the country, improving US exports to countries belonging to the program by making the foreign guest conscious of the products and services available in the United States. Consequently, the authors show that there is positive relationship between VWP and bilateral trade, contributing to the economic welfare of the US by enhancing more trade between their countries and the US.

Regarding the effect of visa on migration, some authors have found that visa restrictions significantly diminish immigration, but also emigration flows, and therefore this barrier reduces global circulation of people. Although visa might neutralize the effects of economic cycles in the destinations and origins (Czaika

and Haas, 2014), these effects do not happen equally around the world, since on one side, citizens of the Organization for Economic Co-operation and Development (OECD) countries have easier access to other parts of the world, due to lower imposed restrictions. On the other side, the citizens from poor and authoritarian countries face higher restrictions, enabling unequal access to foreign spaces between the rich and the poor nations of the world (Neumayer, 2006).

Finally, regarding the effect of visa restrictions on tourism movements, one might expect a detrimental effect of visa on tourist flow. Reilly and Tekleselassie (2018) perform comparison among countries admitted to the VWP in 2008, a similar set of countries that were in the process of negotiations to join the program and the rest of the world, revealing a remarkable increase of 40% in inbound travel to the US from countries admitted to the VWP compared with the countries in the process to join the program and a growth of 36% compared to the rest of the world not in the VWP. Lawson and Roychoudhury (2016) denote a hurdle effect of travel visa requirements on international tourist travel at both the aggregate and the bilateral level.

By the way, Neumayer (2010) and Artal-Tur, Lopez and Silvente (2016) find that visa requirement reduces, on average, bilateral tourism flows although the effect depends on the specification model and, there are differences between the origin and destination country.

Neumayer (2010) detect a negative effect of visa restriction on tourism which is accentuated for tourists who visit and come from developing countries. Whereas, Artal-Tur, Lopez and Silvente (2016) identify a negative and significant impact of visa for tourists visiting developing countries except for East and South Asia, but on the contrary, there is no difference between the tourists of developed countries and in development for home country restrictions.

Song, Gartner and Tasci (2011) obtained that visitor flows to China decline specifically after two events: (i) in 1989 after Tiananmen square protests where visas were used as a tool to filter visitors with different political views, and (ii). In 2008 before and after Olympic Games in Beijing, since foreign ministry modified

visa policy to a tighter one for security considerations (Barboza, 2008). Moreover, this visa regulation declined China's marketing campaigns productivity aimed at its country brand to strengthen its exports, foreign direct investment and tourism.

Another study implemented by Karaman (2016) examines the impacts of visa policies on the inbound visitors to Turkey for a period 2000-2013 when liberal visa policies were actively implemented, and he find that the visa restrictions enforced on a country has a detrimental impact of 29% on average tourism inbound; affecting more countries with almost visa-free travel, as its citizens have many other visa-free travel alternatives available, contrary for countries whose nationals do not have many choices to travel without a visa, so the visa restrictions impact is low.

Other contributors as Balli, Balli and Cebeci (2013) also find, a meaningful impact on inbound tourism due to government's visa waiving policies. They have also detected an important repercussion on travelers' preferences because of indirect marketing result of soap operas on Turkey's international tourism demand, showing that soap operas exported specially to middle eastern, eastern European and north African countries have influenced the preferences of this countries.

With respect to the visa restriction evolution, it seems that countries have become more open since fewer restrictions have been applied during the last decades. Mau, Gulzau, Laube and Zaun (2015) recognize that visa policies have changed during the last 40 years, finding that visa exemptions significantly increase from 1969, but not equally in all the countries of the world. While citizens of OECD countries can travel visa-free to many parts of the world, those from non-OECD countries have it more difficult. An example of this are the citizens of low economic development in some states of Africa, since they have lost mobility in 2010 compared with 1969, therefore there is more mobility for some citizens but less for others. This inequality is also reflected in the cost of the visa.

Recchi, Deutschmann, Gabrielli, and Kholmatova (2021) point out a negative strong and significant relation between tourist-visa costs and income of sender's country per capita: richer is the country, less its citizens pay for the visas to travel

abroad, with African countries as the exception, because its citizens pay very much and load very much to other countries of the world (McKay and Tsegay, 2018)

By contrast to the studies previously highlighted, the present research contributes to the existing literature, measuring the different impacts of visa restrictions on tourism flow, making a difference in visa types: traditional visa, visa on arrival and evisa on bilateral travel of all countries with available data. This thesis pretends to complement studies such as McKay and Tsegay (2018) which groups visa on arrival and visa exemption as a dummy variable for visa as non-restrictive and groups visa prior to arrival as restrictive, and as Karaman (2016) who cover in his study all types of visa regulation: consulate, visa on arrival, e-visas and visa exemption but only for Turkey.

