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International trade in services: Firm-level evidence for Portugal

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Abstract This paper adds to the existing firm-level evidence on international trade in non-tourism services, using a new Portuguese database merged with balance-sheet data. In accordance with the literature, we find that a small number of firms that both export and import services (two-way traders) with diversified service and geographical portfolios account for a substantial share of trade flows. Compared with one-way traders, two-way traders are larger, older, more productive, more profitable and have a higher share of foreign equity. Considering all margins of firm-level trade and controlling for firms' characteristics, the intensive margins of exports and imports of services are positively related to both productivity and profitability. Regarding the extensive margins, the number of services imported is also positively associated with firms' performance.

Keywords International trade · Services · Trade margins · Firm-level data

JEL Classification F1 F14 L25

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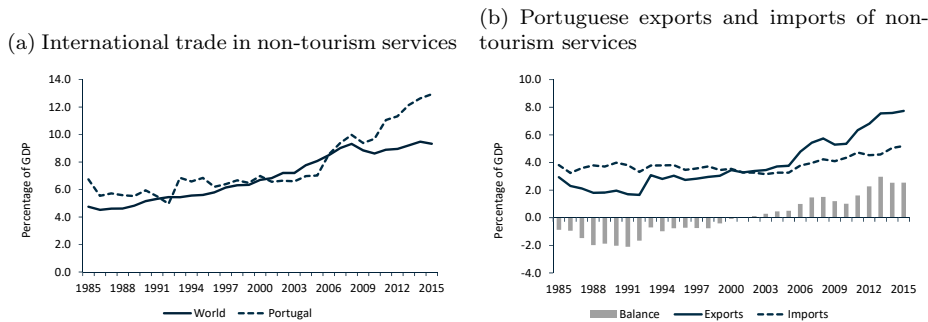
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1 Introduction

International trade in business services has been growing strongly, with its share in world GDP almost doubling since the mid-eighties (Figure 1). The main drivers of trade in services are the reduction of political and economic barriers to international transactions, the development of global value chains and the acceleration of technological progress.¹ In particular, the progress in information and communication technologies has been key in moving services away from the traditional notion of non-tradables. In the next decades, as digital technologies enhance remote connections, a larger number of services should become tradable (see Baldwin (2016) for a discussion of globalisation's *third unbundling*).

In Portugal, exports and imports of non-tourism services have been increasing substantially in recent years (Figure 1). Since the beginning of the 2000s, the Portuguese non-tourism services account registered surpluses, in contrast with the systematic deficits recorded earlier. This paper contributes to the firm-level literature on international trade in services by reporting a set of stylised facts based on a new dataset for Portugal. The analysis relies on detailed firm-level data on Portuguese international trade in non-tourism services, as collected by Banco de Portugal for the compilation of the Balance of Payments, merged with firms' balance-sheet data for 2014 and 2015. This new set of information makes it possible to improve the existing knowledge about services trade in Portugal, for instance in terms of the role of multi-service and multi-country firms.

Fig. 1: International trade in non-tourism services as a percentage of GDP



Source: CEPII-Chelem database.

Notes: Nominal Balance of Payments transactions and nominal GDP are denominated in current US dollars. Exports and imports of services exclude transactions of the travel account.

An important methodological development in the empirical trade literature is the utilisation of micro-level data. This literature has advanced significantly when it comes to goods trade but it is still relatively scarce for international trade in services. The seminal paper of Breinlich and Criscuolo (2011) for the UK provided a novel set of stylised facts on firms engaging in international trade in services and

¹ Francois and Hoekman (2010) provide a survey of the literature on services trade, while Low (2013) and Heuser and Mattoo (2017) discuss the role of services in global value chains.

1 was followed by studies on the profiles of service traders using firm-level Balance of
2 Payments data for other European Union (EU) countries. Among others, the list of
3 these studies includes Federico and Tosti (2017) for Italy, Sanz and Caloca (2010)
4 and Minondo (2016) for Spain, Ariu (2016) for Belgium, Kelle and Kleinert (2010)
5 and Biewen and Schultz (2014) for Germany, Gaulier et al. (2010) for France,
6 Walter and Dell'mour (2010) and Wolfmayr et al. (2013) for Austria. Comparable
7 cross-country evidence on the characteristics of trading firms in service sectors is
8 provided by Haller et al. (2014) and Damijan et al. (2015) for Finland, France,
9 Ireland and Slovenia, while Ariu et al. (2019) analyse the role of firm heterogeneity
10 in shaping aggregate exports of services in Belgium, France, Germany and Spain.

11 This literature finds many similarities between firm-level trade in services and
12 in goods, suggesting that models of heterogeneous firms for goods trade are an
13 appropriate starting point to explain trade in services. These studies show that a
14 small number of firms engage in exports or imports (one-way traders) and even
15 fewer firms are active in both dimensions (two-way traders). Moreover, firms par-
16 ticipating in international trade in services are larger, more productive, and have
17 higher skill intensity and wages than non-traders. Available evidence also confirms
18 the strong heterogeneity in terms of traded values, number of partner countries
19 and types of services, as well as the concentration of the values of trade in services
20 both between and within firms.

21 We confirm most of the evidence on international traders of services observed
22 for other countries, namely the strong degree of firm-level heterogeneity and the
23 concentration of trade flows between and within-firms. Two-way traders with di-
24 versified service and geographical portfolios account for a large proportion of Por-
25 tuguese exports and imports of services. In addition, two-way traders tend to be
26 larger, older, more productive, more profitable and to have a higher share of foreign
27 equity than one-way traders.

