BANCA D'ITALIA

EUROSISTEMA

# Questioni di Economia e Finanza

(Occasional Papers)

## The determinants of service export behaviour in Italian non-financial firms

by Alessandro Moro and Enrico Tosti

September 2020

Number 577

BANCA D'ITALIA
EUROSISTEMA

# Questioni di Economia e Finanza

(Occasional Papers)

## The determinants of service export behaviour in Italian non-financial firms

by Alessandro Moro and Enrico Tosti

Number 577 – September 2020

*The series* Occasional Papers *presents studies and documents on issues pertaining to the institutional tasks of the Bank of Italy and the Eurosystem. The* Occasional Papers *appear alongside the* Working Papers *series which are specifically aimed at providing original contributions to economic research.*

*The* Occasional Papers *include studies conducted within the Bank of Italy, sometimes in cooperation with the Eurosystem or other institutions. The views expressed in the studies are those of the authors and do not involve the responsibility of the institutions to which they belong.*

*The series is available online at www.bancaditalia.it .*

ISSN 1972-6627 (print)
ISSN 1972-6643 (online)

*Printed by the Printing and Publishing Division of the Bank of Italy*

# THE DETERMINANTS OF SERVICE EXPORT BEHAVIOUR IN ITALIAN NON-FINANCIAL FIRMS

Alessandro Moro[†] and Enrico Tosti[*]

## Abstract

This paper analyses the main drivers of Italian service exports using firm-level data. A gravity equation, augmented with firm characteristics and FDI variables, is estimated using a panel of Italian exporters constructed by merging two datasets, the first on international trade in services and the second on FDI relationships, both used to compile the Italian balance of payments. After presenting a formal justification for the presence of FDI variables in the gravity equation, the model is estimated using a panel composed of non-financial firms exporting services other than travel, transport and processing in the period from 2013 to 2018. The econometric analysis shows that FDI is, among the standard drivers of exports (firm size and productivity, foreign demand, trade costs), a significant variable that positively affects Italian firms' exports of services, pointing to complementarity rather than to substitution. This evidence suggests that a significant component of trade in services includes intra-group transactions.

**JEL Classification**: F14, L80, D22, C23, C51.
**Keywords**: trade in services, firm-level data, gravity model, FDI, panel data, firm heterogeneity.
**DOI**: 10.32057/0.QEF.2020.577

## Contents



[†] Bank of Italy, International Relations and Economics Directorate.

[*] Bank of Italy, Statistical Analysis Directorate.

## 1. Introduction[1]

In recent decades, trade in services has played an increasing role in international trade: the share of services in global exports rose from close to 10 per cent in 1970 to almost 25 per cent in 2016 (Loungani *et al.*, 2017). This rapid growth was promoted by the spread, starting from the 1990s, of many preferential trade agreements, both bilateral and regional, and by the signing of the General Agreement on Trade in Services (GATS).

The growth of international trade in services has also been significant for European Union (EU) countries: the value of service exports for the EU-28 as a whole more than tripled between 1999 and 2018, while, in the same period, goods exports increased by 250 per cent and GDP by 176 per cent. Moreover, the ratio between exports and value added of the service sector has shown a constant increase (see Ariu *et al.*, 2019).

In spite of this favourable economic scenario, the growth of Italian service exports has been relatively modest, both in comparison with the other major euro-area countries and with respect to foreign demand. Only as late as 2016 have signals of a significant recovery appeared (Moro and Tosti, 2019), calling for an analytical exploration of the main underlying drivers.

The growing importance of trade in services has motivated a recent stream of empirical studies trying to identify the main determinants using firm-level data, given the increasingly widespread use of sample surveys to compile the service items of the balance of payments (BoP). Examples of this kind of studies are Breinlich and Criscuolo (2011) for the United Kingdom, Kelle *et al.* (2013) for Germany, Haller *et al.* (2014) for four EU countries (Finland, France, Ireland and Slovenia), Lejárraga e Oberhofer (2015) for France, Malchow-Møller *et al.* (2015) for Belgium, Federico and Tosti (2017) for Italy, Amador *et al.* (2018) for Portugal, and Wolfmayr *et al.* (2019) for Austria. The empirical specification of these papers is based on gravity equations derived from the same theoretical framework adopted for trade in goods (Krugman, 1980; Melitz, 2003; Chaney, 2008; Anderson and van Wincoop, 2003). According to this literature, foreign demand and trade costs, measured in terms of physical and cultural distance between exporter and importer countries, are two important drivers of trade in services.

Moreover, firm heterogeneity matters, as shown by the theoretical contributions on trade starting from the fundamental work of Melitz (2003), and by the previously mentioned empirical works: service traders tend to be larger, more productive and characterised by a higher degree of internationalization compared with non-traders.

Another important aspect that may affect service exports are foreign direct investments (FDI) flows. In case of horizontal integration, FDI and exports are likely to be alternative choices because foreign-invested enterprises' sales can substitute for cross-border trade. However, if firms establish vertical integration with foreign enterprises, then FDI can foster exports, whatever the direction of the direct investment: in fact, exported services might be used as inputs in the production process of the foreign firms, be they affiliates or parent companies. Some papers examine the relationship between trade in services and FDI. As an example, in the work of Kelle *et al.* (2013), based on a BoP German dataset, establishing foreign affiliates and making cross-border sales are assumed to be alternative decisions and the main factors influencing this choice are examined. On the contrary, Fillat Castejon *et al.* (2008), using a panel of OECD countries, and Lennon (2009), employing US Foreign Affiliates Trade Statistics (FATS), find evidence of a complementary relationship between FDI and trade in services.

This paper contributes to the growing empirical literature on trade in services based on firm-level data by taking into account not only the standard gravity variables, but also firm characteristics and the role of FDI, trying in particular to identify the nature of the relationship − complementarity or substitution − between these two phenomena. Specifically, we: (i) present a formal model of trade in services when FDI relationships are in place, which allows to derive a firm-level gravity equation augmented with firms' characteristics and FDI variables; (ii) estimate this FDI-augmented gravity

[1] The views expressed in this paper are solely those of the authors and do not necessarily reflect the views of the Bank of Italy. We thank Giovanni D'Alessio, Silvia Fabiani, Alberto Felettigh and Claire Giordano for their useful comments and suggestions.

equation using a firm-level dataset constructed by merging two data sources[2] – on service exports and FDI – collected by the Bank of Italy in order to compile the Italian BoP.

The rest of the paper is organised as follows. Section 2 describes the data and provides some descriptive statistics from the panel used. Section 3 presents the formal model and the derivation of the gravity equation augmented with firms' characteristics and FDI variables that will be tested in the empirical investigation. Sections 4 and 5 present the empirical specification of the gravity equation and the results of its estimation. Section 6 tests the robustness of the main findings. Section 7 concludes.

## 2. Data description and the panel construction

Exports (and imports) of services are defined as transactions between resident and non-resident units, in line with the Sixth Balance of Payments Manual (IMF, 2009). The concept of residence, which is also used in the national accounts, is based on a unit having its "centre of economic interest" within a given country (Lipsey, 2008).

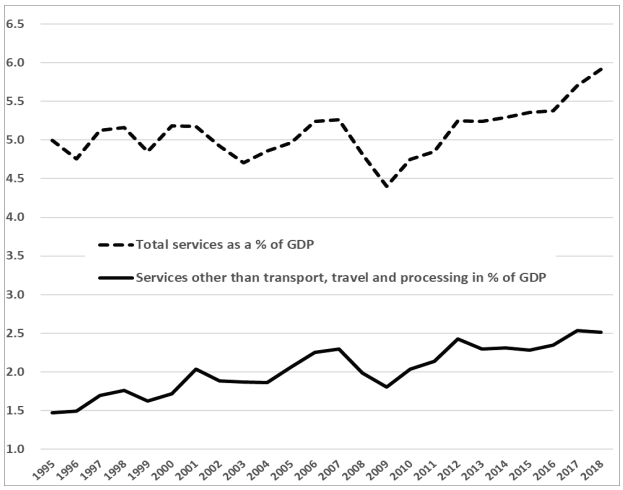
Since 2008 the Bank of Italy has been collecting firm-level data on international trade in services on a quarterly basis to compile the "services" item in the current account of the Italian BoP.[3] This survey is called Quarterly Non-Financial Transactions (QNFT), as data are collected from non-financial firms (but including insurance companies). It covers the international service transactions other than *transportation* and *travel*, which are compiled on the basis of *ad hoc* sample surveys, and from *manufacturing services on physical inputs owned by others* (processing), which are compiled on the basis of data processed and transmitted by the Italian National Institute of Statistics (ISTAT): such set of services will be referred to as "other services" in the rest of this paper.

Data regarding other sectors, namely monetary and financial institutions (including the central bank) and general government, come from different sources and are not taken into account in our analysis.

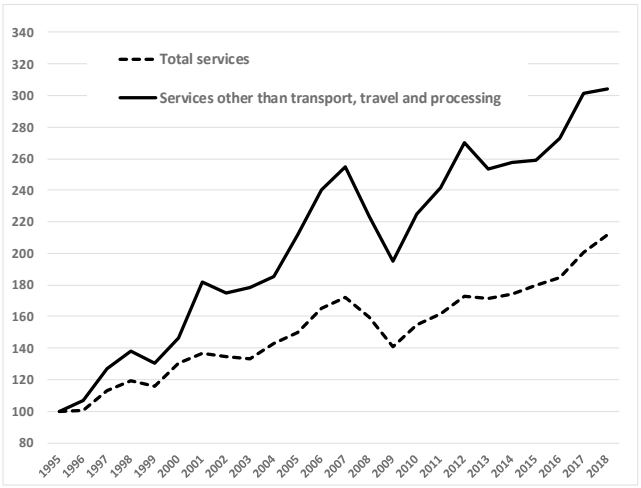
Fig. 1 shows the importance of the exports of total services and of "other services" over a fairly long period of time (from 1995 to 2018), both as a percentage of GDP and in terms of growth. Not only did the share of "other services" in GDP increase over time; they also grew at a faster rate than the overall export of services (about 9 per cent a year against nearly 5 per cent, in nominal terms).

