The migration-tourism nexus in the EU28

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Abstract

This study explores the nexus between tourism and migration on an intra-European scale over the period 2000-2015. Complex-network analysis and gravity models were the investigation methods preferred. For each year under study, we built two country-to-country networks to map and reveal the connections between states as shaped by migration stocks and tourism flows, respectively. Then, the main determinants of the correlation patterns between the two networks were investigated by several econometric analysis. Results point to a quite similar topological structure for the tourism and migration networks, as well as to a significant and reciprocal direct influence between tourism and migration movements inside the European Union. No relevant indirect causal relationship is present in the tourism-migration nexus instead.

Keywords

migration, tourism, European Union, complex network analysis, gravity model

Introduction

Tourism and migrations represent two strictly interconnected forms of human mobility. On the one hand, permanent international migration generates tourism flows "through the geographical extension of friendship and kinship networks" (Williams and Hall, 2000), which trigger visits to or from distant friends and relatives due to special and unrepeatable events like births, birthdays, graduations, weddings, or funerals (Jackson, 1990). This migration-led-tourism (MLT) relationship is not limited to the visiting friend and relative (VFR) phenomenon only but can positively influence short business and leisure trips as well. In fact, immigrants running a commercial activity may foster visits in the host country from people residing in the country of origin because of the trade links they build with them (Seetaram, 2012a; Massidda and Piras, 2015). Immigrants may also encourage tourism in the host country for the richer cultural experience they provide to tourists (King, 1994; UNWTO, 2010) or they may advocate their adopted country of residence in the country of origin stimulating short-term visits. On the other hand, a second relationship between migration and tourism, known as the tourism-led-migration hypothesis (TLM), describes the causal link running from tourism to migration for economic and social reasons. In fact, tourism may lead to the movement of temporary, seasonal or permanent work migrants (Gössling and Schulz, 2005; Williams and Hall, 2002) as well as to a transition of former tourists, mainly retired people, to permanent residents (King *et al.*, 2000; Mason and Pettit, 2001; Oigenblick and Kirschenbaum, 2002; Rodriguez, 2001; Seetaram, 2012a).

The MLT and TLM phenomena have often been presented as they were completely independent and with reference to few main geographical area of interest: Australia and New Zealand (Backer, 2007, 2008, 2009, 2012a, 2012b; Becken and Gnoth, 2004; Cave *et al*., 2003, Jackson, 1990; McKercher, 1996; Min-En, 2006; Morrison *et al*., 1995, Seetaram, 2012a, 2012b; Seetaram & Dwyer, 2009), the USA and Canada (Braunlich and Nadkarni, 1995; Kim *et al*., 2014; Lehto *et al*., 2001; Mason and Pettit, 2001; Navarro and Turco, 1994; Trites *et al*., 1995; Yuan *et al*., 1995), the UK (Basu, 2004, 2007; Boyne, 2001; Boyne *et al*., 2002; Cohen and Harris, 1998; Denman, 1988; Hay, 1996; King *et al.* 2000; Seaton and Tagg, 1995), and Italy (Etzo *et al.*, 2014; Massidda *et al.*, 2015; Massidda & Piras, 2015).

With this paper we contribute to the existing literature dealing with the analysis of the tourism-migration nexus by providing a simultaneous investigation of the MLT and TLM phenomena within the 28 member states of the European Union (EU28, from now on) over the period 2000-2015. In particular, we addressed three main issues.

First, we investigated and compared the topological properties of the EU28 tourism and migration networks to look for similarities and differences in the complex web of links they create. In doing this, the two networks were treated as two strictly interconnected layers of the same graph where countries represent the nodes and tourism flows or migration stocks work as links between them. Network attributes were quantitatively measured and results visually displayed, in order to show the topology of the EU28 migration-tourism nexus.

Second, the correlation patterns between the two networks and their determinants were explored. In particular, two sets of gravity-like models were fitted to study the main determinants of correlations between tourism and migration networks and to derive an estimate of the direct contribution of permanent migration to the overall tourism phenomenon as well as the capacity of tourism to generate new migration. To this end, the stock of immigrants present in country *i* and originating from country *j* was included as an explanatory factor for tourism in country *i*, whereas the number of tourists present in country *i* and originating from country *j* was considered among the determinants of migration in country *i*.

Third, we looked for any indirect causal relationship in the tourism-migration nexus. More precisely, besides the direct impact of people from either countries present in the other one, to explain bilateral tourism and migration we investigated the indirect effect conveyed, respectively, by migrants and tourists coming from third countries. Basically, we tested the hypothesis whether bilateral tourism (migration) may increase the more the two countries under consideration are connected or central in the migration (tourism) network. We addressed this issue by fitting a gravity model of tourism where country centrality in the migration network is added as a further explanatory factor, and a gravity model of migration where country centrality in the tourism network is added as a further explanatory factor.

The rest of the paper is as follows: the data set and methods used are described in the next session. Then, the network analysis and the panel regressions are presented. A section illustrates and comments on the results. The last section concludes the paper.