28 Benefiting from the service and geographical detail of the data, we consider
29 two extensive margins of firm-level trade (number of trading partners and num-
30 ber of services traded) and the intensive margin (trade per country-service type
31 combination). We conclude that the intensive margin of firm-level trade is more
32 important than the extensive margins to explain the differences in traded values
33 among Portuguese traders of services, for both exports and imports. Moreover,
34 larger and more productive firms have higher values of exports and imports of
35 services, trade more per country and service type, and trade with more countries
36 and in more types of services. Most of the correlations between firms' produc-
37 tivity, profitability and size, on the one hand, and firm-level trade flows, on the
38 other hand, are explained by the intensive margin of firm-level trade. Consider-
39 ing the different margins of a firm's trade together and controlling for several of
40 its characteristics, we find a positive link between the average values traded per
41 service-country and firms' productivity and profitability. The number of different
42 types of services imported by a firm is also positively related with its performance,
43 pointing to the importance of foreign services as inputs.

44 The paper is organised as follows. Section 2 describes the databases used and
45 presents some aggregate descriptive statistics. Section 3 starts by analysing the
46 main characteristics of the Portuguese international traders of services. Next, it
47 examines the portfolios of trading firms with regard to the number of services and
48 partner countries. Moreover, this section assesses how the intensive and exten-
49 sive margins of trade are related to firm characteristics.
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sive trade margins at the firm-level correlate with productivity and profitability. Finally, Section 4 offers some concluding remarks.

2 Data and aggregate statistics

The empirical analysis relies on detailed data for Portuguese international traders of services, which is used to compile the services account of the Portuguese Balance of Payments (BoP). This data is merged with balance-sheet and income statement information from the Simplified Corporate Information (*Informação Empresarial Simplificada*, Portuguese acronym: IES). We link the databases by using a common and unique firm identifier in 2014 and 2015, the period for which both sets of data are available. Moreover, we use *Quadros de Pessoal* (QP), an administrative dataset covering virtually all employees and firms based in Portugal, to have information on firms' ownership, namely the share of foreign equity in 2013 (the most recent year of QP available). This section proceeds by providing information about the BoP and IES databases, followed by aggregate descriptive statistics based on the final sample of Portuguese international traders of non-tourism services used in the paper.

The services account of the Portuguese BoP, compiled by Banco de Portugal, measures services transactions between resident and non-resident entities in accordance with the IMF (2016) Balance of Payments Manual (6th edition). This definition of trade in services anchors our analysis and is narrower than the one of the General Agreement on Trade in Services (GATS), which takes into account the modes by which services are internationally supplied.²

Banco de Portugal collects detailed data on external transactions and positions on a monthly basis to compile the Portuguese BoP. The statistical reporting of external operations to Banco de Portugal is regulated by law and it is mandatory (see Banco de Portugal (2018) for a description of the procedures). Two types of electronically transmitted communications are considered: COPE (communication of external transactions and positions) and COL (communication of settlement transactions). COPE concerns external transactions conducted by the entity itself. It covers all legal persons residing or pursuing their business in Portugal that conduct external economic, financial or foreign exchange operations. Entities with a total annual amount of external transactions not exceeding 100 thousand euros, considering total inflows and outflows, are exempt from reporting. Transactions intermediated by the resident banking system, transactions carried out directly with non-resident entities through external or clearing accounts, and transactions in current accounts are communicated. COL concerns transactions reported by the resident banking system on behalf of customers. External settlements on behalf of resident customers and transactions on behalf of non-resident customers are communicated. This information is reported on an individual transaction basis, though not specifying any statistical classification. COL information is then

² GATS defines trade in services in terms of four modes of supply. The four modes are: (1) cross-border supply, (2) consumption abroad, (3) commercial presence, and (4) presence of natural persons. This definition is broader than the BoP concept of services trade, which comprises only transactions between residents of a given country and non-residents, encompassing modes 1, 2, a significant part of mode 4 and a small part of mode 3. See the United Nations Manual on Statistics of International Trade in Services (UN, 2010) for a detailed description of the four modes of supply for international services.

1 made available to firms for simple consultation or to be used in the creation of
2 their COPE. For this latter communication, firms can edit and complement the
3 respective COL with the necessary statistical information and also include other
4 external operations with no impact on bank settlements. For the same reference
5 period, a firm can make multiple submissions of information, which are handled
6 cumulatively.

7 Since there is only a non-reporting threshold on the annual value of all ex-
8 ternal operations of a firm, no specific threshold is imposed on the international
9 transactions of services. However, no firm-level data for travel and tourism flows
10 is available. This data covers more than 90 percent of total Portuguese exports
11 of non-tourism services and around 80 percent of total imports of non-tourism
12 services, as published in the official BoP. Appendix A presents the values of ex-
13 ports and imports of non-tourism services by main categories of services and their
14 respective coverage in relation to the official BoP statistics.

15 We aggregate the data at the annual level and all values are expressed in cur-
16 rent euros. For each external operation, the database reports the firm identifier,
17 classification of the service, partner country, time period and the value traded.
18 Hence, a transaction in this paper is defined as firm-year-service-country record in
19 the database. Types of services are defined according to the Extended Balance of
20 Payments Services (EBOPS) 2010 classification. We use a breakdown that com-
21 prises 29 categories of services, as described in Appendix B. Although this is a
22 relatively disaggregated level in the EBOPS classification, it is much less detailed
23 than the usual product classifications available for trade in goods. Therefore, the
24 interpretation of the results on the contribution of the services “extensive margin”
25 of firm-level trade (number of services traded) should take this fact into consid-
26 eration.