**Figure 1 – Exports of total services and of "other services": a comparison for the period 1995-2018**

*a) Current values as a percentage of GDP*




*b) Index numbers (1995=100, current values)*




Source: for GDP, Istat.

[2] Researchers and economists may access and process micro-data on the Bank of Italy website in compliance with confidentiality requirements (https://www.bancaditalia.it/statistiche/raccolta-dati/direct-reporting/distribuzione-microdati/index.html?com.dotmarketing.htmlpage.language=1).

[3] Before 2008, data on services were taken from banks' aggregate reports on cross-border payment transactions (settlement system), which did not include any firm-level information on exporters or importers.

The QNFT is based on a cut-off sampling scheme with a threshold on firm's turnover (about €70 million). The sample is selected every two years; in the sample for the two-year period 2017-2018 there were 3,265 non-financial firms (including insurance companies) above this threshold.[4]

The starting point of our work is to select a panel of firms exporting services every year, as firms with a constant participation in the QNFT survey tend to provide more accurate and reliable information; furthermore, size of the panel allows us to take into account firms' heterogeneity with fixed effects, as shown in the robustness section.

Theoretically, a panel starting from 2008 can be selected but for several reasons we consider only a shorter time period, from 2013 to 2018. Such choice depends not only on the trade-off between a longer but smaller panel, but also on the availability (from 2013) of a question, very important for our purposes, regarding whether the respondent firm belongs to a multinational group (if so, the nationality of the parent company is also to be provided). Such information is crucial for the analysis on the significance of this firm characteristic for export dynamics. Moreover, the chosen period is long enough to include the phase of recovery registered by Italy's service exports after a long period of relatively weak growth, both with respect to potential demand and in comparison with the main euro-area competitor countries; such phase started in 2016 and still appears to be underway (Moro and Tosti, 2019).

The final size of our panel, based on annual data,[5] accounts on average for nearly 68 per cent of Italy's total exports of "other services" recorded in the BoP (grossed-up values, see Table 1). The average size is $N$=863 (average number[6] of firms exporting "other services" out of 1,329 firms exporting services on average every year) across $T=6$ periods (years) and $C_i$ partner countries of firm $i$; the final dataset has 66,643 rows (implying an average number of nearly 13 counterpart countries by year and firm).

**Table 1 – Sample and panel non-financial firms exporting "other services"**

| Year | A) Size of the panel (number of firms)* | B) Sample size (total number of exporting firms) | C) Value of exports by firms incl. in panel (A) *(millions of euros)* | D) Grossed-up value of C *(millions of euros)* | E) Italian total exports of "other services" *(millions of euros)* | F) Incidence of the panel (F=D/E) *(percentages)* |
|---|---|---|---|---|---|---|
| 2013 | 860 | 1,365 | 13,758 | 24,268 | 37,007 | 65.6 |
| 2014 | 861 | 1,325 | 13,984 | 25,204 | 37,612 | 67.0 |
| 2015 | 861 | 1,349 | 15,083 | 25,640 | 37,783 | 67.9 |
| 2016 | 864 | 1,293 | 15,512 | 26,889 | 39,838 | 67.5 |
| 2017 | 865 | 1,352 | 17,378 | 30,642 | 43,991 | 69.7 |
| 2018 | 865 | 1,292 | 17,049 | 30,876 | 44,397 | 69.5 |
| **Average** | **863** | **1,329** | **15,461** | **27,253** | **40,105** | **67.9** |

* See note 6.

Table 2 shows the twelve main categories of services in BoP data with the specification of the coverage of the selected panel. In detail, about 32 per cent of total service exports is covered by our firm-level dataset. Several items present a high level of coverage (greater than 70 per cent): they are *Maintenance and repair services not included elsewhere*, *Construction*, *Insurance and pension services*, *Charges for the use of the intellectual property*, *Telecommunications, information and computer services* (TIC), and *Other business services*. On the other hand, *Financial services* and *Government services* show a low coverage as they refer mainly to sectors other than non-financial firms and so the bulk of data comes from different data sources.

[4] The reference population of the sample corresponds approximately to about 1.5 million firms whose centre of economic interest is in Italy; the sample is focused on firms having cross-border transactions selected through an indicator based on bank settlements.

[5] We aggregate exports on an annual basis since many drivers are collected yearly, such as the main firm characteristics (number of employee, turnover, etc.) and the FDI variables.

[6] The number of firms is slightly different year by year as in some rare cases there is no correspondence between counterpart countries of Italian exports and availability of IMF data on import of "other services", which will be one of the explanatory variables; see Section4 for further details.

**Table 2 – Main categories of services traded and degree of coverage of the panel (average 2013-18)**

| | BoP codes | Description | Covered by the survey on non-financial firms | Incidence of the panel on Italian exports *(percentages)* | Incidence on total services *(percentages)* |
|---|---|---|---|---|---|
| | S | Services: (S=SA+SB+SC+SD+SE+SF+SG+SH+SI+SJ+SK+SL) | | **31.9** | **100.0** |
| 1 | SA | Processing | *NO* | *0.0* | *3.3* |
| 2 | SB | Maintenance and repair n.i.e. | YES | 88.5 | 0.7 |
| 3 | SC | Transport | *NO* | *0.0* | *13.6* |
| 4 | SD | Travel | *NO* | *0.0* | *39.7* |
| 5 | SE | Construction | YES | 73.0 | 0.5 |
| 6 | SF | Insurance and pension services | YES | 78.5 | 1.5 |
| 7 | SG | Financial services (SG=SG1+SG2) | YES/NO | *11.0* | *6.0* |
| *7.1* | *SG1* | *Explicitly charged and other financial services* | *YES* | *13.2* | *5.0* |
| *7.2* | *SG2* | *Financial intermediation services indirectly measured (FISIM)* | *NO* | *0.0* | *1.0* |
| 8 | SH | Charges for the use of the intellectual property | *YES* | 94.0 | 3.5 |
| 9 | SI | Telecommunications, information and computer services (TIC) | YES | 83.6 | 8.2 |
| 10 | SJ | Other business services (SJ=SJ1+SJ2+SJ3) | YES | 84.5 | 22.3 |
| *10.1* | *SJ1* | *Research and development services* | *YES* | *93.7* | *3.7* |
| *10.2* | *SJ2* | *Professional and management consulting services* | *YES* | *88.7* | *4.3* |
| *10.3* | *SJ3* | *Technical, trade related and other business services* | *YES* | *80.8* | *14.3* |
| 11 | SK | Personal, cultural and recreational services | YES | 46.9 | 0.2 |
| 12 | SL | Government goods and services n.i.e. | YES | 18.3 | 0.7 |

Generally, in this paper we will refer to the whole set of "other services", but in some cases the estimation analysis will also consider two important sub-items, namely TIC and *Other business services* (Section 5). As regards the geographical distribution of exports, Table 3 shows the principal counterpart countries over the period from 2013 to 2018. Switzerland is the most important export destination, with an average share of 16.3 per cent, followed by the United States with 10.4 per cent; the first ten countries account for nearly 70 per cent, showing a significant level of concentration.

**Table 3 – Geographical distribution of exports of "other services" (panel data): averages over 2013-18**

| | Country | Average exports per year (millions of euros) | Average export shares (percentages) | Cumulated average export shares (percentages) |
|---|---|---|---|---|
| 1 | Switzerland | 2,517 | 16.3 | 16.3 |
| 2 | United States | 1,607 | 10.4 | 26.7 |
| 3 | Great Britain | 1,363 | 8.8 | 35.5 |
| 4 | France | 1,347 | 8.7 | 44.2 |
| 5 | Germany | 1,115 | 7.2 | 51.4 |
| 6 | Ireland | 717 | 4.6 | 56.0 |
| 7 | Netherlands | 649 | 4.2 | 60.2 |
| 8 | Belgium | 624 | 4.0 | 64.2 |
| 9 | Sweden | 437 | 2.8 | 67.0 |
| 10 | Spain | 431 | 2.8 | 69.8 |
| 11 | Luxembourg | 373 | 2.4 | 72.2 |
| 12 | Poland | 334 | 2.2 | 74.4 |
| 13 | China | 309 | 2.0 | 76.4 |
| 14 | Brazil | 284 | 1.8 | 78.2 |
| 15 | Austria | 213 | 1.4 | 79.6 |
| 16 | Turkey | 185 | 1.2 | 80.8 |
| 17 | Russia | 149 | 1.0 | 81.8 |
| 18 | Singapore | 144 | 0.9 | 82.7 |
| 19 | Japan | 137 | 0.9 | 83.6 |
| 20 | Romania | 124 | 0.8 | 84.4 |
| 21 | Czech Republic | 120 | 0.8 | 85.2 |
| 22 | India | 105 | 0.7 | 85.9 |
| 23 | Hungary | 93 | 0.6 | 86.5 |
| 24 | Hong Kong | 92 | 0.6 | 87.1 |
| 25 | Egypt | 90 | 0.6 | 87.7 |
| 26 | Finland | 89 | 0.6 | 88.3 |
| 27 | Canada | 83 | 0.5 | 88.8 |
| 28 | Mexico | 81 | 0.5 | 89.3 |
| 29 | South Korea | 76 | 0.5 | 89.8 |
| 30 | Other countries | 1,574 | 10.2 | 100.0 |
| | **Total** | **15,461** | **100.0** | |

There is also a high degree of concentration among firms (Table 4), in line with other countries' data on goods trade ("the happy few", see Mayer and Ottaviano, 2007). The first 10 firms account for nearly 20 per cent of the total export of "other services" recorded in the Italian BoP, the first 50 for nearly 42 per cent, the first 100 for 52 per cent and the first 200 for 61 per cent (grossed-up values). Accordingly, the Gini coefficient takes a high value of concentration, equal to 0.83.