Data and methods

Data used in the study refer to the member states of the European Union just before Brexit. The 28 countries considered were: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (EL), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), the Netherlands

(NL), Poland (PL), Portugal (PT), Romania (RO), Spain (SP), Slovakia (SK), Slovenia (SI), Sweden (SE), and United Kingdom (UK).

The study comprised the years 2000, 2003, 2006, 2009, 2012, and 2015 (latest meaningful data) in order to highlight significant variations, if any.

The OECD (Organisation for Economic Co-operation and Development) - the International Migration Database, and EUROSTAT were our sources for migration data. Migration status was defined in terms of nationality and migration stocks were preferred to migration flows as dependent variable, for the long-run equilibrium showed by the former compared to the latter (Brücher and Siliverstovs, 2006). Moreover, migration stocks are based on national censuses that make data more reliable than the annual report of migration flows.

The World Tourism Organization (UNWTO, 2017), the Statistics and Tourism Satellite Account provided us the tourism data, which in a few cases were integrated with data downloaded from the national statistical office of the individual countries. In this study we referred to visitors who spent at least one night away from their home country.

For each year we built two origin-destination square matrices recording, respectively, bilateral migration stocks and bilateral tourism flows between the EU28 member states, with each matrix providing the algebraic representation of the corresponding directed-weighted graph. Thus, the generic element (i, j) of each migration matrix represented the stock of immigrants originating from country i and present in destination j, whereas the generic element (i, j) of each tourism matrix represented the flow of tourists from country i to country j.

Country-specific data were employed to represent the pull and push factors (determinants) for tourism and migration. Figures for the per capita gross domestic product in U.S. dollars (pcGDPUS$), the consumer price index (CPI), and the population (Pop) of any country under study were extracted from the International Monetary Fund (IMF), the World Economic Outlook (WEO) database (April 2018). The (great-circle) geographical distance (DIST) between countries of origin and destination, as well as a set of dummy variables used in gravity equations to identify particular links between countries such as colonial ties (COLON, COMCOLON, CURCOL, and COL45), common languages (LANGoff and LANGethno), contiguity (CONT), and being part of the same country (SMCTR), were retrieved from CEPII database (Mayer & Zignago, 2011). Data collection was completed in November 2018. The econometric analyses were carried out only referring to pairs of countries with a positive connection in both the tourism and migration datasets. This resulted in an unbalanced panel made of 2413 observations.

Network analysis

To study the pattern of connections between member states for every year considered, we built two weighted directed networks: one for the bilateral stock of migration and one for the bilateral flow of tourists between any two countries (nodes), *i* and *j*, in the graph. Connections between countries in the network were shown by links whose weight measured the stock of migrants or the flow of tourists from country *i* to country *j* in the year *y*.

Networks were first statistically validated against a null hypothesis taking into account system heterogeneity (Tumminello et al, 2011; Hatzopoulos et al, 2013). Basically, the method applied allowed us to identify whether a given relationships between the elements of the network was consistent or not with a null hypothesis of random connectivity. Then, the validated tourism and migration networks were investigated and compared by computing several basic topological metrics (da Fontoura Costa *et al*., 2007; Newman, 2010): the total number *n* of nodes (order), the total number *m* of links between nodes (size), the ratio between the size of the network and the maximum number of links it may have (density), and the average distance between all pairs of nodes in the network (average path length or *AvgPL*) lately used to calculate the closeness centrality of the nodes in the two networks.

The assortativity index and the average clustering coefficient were also calculated to measure the correlation between pairs of countries connected by the mobility of people, and the degree to which the selected countries tend to create groups characterized by a relatively high density of ties. The strength of the network division into such communities was measured by the modularity index *Q* (Newman and Girvan, 2004).

Panel regressions

The analysis of the determinants of bilateral tourism and migration between any ordered pair of countries (*i*, *j*) in the EU28 started with an econometric model where, besides the variables of a basic gravity equation (GDPs, population, and distance), we included a price competitive ratio to compare the cost of living in the countries, a set of dummy variables to represent particular links between each pair of countries and/or resistance factors, year-specific fixed effects to account for the European Union (EU) enlargements over the period under study (15 member states before 1st May 2004, then 25, 27, and 28 countries in 2004, 2007, and 2013, respectively), and country-specific fixed effects to control for time-invariant unobserved heterogeneity (Mátyás, 1997;