DATA

This research uses a database that includes information for 190 origin countries and 170 destination countries for period of years 2017 to 2019. The database is compiled from different data sources as discussed in Table 1.

Table 1: Variable definition and description

Variable	Definition	Obs.	Mean	Std. dev
TA_{ijt}	Tourist arrivals to destination country for origin country at time t.	32.220	910958.4	5.55e+07
$Tvisa_{ijt}$	Takes the value 1 if a consent from a foreign authority to get into a destination country is required prior to travel, 0 otherwise.	96.900	0.4336945	0.4955866
$Evisa_{ijt}$	Prerequisite for foreign citizen travelling to a country where electronic permission to enter is required.	96.900	0.0557688	0.229476
$Avisa_{ijt}$	Takes the value 1 if a permission from a foreign authority to enter a destination country is needed but can be acquired on arrival, 0 otherwise.	96.900	0.1542518	0.3611918
$Dist_{ij}$	Distance between origin and destination country.	94.752	8.744997	0.8479307
$Border_{ij}$	Dummy variable =1 if both countries share a common border.	94.752	0.164957	0.1273725
$Colony_{ij}$	Dummy variable =1 if both countries has had a common colonial link.	94.752	0.129179	0.1129212

$Lang_{ij}$	Common official language: a dummy variable for common official language =1 if two countries share a regional or national official language).	96.900	0.1930031	0.3946575
$Linguistic_{ij}$	Linguistic proximity: a continuous index in [0, 1] measuring how similar the languages spoken by two populations i and j are.	96.900	0.840527	0.1725877
$GDPPC_{jt}$	Real GDP per capita at destination.	93.100	8.831807	1.418652
$GDPPC_{it}$	Real GDP per capita at origin.	91.460	8.710398	1.459357
PPP_{ijt}	Relative prices between the origin and destination country.	85.652	-0.135201	3.739374
Whs_{jt}	Number of World Heritage sites (natural + cultural) in destination.	96.900	6.511765	9.78754
Ge_{jt}	A continuous index of government effectiveness at destination between -3 to 3.	95.190	0.10016	0.9434983
Ge_{it}	A continuous index of government effectiveness at origin between -3 to 3.	95.880	-0.031653	0.9935774
$Attacks_{jt}$	Total number of terrorist attacks at destination.	64.600	24.73235	86.00652
$nKillpop_{jt}$	people killed in terrorist attacks per 100,000 inhabitants.	64.600	0.1920363	1.133525
rta_{ijt}	dummy variable =1 if both countries belong to the same trade agreement,0 otherwise.	96.900	0.2393498	0.4266889
$Temp_{jt}$	annual average temperature at the destination.	94.050	18.96404	8.148129
Cpi_{jt}	Consumer price index at destination.	82.650	138.6096	47.31697
Cpi_{it}	Consumer price index at origin.	80.240	145.428	82.78223
$Tradeopen_{jt}$	Destination size of the imports and exports as a percentage of GDP that is used as a proxy for trade openness.	81.510	94.17348	57.46278
$Curcol_{ij}$	Current colony dummy that takes value =1 if both countries are present colonies, 0 otherwise.	94.752	0.0001266	0.0112531
$Smctry_{ij}$	A dummy variable that takes value =1 if both countries in the pair were part of the same country in the past, 0 otherwise.	94.752	0.0078837	0.0884402
Cu_{ijt}	Dummy variable of customs union =1 if both countries belong to the same custom union, 0 otherwise.	96.900	0.0211249	0.1438013
Ps_{jt}	A continuous index of political stability at destination between -3 to 3.	96.330	0.0744248	0.9005165
Ps_{it}	A continuous index of political stability at origin between -3 to 3.	96.900	-0.040066	0.976762
Cc_{jt}	A continuous index of control of corruption at destination between -3 to 3.	95.190	0.075022	0.9597933

The dependent variable:

The dependent variable (TA_{ijt}) is the number of tourism arrivals to destination country j for origin country i in year t. The source is United Nations World Tourism Organization (UNWTO).