**Table 4 – Firms' export shares (panel data): averages over 2013-18**

*(grossed-up values)*

| Number of firms | Average exports by firm and year (€ million) | Export shares (percentages) |
|---|---|---|
| Top 10 | 794 | 19.8 |
| Top 20 | 569 | 28.4 |
| Top 25 | 509 | 31.7 |
| Top 50 | 338 | 42.2 |
| Top 75 | 257 | 48.0 |
| Top 100 | 210 | 52.4 |
| Top 200 | 123 | 61.2 |
| Remaining firms | 4 | 6.7 |
| **Total** | **46** | **67.9** |

As for the sector of activity, Table 5 shows the average shares over the period 2013-18; manufacturing sectors account for 44 per cent of the total, a significant share not far from that of service sectors, as already pointed out by Federico and Tosti (2012) in reference to 2009 data.

**Table 5 – Panel firms' sector of activity: "other services" export statistics over 2013-18**

*(sample values, not grossed-up)*

| NACE codes | Description | Average number of firms per year (units) | Average exports per year (millions of euros) | Average export shares (percentages) | Average exports per firm per year (million of euros) |
|---|---|---|---|---|---|
| CA | Manufacture of food products, beverages and tobacco products | 38 | 393 | 2.5 | 10 |
| CB | Manufacture of textiles, apparel, leather and related products | 30 | 636 | 4.1 | 21 |
| CC | Manufacture of wood and paper products, and printing | 16 | 152 | 1.0 | 10 |
| CD | Manufacture of coke, and refined petroleum products | 4 | 68 | 0.4 | 16 |
| CE | Manufacture of chemicals and chemical products | 49 | 317 | 2.1 | 6 |
| CF | Manufacture of pharmaceuticals, medicinal chemical and botanical products | 33 | 678 | 4.4 | 21 |
| CG | Manufacture of rubber and plastics products, and other non-metallic mineral products | 41 | 381 | 2.5 | 9 |
| CH | Manufacture of basic metals and fabricated metal products, except machinery and equipment | 48 | 623 | 4.0 | 13 |
| CI | Manufacture of computer, electronic and optical products | 16 | 843 | 5.4 | 52 |
| CJ | Manufacture of electrical equipment | 26 | 234 | 1.5 | 9 |
| CK | Manufacture of machinery and equipment n.e.c. | 65 | 732 | 4.7 | 11 |
| CL | Manufacture of transport equipment | 43 | 1639 | 10.6 | 38 |
| CM | Other manufacturing, and repair and installation of machinery and equipment | 23 | 127 | 0.8 | 6 |
| G | Wholesale and retail trade | 164 | 1,311 | 8.5 | 8 |
| H | Transportation and storage | 27 | 424 | 2.7 | 16 |
| JA | Publishing, audiovisual and broadcasting activities | 28 | 358 | 2.3 | 13 |
| JB | Telecommunications | 18 | 1,908 | 12.3 | 105 |
| JC | IT and other information services | 19 | 1,003 | 6.5 | 52 |
| K | Financial and insurance activities | 45 | 1,060 | 6.9 | 24 |
| MA | Legal, accounting, management, architecture, engineering, technical testing and analysis activities | 17 | 1,158 | 7.5 | 68 |
| MB | Scientific research and development | 4 | 145 | 0.9 | 41 |
| MC | Other professional, scientific and technical activities | 48 | 666 | 4.3 | 14 |
| N to S | Other services' sectors | 19 | 95 | 0.6 | 5 |
| B+D+E+F | Other sectors* | 40 | 511 | 3.3 | 13 |
| C | Manufacturing | 433 | 6,823 | 44.1 | 16 |
| G to S | Services | 390 | 8,127 | 52.6 | 21 |
| B+D+E+F | Other sectors* | 40 | 511 | 3.3 | 13 |
| | **Total** | **863** | **15,461** | **100.0** | **18** |

Note (*): The item "Other sectors" includes B (Mining and quarrying), D (Electricity, gas, steam and air-conditioning supply), E (Water supply, sewerage, waste management and remediation), and F (Construction).

A key element of our analysis is the presence of direct investment abroad or in Italy (FDI). The firm-level data source is a sample survey called Yearly Financial Stocks (YFS), which is conducted by the Bank of Italy jointly with that regarding trade in services, both surveys being administered to non-financial and insurance companies; the methodology and definitions of the YFS survey follow the international standards (IMF, 2009; OECD, 2008). Again, the sample is partially renewed every two years; in the two-year period 2017-2018 there were 5,732 non-financial firms (including insurance companies).

Table 6 reports some summary statistics on outward and inward FDI regarding the panel firms: the main point to be stressed is that firms with FDI relationships have a significant share on the total export of services (around 70 per cent), even though their incidence on the number of panel firms is definitely lower. This suggests that the presence of FDI might be a crucial driver of trade in services, thus indicating a possible relationship of complementarity (Fillat *et al.* 2008; Lennon, 2009 and the papers cited in that work), rather than one of substitution as found in other studies. Moreover, the lower incidence on export values of inward FDI with respect to outward FDI seems to suggest that the latter are a more important driver of firms' exports.

**Table 6 – Distribution of panel firms and export value by FDI presence**
*(panel data, 2013-18 time averages)*

| Type of FDI | Average number of firms (% of total panel) | Average export value (% of total panel) |
|---|---|---|
| Both inward and outward FDI | 4.0 | 11.0 |
| Only outward FDI | 28.2 | 38.6 |
| Only inward FDI | 14.5 | 20.2 |
| No FDI | 53.2 | 30.1 |
| **Total** | **100.0** | **100.0** |

## 3. A simple model of complementarity between trade in services and FDI

In this section, a simple model of trade in services and FDI is presented with the aim of motivating our empirical specification. Most of the existing theoretical models, such as those presented in Helpman *et al.* (2004) and Bhattacharya *et al.* (2012), discuss the relationship between FDI and trade in services considering only the case of horizontal integration: in this framework, it is clear that FDI and exports tend to be alternative choices. The empirical work of Kelle *et al.* (2013), based on German data, also proposes a model in which firms have to decide between cross-border versus foreign-affiliate sales of services in order to justify their empirical specification.

We propose, on the contrary, a simple model that also permits a vertical cross-border integration in which the existence of FDI relationships might stimulate service exports (complementary hypothesis). This model is an extension of the framework proposed by Markusen (1989) and Kelle *et al.* (2013). More precisely, we assume the existence of a domestic country and of a foreign country; in the latter, there exists a downstream industry − called industry $z$ −in which competitive firms assemble input services $S_1, \dots, S_n$ in order to produce a final output ($X_z$) according to a CES production function (1a).

$$X_z = \left( \sum_{i=1}^{n} S_i^{\rho} \right)^{\frac{1}{\rho}} \quad \text{(1a)}$$

These input services are produced by a number of firms in the domestic country that might have vertical FDI relationships with the enterprises of the foreign downstream industry. Once produced, these services are exported to the foreign country and used as inputs in the final output production of the downstream industry.[7] Therefore, the set of available services $\Omega$ can be partitioned into two subsets: the

[7] We make the simplifying assumption that input services are produced exclusively by the domestic country. Hence, the downstream industry in the foreign country must import these inputs in order to produce the final output.

set of services produced by firms with FDI relationships in place with the downstream enterprises, indicated by $\Omega_{FDI}$, and the complementary set, $\Omega_{FDI}^{c}$. If we assume that services belonging to $\Omega_{FDI}$ are more productive inputs than the other services in the complementary set $\Omega_{FDI}^{c}$, the production function (1a) is modified as follows:

$$X_z = \left( \sum_{i \in \Omega_{FDI}^{c}} S_i^{\rho} + \phi \sum_{i \in \Omega_{FDI}} S_i^{\rho} \right)^{\frac{1}{\rho}} \quad (1b)$$

where the parameter $0 < \rho < 1$ is linked to the elasticity of substitution between different input services and $\phi > 1$ represents our hypothesis about the gain in productivity achieved through the services imported from the vertically integrated firms.

This assumption, which will be tested in the econometric section, can be justified by the better knowledge of the production process of the direct invested (or investor) enterprises in the foreign country that vertically integrated firms might have in comparison to firms without FDI relationships. Let the market price of good $z$ be denoted by $p_z$ and the price of service input $i$ be given by $p_i$.