Wall, 2000). Such basic specification of the gravity models for tourism flows and migration stocks looked, respectively, as follows:

$$\begin{aligned}\ln TOUR_{ij}^{y} = {} & \kappa + \beta_1 \ln(pcGDPUS\$_i^y) + \beta_2 \ln(pcGDPUS\$_j^y) + \beta_3 \ln(Pop_i^y) + \\ & + \beta_4 \ln(Pop_j^y) + \beta_5 \ln(DIST_{ij}) + \beta_6 \ln(CPIratio_{ij}^y) + \\ & + \beta_7 CONT + \beta_8 LANGoff + \beta_9 LANGethno + \beta_{10} COLON + \\ & + \beta_{11} COMCOLON + \beta_{12} CURCOLON + \beta_{13} COL45 + \beta_{14} SMCTR + \varepsilon_{ij}^y \end{aligned} \quad (1T)$$

$$\begin{aligned}\ln MIGR_{ij}^{y} = {} & \kappa + \beta_1 \ln(pcGDPUS\$_i^y) + \beta_2 \ln(pcGDPUS\$_j^y) + \beta_3 \ln(Pop_i^y) + \\ & + \beta_4 \ln(Pop_j^y) + \beta_5 \ln(DIST_{ij}) + \beta_6 \ln(CPIratio_{ij}^y) + \\ & + \beta_7 CONT + \beta_8 LANGoff + \beta_9 LANGethno + \beta_{10} COLON + \\ & + \beta_{11} COMCOLON + \beta_{12} CURCOLON + \beta_{13} COL45 + \beta_{14} SMCTR + \varepsilon_{ij}^y \end{aligned} \quad (1M)$$

where, *ln* denotes natural logarithm, κ is a constant, β s are the coefficients to be estimated, $TOUR_{ij}^y$ measures the tourism flow from country *i* to country *j* in year *y*, whereas $MIGR_{ij}^y$ is the stock of migrants native of country *i* and living in country *j* in year *y*. The $CPIratio_{ij}^y$ is computed as follows:

$$CPIratio_{ij}^y = \frac{CPI_j^y}{CPI_i^y}.$$

CONT (contiguity), *LANGoff* (common official or primary language), *LANGethno* (language spoken by at least 9% of the population in both countries), *COLON* (countries ever in colonial relationship), *COMCOLON* (countries with a common colonizer post

1945), *CURCOL* (countries currently in colonial relationship), *COL45* (countries in colonial relationship post 1945), and *SMCTR* (being part of the same country) are all dummy variables. In fact, it is reasonable to assume that many of those factors might influence the interactions between two countries. ε_{ij}^{y} is the stochastic error term.

Population proxies the size (masses) of the two countries, the *pcGDPUS$* is used as an indicator of the country income/economic development, whereas the physical distance in kilometers between the countries *i* and *j* ($DIST_{ij}$) proxies the transportation costs.

In order to study the nexus between tourism and migration, equations (1T) and (1M) were enlarged with the bilateral stock of migrants and the bilateral flow of tourists, respectively. However, the introduction of migration stocks in the equation (1T) and tourism flows in equation (1M) would inevitably bias the coefficients on the variables due to the common gravity forces (GDP, population, distance, colonial linkages, and so on) governing both tourism and migration. Thus, to avoid the multicollinearity phenomenon, we first computed the residuals from the equations (1T) and (1M) and used such residuals, ln($MIGRres_{ij}^{y}$) and ln($TOURres_{ij}^{y}$), as an independent variable in the enlarged gravity equations. The estimated regressions then became:

$$\begin{aligned} \ln TOUR_{ij}^{y} = {} & \kappa + \beta_1 \ln(pcGDPUS\$_i^{y}) + \beta_2 \ln(pcGDPUS\$_j^{y}) + \beta_3 \ln(Pop_i^{y}) + \\ & + \beta_4 \ln(Pop_j^{y}) + \beta_5 \ln(DIST_{ij}) + \beta_6 \ln(CPIratio_{ij}^{y}) + \beta_7 \ln(MIGRres_{ij}^{y}) + \\ & + \beta_8 CONT + \beta_9 LANGoff + \beta_{10} LANGethno + \beta_{11} COLON + \\ & + \beta_{12} COMCOLON + \beta_{13} CURCOLON + \beta_{14} COL45 + \beta_{15} SMCTR + \varepsilon_{ij}^{y} \end{aligned} \qquad (2T)$$

$$\ln MIGR_{ij}^{y} = \kappa + \beta_1 \ln(pcGDPUS\$_{i}^{y}) + \beta_2 \ln(pcGDPUS\$_{j}^{y}) + \beta_3 \ln(Pop_{i}^{y}) +$$
$$+ \beta_4 \ln(Pop_{j}^{y}) + \beta_5 \ln(DIST_{ij}) + \beta_6 \ln(CPIratio_{ij}^{y}) + \beta_7 \ln(TOURres_{ij}^{y}) + \qquad (2M)$$
$$+ \beta_8 CONT + \beta_9 LANGoff + \beta_{10} LANGethno + \beta_{11} COLON +$$
$$+ \beta_{12} COMCOLON + \beta_{13} CURCOLON + \beta_{14} COL45 + \beta_{15} SMCTR + \varepsilon_{ij}^{y}$$

Finally, a third and last specification of the gravity model was used to investigate the indirect causal relationship in the migration-tourism nexus in the EU28. In particular, we enlarged equations (1T) and (1M) with a control variable related to country centrality in the migration network and the tourism network, respectively. In fact, tourism and migration from country *i* to country *j* might increase proportionally to how central the two countries are in the migration and tourism network, respectively. The introduction of such indirect network effect was intended to better understand the role played by the intricate web of migration and tourism corridors in the relationships among the EU28 countries.