27 The balance-sheet data draws on annual information for Portuguese firms re-
28 ported under Simplified Corporate Information (*Informação Empresarial Simpli-*
29 *ficada*, IES). IES results from a collaboration between the Ministry of Finance,
30 the Ministry of Justice, Statistics Portugal and Banco de Portugal and it covers
31 virtually the universe of Portuguese non-financial firms.³

32 The almost universal coverage of IES emerges from its nature, as it is the
33 system through which firms report mandatory information to the tax adminis-
34 tration and statistical authorities. Under IES, firms provide annual balance-sheet,
35 profit and loss accounts. It further contains information on firms’ characteristics
36 such as number of employees, age and main sector of economic activity according
37 to the Portuguese industrial classification Rev 3 – *Classificação Portuguesa das*
38 *Actividades Económicas* (CAE).

39 Some filters are imposed on the IES database to eliminate erroneous, incon-
40 sistent or missing observations. Firstly, the sample is restricted to firms for whom

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43 ³ More precisely, it excludes firms whose main activity is in sections O - Public adminis-
44 tration and defence, compulsory social security (division 84); T - Activities of households as
45 employers; undifferentiated goods and services producing activities of households for own use
46 (division 97 – 98); U - Activities of extraterritorial organisations and bodies (division 99) of
47 the Portuguese statistical classification of economic activities Rev 3 – *Classificação Portuguesa*
48 *das Actividades Económicas* (CAE). In addition, most firms in section K - Financial and insur-
49 ance activities (divisions 64 – 66), like banks and insurance companies, are also excluded from
50 IES, since they have specific accounting reporting requirements and a distinct balance-sheet
51 structure. However, other financial and insurance intermediaries and auxiliaries are available
52 in the database.

1 there is information for a set of key variables, such as age and sector of activity.
2 Secondly, we further restrict the sample to firms with positive values for gross
3 value added, employment, labour costs and total assets.

4 The sample used in this paper is based on firms present in both the BoP
5 and IES databases, and thus it includes only Portuguese firms that either export
6 and/or import non-tourism services in 2014 and/or 2015. Due to the merge with
7 IES, the final sample excludes most of the banking and insurance sectors. This
8 leads to a reduced coverage of international trade in these services, even if the
9 database still contains information on financial services of non-bank institutions.⁴
10 For insurance services, the sample covers around 37 percent and 17 percent of
11 total exports and imports in 2014-2015, respectively (Appendix A). For financial
12 services, the sample coverage is around 15 percent for exports and 12.5 percent
13 for imports. In comparison to total exports and imports of non-tourism services
14 published in the official Portuguese BoP, the coverage of the final sample used in
15 this paper is 84.3 percent for exports and 65.1 percent for imports.

16 Some basic aggregate statistics are worthwhile referring. Firstly, Portuguese
17 international trade in non-tourism services is dominated by three main categories
18 of services: “Other business services”, “Transports” and “Telecommunications,
19 computer and information” (Tables A.1 and A.2 of Appendix A). Within these
20 categories, the most important types of services are “Air transport”, “Telecommu-
21 nications”, “Computer services”, “Scientific and other technical services”, “Trade-
22 related services” and “Other business services n.i.e”, on both the export and im-
23 port sides (Tables B.1 and B.2 of Appendix B). Secondly, the largest export and
24 import partner countries in terms of their percentage share in the respective trade
25 flows and number of firms are included in Appendix C. The major partners are
26 very similar on the export and import sides, with EU and Portuguese-speaking
27 countries standing out.

28 Given that this is a new database, it is also important to report the repre-
29 sentativity of the final sample of Portuguese international traders of non-tourism
30 services in relation to the universe of non-financial firms available in IES (Table A.3
31 of Appendix A). As found for other countries, the participation in international
32 trade in services is uncommon in Portuguese firms: considering firm-year obser-
33 vations, only 3.4 percent of Portuguese non-financial firms export and/or import
34 non-tourism services. This participation rate in services trade is lower than the one
35 found for the UK (8.1 percent as in Breinlich and Criscuolo (2011)) and closer to
36 the shares reported by Ariu (2016) for Belgium (2.68 percent for service exporters
37 and 1.71 percent for service importers). However, on aggregate terms, these inter-
38 national traders of services account for a disproportionate share of the Portuguese
39 economic activity: around half of total turnover, output and value added and
40 almost 30 percent of total employment of non-financial firms. These shares are
41 higher than those found by Breinlich and Criscuolo (2011) for the UK (30 percent
42 for value added and 22 percent for employment). This feature reflects the fact that
43 most of the largest Portuguese firms engage in international trade in non-tourism
44 services. For instance, the largest 5 traders of services in terms of value added
45 represent 5.7 percent of the aggregate total. All sectors of activity include firms

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48 ⁴ Note that the classification of types of services is independent from the one used to assign
49 firms to sectors of economic activity. Firms are officially classified in a sector of CAE according
50 to their main reported activity and import and/or export one or more of the 29 types of services
51 of the EBOPS classification.
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that participate in international trade in services, but the shares of traders in the total number of firms and in the totals of the other variables vary widely across sectors.