Then, the profit-maximisation problem of a representative firm in the $z$ industry is to choose $S_i$, $i \in \Omega$, according to:

$$\max_{S_i} p_z \left( \sum_{i \in \Omega} \phi^{\delta_i^{FDI}} S_i^{\rho} \right)^{\frac{1}{\rho}} - \sum_{i \in \Omega} p_i S_i \quad (2)$$

in which $\delta_i^{FDI}$ is equal to 1 if $i \in \Omega_{FDI}$, and 0 otherwise. From the first order conditions of the profit-maximisation problem and assuming that there are sufficiently many service providers so that each views $p_z$ and $X_z$as exogenous, it is possible to derive the demand functions for input services:

$$S_i^{1-\rho} = \phi^{\delta_i^{FDI}} p_z X_z^{1-\rho} p_i^{-1} \quad (3)$$

It is easy to see that the parameter $\phi$ is a demand shifter for inputs produced by vertically integrated firms. As for domestic firms producing and exporting service $S_i$, we assume they face a production cost $\lambda_i$ and a trade cost $\tau_i$. Moreover, the fixed cost of establishing an outward FDI relationship is denoted by $\chi_i$.[8] Their profit-maximisation problem can be written as follows:

$$\max_{S_i} \left( \phi^{\delta_i^{FDI}} p_z X_z^{1-\rho} S_i^{\rho-1} - \tau_i \lambda_i \right) S_i - \chi_i \delta_i^{FDI} \quad (4)$$

The optimal level of exports derived from the optimization is given by:

$$S_i^{1-\rho} = \rho \frac{p_z X_z^{1-\rho} \phi^{\delta_i^{FDI}}}{\tau_i \lambda_i} \quad (5)$$

The log-linearization of equation (5) allows us to write the following expression, which will be the guideline for the econometric specification of our model:

$$\log(S_i) = \frac{\log(\rho)}{1-\rho} + \frac{1}{1-\rho} \log\left(p_z X_z^{1-\rho}\right) - \frac{1}{1-\rho} \log(\tau_i) - \frac{1}{1-\rho} \log(\lambda_i) + \frac{\log(\phi)}{1-\rho} \delta_i^{FDI} \quad (6)$$

From equation (6) we can elicit the different drivers of firm $i$'s service exports:

(i) the positive effect of the size of service demand in the foreign country $p_z X_z^{1-\rho}$, which can be captured empirically by the total value of "other services" imports by counterpart countries;
(ii) the negative impact of the trade cost $\tau_i$, which can be measured by the physical distance between the domestic and the foreign country;
(iii) the negative effect of the production costs $\lambda_i$, which could be considered a function of firm characteristics (such as size and productivity);

[8] Without loss of generality, we consider formally only the case of outward FDI from domestic firms, but the main conclusions of the analysis would not be affected by the presence of inward FDI.

(iv) finally, the presence of FDI relationships between the domestic and the foreign country, measured by the dummy variable $\delta_i^{FDI}$, which should have a positive impact on the level of exports if our hypothesis ($\phi > 1$) is correct.

Firm $i$'s decision to establish an outward FDI relationship depends on the condition:

$$\phi > \left(\frac{\chi_i}{\Phi_i} + 1\right)^{1-\rho} \quad (7) \quad \text{where } \Phi_i = \left(\frac{1-\rho}{\rho}\right)(\tau_i \lambda_i)^{\frac{\rho}{\rho-1}} p_z^{\frac{1}{1-\rho}} X_z.$$

If the positive effect of establishing an FDI in terms of a higher demand (see equation 3) exceeds the threshold in (7), it is optimal to invest in an FDI relationship. The higher the costs $\chi_i$ are, in comparison with the size of the foreign market, the greater the gain $\phi$ should be in order to make outward FDI profitable.

## 4. A firm-level gravity equation for trade in services and FDI

The empirical specification proposed in this section is strictly based on equation (6). Particularly, our dependent variable is the logarithm of the export of "other services" $\log(S_{i,c,t})$ of firm $i$ towards country $c$ during year $t$, derived from the Bank of Italy's QNFT Survey.

Regarding the independent variables, we measure the size of foreign demand with the logarithm of the total imports of "other services"[9], $\log(IMP_{c,t})$, by country $c$ during year $t$, extracted from the IMF database. [10]

The trade costs are expressed as a function of the logarithm of the physical distance between Italy and country $c$, i.e. $\log(Dist_c)$, and with a dummy variable indicating whether there is contiguity between Italy and country c, $Contig_c$: both indicators are taken from the CEPII database.[11] In fact, in the literature there is a wide consensus that bilateral services trade − both in the aggregate and in specific sectors, such business services − is well explained by the standard gravity model featuring heterogeneous firms trading goods (Lodefalk and Nordås, 2017). Hence, even if services do not have to bear physical transport costs, bilateral trade in services – similarly to goods – increases with the market size of both parties and declines with geographical, cultural and institutional distance (Moïsé and Le Bris, 2013; for the Italian case, Federico and Tosti, 2017).

The production costs are assumed to be a function of firm characteristics, including the number of employees $\log(N_{i,t})$, which captures firm size, firm productivity, $\log(Prod_{i,t})$, measured as the logarithm of the ratio between firm's turnover and the number of employees, and a dummy variable indicating whether the firm $i$ is Italian or foreign-controlled, $IT_{i,t}$ (equal to 1 when firm $i$ is either independent or controlled by an Italian firm and equal to 0 when it is controlled by a foreign parent company). All these variables are derived from the QNFT database.

Finally, the presence of FDI relationships is measured with a dummy variable $FDI^O_{i,c,t}$ (and $FDI^I_{i,c,t}$) equal to 1 if firm $i$ has one or more outward (inward) FDI relationship towards (from) country $c$ in year $t$, and 0 otherwise (an information coming from the YFS survey).

The empirical specification of equation (6) therefore becomes:

$$\log(S_{i,c,t}) = \beta_0 + \beta_1 \log(IMP_{c,t}) + \beta_2 \log(Dist_c) + \beta_3 Contig_c + \beta_4 \log(N_{i,t-1}) + \beta_5 \log(Prod_{i,t-1}) + \beta_6 IT_{i,t-1} + \beta_7 FDI^O_{i,c,t-1} + \beta_8 FDI^I_{i,c,t-1} + \omega_t + \theta_i^s + \nu_{i,c} + \varepsilon_{i,c,t} \quad (8)$$

in which $\omega_t$ are yearly time fixed effects and $\theta_i^s$ are industry (two digits) fixed effects; $\nu_{i,c} \sim N(0, \sigma_\nu^2)$ are firm-country random effects. We prefer to include random effects in the baseline specification of the model to account for firm-country unobserved heterogeneity since the fixed effects would prevent the

[9] Instead of GDP, which is usually considered in gravity models; we have verified that the results do not change significantly if imports of "other services" are replaced by GDP per capita as a measure of foreign demand.

[10] See http://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52&sId=1390030341854 (balance of payments statistics).

[11] See http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=6.

identification of time-invariant country-specific variables, such as trade costs (physical distance and contiguity), and of factors with a low within-firm variation, such as the nationality of the ultimate controlling entity.[12] It is important to note that firm characteristics as well as FDI variables are lagged by one period to limit endogeneity problems.

In some specifications the baseline regression is enriched by including additional explanatory variables for the outward side:[13]

(i) the number of outward FDI relationships of firm $i$ towards country $c$ in year $t-1$, indicated with $NFDI^{O}_{i,c,t-1}$, replacing the dummy variable $FDI^{O}_{i,c,t-1}$ indicating the mere presence of FDI;

(ii) the interaction term $FDI^{O}_{i,c,t-1} * HP_{i,t-1}$, where $HP_{i,t}$ is a dummy equal to 1 when productivity is above the sample average;[14]

(iii) a dummy $SameNACE^{O}_{i,t-1}$ equal to 1 if at least one direct invested firm in country $c$ has the same NACE classification (two digits) of the Italian reporting firm; this variable is included to account for the possibility of horizontal integration, which is more likely to happen between firms in the same sector of economic activity, even if it is to be considered as a rough proxy due to the heterogeneity within the two-digit classification;

(iv) finally, in order to test the robustness of the empirical results, random effects will be replaced in Section 6 by using firm and counterpart country fixed effects.

## 5. Estimation results

In this section, the estimates are shown by first considering total exports of "other services" without any selection on the basis of the firm's activity sector. Subsequently, the estimation will be restricted to service sector firms, in order to test the model specifically on firms producing services as their main activity; moreover, two important subsets of "other services" − namely TIC and *other business services* − will be analysed. Finally, the stability over time of our econometric specification will be tested considering two phases of equal time length, i.e. the three-year period 2013-2015 and the subsequent one, 2016-2018. The latter period coincides with the phase of significant recovery of Italian service exports analysed in Moro and Tosti (2019).

### *Total exports of "other services"*

The results of the estimation of equation (8) are displayed in Table 7 and consider all industries and the total value of "other services" exports as the dependent variable. Each column corresponds to a different model, with its own set of conditioning variables.

Particularly, model A1 includes the standard regressors of gravity equations, i.e. the logarithm of total imports of services by counterpart country and trade costs, measured in terms of physical distance (in logarithm) and a dummy for contiguity. All these variables are highly significant and present the expected sign: an increase of foreign demand has a positive impact on exports, while an increase of trade costs leads to a reduction of exports.

In model A2, firm characteristics are added, including the logarithm of the number of employees, the logarithm of productivity and a dummy variable for the nationality of the ultimate controlling entity (Italian versus foreigner). Both the number of employees, which captures firm size, and productivity have a positive and significant effect on "other services" exports, as expected.[15]

[12] However, as in Wolfmayr *et al.* (2019), we will check the sensitivity of the results of our analysis by including firm and country fixed effects in the robustness section (Section 6).

[13] As for inward FDI, we include only the dummy for the presence/absence of inward FDI because both the interaction with productivity and the dummy for the common NACE code are not significant (data not reported).

[14] The interaction with the continuous variable $\log(Prod_{i,t-1})$ leads to less interpretable estimates for both the coefficients of $\log(Prod_{i,t-1})$ and the interaction $FDI^{O}_{i,c,t-1} * \log(Prod_{i,t-1})$.

[15] In principle, if the coefficients associated with the two variables are equal, only turnover is significant. However, the test on the equality of the two coefficients rejects the null hypothesis in each of the following model specifications, meaning that the two variables capture distinct features, i.e. size and productivity, and should both be included in the regression.

