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Air Connectivity and Foreign Direct Investments

The economic effects of the introduction of new routes

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Keywords: foreign direct investments, air connectivity, control group design

Abstract

This paper analyzes the impact of new routes on the creation of European inward FDI in Italy. We employ a comparison group design to determine the net impact of new routes on the generation of FDI considering both SMEs and large companies at a municipality level. As control groups, we considered all FDI between the Italian region in which the foreign company is investing and the related foreign Country, in the two years before and in the two years after the opening of each new route. Results show that inward FDI increased overall by 33.7% in the two years after the opening of the new routes while, in the same period, FDI in the control group decreased by 16.6%. So, the impact of new routes on inward FDI in Italy appears very significant.

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1. Introduction

John Dunning (2009) points out that a greater integration of the international business' behavioral analysis with the insights of economic geography is required. Furthermore, McCann and Acs (2011) argue that, even if global connectivity is a critical aspect in this context, it is largely overlooked by economists. For these reasons, we investigate the relationship between air connectivity and the localization of foreign direct investments (FDIs). In particular the key research question for this study is whether the spatial network structure offered by the global airline system contributes to the development of Italian inward FDIs.

Several studies have already analyzed the linkage between air traffic and various urban or regional characteristics, among which its degree of internationalization, and have unanimously demonstrated that the geography of FDIs is related to the desire of large multinational companies to easily access the main international airports (for a review see Carod et al. 2010). However, notwithstanding the internationalization process has been recently involving a growing number of small and medium enterprises (SMEs), literature traditionally focused on larger multinational companies located in global cities (e.g. Bel and Fageda, 2008; Sellner and Nagl, 2010) and, to the best of our knowledge, no study has yet considered the impact of airline network on FDI decisions by SMEs in secondary cities taking into account the introduction of every new single route.

For these reasons we aim to test whether the geography of Italian inward FDI from Europe is related to the desire of foreign companies to directly access international airports. We employ a comparison group design (Blundell and Costa Dias, 2000) to determine the net impact of new routes on the generation of FDIs considering both SMEs and large companies. In particular, we built an original database covering the

period 2001-2010 where, for each FDI, we collected information about the exact locations of both the parent company and the newly created subsidiaries at a municipality level. That enables us to estimate the impact of the opening of a new route to the FDI subsequently generated in the catchment areas of the connected airports.

The paper is structured as follows. The next section surveys the existing literature on the relationship between airport network and international investments and puts forward the research question that drives the empirical analysis. The third section describes the data set and the methodology, while the fourth one presents the empirical findings. Final comments and policy implications are reported in the last section.

2. Literature review

The analysis of the relationship between air connectivity and international investments has proven to be rather complex and empirical studies insofar realized mainly concern the causality relationship between the airport infrastructure and the local economic development. Most studies, in fact, have shown that the air accessibility has a significant impact on GDP, employment levels and investment growth (see e.g. Carod et al., 2010; Sellner and Nagl, 2010). Moreover, recent studies found that the size of the city has little if any explanatory power in terms of location choice and, as such, urban and national scale appear to be much less important than the structure of airline networks (Bel and Fageda, 2008). Good airline service, in fact, is found to be an important factor in urban economic development and frequent services to a variety of destinations resulted, among others, in attracting new firms. In particular air travel is more important for service-related businesses, young and high tech firms (Hong, 2007; Brueckner, 2003; Button et al., 1999). Such companies, in fact, conduct activities

requiring considerable interpersonal contacts that are often only possible with high quality transport. Moreover William and Balaz (2009) argue that also the emergence of low-cost carriers has implications for firms' investments and regional economies.

If on the one side many papers investigated the relationship between air connectivity and the local economic development, on the others the correlation between air connectivity and foreign investments has been so far underexplored and only few studies have empirically analyzed the phenomenon.

A first evidence is provided by Hoare (1975) which shown that the geography of FDI in England is related to the accessibility to airports. More in general, the few available empirical studies agree that an airport positively affects the location choices of domestic plants and, to greater extent, the location choice of multinational firms. Hong (2007) demonstrated in fact that national investors, when make location decisions, value market size, while foreign ones emphasize cheap labor and convenient airway transport. Also Strauss-Khan and Vives (2005) found that, among other factors, headquarters relocate to metropolitan areas with good airport facilities. In particular Bel and Fageda (2008) demonstrated that the availability of direct non-stop flights is a major determinant in the location choices of large European firms' headquarters. To the best of the authors' knowledge, opposite evidence does not exist.