The explanatory variables:

Information of the main explanatory variable is presented as follows. Bilateral visa ($VISA_{ijt}$) information comes from Passport Index website, established by Arton Capital, a financial advisory company specializing in investment programs for residence and citizenship, wherein is located a real-time interactive ranking of all passport and visa requirements, sorted into visa free, visa on arrival and visa required since 2015 to 2022 based on official information provided by the governments of the different countries. This variable ($VISA_{ijt}$) is defined as a dummy variable that takes the value 1 when country i imposes any type of visa requirement to tourists from country j in year t . Then, the variable will be split by types of visa defined according Passport Index website: Traditional Visa ($Tvisa_{ijt}$) a consent from a foreign authority to get into a country is required prior to travel; Electronic Visa ($Evisa_{ijt}$) prerequisite for foreign citizen travelling to a country where permission to enter is not required and Visa-on-arrival ($Avisa_{ijt}$) a permission from a foreign authority to enter a country is needed but can be acquired on arrival.

The Gross Domestic Product per capita ($GDPPC_{ijt}$), trade openness at destination ($Tradeopen_{jt}$), consumer price indexes in both countries (Cpi_{it} , Cpi_{jt}), and relative prices between the origin and destination country (PPP_{ijt}) comes from World Development indicators (WDI) elaborated by the World Bank, that is a compilation of relevant statistics about global development. The variable people killed in terrorist attacks at destination ($nKillpop_{jt}$) and the number of terrorist attacks at destination ($Attacks_{jt}$) come from Global Terrorism Database, a web platform that includes information on domestic and international terrorist attacks around the world from 1970 to 2019 and information on over 200.000 terrorist attacks.

The center for prospective studies and International Information (CEPII) provides data for variables as common border ($contig$), common colonial link ($colony$), current colony ($curcol$), same country in the past ($Smctry$), Customs union (Cu), and distance between origin and destination country ($dist_{ij}$).

The dummy variable trade agreement (Rta), comes from Regional Trade Agreements Information System. This system contains information on agreements notified and allows a dynamic search through all RTA notified according to a selection criterion, such as year of entry into force and type of agreement.

Culture, natural and world heritage sites at destination (Whs_j) come from UNESCO containing a list of number of world heritage properties inscribed each year by region and by country.

Variables related with language as common official language (Col_{ij}) and linguistic proximity index (Lp_{ij}) comes from Domestic and International Common Language Database, retains index measures of linguistic similarity based on 6.534 individual languages.

Annual average, maximum and minimum temperature at destination ($Temp_{jt}$) is taken from Climate Change Knowledge portal. This platform provides global data on historical and future climate, disaster risk and other climate related topics.

Finally, governance indicators variables like indicators political stability (Ps_{ijt}), government effectiveness (Ge_{ijt}) and control of corruption at destination (Cc_{jt}) comes from World Governance Indicators that reports aggregate and individual governance indicators over the period 1996 to 2020.

METHODOLOGY

The empirical analysis uses a gravity model for tourism demand. This type of specification has been extensively used in international trade to estimate impacts of a large variety of policy issues (Cheng and Wall, 2005; Baldwin and Taglioni, 2006). Moreover, it is considered as one of the most successful empirical backdrops in international economics (Gómez Herrera, 2011) and some authors as Kimura and Lee (2006) have proved gravity equation get better achievement with international trade in services than international trade in goods.

Particularly, this document uses a panel gravity model framework, mainly because in accordance with Rosselló and Santana-Gallego (2022) it has several advantages: Firstly, this framework captures significant relationships over time, and secondly, it prevents the risk of selecting an unrepresentative year. However, according to Neumayer (2010) as a handicap, gravity models have to deal with two main problems: one is identification problem due to potential omitted variable bias and the other issue, a potential sample selection problem due to lack of information.

The gravity models defined for the empirical analysis are estimated by Ordinary Least Squares (OLS) with log specification and Pseudo-Poisson Maximum Likelihood (PPML) as estimation methods. Concerning PPML, in compliance with Correia, Guimarães, and Zylkin (2019a and 2019b) this estimator has as main advantages over the OLS estimator, the multi-way fixed effects, consider zero values on the dependent variable, tolerates large database, and properly accounts for the existence of heteroscedastic residuals (Santos-Silva and Tenreyro, 2006), becoming PPML the preferred estimation method (Rosselló and Santana-Gallego, 2022).