On the other hand, the coefficient associated with the dummy for the nationality of the controlling entity is negative and significant, meaning that firms belonging to a foreign group tend to export more.

**Table 7 – Total "other services" exports, all sectors**

| | Model A1 $\log(S_{i,c,t})$ | Model A2 $\log(S_{i,c,t})$ | Model A3 $\log(S_{i,c,t})$ | Model A4 $\log(S_{i,c,t})$ | Model A5 $\log(S_{i,c,t})$ |
|---|---|---|---|---|---|
| $\log(IMP_{c,t})$ | 0.463*** | 0.491*** | 0.469*** | 0.470*** | 0.472*** |
| | *(0.0110)* | *(0.0109)* | *(0.0107)* | *(0.0107)* | *(0.0106)* |
| $\log(Dist_c)$ | -0.0571*** | -0.0880*** | -0.0830*** | -0.0842*** | -0.0863*** |
| | *(0.0216)* | *(0.0212)* | *(0.0207)* | *(0.0207)* | *(0.0207)* |
| $Contig_c$ | 0.290*** | 0.299*** | 0.294*** | 0.291*** | 0.291*** |
| | *(0.0716)* | *(0.0702)* | *(0.0685)* | *(0.0684)* | *(0.0684)* |
| $\log(N_{i,t-1})$ | | 0.427*** | 0.405*** | 0.405*** | 0.402*** |
| | | *(0.0137)* | *(0.0136)* | *(0.0135)* | *(0.0135)* |
| $\log(Prod_{i,t-1})$ | | 0.179*** | 0.174*** | 0.168*** | 0.173*** |
| | | *(0.0129)* | *(0.0129)* | *(0.0130)* | *(0.0129)* |
| $IT_{i,t-1}$ | | -0.143*** | -0.164*** | -0.165*** | -0.162*** |
| | | *(0.0299)* | *(0.0298)* | *(0.0297)* | *(0.0297)* |
| $FDI^{O}_{i,c,t-1}$ | | | 0.859*** | 0.535*** | |
| | | | *(0.0418)* | *(0.0573)* | |
| $FDI^{O}_{i,c,t-1}$ x $HP_{i,t-1}$ | | | | 0.297*** | |
| | | | | *(0.0628)* | |
| $SameNACE^{O}_{i,t-1}$ | | | | 0.458*** | 0.527*** |
| | | | | *(0.0649)* | *(0.0600)* |
| $FDI^{I}_{i,c,t-1}$ | | | 0.824*** | 0.828*** | 0.829*** |
| | | | *(0.0969)* | *(0.0969)* | *(0.0969)* |
| $NFDI^{O}_{i,c,t-1}$ | | | | | 0.420*** |
| | | | | | *(0.0337)* |
| *Constant* | 0.719* | -6.214*** | -5.571*** | -5.490*** | -5.546*** |
| | *(0.414)* | *(0.490)* | *(0.482)* | *(0.481)* | *(0.482)* |
| Observations | 66,314 | 66,266 | 66,266 | 66,266 | 66,266 |
| Industry FE | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES |
| Firm-Country RE | YES | YES | YES | YES | YES |
| Adj. $R^2$ | 0.146 | 0.180 | 0.210 | 0.214 | 0.213 |

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

FDI variables are considered in models A3-A5. In model A3, the dummies for the presence of outward and inward FDI relationships are included. In model A4, we add the interaction between the dummy for outward FDI and the dummy for high productivity (productivity above the sample average); it also includes a dummy for the presence of at least one outward FDI relationship in which an Italian firm and a foreign invested enterprise have the same two-digit NACE classification.

All these variables have a positive and highly significant effect on exports. This means that more internationalised firms, with outward or inward FDI relationships, have a greater propensity to export. This is particularly true for firms having outward FDI and, at the same time, a productivity higher than the panel average, and it also holds true for firms with at least one controlled firm in the same sector of economic activity. The significance of the interaction term between productivity and the presence of FDI is in line with the predictions of the framework proposed in Section 3: more productive firms have a higher incentive to establish outward FDI relationships since they obtain a greater gain from exports.[16] The positive effect on exports of reporting and controlled firms operating in the same sector of economic activity suggests that the complementarity hypothesis might hold even at the industry level; in other words, (possible) horizontal integration might also have a positive effect on exports, instead of a negative

[16] In order to clarify this concept, let us assume that there are two types of firms with FDI: low-productivity firms ($\phi_L$) and high-productivity firms ($\phi_H = \xi\phi_L, with\ \xi > 1$). In this case, denoting with $HP_i$ the dummy for high-productivity enterprises, equation (6) would become:

$$\log(S_i) = \frac{\log(\rho)}{1-\rho} + \frac{1}{1-\rho}\log\left(p_m X_m^{1-\rho}\right) - \frac{1}{1-\rho}\log(\tau_i) - \frac{1}{1-\rho}\log(\lambda_i) + \frac{\log(\phi_L)}{1-\rho}\delta_i^{FDI} + \frac{\log(\xi)}{1-\rho}\delta_i^{FDI}HP_i \quad (6bis)$$

with the interaction term $\delta_i^{FDI}HP_i$ as a driver of service exports.

one, as frequently found in literature. However, the within heterogeneity of a two-digit classification does not permit straightforward conclusions on this issue.

Another plausible factor explaining the positive significance of FDI variables (especially on the outward side) on trade in services is constituted by profit-shifting behaviour, as found in several works, e.g. Tørsløv *et al.* (2018) and Heckemeyer and Overesch (2013); however, in the case of Italy, which is not a tax haven country, such phenomenon should occur mainly on the import side – typically *Charges for the use of the intellectual property* and *Other business services*, of which *Research and development services* and *Professional and management consulting services* are among "the usual suspects" − and less so on the export side. In any case, this issue would be an interesting extension of our research.

Finally, in Model A5, the dummy for the presence of outward FDI and its interactions are replaced by the number of outward FDI relationships: it is possible to observe that domestic firms with many foreign controlled enterprises are more likely to export and this effect is statistically significant.

This evidence is in line with a stream of empirical literature that finds complementarity between trade in services and FDI (Fillat Castejon *et al.* 2008; Lennon, 2009). Moreover, it is compatible with the idea that a significant component of service trade happens at the intra-group level and supports the assumption regarding the higher productivity of services exported to affiliated enterprises ($\phi > 1$).

*Exports by service industry or by service type*

In Table 8, the estimation of equation (8) is repeated considering only the firms classified in service sectors. The fitting of the model, measured with the adjusted $R^2$, increases slightly; moreover, the values and the signs of coefficients remain practically unchanged in comparison with Table 7.

Particularly, the complementarity between trade in services and FDI relationships, both from the inward and the outward perspective, is confirmed.

**Table 8 – Total "other services" exports, firms belonging to service sectors**

| | Model S1 $\log(S_{i,c,t})$ | Model S2 $\log(S_{i,c,t})$ | Model S3 $\log(S_{i,c,t})$ | Model S4 $\log(S_{i,c,t})$ | Model S5 $\log(S_{i,c,t})$ |
|---|---|---|---|---|---|
| $\log(IMP_{c,t})$ | 0.491*** | 0.523*** | 0.509*** | 0.509*** | 0.510*** |
| | *(0.0146)* | *(0.0143)* | *(0.0141)* | *(0.0141)* | *(0.0141)* |
| $\log(Dist_c)$ | -0.211*** | -0.251*** | -0.242*** | -0.242*** | -0.242*** |
| | *(0.0302)* | *(0.0296)* | *(0.0290)* | *(0.0290)* | *(0.0290)* |
| $Contig_c$ | 0.261*** | 0.260*** | 0.251*** | 0.252*** | 0.254*** |
| | *(0.0981)* | *(0.0958)* | *(0.0938)* | *(0.0937)* | *(0.0938)* |
| $\log(N_{i,t-1})$ | | 0.450*** | 0.437*** | 0.438*** | 0.434*** |
| | | *(0.0172)* | *(0.0170)* | *(0.0170)* | *(0.0170)* |
| $\log(Prod_{i,t-1})$ | | 0.252*** | 0.249*** | 0.242*** | 0.247*** |
| | | *(0.0173)* | *(0.0172)* | *(0.0173)* | *(0.0172)* |
| $IT_{i,t-1}$ | | -0.118*** | -0.107** | -0.114** | -0.111** |
| | | *(0.0444)* | *(0.0442)* | *(0.0442)* | *(0.0442)* |
| $FDI^{O}_{i,c,t-1}$ | | | 0.937*** | 0.569*** | |
| | | | *(0.0707)* | *(0.111)* | |
| $FDI^{O}_{i,c,t-1}$ x $HP_{i,t-1}$ | | | | 0.453*** | |
| | | | | *(0.125)* | |
| $SameNACE^{O}_{i,t-1}$ | | | | 0.302*** | 0.422*** |
| | | | | *(0.104)* | *(0.0921)* |
| $FDI^{I}_{i,c,t-1}$ | | | 0.851*** | 0.857*** | 0.855*** |
| | | | *(0.141)* | *(0.141)* | *(0.141)* |
| $NFDI^{O}_{i.c.t-1}$ | | | | | 0.462*** |
| | | | | | *(0.0552)* |
| *Constant* | -0.823** | -7.317*** | -7.028*** | -6.925*** | -6.984*** |
| | *(0.416)* | *(0.508)* | *(0.502)* | *(0.502)* | *(0.502)* |
| Observations | 34,981 | 34,959 | 34,959 | 34,959 | 34,959 |
| Industry FE | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES |
| Firm- Country RE | YES | YES | YES | YES | YES |
| Adj. $R^2$ | 0.188 | 0.229 | 0.254 | 0.256 | 0.253 |

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.