3 The portrait of Portuguese international traders of services

In this section, we report a set of stylised facts about Portuguese international traders of non-tourism services, distinguishing between firms that only export (one-way exporters); firms that only import (one-way importers); and firms that import and export (two-way traders). The general term exporters (importers) refers to firms exporting (importing) services regardless of their import (export) dimension. Throughout the paper, we calculate the statistics using firm-year observations, implying that a firm active in services trade in both years is counted twice in the pooled dataset. For simplicity, we use the term *firm* for *firm-year* and refer to non-tourism services only as services in the remaining of the paper.

Considering 2014 and 2015, there are 16,177 firms, of which 4,506 are one-way exporters, 4,430 are one-way importers and 7,181 engage in both activities (Table 1). For the UK, Breinlich and Criscuolo (2011) find that exporting services is more common than importing, while Federico and Tosti (2017) and Biewen and Schultz (2014) have the opposite result for Italy and Germany, respectively. In our sample of Portuguese service traders, the proportions of one-way exporters and importers are very similar, each representing around 28 percent of total. Interestingly, a substantial share of firms are active in both flows: two-way traders represent around 45 percent of trading firms. Another feature that stands out in Table 1 is the striking concentration of trade values in two-way traders: these firms represent 89.1 percent of total exports and around 93.6 percent of total imports. These proportions are of comparable magnitude to the ones found by Kelle and Kleinert (2010) for Germany (97.2 percent for exports and 83.5 percent for imports) and by Breinlich and Criscuolo (2011) for the UK (79.8 percent for exports and 86.4 percent for imports).

Table 1: Sample of Portuguese international traders of services, 2014-2015

Firm type	Firms		Exports		Imports	
	Number	%	Value	%	Value	%
One-way exporters	4,506	28.0	2,389,858	10.9	–	–
One-way importers	4,430	27.5	–	–	736,306	6.4
Two-way traders	7,181	44.6	19,570,445	89.1	10,850,840	93.6
Exporters	11,687	72.5	21,960,303	100.0	10,850,840	–
Importers	11,611	72.0	19,570,445	–	11,587,146	100.0
Total	16,117	100.0	21,960,303	100.0	11,587,146	100.0

Notes: Import and export values are in thousand euros. All values are based on firm-year observations pooled for 2014-2015.

As shown above, two-way traders play a prominent role in Portuguese international trade in services. Hence, it is important to understand how these firms

differ from one-way traders. We use descriptive regressions to assess the magnitude of the differences between one-way and two-way traders along a number of attributes. More precisely, we regress several firm-level variables in logs on a dummy variable identifying two-way traders of services, i.e., one-way traders are the reference group. The regressions include year and industry fixed-effects to control for differences in firms' characteristics across sectors. The control for the main sector of activity of the firm is defined at the CAE 2-digit level, comprising 80 different sectors. Although these estimates are simple correlations, they have the advantage that the coefficients can be interpreted in percentage terms.

As found by Damijan et al. (2015), firms that both export and import tend to outperform one-way traders in most variables. Estimates of Table 2 show that two-way traders of services are more than 100 percent larger than one-way traders in terms of employment, total sales of services and gross value added.⁵ However, there is no significant difference between Portuguese international traders of services in terms of capital labour ratios and average wages per employee. Firms that both export and import services tend to be older than one-way traders, have a higher leverage ratio and a greater share of foreign equity. Finally, the advantage of two-way traders in terms of labour productivity is around 25 percent and the profitability premium is about 5 percent, on average. As discussed in Muûls and Pisu (2009) for international trade in goods, the significance of most of these results suggests that there are spillovers from combining exports and imports, which benefit two-way traders.

Table 2: Characteristics of two-way traders of services, 2014-2015

	(1) Employment	(2) Total sales of services	(3) Gross value added	(4) Age	(5) Capital labour ratio	(6) Average wages	(7) Productivity	(8) Profitability	(9) Leverage ratio	(10) Foreign equity
Two-way traders	0.732*** (0.028)	1.110*** (0.044)	0.956*** (0.032)	0.086*** (0.015)	0.036 (0.039)	0.046 (0.024)	0.223*** (0.017)	0.051** (0.020)	0.046** (0.016)	0.705*** (0.046)
Adjusted R^2	0.225	0.368	0.192	0.096	0.241	0.246	0.198	0.048	0.028	0.111
Observations	16,117	16,117	16,117	16,117	15,343	16,117	16,117	14,319	14,859	12,098

Notes: The dependent variables are reported in the column headings: total employment, total domestic and foreign sales of services, gross value added, number of years of age, capital to labour ratio, average wages as total labour costs divided by total employment, labour productivity defined as gross value added per worker, profitability defined as the ratio of earnings before interest, taxes, depreciation and amortisation (EBITDA) over total assets, leverage ratio as total assets to equity ratio, percentage share of foreign equity in 2013. All variables are in log-form. Each one of them is regressed on a dummy variable identifying two-way traders of services. Only firms with positive capital labour ratio, profitability and leverage ratio are included in the respective regressions. The inclusion of fully domestic-owned firms in the regression is achieved by summing 1 to the share of foreign equity before taking the logarithm. All regressions include a constant, 2-digit sector and year fixed-effects. See the main text for more details. Standard errors in parenthesis are clustered at the firm-level and are robust to heteroscedasticity. Stars indicate significance levels of 5% (*), 1% (**), and 0.1% (***).