Moreover, three different specifications with different sets of fixed effects and controls are defined. The initial model is fixed effects identified in Model 1, continuing with Multilateral Tourism Resistance (MTR) specified in Model 2 and finishing with dyad fixed effects added as established in Model 3.

Firstly, a basic model to explore the effect of visa restriction is estimated as defined by Model 1. This simple version of gravity models includes origin, destination, and year fixed effects ($\lambda_i, \lambda_j, \lambda_t$) as well as a large set of control variables.

$$\begin{aligned}
 \text{[Model 1]} \quad \ln TA_{ijt} = & B_0 + B_1 \ln Dist_{ij} + B_2 Border_{ij} + B_3 Colony_{ij} + B_4 Lang_{ij} + \\
 & B_5 Linguistic_{ij} + B_6 \ln GDPPC_{ijt} + B_7 \ln PPP_{ijt} + B_8 Whs_{jt} + B_9 Ge_{ijt} + \\
 & B_{10} nKillpop_{jt} + B_{11} rta + B_{12} Temp_{jt} + B_{13} Cpi_{ijt} + B_{14} Tradeopen_{jt} + \\
 & B_{15} Attacks_{jt} + B_{16} curcol + B_{17} smctry + B_{18} cu + B_{19} Ps_{ijt} + B_{20} Cc_{jt} + \\
 & B_{21} Tvisa_{ijt} + B_{22} Evisa_{ijt} + B_{23} Avisas_{ijt} + (\lambda_i + \lambda_j + \lambda_t) + u_{ijt}
 \end{aligned}$$

Secondly, we add to the specification multilateral tourism resistances (λ_{it} , λ_{jt}) to control inconsistent estimation including MRT, due to MTR are the barriers which each i and j deal with all their trading partners (Adam and Cobham, 2007)

$$\text{[Model 2]} \quad \ln TA_{ijt} = B_0 + B_1 \ln Dist_{ij} + B_2 Border_{ij} + B_3 Colony_{ij} + B_4 Lang_{ij} + B_5 Linguistic_{ij} + B_{11} rta + B_{16} curcol + B_{17} smctry + B_{18} cu + B_{21} Tvisa_{ijt} + B_{22} Evisa_{ijt} + B_{23} Avisa_{ijt} + (\lambda_{it} + \lambda_{jt}) + u_{ij}$$

Without considering multilateral resistance terms it would not be easy to interpret the exactly real tourism flow between two countries, then without consider multilateral resistance it is impossible either to obtain precise estimates (Adam and Cobham, 2007) since, the result could be bias. Roselló and Santana-Gallego (2022) point out that could arise relevant bias when multilateral resistance is ignored: first, the extent of the estimated coefficients doubles those acquired in the structural setting, and second, the estimated impact of migration on tourism is larger due there is no control for the remoteness of the country pairs implicated.

Now, in Model 2, it is not necessary to includes origin-year and destination-year controls such as GDP per capita or quality of institutions at destination and origin. Regarding fixed effect estimation, it can be biased and inconsistent, since it does not consider differences between countries, for this reason, origin and destination fixed effect is included in first model, allowing analysis of unobserved or wrongly specified factors that simultaneously explain trade volume between two countries (Cheng and Wall, 2005). Subsequently, Adam and Cobham (2007) find that adding country fixed effects increase explanatory power, MTR is incorporate. This year-specific destination and year-specific origin fixed effects allow according to Neumayer (2010) capture destination and origin country effects that do not change over time.

Lastly, in Model 3 bilateral fixed effects (λ_{ij}) are included. The dyad fixed effects are recommended by Baldwin and Taglioni (2006) to deal with the identification problem, then are introduced in model three, absorbing all the explanatory variables of the pair, leaving only bilateral variables that change over time, the specification of trade agreements and visa variables.

$$[\text{Model 3}] \ln TA_{ijt} = B_0 + B_1 rta + B_2 Tvisa + B_3 Evisa + B_4 Avis a + (\lambda_{it} + \lambda_{jt} + \lambda_{ij}) + u_{ij}$$

It is worth to mention that *visa restriction variable* has little variation over time (Neumayer, 2006), although this study makes a differentiation of visas as traditional, electronic and on arrival, the variation in this variable is still small. For this reason, this article performs estimates with and without pair fixed effects to observe estimated effect visa dummies changes.