This last result holds true even for a sizeable subset of services, i.e. *Other business services*. In fact, the estimates reported in Table 9 (first three columns), show that the coefficients associated with FDI

variables, both on the outward and inward sides, are positive and significant. The signs and significance of the other variables in the gravity equation are preserved, the only exception being geographical distance.

Focusing on TIC services (last three models of Table 9), some non-negligible differences with respect to the "other services" aggregate can be detected. Particularly, the inward FDI variable as well as the dummy for the nationality of the controlling entity $IT_{i,t-1}$ (and the dummy for geographical contiguity $Contig_c$) lose statistical significance. On the other hand, outward FDI variables retain a significant and positive effect on exports. This result might be due to a feature of the Italian communications industry, the most important producer of TIC services, which is characterised by the presence of big national players with few inward relationships.

**Table 9 – Other business services and TIC exports, all sectors**

| | OTHER BUSINESS SERVICES | | | TIC SERVICES | | |
|---|---|---|---|---|---|---|
| | Model O3 $\log(S_{i,c,t})$ | Model O4 $\log(S_{i,c,t})$ | Model O5 $\log(S_{i,c,t})$ | Model T3 $\log(S_{i,c,t})$ | Model T4 $\log(S_{i,c,t})$ | Model T5 $\log(S_{i,c,t})$ |
| $\log(IMP_{c,t})$ | 0.391*** | 0.393*** | 0.395*** | 0.479*** | 0.480*** | 0.481*** |
| | *(0.0125)* | *(0.0125)* | *(0.0125)* | *(0.0218)* | *(0.0218)* | *(0.0218)* |
| $\log(Dist_c)$ | -0.0168 | -0.0196 | -0.0233 | -0.222*** | -0.223*** | -0.225*** |
| | *(0.0257)* | *(0.0256)* | *(0.0257)* | *(0.0479)* | *(0.0479)* | *(0.0480)* |
| $Contig_c$ | 0.318*** | 0.312*** | 0.309*** | -0.0657 | -0.0666 | -0.0693 |
| | *(0.0804)* | *(0.0802)* | *(0.0803)* | *(0.170)* | *(0.170)* | *(0.170)* |
| $\log(N_{i,t-1})$ | 0.254*** | 0.253*** | 0.250*** | 0.672*** | 0.675*** | 0.676*** |
| | *(0.0180)* | *(0.0180)* | *(0.0180)* | *(0.0316)* | *(0.0316)* | *(0.0316)* |
| $\log(Prod_{i,t-1})$ | 0.123*** | 0.111*** | 0.123*** | 0.409*** | 0.389*** | 0.406*** |
| | *(0.0171)* | *(0.0173)* | *(0.0171)* | *(0.0381)* | *(0.0390)* | *(0.0381)* |
| $IT_{i,t-1}$ | -0.346*** | -0.346*** | -0.338*** | -0.0798 | -0.0832 | -0.0783 |
| | *(0.0369)* | *(0.0369)* | *(0.0369)* | *(0.0709)* | *(0.0709)* | *(0.0709)* |
| $FDI^{O}_{i,c,t-1}$ | 0.961*** | 0.569*** | | 0.475*** | 0.178 | |
| | *(0.0510)* | *(0.0699)* | | *(0.0765)* | *(0.113)* | |
| $FDI^{O}_{i,c,t-1}$ x $HP_{i,t-1}$ | | 0.400*** | | | 0.221** | |
| | | *(0.0719)* | | | *(0.0976)* | |
| $SameNACE^{O}_{i,t-1}$ | | 0.523*** | 0.588*** | | 0.321*** | 0.395*** |
| | | *(0.0792)* | *(0.0738)* | | *(0.112)* | *(0.0981)* |
| $FDI^{I}_{i,c,t-1}$ | 0.916*** | 0.917*** | 0.919*** | 0.223 | 0.214 | 0.219 |
| | *(0.109)* | *(0.109)* | *(0.109)* | *(0.212)* | *(0.211)* | *(0.211)* |
| $NFDI^{O}_{i,c,t-1}$ | | | 0.451*** | | | 0.129** |
| | | | *(0.0408)* | | | *(0.0568)* |
| *Constant* | 3.256*** | 3.464*** | 3.340*** | -1.634** | -1.449* | -1.631** |
| | *(0.603)* | *(0.603)* | *(0.602)* | *(0.831)* | *(0.836)* | *(0.832)* |
| Observations | 39,883 | 39,883 | 39,883 | 11,952 | 11,952 | 11,952 |
| Industry FE | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES |
| Firm- Country RE | YES | YES | YES | YES | YES | YES |
| Adj. $R^2$ | 0.174 | 0.178 | 0.176 | 0.309 | 0.310 | 0.310 |

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

### *Stability over time of the gravity equation*

As pointed out in Moro and Tosti (2019), the recovery of Italian service exports started in 2016 after a long period of unsatisfactory growth. This motivates the idea of testing the temporal stability of the coefficients of our gravity equation. For this purpose, Table 10 reports the estimates of the equation in the two periods of equal length (2013-2015 and 2016-2018).

The Wald *F*-test on the equality of coefficients in the two sub-periods clearly rejects the null hypothesis in each of the three reported models, at any conventional confidence level: hence, as expected, a structural break occurred in 2016. The rejection is due to statistically significant changes in the magnitude of most of the coefficients; more in detail, the number of employees, productivity, the presence and the number of outward FDI all display a lower coefficient in the 2016-2018 period than in the previous period. On the other hand, the coefficients regarding the interaction between outward FDI

and high productivity and those for the presence of inward FDI show higher values in the 2016-2018 period, particularly the former, which also exhibits an increase in its statistical significance.

From an economic point of view, these results may suggest that the recent recovery phase is mainly driven by more internationalised firms, with an outward FDI relationship and/or belonging to foreign multinationals, which display, at the same time, a productivity above the sample average.

On the contrary, all the remaining coefficients remain stable over time, both in terms of magnitude and significance. In fact, the test on the equality of the coefficients associated with foreign demand, geographical distance and the dummies for contiguity, Italian nationality and common NACE does not reject the null hypothesis of equality in the two time periods. Since these variables do not change their significance in the gravity equation, they are unlikely to explain the recent recovery phase of Italian export of "other services".

**Table 10 – Total exports of "other services", all sectors: 2013-2015 and 2016-2018**

| | 2013-2015 | | | 2016-2018 | | |
|---|---|---|---|---|---|---|
| | Model A3 $\log(S_{i,c,t})$ | Model A4 $\log(S_{i,c,t})$ | Model A5 $\log(S_{i,c,t})$ | Model A3 $\log(S_{i,c,t})$ | Model A4 $\log(S_{i,c,t})$ | Model A5 $\log(S_{i,c,t})$ |
| $\log(IMP_{c,t})$ | 0.485*** | 0.486*** | 0.488*** | 0.471*** | 0.474*** | 0.477*** |
| | *(0.0127)* | *(0.0127)* | *(0.0127)* | *(0.0128)* | *(0.0127)* | *(0.0127)* |
| $\log(Dist_c)$ | -0.0902*** | -0.0920*** | -0.0951*** | -0.0584** | -0.0600** | -0.0639*** |
| | *(0.0241)* | *(0.0240)* | *(0.0240)* | *(0.0242)* | *(0.0242)* | *(0.0242)* |
| $Contig_c$ | 0.313*** | 0.311*** | 0.312*** | 0.288*** | 0.286*** | 0.284*** |
| | *(0.0766)* | *(0.0765)* | *(0.0766)* | *(0.0781)* | *(0.0778)* | *(0.0779)* |
| $\log(N_{i,t-1})$ | 0.403*** | 0.403*** | 0.404*** | 0.334*** | 0.338*** | 0.333*** |
| | *(0.0178)* | *(0.0178)* | *(0.0178)* | *(0.0164)* | *(0.0164)* | *(0.0164)* |
| $\log(Prod_{i,t-1})$ | 0.224*** | 0.221*** | 0.224*** | 0.141*** | 0.125*** | 0.142*** |
| | *(0.0175)* | *(0.0176)* | *(0.0175)* | *(0.0170)* | *(0.0171)* | *(0.0170)* |
| $IT_{i,t-1}$ | -0.262*** | -0.265*** | -0.260*** | -0.178*** | -0.175*** | -0.160*** |
| | *(0.0407)* | *(0.0407)* | *(0.0407)* | *(0.0410)* | *(0.0409)* | *(0.0409)* |
| $FDI^{O}_{i,c,t-1}$ | 1.163*** | 0.861*** | | 1.108*** | 0.563*** | |
| | *(0.0565)* | *(0.0791)* | | *(0.0568)* | *(0.0842)* | |
| $FDI^{O}_{i,c,t-1}$ x $HP_{i,t-1}$ | | 0.196** | | | 0.689*** | |
| | | *(0.0940)* | | | *(0.0884)* | |
| $SameNACE^{O}_{i,t-1}$ | | 0.467*** | 0.557*** | | 0.609*** | 0.711*** |
| | | *(0.0855)* | *(0.0802)* | | *(0.0981)* | *(0.0886)* |
| $FDI^{I}_{i,c,t-1}$ | 1.120*** | 1.128*** | 1.126*** | 1.462*** | 1.467*** | 1.457*** |
| | *(0.134)* | *(0.134)* | *(0.134)* | *(0.143)* | *(0.143)* | *(0.143)* |
| $NFDI^{O}_{i,c,t-1}$ | | | 0.635*** | | | 0.486*** |
| | | | *(0.0473)* | | | *(0.0479)* |
| *Constant* | -6.234*** | -6.193*** | -6.276*** | -4.712*** | -4.609*** | -4.768*** |
| | *(0.597)* | *(0.596)* | *(0.596)* | *(0.583)* | *(0.581)* | *(0.582)* |
| Observations | 32,636 | 32,636 | 32,636 | 33,630 | 33,630 | 33,630 |
| Industry FE | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES |
| Firm- Country RE | YES | YES | YES | YES | YES | YES |
| Adj. $R^2$ | 0.219 | 0.222 | 0.221 | 0.220 | 0.226 | 0.224 |