The closeness centrality was the preferred index, but our results are robust to the alternative measure of centrality. The closeness centrality (or closeness) of a node *v* is defined as the inverse of the sum of the shortest paths between the node *v* and all other nodes in the graph. Thus, the more central a node is, the closer it is to all other nodes. In mathematical terms:

$$CLOS_v = \frac{N}{\sum_{u \neq v} d(u,v)},$$

where *N* is the number of nodes in the network graph, and *d(u,v)* is the distance between nodes *v* and *u*.

Equations (3T) and (3M) show the two gravity models including the node centrality measure (CLOS), where $CLOS_{ij}^{y}$ in (3T) is the sum of country *i* and country *j* closeness centrality in the migration network, while $CLOS_{ij}^{y}$ in (3M) is the sum of country *i* and country *j* closeness centrality in the tourism network.

$$\begin{aligned} \ln TOUR_{ij}^{y} = \kappa + \beta_1 \ln(pcGDPUS\$_i^y) + \beta_2 \ln(pcGDPUS\$_j^y) + \beta_3 \ln(Pop_i^y) + \\ + \beta_4 \ln(Pop_j^y) + \beta_5 \ln(DIST_{ij}) + \beta_6 \ln(CPIratio_{ij}^y) + \beta_7 \ln(CLOS_{ij}^y) + \\ + \beta_8 CONT + \beta_9 LANGoff + \beta_{10} LANGethno + \beta_{11} COLON + \\ + \beta_{12} COMCOLON + \beta_{13} COL45 + \beta_{14} SMCTR + \varepsilon_{ij}^y \end{aligned} \quad (3T)$$

$$\begin{aligned} \ln MIGR_{ij}^{y} = \kappa + \beta_1 \ln(pcGDPUS\$_i^y) + \beta_2 \ln(pcGDPUS\$_j^y) + \beta_3 \ln(Pop_i^y) + \\ + \beta_4 \ln(Pop_j^y) + \beta_5 \ln(DIST_{ij}) + \beta_6 \ln(CPIratio_{ij}^y) + \beta_7 \ln(CLOS_{ij}^y) + \\ + \beta_8 CONT + \beta_9 LANGoff + \beta_{10} LANGethno + \beta_{11} COLON + \\ + \beta_{12} COMCOLON + \beta_{13} COL45 + \beta_{14} SMCTR + \varepsilon_{ij}^y \end{aligned} \quad (3M)$$

Results and discussion

Figure 1 shows the tourism (Fig. 1a) and migration (Fig. 1b) networks for the year 2015. To avoid superimposition only the main links between countries have been represented. A visual inspection of the two graphs reveals that Austria (AT), Germany (DE), Spain (ES), and the United Kingdom (UK) were among the main destinations for both migration and tourism phenomena. Italy kept its primacy in the tourism market in Europe, while it was not the preferred destination for migration movements in Europe probably because of its difficulty to recover from the economic crisis, which has interested the countries of the euro area since 2007.

To better characterize the tourism and migration dynamics over the time horizon considered, the topological properties of the two networks were measured with the Radatools set of programs (Radatools, 2018). Table 1 reports the quantitative analyses carried out.

The order of the two networks shows that all the member states of the European Union recorded at least a positive value in the tourism and migration movements in the years studied. A strong and growing number of tourism and migration corridors among the countries selected is revealed by the high and increasing values for the size and density of the two networks over time. This positive trend increased the efficiency of the two networks, as measured by the AvgPL, by shortening (on average) the topological distance between the countries and fostering (on average) new dynamics in the tourism and migration mobility of people. Yet, while the trend towards a more and more connected structure is clear for the tourism phenomenon, human migration in the EU28 looks characterized by more controversial dynamics. Indeed, as showed by the average clustering coefficient, the degree of connectivity between nodes in the tourism network increased, leading to a more cohesive network structure (from 4 to 3 communities) over time.

(Figure 1 around here)

(Table 1 around here)

On the contrary, the increased connectivity of nodes in the migration network seems to have strengthen the already existing migration path between the countries belonging to the 5 communities found (the number of communities looks quite stable over the years).

The two networks have in common a low and decreasing value for the assortativity coefficient instead.

The assortativity coefficient, ρ, measures the correlation between pairs of linked nodes with a value varying in the range [-1, 1]. In an assortative network, $\rho > 0$, nodes with a high (low) degree are on average connected to other nodes with a high (low) degree. The network is nonassortative when $\rho = 0$, and disassortative otherwise.

For the cases under study, the value of the coefficient close to zero characterizes the two networks as uncorrelated, with countries that do not show any preferential associative behavior with the rest of the member states. Migration dynamics, in particular, are giving rise to a nonassortative network faster than the tourism flows.

Fig. 2 compares the tourism and migration communities for the year 2015 by an alluvial diagram made of blocks and stream fields. The blocks on the left represent the division of countries into the three modules of the tourism network, whereas the five modules on the right belong to the migration structure. Yet, the low values for the modularity index *Q* (Table 1) reveal that tourism and migration inside the EU28 do not generate a strong division of countries into the communities shown. The stream fields show the changes in the internal composition of the two sets of blocks.