The reasons explaining that empirical evidence have been found in the importance of the face-to-face contact and the travel costs. Due to the widespread organizational framework of multinationals, air travel is often required as a mean to engage face-to-face contacts within the group, especially from and to the head office location, by the board of directors, managers, entrepreneurs and staff (Hoare, 1975). Face-to-face contacts have unique advantages as a mean of unstructured, informal, complex and tacit

knowledge flow (Aguileira, 2008). Consequently, moving people is largely considered to be a way of achieving industrial strategies and firms see professional mobility as an example of the flexibility and reactivity of its organization (Aguilera, 2008). In particular the central role played by face to face is important especially for SMEs. Further since many strategic and operative decisions concerning FDI will be taken by the home-based board of directors in the case of large multinational, and by the entrepreneur in the case of SME, it is reasonable that they both make investment location decisions taking into account future travel convenience and thus choose to locate subsidiaries within acceptable distance from major airports. Physical mobility of people from the head office to the subsidiaries in the world is in fact costly due to the travel time's opportunity cost, which usually increases with income and the importance of the role played by the manager or entrepreneur travelling.

Companies then seek to reduce travel costs, in particular by diminishing the cost per trip and by reducing travel time (Aguilera, 2008). Given that codified and mediated information is available everywhere and anytime, thanks to information and communication technology, the importance of the knowledge that can be transmitted only by face to face contact is such that the costs of human resources management in the world is relevant (Bel and Fageda, 2008). Also Williams and Balaz (2009) remark that the cost of air travel within multinational groups is not negligible. In particular, the spatial network structure offered by the global airline system ultimately determines the cost, the ease and frequency with which managers, entrepreneurs and staff are able to engage in direct contact within the multinational groups (McCann and Acs, 2011; Aguilera, 2008).

AUTHORS	FINDINGS	SAMPLE	
McCann and Acs, 2011	Size of a city is much less important than its level of global connectivity in determining international investments.	Large MNE, global cities	Conceptual paper
Carod et al., 2010	Among others, infrastructures are key determinants of investment location.	National and foreign firms, regional and municipality level	Conceptual paper
Sellner and Nagl, 2010	Air accessibility has positive impact on GDP and investment growth.	Investment rate, country level	1993-2006, dynamic analysis
Williams and Balaz, 2009	The emergence of low-cost carriers has major implications for firms' investments and regional economies.	Firms, employee, knowledge, regional level	Conceptual paper
Xu et al., 2009	A sound foundation in traffic infrastructure, in particular in airfreight network, attracts more FDI.	FDI, provincial area	1998-2007, dynamic analysis
Bel and Fageda, 2008	The availability of direct non-stop flights is a major determinant in the location choices of large European firms' headquarters.	Large firms' headquarters, metropolitan area	2004-2005, static analysis
Hong, 2007	National investors, when make location decision, value market size, while foreign ones emphasize cheap labor and convenient airway transport.	Foreign logistic firms, metropolitan area	2001, static analysis
Basile et al., 2005	Italian regions attracted significantly less than their potential and this could be explained, among others, by the low level of infrastructures.	FDI, regional level	1991-1999, dynamic analysis
Strauss-kahn and Vives, 2005	Among other factors, headquarters relocate to metropolitan areas with good airport facilities.	Headquarters, metropolitan area	1996-2001, dynamic analysis
Doeringer et al. 2004	The presence of an international airport influences the location choices of both multinational and domestic plants.	National and foreign firms, regional level	1978-1988, static analysis
Brueckner, 2003	Frequent service to a variety of destinations, reflected, among others, in attracting new firms. Air travel is less important for such firms than for service-related businesses.	Employment, metropolitan area	1996, static analysis
Hoare, 1975	The geography of FDI in UK is related to the accessibility to airports.	Foreign firms, provincial area	1969, static analysis

TABLE 1: Selected list of research papers on the relationship between internationalization and air service.

The implication of all these arguments is that the introduction of a new route, by reducing transport costs and facilitating tacit and complex knowledge flow, should increase the likelihood of FDI exchange between the regions newly connected.