⁵ Since the differences between one-way and two-way traders are often large, the log approximation understates the size of these gaps. For example, taking exponents of the employment coefficient in column (1) of Table 2, two-way traders have, on average, 107.9 percent more employment ($100 * (\exp(0.732) - 1) = 107.9$).

1 Finally, the distributions of trade values and number of traders by firm type
2 and sector of activity, age and size convey some results that are worth mention-
3 ing. Firstly, there is some heterogeneity in the shares of one-way and two-way
4 traders within sectors, but the concentration of the values of exports and imports
5 of services in two-way traders is common to most sectors of activity (Tables D.1
6 and D.2 of Appendix D). Secondly, firms with more than 20 years account for a
7 large part of Portuguese international trade in services, both in terms of the num-
8 ber of traders and, mostly, of the values traded (Table D.3). Thirdly, the majority
9 of service traders are micro and small firms but large firms are responsible for
10 more than 60 percent of the values traded (Table D.4).
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12 3.1 Service and geographical portfolios

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16 In this section, we examine the firm-level heterogeneity of Portuguese exports
17 and imports of services, in terms of firms' service and geographical portfolios,
18 distinguishing between the three types of traders.

19 Table 3 reports the joint distribution of traders and trade values over the
20 number of services and partner countries. Panels A.1 and B.1 show that most
21 exporters and importers trade only one type of services, representing 74.8 (34.6 +
22 40.2) and 50.8 (22.9 + 27.9) percent of total, respectively. In addition, most of
23 them have a single partner country. For example, one-way exporters that sell one
24 service to one country account for 18.5 percent of all exporters. This pattern is
25 similar for the three types of traders examined, even if the relative number of
26 multi-service firms is always higher on the import side. As it is also the case with
27 Portuguese international trade in goods (Amador and Opromolla, 2013), firms
28 that only sell/buy one service represent much smaller shares in total traded values
29 than in the number of firms. This fact is especially clear for one-way exporters
30 (9.9 and 34.6 percent, respectively) and one-way importers (2.0 and 22.9 percent,
31 respectively).

32 Another clear result in Table 3, and also found for trade in goods, is that
33 large fractions of exports and imports are concentrated in a few two-way traders,
34 which trade multiple services with many countries. For instance, two-way traders
35 exporting more than 3 different services to more than 50 countries represent only
36 0.3 percent of exporters but 27.9 percent of exports. A similar concentration is
37 found on the import side as 0.2 percent of importers account for 31.1 percent of
38 total imports. The importance of two-way traders that trade more than 3 types of
39 services is particularly strong on the import side, as they account for 64.2 percent
40 of total imports and 13.0 percent of importing firms.

41 The strong concentration of Portuguese trade in services is in line with one of
42 the main findings of empirical studies that use transaction-level data to examine
43 international trade in goods: exports and imports are dominated by "superstars"
44 trading many goods with many countries. Other empirical analyses of international
45 trade in services reached the same conclusions. Breinlich and Criscuolo (2011) for
46 the UK, Federico and Tosti (2017) for Italy and Minondo (2016) for Spain also
47 found that the values of services traded are highly concentrated among a small
48 group of firms that tend to trade several services and to have a large geographical
49 coverage. For Portugal, we further show that firms in this small group of "super-
50 stars" are predominantly two-way traders.
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Table 3: Joint distribution of trade values and traders by number of services and partner countries, 2014-2015

(A.1) Exporters					(A.2) Exports				
Number of countries	Number of services			Total	Number of countries	Number of services			Total
	1	2 – 3	> 3			1	2 – 3	> 3	
One-way exporters					One-way exporters				
1	18.5	1.1	0.0	19.7	1	1.5	0.2	0.0	1.7
2 – 50	15.8	2.6	0.2	18.6	2 – 50	5.0	0.7	0.1	5.8
> 50	0.3	0.0	0.0	0.4	> 50	3.4	0.1	0.0	3.5
Total	34.6	3.7	0.2	38.6	Total	9.9	1.0	0.1	10.9
Two-way traders					Two-way traders				
1	16.0	2.2	0.1	18.3	1	2.7	1.2	0.3	4.2
2 – 50	24.1	15.3	3.2	42.5	2 – 50	21.3	17.4	9.3	48.0
> 50	0.1	0.2	0.3	0.6	> 50	5.9	3.1	27.9	36.9
Total	40.2	17.6	3.6	61.4	Total	29.9	21.7	37.5	89.1

(B.1) Importers					(B.2) Imports				
Number of countries	Number of services			Total	Number of countries	Number of services			Total
	1	2 – 3	> 3			1	2 – 3	> 3	
One-way importers					One-way importers				
1	17.8	2.7	0.4	20.9	1	0.8	0.2	0.4	1.4
2 – 50	5.1	9.0	3.2	17.2	2 – 50	1.1	1.6	2.2	4.8
> 50	0.0	0.0	0.0	0.0	> 50	0.1	0.0	0.0	0.1
Total	22.9	11.6	3.7	38.2	Total	2.0	1.8	2.6	6.4
Two-way traders					Two-way traders				
1	13.0	3.1	0.6	16.7	1	4.3	2.5	0.1	6.9
2 – 50	14.8	17.7	12.2	44.8	2 – 50	10.2	12.2	33.0	55.4
> 50	0.1	0.0	0.2	0.3	> 50	0.1	0.1	31.1	31.4
Total	27.9	20.9	13.0	61.8	Total	14.6	14.9	64.2	93.6

Notes: Each cell represents the percentage of total exporters (importers) or exports (imports) associated with firms-year exporting (importing) a certain number of service types (column category) to (from) a given number of partner countries (row category) in 2014-2015.