(Figure 2 around here)

(Table 2 around here)

In spite of the different number of modules, the spatial distributions of tourists and migrants inside the EU28 does not show strong differences. In fact, the segmentation of tourism in geographical area and the spatial preferences of migrants look quite similar. In particular, four out of nine countries in the first module of the tourism network keep a strong reciprocal connectivity in the first module of the migration structure. Module 2 of the tourism network contributes almost totally to the composition of the second, third, and fourth blocks of the migration network. Finally, human mobility among the countries of the third tourism cluster generates equally strong connections between the same countries when migration is considered, with Latvia and Finland being the only exceptions. The internal composition of the tourism and migration communities is reported in Table 2.

Push and pull factors originating such migration and tourism movements are analyzed by the regression analyses carried out with reference to the gravity equations previously described. Pooled ordinary least squares (OLS) was the estimation technique run on our panel dataset. Table 3 reports the results of the analyses.

(Table 3 around here)

With a few exceptions, the coefficients of the variables in the tourism and migration equations are significant and enter the models with the expected sign.

The pcGDPUS$ of the origin country has a positive impact on tourism and a negative influence on migration. As a matter of facts, better living conditions/economic opportunities in a country allow local people to get the resources to spend in their holidays and, at the same time, the need to look for employment in another country is reduced. Thus, with reference to the EU28, we found that a one percent increase in the wealth of the origin country increases (on average) the outflow of tourism by 0.656% but decreases (on average) the stock of migrants by 0.426%.

The pcGDPUS$ of the destination country has a positive impact on both tourism and migration. According to our results, a one percent increase in the GDP of the destination country generates (on average) more immigration (+1.961%) than incoming tourism (+0.349%). In fact, countries with higher standards of living generally provide tourism services of higher quality that might result more expensive yet. That's why the pull effect of the variable is positive but small. Consistently, better economic conditions and job opportunities represent a strong attractor for migrants.

The geographical size of the origin and destination countries, proxied by their population, produces a positive effect on both tourism and migration. Interestingly, the statistically significant and robust enhancing effect in the origin country (+0.831 for tourism and +0.907 for migration) is very close to the statistically significant and robust positive pulling effect of the variable in the destination one (+0.773 for tourism and +1.066 for migration).

The coefficient for the variable CPIratio is not significant in the tourism model, whereas it provides statistical evidence of a negative relationship between the relative expensiveness of the destination country and its stocks of migrants. Specifically, a one percent increase of the price level in the destination country compared to the price level in the origin one causes (on average) a 1.323% decrease in the stock of migrants.

The effect of distance is statistically significant and negative. Because of the higher transportation costs, countries farthest from each other generate less demand of tourism in the region (-0.644% for a 1% increase in distance), and attract a lower quantity of migrants (-0.572% in the stock of migrants for a 1% increase in distance). Instead, a common border has a positive effect on the mobility of people between countries. In particular, contiguity between countries leads to more than a 70% increase in tourism flows and to a 65% increase in migration stocks (the approximation $e^{\beta}-1$ is used to convert coefficients on dummy variables).

Language spoken in the destination country does not seem to have any effect on the inflow of tourists. On the contrary, a common official language between two countries

(LANGoff) increases the bilateral stock of migrants by 66%, as speaking the same language makes the social integration and the job-hunting easier.

Also colonial links between the origin and the destination countries are able to explain patterns of travel in the tourism and migration domain. In particular, former colonial states, as well as post colonial ties, positively affect tourists' and migrants' choice of the destination.

Finally, being part of the same country is found to have no effect on the flow of tourists, whereas a 59% increase in the stock of migrants might be ascribed (on average) to a territorial link between the origin and the destination country.

As shown by the R^2 coefficient, the regression models (1T) and (1M), specified with the set of variables previously described, are able to explain a high proportion of tourism (about 67%) and migration (about 79%) mobility in EU28.

In order to study the migration-tourism nexus, the gravity equations were enriched with two more control variables related to tourism and migration movements. Specifically, to avoid multicollinearity, residuals computed from the models (1M) and (1T) were used as regressors in the next tourism (2T) and migration (2M) equations, respectively. Basically, our purpose was to measure how much human migration drive tourism flows as well as the capacity of tourism to elicit new migration. As expected, bilateral migration positively and significantly affect bilateral tourism (+0.252%, on average, for a one percent increase in the stock of migration) as bilateral tourism does with respect to the stock of migrants (0.251% increase, on average, for a one percent increase in the bilateral flow of tourism).

The explanatory power of the gravity equation increases to 0.686 for the tourism model and to 0.806 for the migration one. As proved by the adjusted R^2 (Adj R^2), the increased explanatory power of the model is not the result of the increased number of variables only. The coefficients estimated for the tourism and migration regressors are in line with the findings of previous studies. The percentage of tourism flows related (on average) to a one percent increase in the stock of immigrants in the destination country was estimated at 0.31 in Prescott *et al.* (2005) for Canada, 0.658 in Dwyer et al. (2010) for arrivals in Australia, 0.37 in Gheasi *et al.* (2011) with respect to the UK, 0.205 in the study carried out by Genç (2013) for New Zealand, and 0.231 for VFR trips in Italy according to Etzo et al. (2014).