3. Empirical setting

3.1 Data

The dataset used in the empirical analysis combines two different sources of data: Innovata, which provide information about all new passengers scheduled flights to Italy for the period 2000-2010 and database Reprint, which provides a census of inward FDIs in Italy since 2001².

Innovata provides information about all airline scheduled flights in the world. For each flight, the dataset includes some basic information about departure and arrival airports, flights dates, departing and arrival times, carriers and code-share agreements (if any), flight times, distance, type of aircraft and number of seats.

As concern international investments, an illustration of the methodology employed to identify FDIs is essential for proper interpretation of the data and analyses presented in this paper. The criteria were based on the principle of economic materiality rather than formal and/or legal-administrative nature. So, foreign investments made by financial institutes were not considered. However, the existence of intermediate forms that are difficult to classify must be noted: this is the case of private equity and merchant bank funds, which operate basing on targeted business strategies, acquiring controlling interests in companies belonging to selected sectors and directly intervening in their management. These investments have been included in the analysis, while we have excluded interests acquired in industrial firms by investment funds, private equity funds and merchant banks as part of management buy-outs and when there is no direct participation in the management of the investee company. The nationality of the

² Reprint is updated yearly and is sponsored by the Italian Institute for Foreign Trade, for further information see Mariotti and Mutinelli, 2010.

multinational company associated with the Italian foreign-owned company is that of the final parent company and not any intermediate holding companies, which may have different nationalities.

The dataset obtained by merging the above two sources includes information on 2,583 FDI created between 2001 and 2010 and 629 new routes. In particular the identified projects involved 1,302 parent firms in 25 European countries. The FDI considered in this study represent 97 percent³ of the international initiatives launched by foreign firms in Italy from the selected countries while the new routes represent all the new scheduled connections in the 25 selected countries between 2000 and 2010.

Compared to that of most other European countries and to its potential, the attractiveness of the Italian economy for FDI has been limited. In 2009 the ratio of inward FDI stock to gross domestic product amounted in Italy only to 18.6%, compared with 45.5% for the European Union as a whole (UNCTAD, 2010). However, notwithstanding the relatively low level of the inward FDI stock, foreign-controlled companies play a quite important role in the Italian economy and, at the end of 2008 almost 1,266,000 workers were employed in Italy. In particular FDI in Italy today is mainly concentrated in the services sector, which in 2009 accounted for 52.7% of the total IFDI stock. As concern the origin of the investors, FDI from developed economies accounted for more than 96% of the inward FDI stock in Italy in 2009, and the European partner countries alone were responsible for two third of total investments (65.7%). This is to say that by focusing on European inward investments the analysis is highly significant with respect to all FDIs to Italy.

³ The completeness of the data may be evaluated thanks to comparison with Istat survey (www.istat.it). Estimates for Reprint's sector aggregates confirms the reliability of the database; in terms of employees and turnover, the deviation between the database and Istat estimates oscillates regularly between 1% and 3% less for Reprint, a very limited gap and understandably attributable to minor activities which eluded direct measurement.

The identified FDIs are linked to all the 629 new routes from Italy to the 25 Countries. They represent about 76% of all new short-to-medium haul routes opened from Italian airports in the period 2000-2010.

3.2 Methodology

When studying the relationship between air traffic and FDIs, the issue of the link between the airports' catchment areas and the location of foreign investments and parent companies is essential. That problem has been largely ignored by the existing literature. To the best of our knowledge, while previous studies provide aggregate indicators of the level of global connectivity of different cities, no study has yet considered the impact of single routes. Furthermore, while previous papers generally resorted to large territorial units, such as metropolitan areas and states, we rely on smaller units, at a municipality level. Airports obviously serve much wider territories and many different parameters can influence the size and shape of catchment areas. The difficulty is even increased when taking into account potential overlaps of catchment areas since it is more complicated to assign new FDIs to one or more new routes. However, recent literature (see e.g. Lian and Rønnevik, 2011 and Pantazis and Liefner, 2006) show that the attractiveness of airports depends, among others, on their land-side accessibility. For these reasons we have decided to work on the basis of the travel time both from home and host countries to reach their related airports, knowing that it is only a proxy of the actual catchment areas. We will thus use the inverse square of effective travel time by road between the airport and the firm's localization as a driver to allocate a new FDI to route. Each municipality is then connected to the nearest airports by taking into account effective travel times by road to access the airports. We computed the FDIs between the

catchment areas of the newly connected airports after two years from the opening of a new route, and those which happened in the two years before the new connection. When more options are available to connect the two territories, FDIs are allocated to the different alternative routes based on the inverse square of travel times by road to access the airports. In this way, when a new route is between regions not previously connected, a FDI is linked only to that route. When a new route is between regions previously connected by other routes, or when more-than-one new route is operated between the same regions, FDIs are allocated among the different alternatives to connect the same regions.