Next, we examine how exports and imports of services are concentrated within a firm in terms of its service and geographical portfolios. Table 4 shows the average share of a firm's exports and imports that is accounted for by its top four services and partner countries. On both export and import sides, and for all firm types, the top service accounts for the majority of a firm's trade, while the lower ranked types of services have a much smaller role. For instance, the first and second most sold services account, on average, for 73.9 and 17.0 percent of exports of a one-way exporter selling more than 3 services. The relative importance of the main service seems to be somewhat smaller for imports than for exports, particularly for firms with larger portfolios.

Export and import shares present a similar pattern when considering partner countries instead of types of services, though the role played by the top country appears to be less dominant, especially as the geographical scope broadens. However, even for firms trading with more than 50 countries, the main partner accounts for more than 20 percent of trade flows for one-way traders and 30 percent for two-way traders.

This evidence on within-firm concentration of international trade in services observed for Portugal also exists for other countries and is similar to that of Amador and Opromolla (2013) for Portuguese exports of goods. However, for the concentration by type of services, the latter comparison must be taken with caution,

because the disaggregation level for goods is much larger than for services.

Table 4: Concentration of firms' exports and imports by service type and partner country, 2014-2015

(A) Exports										
Service rank	Number of services				Country rank	Number of countries				
	1	2	3	> 3		1	2	3	4 – 50	> 50
One-way exporters					One-way exporters					
1	100.0	82.7	74.7	73.9	1	100.0	83.9	75.7	57.6	22.4
2		16.8	19.8	17.0	2		16.1	18.9	19.6	12.8
3			5.1	5.7	3			5.4	9.1	9.0
4				2.7	4				5.0	6.6
Two-way traders					Two-way traders					
1	100.0	87.9	79.7	73.3	1	100.0	85.3	76.1	57.4	33.1
2		12.1	16.5	18.7	2		14.6	18.7	19.6	15.8
3			3.8	5.6	3			5.0	9.4	10.4
4				1.8	4				5.1	7.2

(B) Imports										
Service rank	Number of services				Country rank	Number of countries				
	1	2	3	> 3		1	2	3	4 – 50	> 50
One-way importers					One-way importers					
1	100.0	83.8	75.1	67.0	1	100.0	82.2	73.4	63.4	24.7
2		16.1	19.9	21.0	2		17.6	20.0	19.9	17.7
3			4.8	7.5	3			6.1	9.0	10.7
4				3.1	4				4.3	9.0
Two-way traders					Two-way traders					
1	100.0	85.8	78.7	69.1	1	100.0	84.1	76.9	61.0	33.5
2		14.0	17.0	19.3	2		15.9	18.2	19.6	16.4
3			4.3	7.3	3			4.9	9.1	11.0
4				2.7	4				4.6	7.6

Notes: For the service rank, values report the average share of a firm's exports (imports) accounted for by its four most important service types exported (imported) for firms-year exporting (importing) 1, 2, 3 or >3 service types. For the country rank, values report the average share of a firm's exports (imports) accounted for by its four most important export (import) partner countries for firms-year exporting to (importing from) to 1, 2, 3, 4-50 or >50 countries. Types of services and partner countries are ranked within each firm according to their share in total exports or imports of that firm in 2014-2015.

3.2 Trade margins, productivity and profitability

Transaction-level data on exports and imports of goods has allowed for the study of the different margins of trade at the firm-level, as well as their links with several characteristics of the firm (see Wagner (2016) for a review). In this section, we follow this literature and focus on the relative importance of the intensive and extensive margins of international trade in services at the firm-level. This analysis can be interpreted as a complementary dimension in the characterisation of Portuguese traders of services.

Following Breinlich and Criscuolo (2011), we start by examining the contribution of the intensive and extensive margins to the differences between firms' traded

values. We consider two extensive margins of firm-level trade – number of trading partners (destination and source countries) and number of services traded – and the intensive margin (trade per country-service type combination).⁶ In order to assess the role of the different margins, we run separate regressions of the log of each component on the log of firm-level trade. For exports, the regression is as follows:

$$\log Y_{it} = \alpha + \beta_1 \log X_{it} + \gamma_j + \gamma_t + \epsilon_{it}, \quad (1)$$

where Y_{it} is the dependent variable of interest (number of destination countries, number of service types, and exports per country-service type) of firm i in year t and X_{it} are total exports of firm i in year t . γ_t are time fixed-effects, γ_j is a vector of sector fixed-effects at the CAE 2-digit level, and ϵ_{it} is the error term. In addition, we also estimate Equation (1) separately for one-way exporters and two-way traders. The same exercise is performed for imports and the results for both flows and types of firms are presented in Table 5. All variables are in logs, and thus the reported coefficients add up to unity.