EMPIRICAL RESULTS

Table 2 contains the first estimations results of model 1 with fixed effects with OLS and PPML methods. In general terms, OLS explains this first model at 88%, whereas PPML at 98%, so the performance of this model is much higher with the second estimation method. Among all the consider variables, the statistically significant variables at conventional levels in both methods are distance, common land border, colony, common official language, linguistic proximity, regional trade agreement, current colony, customs union, visa variables and only in OLS method, political stability variable.

Table 2: Model 1 with basic fixed effects

Dependent variable	Ln Tourist arrivals		Tourist arrivals	
Estimation method	OLS (1)		PPML (2)	
	Coeff.	Robust S.E.	Coeff.	Robust S.E.
LnDist _{ij}	-1.351 ***	[0.0164]	-1.118 ***	[0.0615]
Border _{ij}	0.446 ***	[0.0842]	-0.854 **	[0.3818]
Colony _{ij}	0.824 ***	[0.0749]	-0.004	[0.1528]
Lang _{ij}	0.556 ***	[0.0275]	0.684 ***	[0.1118]
Linguistic _{ij}	1.661 ***	[0.0632]	1.987 ***	[0.1517]
LnGDPPC _{jt}	1.195	[0.8559]	1.599	[4.2687]
LnGDPPC _{it}	0.432	[0.7586]	1.309	[2.9302]

$\ln PPP_{ijt}$	-0.136	[0.3432]	0.320	[1.3567]
Whs_{jt}	-0.055	[0.0396]	-0.000	[0.0817]
Ge_{jt}	0.006	[0.1682]	-0.127	[1.0909]
Ge_{it}	0.086	[0.1705]	0.047	[1.1865]
$nKillpop_{jt}$	0.098	[0.1516]	-0.170	[0.9871]
rta_{ijt}	0.332 ***	[0.0240]	-0.513 ***	[0.1551]
$Temp_{jt}$	0.018	[0.0306]	0.047	[0.2217]
Cpi_{jt}	0.004	[0.0032]	-0.003	[0.0093]
Cpi_{it}	0.000	[0.0007]	0.001	[0.0028]
$Tradeopen_{jt}$	0.002	[0.0044]	0.006	[0.0109]
$Attacks_{jt}$	-0.000	[0.0007]	-0.000	[0.0029]
$Curcol_{ij}$	-1.357 **	[0.6267]	1.256 ***	[0.3670]
$Smctry_{ij}$	0.140	[0.1124]	1.358 ***	[0.4315]
Cu_{ijt}	0.360 ***	[0.0649]	0.717 **	[0.3102]
Ps_{jt}	0.223 *	[0.1173]	0.112	[0.6881]
Ps_{it}	-0.109	[0.1120]	-0.005	[0.7506]
Cc_{jt}	0.079	[0.1733]	0.153	[0.5931]
$Tvisa_{ijt}$	-0.869 ***	[0.0303]	-1.479 ***	[0.0919]
$Evisa_{ijt}$	-0.736 ***	[0.0540]	-1.992 ***	[0.3030]
$Avisa_{ijt}$	-0.490 ***	[0.0407]	-0.440 ***	[0.1657]
Constant	3.601	[10.457]	-2.182	[39.375]
Origin -FE	Yes		Yes	
Destination -FE	Yes		Yes	
Year -FE	Yes		Yes	
observations	21.261		21.286	
R-squared	0.8814		0.9877	

Note: Robust standard errors in parenthesis. *, ** and *** indicate significance at 10%, 5% and 1% level, respectively.

On the one hand, distance variable has a detrimental impact on tourist arrivals, while common official language, linguistic proximity and customs union have a positive effect on the tourist arrivals variable. Moreover, common land border dyad and regional trade agreement impact change according to the estimation

method, since in OLS it is positive but negative in PPML; colony link is relevant and favorable to tourist flow in OLS method although it is not significant in PPML; current colony has harmful impact with OLS and positive with PPML; being part of the same country in the past is significant and positive only when using PPML estimation method; and according with first method, political stability at destination improve tourist arrivals, while on the contrary this variable is not significant for the second estimation method.