When estimating the effects of a new connection in terms of FDIs, the methodological difficulty is to rightly assess the causality link between the establishment of new routes and the observed changes in the economic outcomes of interest. In particular, evaluating the net impact is a difficult task because it requires distinguishing changes due to the new connections from changes due to many other independent factors that may affect FDI locations (e.g. general economic growth or an improvement in attractiveness of the destination area). Indeed, the analysis is implemented with a comparison group design and, as control groups, we considered all FDIs between the Italian region in which the foreign company is investing and the related foreign Country, in the two years before and in the two years after the opening of each new route. Of course the estimates are based on a strong identifying assumption. In the absence of the new connection, the average outcomes for the catchment area and control groups would have followed parallel paths over time (Blundell and Costa Dias, 2000). Fortunately this assumption is plausible because characteristics that are associated with the dynamics of the internationalization are the same for the catchment area and the control group.

Then the basic principle upon which we base our approach is that the availability of observation recorded in the two years prior and the two years after the creation of a new connection, allows us to detect and control for pre-creation attraction potential differences between the target catchment area and the control group area.

In particular we calculate the difference between the number of new FDIs observed two years after the creation of the new connections compared with two years before both for the target area and for the control group. Finally, due to different dimensions of the target area and the control group (i.e. the new connected areas are at a municipality level, while the control group is at a regional level) we calculate the impact as the difference of the percentage of the internationalisation level two years before. Specifically, we assume that the new routes' impact is measured by:

$$\text{IMPACT} = (\Sigma(\text{FDI}_{i,t+2} - \text{FDI}_{i,t-2}) / \Sigma\text{FDI}_{i,t-2}) - (\Sigma(\text{FDI}_{j,t+2} - \text{FDI}_{j,t-2}) / \Sigma\text{FDI}_{j,t-2}) \quad [1]$$

Where FDI is the number of new foreign investments, *i* is the area related to the new flight at time *t* and *j* is the control group not covered by the new flight in the same year.

4. Results

Figure 1 shows the regional level of inward internationalization in 2010 and the air connections that are active in 2008. The distribution of foreign affiliates across Italian regions is strongly asymmetric. Namely, the 63.4% of the headquarters of foreign affiliates are located in the North-Western regions (51.9% in Lombardy alone) and

19.6% in the North-Eastern regions; 12.7% of the investments are hosted by Central regions (Tuscany, Umbria, Marche, Lazio), while only 4.4% in the Southern regions.