Table 5: Intensive and extensive margins of firm-level services trade, 2014-2015

Panel A - Exports									
	Total sample of exporters			One-way exporters			Two-way traders		
	(1) Average value	(2) Number of services	(3) Number of countries	(4) Average value	(5) Number of services	(6) Number of countries	(7) Average value	(8) Number of services	(9) Number of countries
Total exports	0.770*** (0.0048)	0.046*** (0.0020)	0.184*** (0.0038)	0.834*** (0.0066)	0.013*** (0.0017)	0.153*** (0.0062)	0.760*** (0.0059)	0.054*** (0.0026)	0.185*** (0.0045)
Adjusted R^2	0.841	0.148	0.437	0.883	0.052	0.419	0.834	0.156	0.447
Observations	11,687	11,687	11,687	4,506	4,506	4,506	7,181	7,181	7,181
Panel B - Imports									
	Total sample of importers			One-way importers			Two-way traders		
	(1) Average value	(2) Number of services	(3) Number of countries	(4) Average value	(5) Number of services	(6) Number of countries	(7) Average value	(8) Number of services	(9) Number of countries
Total imports	0.718*** (0.0042)	0.109*** (0.0023)	0.173*** (0.0027)	0.786*** (0.0061)	0.093*** (0.0033)	0.121*** (0.0041)	0.700*** (0.0055)	0.109*** (0.0030)	0.191*** (0.0036)
Adjusted R^2	0.827	0.272	0.453	0.864	0.247	0.316	0.793	0.262	0.442
Observations	11,611	11,611	11,611	4,430	4,430	4,430	7,181	7,181	7,181

Notes: The table reports OLS estimates of Equation (1) for exports in panel A and for imports in panel B. The dependent variables are reported in the column headings: log of average trade value per country-service type combination, log of number of traded service types, log of number of partner countries. Each of them is regressed on the log of total trade value of the firm. The regressions are estimated separately for the different types of service traders. All regressions include a constant, 2-digit sector and year fixed-effects. See the main text for more details. Standard errors in parenthesis are clustered at the firm-level and are robust to heteroscedasticity. Stars indicate significance levels of 5% (*), 1% (**), and 0.1% (***)

The first 3 columns of each panel of Table 5 show that the intensive margin is much more important than the extensive margins in explaining the differences in traded values among Portuguese firms, for both exports and imports (77.0 percent for exports and 71.8 percent for imports). Regarding the two extensive margins, the

⁶ Appendix E includes some basic descriptive statistics on the three margins of firm-level trade.

country margin is more relevant than the service margin, in particular for exports. However, the relatively broad service classification used tends to underestimate the relevance of the services extensive margin. These results are broadly in line with those obtained for the UK (Breinlich and Criscuolo, 2011), Italy (Federico and Tosti, 2017), Germany (Kelle and Kleinert, 2010) and Spain (Minondo, 2016). In these countries, the contribution of the intensive margin was found to be around 70 percent and the country extensive margin was also more relevant than the service margin. Nevertheless, the importance of the intensive margin seems to be somewhat higher in Portugal than in these countries.

Differentiating between types of traders (columns (4) to (9) of both panels), the intensive margin is specially relevant for one-way traders, accounting for 83.4 percent of the differences in exports across this type of firms (78.6 percent for one-way importers).⁷ Regarding the sum of the two extensive margins, the highest value is estimated for imports of two-way traders, accounting for 30 percent of the inter-firm variation of imports.

An important topic that has been investigated with transaction-level data is the association between trade margins and firms' characteristics. Among the main findings of these studies is the fact that productivity is not only positively related to export participation, but also to the extensive margins of exports (the number of goods exported and the number of destination countries). Motivated by this literature on international trade in goods, we assess whether the margins of international trade in services at the firm-level are related with firms' attributes like productivity, profitability and size. This exercise does not aim at establishing a causal relationship between international trade and firms' performance, which is a long-standing research question in the empirical trade literature; thus, these results should be interpreted only as correlations.

Firstly, we examine the correlations of the margins of a firm's trade with its characteristics, differentiating between the three types of traders. For exports, we estimate several regressions of the form:

$$\log Y_{it} = \alpha + \beta_1 \log X_{it} + \gamma_j + \gamma_t + \epsilon_{it}, \quad (2)$$

where Y_{it} is the dependent variable of interest (total exports, number of destination countries, number of service types, and exports per country-service type) of firm i in year t and X_{it} represents three different firm-level attributes taken separately: firm size (proxied by total employment), labour productivity (defined as gross value added per worker) and profitability (proxied by the ratio of earnings before interest, taxes, depreciation and amortisation (EBITDA) over total assets). 2-digit level sector and time fixed-effects are included in γ_j and γ_t , respectively, and ϵ_{it} is the error term. Again, since all variables are in logs, the reported coefficients of the three trade margins add up to the coefficient of total

⁷ We also estimated Equation (1) including interactions between all variables considered and a dummy variable identifying two-way traders. The coefficients estimated from the fully interacted model and from the separate regressions for one-way and two-way traders presented in Table 5 are equivalent, even if the variance of the different types of traders is allowed to differ in the separate regressions. From the fully interacted model, we can see that the contributions of the three margins differ between the two types of traders in a statistically significant way for both exports and imports at a level of significance of 0.1 percent. All results are available from the authors upon request.