Variables as GDP per capita at destination and origin, PPP, WHS, Government effectiveness, number of kill population, temperature, consumer price index, trade openness, terrorist attacks, political stability at origin and control of corruption are not significant with either of the two estimation methods.

As for the variables of interest, without a doubt each of visa variables has a negative impact on international tourist flow. The interesting aspect here is that with the first estimation method (OLS), visa required is the one that has the most detrimental impact on the dependent variable, followed by e-Visa and Visa on arrival, but with the second method (PPML) the results change, since the type of visa that reduces the tourist flow to a greater extent is e-Visa, although it should be noted the estimated precision for this variable is lower, due to its robust standard error is greater compared to that of visa required or visa on arrival. However, it should be noted that this model is not properly controlling for multilateral resistances to tourism as well as bilateral fixed travel costs that are required when this specification is estimated.

For this reason, Model 2 includes multilateral resistances and these estimates are presented in Table 3. Note that all origin and destination specific variables are now dropped from the estimates in Model 2 since they are already controlled by the origin-year and destination-year fixed effects. The number of observations increases by 63%, when global shocks that affect international tourist arrivals worldwide are controlled by multilateral resistance, and the strength of the variables to predict the outcome remains high and similar to the ones in the first model. Regarding the precision of the coefficient, it is higher in model 2, compared to Model 1 since the standard error of all the variables is lower in this model.

Compared to Model 1, distance is the variable that does not vary in terms of its significance and negative impact on tourist arrivals. Regarding the positive impact, the variables that do not change are Colony, Common official language, Linguistic proximity, Same country in the past (only in PPML) and, Customs union (only in OLS).

On the other hand, regional trade agreement continues with a positive coefficient in OLS and negative in PPML, while current colony remains negative in first method and positive in second one.

Table 3: Model 2 with Multilateral resistances to tourism

Dependent variable	Ln Tourist arrivals		Tourist arrivals	
	OLS		PPML	
Estimation Method	Coeff.	Robust S. E	Coeff.	Robust S. E
LnDist _{ij}	-1.370 ***	[0.0126]	-1.088 ***	[0.0577]
Border _{ij}	0.510 ***	[0.0684]	-0.473	[0.3287]
Colony _{ij}	0.797 ***	[0.0608]	-0.180	[0.1240]
Lang _{ij}	0.545 ***	[0.0219]	0.630 ***	[0.0922]
Linguistic _{ij}	1.606 ***	[0.0502]	2.090 ***	[0.1293]
<i>rta</i> _{ijt}	0.414 ***	[0.0195]	-0.499 ***	[0.1562]
<i>Curcol</i> _{ij}	-1.139 **	[0.5744]	1.304 ***	[0.3281]
<i>Smctry</i> _{ij}	0.107	[0.0922]	1.449 ***	[0.3664]
<i>Cu</i> _{ijt}	0.214 ***	[0.0557]	0.352	[0.3272]
<i>Tvisa</i> _{ijt}	-0.874 ***	[0.0244]	-1.422 ***	[0.0927]
<i>Evisa</i> _{ijt}	-0.769 ***	[0.0425]	-1.830 ***	[0.2242]
<i>Avisa</i> _{ijt}	-0.481 ***	[0.0326]	-0.700 ***	[0.1571]
Constant	18.795	[0.1135]	25.630	[0.4730]
Origin-year FE	Yes		Yes	
Destination-year FE	Yes		Yes	
observations	34.611		34.652	
R-squared	0.8765		0.9860	

Note: Robust standard errors in parenthesis. *, ** and *** indicate significance at 10%, 5% and 1% level, respectively.

The estimates in the variables of interest in this model are in line with the results obtained in model 1. In model 2, visa variables have greater negative enhancement in PPML. In OLS estimation, visa required continues with the greatest detriment, in contrast to the second method where e-visa persists with the most negative effect on the flow of tourists. Visa on arrival has the least detrimental effect on tourist flow in model 1 and model 2.

The negative effect of visa required, and e-visa is slightly less in both estimation methods, compared to model 1, while visa on arrival has a greater effect in both models.

Finally, the model 3 displayed in Table 4, removes all time invariant determinants at pair level and only considers bilateral variables that change over time, in this case regional trade agreement variable and the variables of interest.