Unfortunately, within the context of the TLM hypothesis, literature is missing of case studies where the relationship running from tourism to migration was quantitatively measured. Thus, our analysis provides the first estimate ever made.

Finally, in order to measure if and up to which extent tourists and migrants coming from "third parties" might foster bilateral migration and tourism between two countries, we enlarged equations (1T) and (1M) with a measure of centrality of both countries in the migration and tourism networks, respectively.

The coefficient estimated for the CLOS variable in the tourism model (3T) is positive and at a significance level of 5%. Specifically, a one percent increase in the centrality measure of two member states of the EU in the migration network, increases (on average) the flow of tourists between them by 0.180%. Therefore, a little network effect is present in the causal link going from migration to tourism. On the contrary, the coefficient estimated for the variable CLOS in the migration model (3M) is not significant. Probably, this is due to the fact that migrants inside the European Union do not find a job in the tourism industry.

Conclusions

In this paper, we studied the migration-tourism nexus on an intra-European scale for the period 2000-2015. Our analysis is grounded in the wide literature suggesting that tourism flows between two countries may be affected by their bilateral stock of immigrants just as their reciprocal tourism flows may lead to temporary, seasonal or permanent migration.

For any year under study, we first represented the bilateral flow of tourists and the bilateral stock of migrants between the member states of the European Union by two country-to-country networks.

The analysis revealed a trend towards an increasing size and density of the two networks due to a growing number of tourism and migration corridors, which led to a more cohesive structure for tourism and stronger paths for migration. Moreover, tourism flows and migrations stocks showed meaningful similarities with respect to the preferential associative behavior of countries and their division into modules, in spite of the different number of communities.

Moreover, the analysis of the determinants of tourism and migration movements allowed us to quantify the contribution of migration to tourism and vice versa. Results point to a similar and positive direct relation between the two phenomena at an intra-European scale. In other words, the higher the number of migrants coming from a member state of the European Union in another member state, the higher the flow of tourists from the former to the latter. Same migration-enhancing effect of tourism is found in our dataset. According to our results, there is not a meaningful network effect between tourism and migration instead.

Our study contribute to the existing literature by providing the first simultaneous investigation of the MLT and TLM phenomena within the 28 member states of the European Union.

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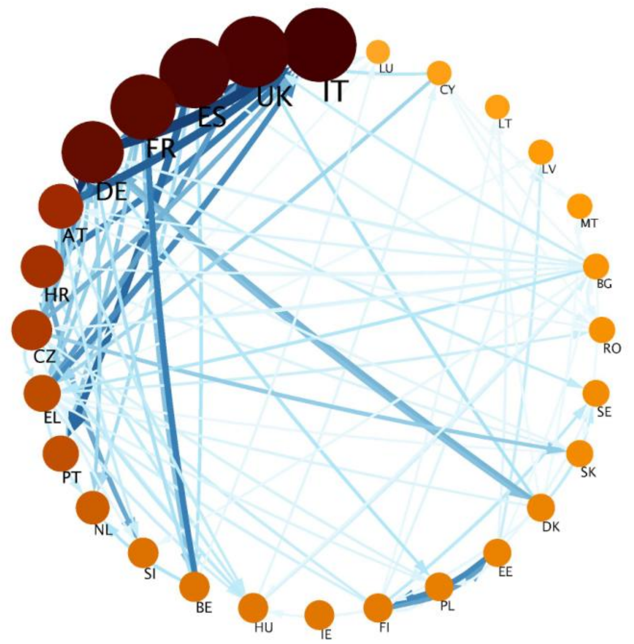
Fig.1.: Network representation of tourism flows(a) and migration stocks (b) in the EU28 for the year 2015

(a)



(b)