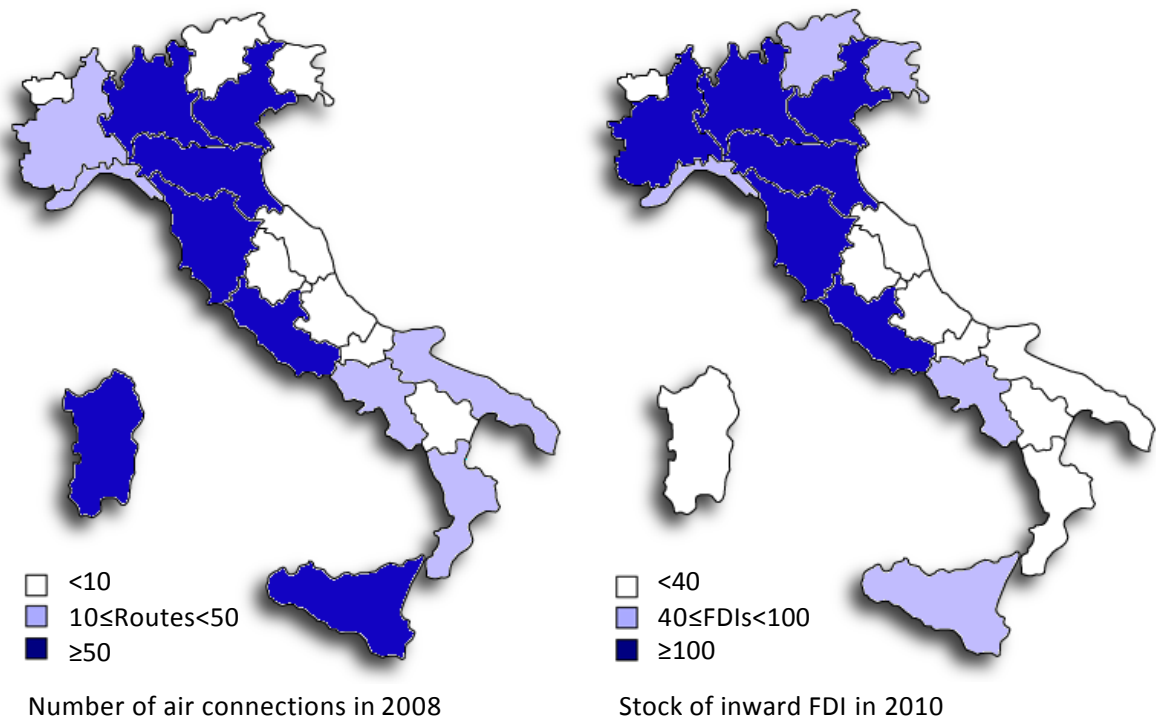


FIGURE 1: Air connections and inward FDI at regional level.

Also the distribution of the available air connections across Italian regions is strongly asymmetric (FIGURE 1). Namely, the regions better connected at the end of 2008 are Lombardy, Lazio and the two Isles.

Notice that the very low level of connections (i.e. number of routes lower than 20) in Valle d'Aosta, Umbria, Molise and Basilicata correspond to a very low degree of regional inward internationalization (i.e. number of inward FDIs lower than 20). In conclusion, regions that are characterized by a high level of air connections are also

characterized by a high level of internationalization, and regions with no or very low connections have the lowest levels of internationalization in Italy. Finally, the study reveals the asymmetries between sub-national regions regarding both the global connections and the international activities of their firms.

When comparing the target and the control areas, the highly significant differences between the two groups provide evidence of the effects due to the establishment of new routes. In particular, the difference between the number of new FDIs observed two years after the creation of the new connections compared with two years before is positive and it takes value of 43.4, while in the case of control group is negative and equal to -752.0.

$$\Sigma (FDI_{i,t+2} - FDI_{i,t-2}) = 172.0 - 128.6 = 43.4 \quad [2]$$

$$\Sigma (FDI_{j,t+2} - FDI_{j,t-2}) = 3779.0 - 4531.0 = -752.0 \quad [3]$$

When estimating the impact in percentage terms, results show that inward FDIs increased overall by 33.7% in the two years after the opening of the new routes while, in the same period, FDIs in the control group decreased by 16.6%.

$$(\Sigma(FDI_{i,t+2} - FDI_{i,t-2}) / \Sigma FDI_{i,t-2}) = 43.4 / 128.6 = 33.7\% \quad [4]$$

$$(\Sigma(FDI_{j,t+2} - FDI_{j,t-2}) / \Sigma FDI_{j,t-2}) = -752.0 / 4531.0 = -16.6\% \quad [5]$$

So, the impact of new routes on inward FDIs in Italy, that it is in all equal to 50.3%, appears very significant.

$$\begin{aligned} \text{IMPACT} &= (\Sigma(\text{FDI}_{i,t+2} - \text{FDI}_{i,t-2}) / \Sigma\text{FDI}_{i,t-2}) - (\Sigma(\text{FDI}_{j,t+2} - \text{FDI}_{j,t-2}) / \Sigma\text{FDI}_{j,t-2}) = \\ &= 33.7\% - (-16.6\%) = 50.3\% \end{aligned} \quad [6]$$

Finally the number of new FDI's recorded in the two years prior and the two years after the creation of a new connection for the target area are shown for the 20 new routes with the highest number of FDI's generated (*TABLE 2*). Descriptive statistics show that the positive impact generated by the introduction of a new connection is registered both by municipalities in the north, centre and south of Italy, even if the former case it is more relevant. In particular the most frequent airports in the top 20 positions are the Orio al Serio airport in Milan with a total number of 16 new FDI's and the Galileo Galilei airport in Pisa with more than 6 new FDI's. Moreover the first route of the list is from the Bari airport, with 5 new FDI's generated in from 2004 to 2006.