Table 4: Model 3 with multilateral resistances to tourism and bilateral fixed costs

Dependent variable	Ln Tourist arrivals		Tourist arrivals	
Estimation method	OLS		PPMLHDFE	
	Coeff.	Robust S.E.	Coeff.	Robust S.E.
rta_{ij}	-0.045	[0.0279]	0.057 **	[0.0234]
$Tvisa_{ijt}$	-0.253 ***	[0.0543]	-0.212 ***	[0.0380]
$Evisa_{ijt}$	-0.289 ***	[0.5766]	-0.143 ***	[0.0446]
$Avisa_{ijt}$	-0.107 *	[0.0496]	-0.131 ***	[0.0339]
Constant	7.381	[0.0280]	20.330	[0.0032]
Origin-year FE	Yes		Yes	
Destination-year FE	Yes		Yes	
Pair FE	Yes		Yes	
Observations	33.710		33.755	
R-squared	0.9859		0.9999	

Note: Robust standard errors in parenthesis. *, ** and *** indicate significance at 10%, 5% and 1% level, respectively.

In this model almost all the parameters are highly significant, except the regional trade agreement variable in OLS method. Moreover, to estimate the parameters of interest this is the preferred model. In addition, the standard errors are lower in the estimation with PPML, this estimate better predicts the model (99.9%), compared to the OLS (98.5%).

Regional trade agreement stops being significant in OLS and become positive in PPML estimation with an impact of 5.7%, in other words, dyads of countries with regional trade agreement have greater possibility of increasing the tourist flow between them.

Regarding the variables of interest, e-visa has the greatest detriment using OLS estimation, affecting tourist flow in 28.9%, while with PPML visa required has a higher damage on international tourist arrival in 21.2%. Visa arrival is the type of visa with least negative effects on international tourist flow in both methods, 10.7% in OLS and 13.1% in PPML.

CONCLUSION

This article explored the effect of visa restriction on tourism flow, contemplating the types of visas: visa required, Evisa and visa on arrival; contributing to the few studies in the economic literature analyzed the extent to which visa restrictions reduce the flow of travelers between countries, demonstrating visa restrictions is an obstacle to travel and tourism, through visa restrictions are imposed by the large majority of nations to control security and immigration (Neumayer,2010).

The type of visa that has the greatest negative impact on international tourist flow is the traditional one, visa required with 21%, followed by Evisa with 14% and finally visa on arrival, with 13% of negative repercussion, showing all visa restrictions affect negative and significantly bilateral travel. These results are lower than the obtained by Neumayer (2010) with a reduction between 52 and 63 percent, while visa required impact is close to 25% of the effect in bilateral regulation found by Neumayer (2011) and to the adverse effect 20% in visa regulation found by Czaika and Neumayer (2017).

World Tourism Organization (2012, 2013, 2016) points out that to take full advantage of the socioeconomic benefits that international tourism can bring to a country, it is necessary to establish some conditions that make the country competitive among which most essentially is to make it easy to visit.

In other words, governments must evaluate the costs of visa policy and specially the type of visa they require from international tourists its negative impact and weigh the advantages against the disadvantages of visa restrictions. It is important that each government analyze the benefits of visa applications flexibility, and more now in post-pandemic times to enhance economic growth, development, and job generation through tourism sector development.

It is also important that governances evaluate their regional trade agreements, due to according to the analysis carried out in this article, if two countries concerned a bilateral trade agreement this increase flow of tourists in 5.7% between them. Making restrictions more flexible would not only increase the international tourist flow, also have other political implications such as increase of trade, foreign investment, birth rate growth, have more workforce and qualified workers contributing to the country's economic development.

Future research could extend the impact analysis of visa regulation types on international tourism arrivals for a longer period and for more destinations and origin countries for the different kind of visas. Moreover, by applying a simulation analysis, we can also evaluate changes on tourism flows due to changes on visa policies.