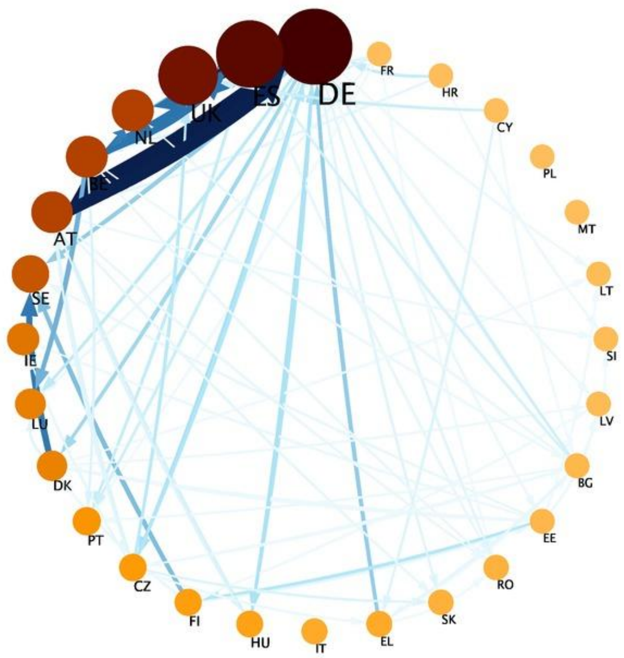


Table 1.: Network analysis of tourism flows and migration stocks in the EU28

	Tourism						Migration					
	2000	2003	2006	2009	2012	2015	2000	2003	2006	2009	2012	2015
Order	28	28	28	28	28	28	28	28	28	28	28	28
Size (unweighted)	560	561	610	609	613	652	391	490	498	532	607	622
Density (unweighted)	0.741	0.742	0.807	0.806	0.811	0,862	0.517	0.648	0.659	0.704	0.803	0,823
Avg. path length (unweighted)	1.229	1.258	1.193	1.194	1.159	1.138	1.236	1.092	1.161	1.014	1.022	1.032
Avg. clustering coefficient (unweighted)	0.777	0.782	0.829	0.826	0.846	0.884	0.779	0.842	0.832	0.868	0.899	0.893
Assortativity (weighted)	0.232	0.256	0.219	0.220	0.166	0.166	0.223	0.133	0.121	0.099	0.074	0.081
no. of communities	4	4	4	4	3	3	5	4	5	5	4	5
Q	0.167	0.195	0.158	0.170	0.153	0.142	0.257	0.230	0.231	0.251	0.255	0.230

Fig.2.: Alluvial diagram comparing tourism and migration modules.in the EU28 for the year 2015

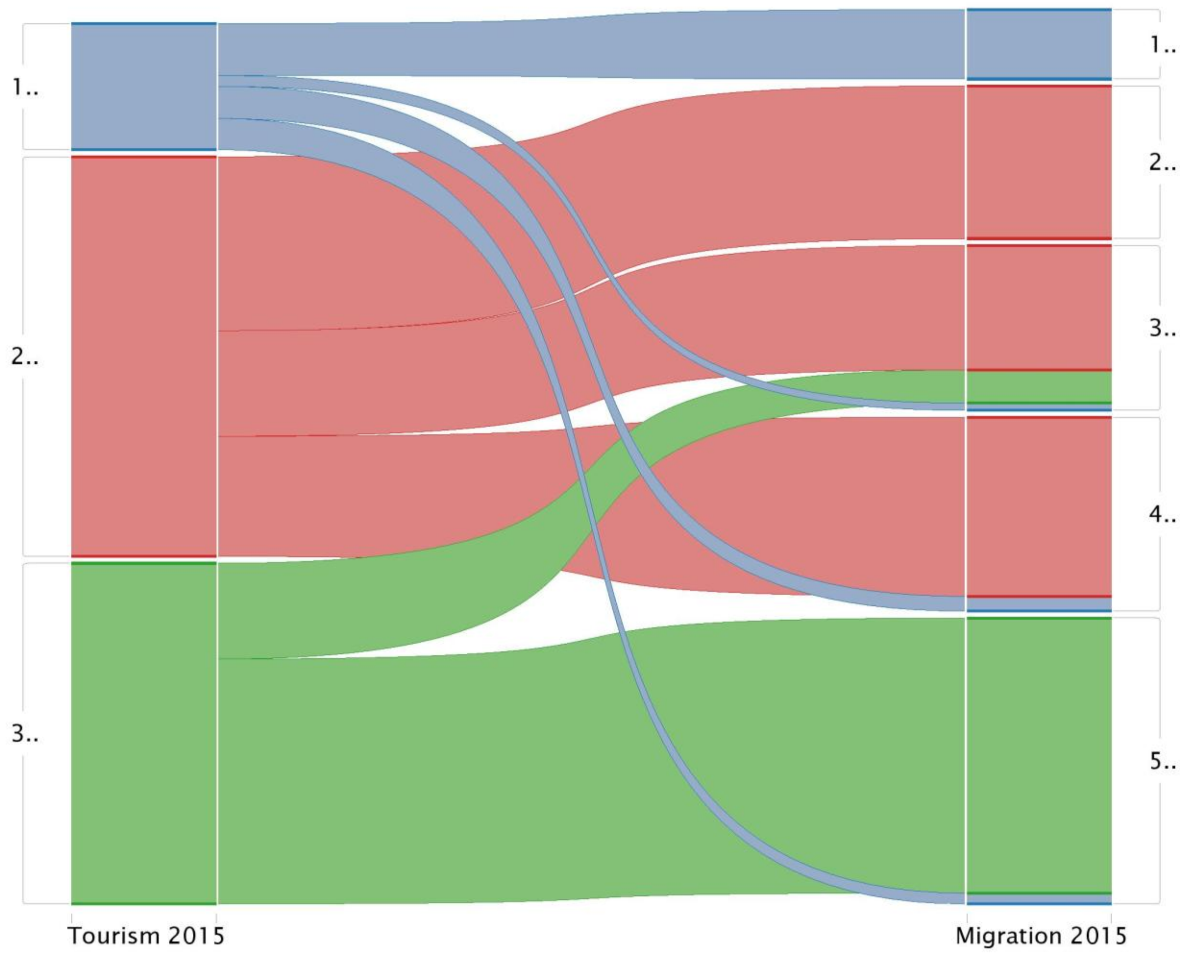


Table 2.: Modules composition for tourism and migration in the EU28 for the year 2015