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

## 6. Robustness checks

In order to test the robustness of the results described above, we replace random effects with firm and counterpart country fixed effects. Thanks to such inclusion, we are able to account for firm and country specific variables that are not observed and that might correlate with the other regressors in the gravity equation. In this framework, our econometric specification becomes:

$$\log(S_{i,c,t}) = \beta_0 + \beta_1 \log(IMP_{c,t}) + \beta_2 \log(Dist_c) + \beta_3 Contig_c + \beta_4 \log(N_{i,t-1}) + \beta_5 \log(Prod_{i,t-1}) + \beta_6 IT_{i,t-1} + \beta_7 FDI^{O}_{i,c,t-1} + \beta_8 FDI^{I}_{i,c,t-1} + \omega_t + \theta^s_i + \psi^f_i + \varepsilon_{i,c,t} \quad (9a)$$

including only firm-specific fixed effects $\psi^f_i$ and:

$$\log(S_{i,c,t}) = \beta_0 + \beta_1 \log(IMP_{c,t}) + \beta_4 \log(N_{i,t-1}) + \beta_5 \log(Prod_{i,t-1}) + \beta_6 IT_{i,t-1} + \beta_7 FDI^{O}_{i,c,t-1} + \beta_8 FDI^{I}_{i,c,t-1} + \omega_t + \theta^{s}_{i} + \psi^{f}_{i} + \delta_c + \varepsilon_{i,c,t} \quad (9b)$$

considering also country fixed effects $\delta_c$.

In specification (9b) it is not possible to identify the impact of trade costs − coefficients $\beta_2$ and $\beta_3$ associated with the variables $\log(Dist_c)$ and $Contig_c$. However, using country-specific fixed effects, we are able to capture the influence of all unobserved time-invariant country characteristics that might correlate with the included variables.

Table 11 reports the estimates of equation (9a) − both with the dummy for outward FDI and with the number of outward FDI relationships − and (9b), with the number of outward FDI, using the total exports of "other services" as the dependent variable. The data refer to all sectors (first three models) and to service sectors only (last three models).

**Table 11 – Total exports of "other services": fixed effects estimation**

| | ALL SECTORS | | | ONLY SERVICE SECTORS | | |
|---|---|---|---|---|---|---|
| | Model FA1 | Model FA2 | Model FA3 | Model FS1 | Model FS2 | Model FS3 |
| | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ |
| $\log(IMP_{c,t})$ | 0.517*** | 0.523*** | 0.176*** | 0.601*** | 0.602*** | 0.200*** |
| | *(0.00572)* | *(0.00570)* | *(0.0535)* | *(0.00754)* | *(0.00754)* | *(0.0679)* |
| $\log(Dist_c)$ | -0.208*** | -0.216*** | | -0.425*** | -0.426*** | |
| | *(0.0103)* | *(0.0103)* | | *(0.0145)* | *(0.0145)* | |
| $Contig_c$ | 0.261*** | 0.260*** | | 0.202*** | 0.206*** | |
| | *(0.0307)* | *(0.0308)* | | *(0.0421)* | *(0.0421)* | |
| $\log(N_{i,t-1})$ | 0.280*** | 0.267*** | 0.414*** | 0.432*** | 0.421*** | 0.550*** |
| | *(0.0423)* | *(0.0423)* | *(0.0271)* | *(0.0519)* | *(0.0519)* | *(0.0326)* |
| $\log(Prod_{i,t-1})$ | 0.0351 | 0.0426* | 0.0535*** | 0.0780** | 0.0771** | 0.0656*** |
| | *(0.0254)* | *(0.0254)* | *(0.0161)* | *(0.0364)* | *(0.0363)* | *(0.0226)* |
| $IT_{i,t-1}$ | 0.0659 | 0.0624 | -0.0362 | -0.0241 | -0.0333 | -0.145** |
| | *(0.0618)* | *(0.0619)* | *(0.0399)* | *(0.0971)* | *(0.0972)* | *(0.0620)* |
| $FDI^{O}_{i,c,t-1}$ | 0.924*** | | | 0.981*** | | |
| | *(0.0508)* | | | *(0.111)* | | |
| $FDI^{O}_{i,c,t-1}$ x $HP_{i,t-1}$ | 0.432*** | | | 0.153 | | |
| | *(0.0661)* | | | *(0.122)* | | |
| $SameNACE^{O}_{i,t-1}$ | 0.825*** | 1.057*** | 0.139** | 0.494*** | 0.821*** | 0.242** |
| | *(0.0583)* | *(0.0533)* | *(0.0678)* | *(0.115)* | *(0.0992)* | *(0.0980)* |
| $FDI^{I}_{i,c,t-1}$ | 2.280*** | 2.273*** | 0.123 | 2.420*** | 2.419*** | -0.00224 |
| | *(0.0777)* | *(0.0778)* | *(0.111)* | *(0.111)* | *(0.112)* | *(0.165)* |
| $NFDI^{O}_{i,c,t-1}$ | | 0.596*** | 0.120*** | | 0.558*** | 0.101 |
| | | *(0.0277)* | *(0.0390)* | | *(0.0518)* | *(0.0613)* |
| *Constant* | -0.232 | -0.288 | 5.813*** | -5.176*** | -5.096*** | 0.981 |
| | *(1.351)* | *(1.353)* | *(1.683)* | *(0.768)* | *(0.768)* | *(1.648)* |
| Observations | 66,266 | 66,266 | 66,266 | 34,685 | 34,685 | 34,685 |
| Country FE | NO | NO | YES | NO | NO | YES |
| Industry FE | YES | YES | YES | YES | YES | YES |
| Firm FE | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES |
| Adj. $R^2$ | 0.479 | 0.478 | 0.818 | 0.501 | 0.501 | 0.832 |

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Considering all industries, the sign and significance of the main variables in models FA1 and FA2 are virtually unaffected. The most important exception is represented by the dummy $IT_{i,t-1}$, which loses its significance: however, the effect of this variable might be absorbed by firm-specific fixed effects, given the extremely low within-firm time variation of this dummy. Moreover, the coefficients of outward and inward FDI variables remain positive and statistically significant in all specifications and the magnitude of their effects, both on the outward and inward side, is even bigger.

The inclusion of country fixed effects increases substantially the variability of exports explained by the model (the $R^2$ increases to a value above 80 per cent). The coefficients of the main explanatory variables remain highly significant, although with greater standard errors, and preserve the same sign, supporting the idea that, in the previously estimated specifications without country fixed effects, the omitted country-specific variables do not correlate with the included variables of the augmented gravity equation.

The statistical significance of FDI variables is lower when considering only the firms classified in service sectors; however, this might be due to the considerable drop in the number of observations, which leads to a far less precise estimation of the gravity equation parameters.

As in Ariu *et al.* (2019), a further robustness check is performed in Table 12, analysing the export performance across two more homogeneous classes of firm size. Specifically, the analysis is restricted to the top 100 (and 200) firms, defined on the basis of the average value of their exports, which account for the 77.2 (and 90.1) per cent of the panel's total exports of "other services". Considering this more homogeneous group of firms, some firm characteristics, such as productivity and the nationality of the group they belong to, are less significant, with the exception of the number of employees, which remains highly significant. Foreign demand, trade costs and FDI variables also remain highly significant with the expected signs. We can therefore conclude that the main findings of the previous section are robust to alternative specifications of the unobserved component of the gravity equation and are confirmed in more homogeneous sub-samples.