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APPENDIX

Variable	Definition	Source	
TA_{ijt}	Arrivals to destination country for origin country	United Nations World Tourism Organization	
Pop_{it}	population at origin	World Development Indicators	
GDP_{it}	real GDP at origin		
$GDPPC_{it}$	real GDP per capita at origin		
$Tradeopen_{it}$	trade openness at origin		
Pop_{jt}	population at destination		
GDP_{jt}	real GDP at destination		
$GDPPC_{jt}$	real GDP per capita at destination		
$Tradeopen_{jt}$	trade openness at destination		
PPP_{ijt}	relative prices between the origin and destination country		World Development Indicators
$nKillpop_{jt}$	people killed in terrorist attacks per 100,000 inhabitants		Global Terrorism Database
$Border_{ij}$	dummy variable =1 if both countries share a common border	CEPII database	
$Colony_{ij}$	dummy variable =1 if both countries has had a common colonial link		
$Dist_{ij}$	distance between origin and destination country		
rta_{ijt}	dummy variable =1 if both countries belong to the same trade agreement	Regional Trade Agreements Information System	
$Cwhs_{jt}$	Cultural World heritage sites at destination	UNESCO	
$Nwhs_{jt}$	Natural World Heritage sites at destination		
Whs_{jt}	World Heritage sites (natural + cultural) at destination		
$Cwhs_{it}$	Cultural World heritage sites at origin		
$Nwhs_{it}$	Natural World Heritage sites at origin		
Whs_{it}	World Heritage sites (natural + cultural) at origin		
$Lang_{ij}$	Common official language: a dummy variable for common official language. (=1 if two countries share a regional or national official language).	Domestic and international common language database (DIDL)	
Cnl_{ij}	Common national language: a continuous index in [0, 1] reflecting the likelihood that two people selected at random from populations i and j will speak the same native language		
$Linguistic_{ij}$	Linguistic proximity: a continuous index in [0, 1] measuring how similar the languages spoken by two populations i and j are		

Cl_{ij}	Common Language: a continuous index in [0; 1] computed as the simple average of col, cnl and lp and LPij .	
$Temp_{jt}$	annual average temperature at the destination	Climate change knowledge portal by world bank
$Maxtemp_{jt}$	annual maximum temperature at destination	
$Mintemp_{jt}$	annual minimum temperature at destination	
$Temp_{it}$	annual average temperature at origin	
$Maxtemp_{it}$	annual maximum temperature at origin	
$Mintemp_{it}$	annual minimum temperature at origin	
Va_{it}	voice and accountability at origin	
Ps_{it}	political stability at origin	
Ge_{it}	government effectiveness at origin	
Rq_{it}	regulatory quality at origin	
Rl_{it}	rule of law at origin	
Cc_{it}	control of corruption at origin	
Va_{jt}	voice and accountability at destination	
Ps_{jt}	political stability at destination	
Ge_{jt}	government effectiveness at destination	
Rq_{jt}	regulatory quality at destination	
Rl_{jt}	rule of law at destination	
Cc_{jt}	control of corruption at destination	

Do file stata:

sum tou visa_required eVisa visa_onarrival Indist contig colony col lp lngdppc_dest lngdppc_orig
 lnPPP Event WHS_dest ge_orig ge_dest nkillpop_dest rta temp_dest cpi_dest cpi_orig
 tradeopen_dest attacks_dest curcol smctry cu ps_dest ps_orig cc_dest

*** Model 1 (with origin, destination and fixed effects) *****

reghdfe Intou Indist contig colony col lp lngdppc_dest lngdppc_orig lnPPP WHS_dest ge_orig
ge_dest nkillpop_dest rta temp_dest cpi_dest cpi_orig tradeopen_dest attacks_dest curcol
smctry cu ps_dest ps_orig cc_dest visa_required eVisa visa_onarrival, a(iddest idorig year)
vce(robust)

ppmlhdfe tou Indist contig colony col lp lngdppc_dest lngdppc_orig lnPPP WHS_dest ge_orig
ge_dest nkillpop_dest rta temp_dest cpi_dest cpi_orig tradeopen_dest attacks_dest curcol
smctry cu ps_dest ps_orig cc_dest visa_required eVisa visa_onarrival, a(iddest idorig year)
vce(robust)

*** Model 2 (with multilateral resistance terms) *****

reghdfe Intou Indist contig colony col lp rta curcol smctry cu visa_required eVisa visa_onarrival,
a(iddesty idorigy) vce(robust)

ppmlhdfe tou Indist contig colony col lp rta curcol smctry cu visa_required eVisa visa_onarrival,
a(iddesty idorigy) vce(robust)

*** Model 3 (with multilateral resistance terms and pair fixed effects) *****

reghdfe Intou rta visa_required eVisa visa_onarrival, a(iddesty idorigy idpair) vce(robust)

ppmlhdfe tou rta visa_required eVisa visa_onarrival, a(iddesty idorigy idpair) vce(robust)