Year _t	Departure	Arrival	FDI _{i,t+2}	FDI _{i,t-2}	ΔFDI _i
2004	Palese, Bari	Barcelona	5.0	0.0	5.0
2007	Orio al Serio, Milan	Metz-Nancy-Lorraine	4.3	0.2	4.1
2005	Orio al Serio, Milan	Newcastle	4.1	0.0	4.1
2006	Parma	Stansted, London	4.0	0.4	3.6
2004	Fontanarossa, Catania	Gatwick, London	3.0	0.0	3.0
2004	Bolzano	Munich	2.8	0.0	2.8
2003	Galileo Galilei, Pisa	Manchester	2.8	0.0	2.8
2005	Verona	Stuttgart	3.7	1.3	2.3
2005	Montichiari, Verona	Newcastle	2.3	0.0	2.3
2006	Galileo Galilei, Pisa	Billund	2.0	0.0	2.0
2003	Ciampino, Rome	Hamburg	1.9	0.0	1.9
2007	Orio al Serio, Milan	Marseille	1.9	0.0	1.9
2008	Guglielmo Marconi, Bologna	Brussels S. Charleroi	2.2	0.4	1.7
2005	Malpensa, Milan	Bristol	2.2	0.6	1.6
2005	Cristoforo Colombo, Genova	Amsterdam-Schiphol	1.9	0.4	1.6
2007	Ciampino, Rome	Vienna	1.5	0.0	1.5
2005	Fiumicino, Rome	Rotterdam	1.5	0.0	1.5
2003	Orio al Serio, Milan	Birmingham	2.8	1.3	1.4
2005	Galileo Galilei, Pisa	Bournemouth	1.4	0.0	1.4
2008	Orio al Serio, Milan	Saeve, Gothenburg	3.0	1.6	1.4

TABLE 2: New routes with the highest number of FDIs generated.

5. Concluding remarks

The paper shows that new routes account for an increase of about 50% in the inward FDIs flow to Italy between the newly connected areas. Given the substantial benefits

that urban areas can obtain from attracting and promoting not only large firms' headquarters but also subsidiaries of smaller firms (UNCTAD, 2010), our results provide new evidence of the contribution of transport infrastructures to local growth. In particular, evidence of a direct causal relationship between airport connectivity and FDI has important implications for the industrial geography of Italy and Europe. From a policy-makers perspective, regional policies aimed at attracting or promoting FDI, both from large and small multinational firms, must contextually promote the development of transport infrastructure and in particular of international airports (e.g. by providing legal authorization or by financing ground transport) (Dobruszkes et al., 2010).

Although few recent actions have been undertaken to attract inward FDI, the main issue is lack of coordination with other relevant policy measures (e.g. infrastructure development) within a broader framework aiming at the regional and national development. The relatively low attractiveness of Italy for inward FDI is often reflected in the results of surveys conducted by several prominent international companies and institutions⁴. It can be attributed to a "country effect" of a general nature related to a number of factors frequently highlighted by the above-mentioned international surveys, among which the lack of infrastructure (Basile et al., 2005).

Indeed, efforts made by regions to improve the attractiveness of their areas by investing in infrastructures, and in particular in airport network, can be helpful in reducing significant regional imbalances. Moreover, investments to improve air transport capacity and strategies to attract both traditional and low cost airlines are critical aspects for the success of such policies. On the other side, policymakers have to persuade multinational firms to locate or relocate elsewhere when their first choice is a congested

⁴ Italy ranks only 40th in the World Competitiveness Scoreboard 2010 of the IMD and 48th in the Competitiveness Index 2010-2011 of the World Economic Forum

area. In this way policy makers can contribute to achieve any predetermined reduction of regional disparities.

Concluding, this study is one of the first attempts to evaluate the impact of the establishment of new air connections on the local level of internationalization. Given the novelty of the subject, future agenda could expand the analysis in several ways. First of all, the empirical methodology presented above can be improved and sample data can be enlarged to more than one destination country. Secondly, effects can be tested also on outward investments; unfortunately data are not yet available. Finally, the impact of air connections can vary from industry to industry (e.g. service, high tech, traditional sectors); therefore future research should take into account inter-industry differences.

In conclusion, the findings of this paper seem to justify broader research efforts on measuring and assessing the effects of air infrastructure toward both outward and inward FDI.

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