**Table 12 – Total exports of "other services": fixed effects estimation**

| | **TOP 100 FIRMS** | | | **TOP 200 FIRMS** | | |
|---|---|---|---|---|---|---|
| | Model FT1 | Model FT2 | Model FT3 | Model FT1 | Model FT2 | Model FT3 |
| | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ | $\log(S_{i,c,t})$ |
| $\log(IMP_{c,t})$ | 0.658*** | 0.657*** | 0.668*** | 0.629*** | 0.628*** | 0.637*** |
| | *(0.0116)* | *(0.0116)* | *(0.0115)* | *(0.00883)* | *(0.00882)* | *(0.00880)* |
| $\log(Dist_c)$ | -0.272*** | -0.271*** | -0.291*** | -0.234*** | -0.233*** | -0.250*** |
| | *(0.0208)* | *(0.0208)* | *(0.0208)* | *(0.0158)* | *(0.0158)* | *(0.0158)* |
| $Contig_c$ | 0.405*** | 0.401*** | 0.411*** | 0.382*** | 0.381*** | 0.382*** |
| | *(0.0784)* | *(0.0784)* | *(0.0786)* | *(0.0548)* | *(0.0548)* | *(0.0549)* |
| $\log(N_{i,t-1})$ | 0.447*** | 0.476*** | 0.448*** | 0.422*** | 0.441*** | 0.426*** |
| | *(0.0727)* | *(0.0729)* | *(0.0728)* | *(0.0623)* | *(0.0625)* | *(0.0624)* |
| $\log(Prod_{i,t-1})$ | 0.0351 | 0.000547 | 0.0277 | -0.0174 | -0.0298 | -0.0233 |
| | *(0.0679)* | *(0.0682)* | *(0.0680)* | *(0.0428)* | *(0.0429)* | *(0.0429)* |
| $IT_{i,t-1}$ | -0.198* | -0.192 | -0.204* | -0.158* | -0.160* | -0.164* |
| | *(0.119)* | *(0.119)* | *(0.120)* | *(0.0935)* | *(0.0934)* | *(0.0936)* |
| $FDI^{O}_{i,c,t-1}$ | 1.280*** | 0.978*** | | 1.188*** | 0.960*** | |
| | *(0.0911)* | *(0.111)* | | *(0.0710)* | *(0.0881)* | |
| $FDI^{O}_{i,c,t-1}$ x $HP_{i,t-1}$ | | 0.587*** | | | 0.418*** | |
| | | *(0.123)* | | | *(0.0956)* | |
| $SameNACE^{O}_{i,t-1}$ | 0.683*** | 0.701*** | 1.131*** | 0.705*** | 0.767*** | 1.112*** |
| | *(0.117)* | *(0.117)* | *(0.104)* | *(0.0904)* | *(0.0915)* | *(0.0794)* |
| $FDI^{I}_{i,c,t-1}$ | 2.841*** | 2.845*** | 2.836*** | 2.462*** | 2.465*** | 2.456*** |
| | *(0.170)* | *(0.170)* | *(0.171)* | *(0.134)* | *(0.134)* | *(0.134)* |
| $NFDI^{O}_{i,c,t-1}$ | | | 0.517*** | | | 0.531*** |
| | | | *(0.0452)* | | | *(0.0376)* |
| *Constant* | -4.048*** | -3.806** | -3.990*** | -4.341*** | -4.310*** | -4.305*** |
| | *(1.490)* | *(1.490)* | *(1.493)* | *(0.936)* | *(0.935)* | *(0.937)* |
| Observations | 16,349 | 16,349 | 16,349 | 28,491 | 28,491 | 28,491 |
| Country FE | NO | NO | NO | NO | NO | NO |
| Industry FE | YES | YES | YES | YES | YES | YES |
| Firm FE | YES | YES | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES |
| Adj. $R^2$ | 0.431 | 0.432 | 0.428 | 0.415 | 0.415 | 0.413 |

Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

## 7. Conclusions

Our paper contributes to the literature on trade in services based on firm-level data by highlighting, among the standard drivers elicited by recent empirical studies (firm size, productivity, trade costs, foreign demand), the important role played by FDI, both outward and inward, in Italian firms' exports of "other services" (services other than travel, transport and processing).

After presenting a formal justification for a gravity equation augmented with firm characteristics and FDI, we estimate its parameters using two firm-level databases, the first on trade in services and the second on external financial stocks, employed for the compilation of the Italian balance of payments and international investment position. Our analysis is performed on a panel of firms that have always exported "other services" in the period from 2013 to 2018. As noted before, this is a significant period for Italian trade in services, since 2016 marked the beginning of a recovery of exports of "other services" after a long phase of unsatisfactory growth in comparison with the main euro-area partners and with foreign demand.

Our analysis confirms a widespread finding of the trade literature: traditional gravity variables − such as foreign market size and geographical proximity −have a positive and significant effect on service exports. The same applies to firm characteristics, namely size and productivity, again in line with the literature.

In addition, we find that firms belonging to foreign multinational groups have a greater propensity to export. Estimates of a gravity model including FDI variables suggest the presence of a complementarity relationship between trade in services and FDI, in line with other recent papers.

This evidence is compatible with the hypothesis, highlighted in our theoretical model, that a significant component of "other services" exports consists of intra-group transactions, potentially used as inputs in the production process of affiliate enterprises. Furthermore, we show that the number of outward FDI relationships and the interaction between the presence of outward FDI and firm productivity are highly significant as well, with a positive effect on exports.

The main results of our work, including the complementarity between service exports and FDI, broadly hold not only for total exports of "other services" but also for some service categories, such as *Telecommunications, information and computer services* and *Other business services*. The same is true when restricting the analysis to the top 100 (or 200) exporting firms, defined on the basis of the average value of their exports, or to firms belonging to service sectors. The main findings are robust even to alternative ways of specifying the unobserved component of the gravity equation, including firm and country fixed effects.

Finally, our analysis detects a structural break in 2016, the starting year for the recovery of Italian exports of "other services", with significant changes in the values of the gravity equation coefficients. In fact, when the analysis is restricted to the three-year period 2016-18, it is possible to observe, in comparison with the previous sub-period, an upward shift of the coefficients relative to the interaction between outward FDI and productivity and, although to a lesser extent, the inward FDI dummy. For the other firm characteristics, such as firm size, the coefficients are lower, while the standard gravity variables (foreign demand, geographical distance, proximity) do not change their impact significantly. These result shed light on the main drivers in the recent recovery phase of Italian exports of "other services": more productive firms with outward FDI or more internationalised enterprises belonging to foreign multinationals seem to be the most successful exporters and their increase of foreign sales is largely contributing to the Italian recovery of service exports.

# References


Amador, J., Ringstad, B. and Cabral, S. (2018). A portrait of Portuguese international traders of non-tourism services. https://www.bportugal.pt/sites/default/files/anexos/papers/re201808_e.pdf

Anderson, J. E., and Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American economic review*, *93*(1), 170-192.

Ariu, A., Biewen, E., Blank, S., Gaulier, G., González, M. J., Meinen, P. and Tello, P. (2019). Firm heterogeneity and aggregate business services exports: Micro evidence from Belgium, France, Germany and Spain. *The World Economy*, *42*(2), 564-589.

Breinlich, H., & Criscuolo, C. (2011). International trade in services: A portrait of importers and exporters. *Journal of International Economics*, *84*(2), 188-206.

Bhattacharya, R., Patnaik, I., & Shah, A. (2012). Export versus FDI in services. *The World Economy*, *35*(1), 61-78.

Chaney, T. (2008). Distorted gravity: the intensive and extensive margins of international trade. *American Economic Review*, *98*(4), 1707-21.

Haller, S. A., Damijan, J., Kaitila, V., Kostevc, Č., Maliranta, M., Milet, E. and Rojec, M. (2014). Trading firms in the services sectors: comparable evidence from four EU countries. *Review of World Economics*, *150*(3), 471-505.

Fillat Castejon, C., Francois, J. F. and Wörz, J. (2008). Cross-border trade and FDI in services. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1311197

Federico, S. and Tosti, E. (2012). Exporters and importers of services: Firm-level evidence on Italy. *Questioni di Economia e Finanza (Occasional Papers)*, Bank of Italy, no. 877, https://www.bancaditalia.it/pubblicazioni/temi-discussione/2012/2012-0877/en_tema_877.pdf.

Federico, S. and Tosti, E. (2017). Exporters and importers of services: Firm-level evidence on Italy. *The World Economy*, *40*(10), 2078-2096.

Heckemeyer, J. and Overesch, M. (2013). Multinationals' profit response to tax differentials: Effect size and shifting channels. *ZEW-Centre for European Economic Research Discussion Paper*.

Helpman, E., Melitz, M. J. and Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *American economic review*, *94*(1), 300-316.

International Monetary Fund (IMF), *Balance of Payments Manual,* VI edition (2009): http://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf

Kelle, M., Kleinert, J., Raff, H. and Toubal, F. (2013). Cross-border and foreign affiliate sales of services: Evidence from German microdata. *The World Economy*, *36*(11), 1373-1392.

Lejárraga, I. and Oberhofer, H. (2015). Performance of small-and medium-sized enterprises in services trade: Evidence from French firms. *Small Business Economics*, *45*(3), 673-702.

Lennon, C. (2009). Trade in services: cross-border trade vs. commercial presence. Evidence of complementarity (No. 59). *WIIW Working Paper*.

Lipsey R.E. 2008. Measuring international trade in services, in Reinsdorf M.B., Slaughter M.J. (eds) *International trade in services and intangibles in the era of globalization*, NBER.

Lodefalk, M., and Nordås, H. K. (2017). Trading firms and trading costs in services: The case of Sweden. Örebro University, *School of Business Working Paper* (forthcoming).

Loungani, M. P., Mishra, M. S., Papageorgiou, M. C. and Wang, K. (2017). *World trade in services: evidence from a new dataset*. International Monetary Fund.

Malchow-Møller, N., Munch, J. R. and Skaksen, J. R. (2015). Services trade, goods trade and productivity growth: evidence from a population of private sector firms. *Review of World Economics*, *151*(2), 197-229.

Markusen, J. R. (1989). Trade in producer services and in other specialized intermediate inputs. *The American Economic Review*, 85-95.

Mayer, T. and Ottaviano, G. (2007). The happy few: the internationalisation of European firms: new facts based on firm-level evidence. *Bruegel Blueprint Series*, vol. III.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, *71*(6), 1695-1725.

Moïsé, E. and F. Le Bris (2013), "Trade Costs - What Have We Learned?: A Synthesis Report", *OECD Trade Policy Papers*, No. 150, OECD Publishing, Paris. http://dx.doi.org/10.1787/5k47x2hjfn48-en

Moro, A. and Tosti, E. (2019). Italy's international trade in services: a story of missed growth? *Questioni di Economia e Finanza (Occasional Papers)*, Bank of Italy, No. 519, https://www.bancaditalia.it/pubblicazioni/qef/2019-0519/QEF_519_19.pdf?language_id=1.

OECD (2008). *Benchmark Definition of Foreign Direct Investment*, vol. 4. Paris: OECD. https://www.oecd.org/daf/inv/investmentstatisticsandanalysis/40193734.pdf

Tørsløv, T.R., Wier L.S. & Zucman G. (2018). The missing profits of nations (No. w24701). *National Bureau of Economic Research.*

Wolfmayr, Y, Christen, E. and Pfaffermayr, M. (2019). Decomposing service exports adjustments along the intensive and extensive margin at the firm-level. *Review of International Economics*, *27*(1), 155-183.