Tourism		Migration	
Module	Country	Module	Country
1	Denmark	1	Denmark
	Estonia		Estonia
	Germany		Germany
	Slovenia		Slovenia
	Slovakia		
	Lithuania		
	Malta		
	Portugal		
	Finland		
2	Belgium	2	Belgium
	Greece		Greece
	Luxembourg		Luxembourg
	Netherlands		Netherlands
	Poland		Poland
	Romania		Romania
	France	3	France
	Croatia		Slovakia
	Italy		Latvia
	United Kingdom	4	Lithuania
			Malta
			Portugal
			Croatia
			Italy
			United Kingdom
3	Latvia	5	Finland
	Austria		Austria
	Bulgaria		Bulgaria
	Cyprus		Cyprus
	Czech Republic		Czech Republic
	Hungary		Hungary
	Ireland		Ireland
	Spain		Spain
	Sweden		Sweden

Table 3. Gravity model estimations – full-sample (pooled) ordinary least-square (OLS) fit

	Tourism			Migration		
	(1T)	(2T)	(3T)	(1M)	(2M)	(3M)
CONST	1.774**	1.774**	2.791***	-8.720***	-8.720***	-9.192***
	(0.626)	(0.606)	(0.765)	(0.625)	(0.605)	(0.703)
pcGDPUS$ orig	0.656***	0.656***	0.649***	-0.426***	-0.426***	-0.426***
	(0.039)	(0.037)	(0.039)	(0.039)	(0.037)	(0.039)
pcGDPUS$ dest	0.349***	0.349***	0.335***	1.961***	1.961***	1.955***
	(0.038)	(0.037)	(0.039)	(0.038)	(0.037)	(0.038)
Pop orig	0.831***	0.831***	0.831***	0.907***	0.907***	0.905***
	(0.019)	(0.018)	(0.019)	(0.019)	(0.018)	(0.019)
Pop dest	0.773***	0.773***	0.760***	1.066***	1.066***	1.075***
	(0.020)	(0.019)	(0.021)	(0.020)	(0.019)	(0.021)
CPIratio	0.321	0.321	0.275	-1.323***	-1.323***	-1.328***
	(0.277)	(0.268)	(0.278)	(0.277)	(0.268)	(0.277)
DIST	-0.644***	-0.644***	-0.649***	-0.572***	-0.572***	-0.573***
	(0.051)	(0.049)	(0.051)	(0.051)	(0.049)	(0.051)
CONT	0.538***	0.538***	0.538***	0.504***	0.504***	0.506***
	(0.102)	(0.099)	(0.102)	(0.102)	(0.099)	(0.102)
LANGoff	-0.108	-0.108	-0.115	0.508**	0.508**	0.496**
	(0.163)	(0.158)	(0.163)	(0.163)	(0.158)	(0.163)
LANGethno	-0.077	-0.077	-0.069	0.285 .	0.285 .	0.289 .
	(0.169)	(0.164)	(0.169)	(0.169)	(0.163)	(0.169)
COLON	0.335*	0.335*	0.325*	0.640***	0.640***	0.633***
	(0.155)	(0.149)	(0.155)	(0.155)	(0.150)	(0.155)
COMCOLON	3.306***	3.306***	3.263***	3.116***	3.116***	3.094***
	(0.334)	(0.323)	(0.334)	(0.333)	(0.323)	(0.334)
CURCOL	1.414 .	1.414 .	1.428 .	1.572*	1.572*	1.587*
	(0.749)	(0.725)	(0.748)	(0. 748)	(0. 724)	(0. 748)
COL45	1.468**	1.468**	1.469**	1.637**	1.637**	1.658**
	(0.530)	(0.530)	(0.530)	(0,529)	(0,512)	(0,529)
SMCTR	0.057	0.057	0.076	0.466***	0.466***	0.467***
	(0.131)	(0.127)	(0.131)	(0.131)	(0.127)	(0.131)
MIGRres		0.252***				
		(0.019)				
TOURres					0.251***	
					(0.019)	
CLOS			0.180*			-0.132
			(0.078)			(0.090)
Country specific fixed effects	YES	YES	YES	YES	YES	YES
Year fixed effecs	YES	YES	YES	YES	YES	YES
Observations	2413	2413	2413	2413	2413	2413
R^2	0.667	0.688	0.668	0.794	0.807	0.794
Adj R^2	0.664	0.686	0.665	0.793	0.806	0.792

Note: Robust standard errors in parentheses. '.', '*', '**', '***' indicate that coefficients are significant at 10, 5, 1, and 0.1 percent levels respectively.