1 exports. As before, we also estimate Equation (2) separately for one-way and two-
 2 way exporters. The same exercise is performed for imports and Table 6 includes
 3 the results for both trade flows and types of firms.⁸ We also estimated a different
 4 version of Equation (2) using pairs of covariates, namely employment and pro-
 5 ductivity (as in Breinlich and Criscuolo, 2011) and employment and profitability.
 6 The results are very similar to the ones shown in Table 6, where each covariate is
 7 regressed separately, and are available from the authors upon request.
 8

10 Table 6: Employment, productivity, profitability and margins of firm-level services
 11 trade, 2014-2015

Panel A - Exports												
	Total sample of exporters				One-way exporters				Two-way traders			
	(1) Total value	(2) Average value	(3) Number services	(4) Number countries	(5) Total value	(6) Average value	(7) Number services	(8) Number countries	(9) Total value	(10) Average value	(11) Number services	(12) Number countries
Employment	0.444*** (0.020)	0.146*** (0.017)	0.076*** (0.0039)	0.221*** (0.0072)	0.206*** (0.035)	0.037 (0.030)	0.011** (0.0033)	0.159*** (0.012)	0.492*** (0.025)	0.192*** (0.021)	0.082*** (0.0052)	0.218*** (0.0091)
Productivity	0.601*** (0.038)	0.466*** (0.032)	0.047*** (0.0055)	0.087*** (0.013)	0.595*** (0.051)	0.518*** (0.046)	0.011 (0.0062)	0.065*** (0.019)	0.513*** (0.048)	0.440*** (0.041)	0.032*** (0.0074)	0.041** (0.016)
Profitability	0.140*** (0.028)	0.161*** (0.025)	-0.006 (0.0044)	-0.015 (0.011)	0.213*** (0.041)	0.199*** (0.038)	-0.003 (0.0045)	0.017 (0.014)	0.094* (0.037)	0.143*** (0.033)	-0.010 (0.0064)	-0.039** (0.014)

Panel B - Imports												
	Total sample of importers				One-way importers				Two-way traders			
	(1) Total value	(2) Average value	(3) Number services	(4) Number countries	(5) Total value	(6) Average value	(7) Number services	(8) Number countries	(9) Total value	(10) Average value	(11) Number services	(12) Number countries
Employment	0.822*** (0.022)	0.419*** (0.019)	0.159*** (0.0053)	0.245*** (0.0070)	0.696*** (0.038)	0.440*** (0.032)	0.108*** (0.0076)	0.147*** (0.0094)	0.785*** (0.025)	0.358*** (0.021)	0.165*** (0.0065)	0.202*** (0.0085)
Productivity	0.750*** (0.041)	0.540*** (0.033)	0.101*** (0.0082)	0.108*** (0.011)	0.553*** (0.063)	0.403*** (0.053)	0.066*** (0.011)	0.084*** (0.013)	0.734*** (0.049)	0.541*** (0.039)	0.101*** (0.011)	0.093*** (0.015)
Profitability	0.044 (0.034)	0.041 (0.028)	0.013 (0.0074)	-0.010 (0.010)	0.121* (0.052)	0.072 (0.044)	0.024* (0.010)	0.025* (0.012)	-0.051 (0.041)	-0.008 (0.033)	-0.000 (0.0096)	-0.043** (0.013)

22 Notes: The table reports OLS estimates of Equation (2) for exports in panel A and for imports in
 23 panel B. The dependent variables are reported in the column headings: log of total trade value of the
 24 firm, log of average trade value per country-service type combination, log of number of traded service
 25 types, log of number of partner countries. Each of them is regressed individually on the log of total
 26 employment, the log labour productivity, and the log of profitability of the firm. Labour productivity
 27 is defined as gross value added per worker and profitability is defined as EBITDA over total assets.
 28 Only firms with positive profitability are included in the respective regressions. The regressions are
 29 estimated separately for the different types of service traders. The number of observations in each
 30 regression is the same as in Table 5, with the exception of the regressions using profitability that
 31 include 10,364, 3,981 and 6,383 observations for the total sample of exporters, one-way exporters
 32 and two-way exporters, respectively; and 10,338, 3,955 and 6,383 for the total sample of importers,
 33 one-way importers and two-way importers, respectively. All regressions include a constant, 2-digit
 34 sector and year fixed-effects. See the main text for more details. Standard errors in parenthesis are
 35 clustered at the firm-level and are robust to heteroscedasticity. Stars indicate significance levels of
 36 5% (*), 1% (**), and 0.1% (***).
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 43 As identified for the UK (Breinlich and Criscuolo, 2011) and Italy (Federico
 44 and Tosti, 2017), higher employment is associated with a higher value of firm-level
 45 exports and imports and also with all three margins of both flows. For exports,
 46 the largest coefficient is the one of the geographical extensive margin, while, for
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48 ⁸ We also estimated a fully differentiated model of Equation (2), including interactions
 49 between all variables and a two-way trader dummy, and the differences in the parameters
 50 between the two types of traders are always statistically significant. All results are available
 51 from the authors upon request.
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1 imports, it is the parameter of the intensive margin. Moreover, all estimates are
 2 higher for two-way traders than for one-way traders, with the exception of the
 3 intensive margin of imports. Labour productivity is also positively and significantly
 4 correlated with the value of exports and imports of a firm, especially with the
 5 average values per country and service type (intensive margin). By type of trader,
 6 the correlations between productivity and firms' imports are higher for two-way
 7 traders but the opposite occurs on the export side. The links between profitability
 8 and firms' international trade in services are less clear. The intensive margin of
 9 exports explains most of the correlations between profitability and firm-level trade
 10 flows, for both types of firms, and the parameter is higher for one-way exporters.
 11 On the import side, most estimates are not statistically significant.

12 Secondly, we examine how firm-level productivity and profitability are associ-
 13 ated with the different margins of a firm's exports and imports taken together,
 14 while controlling for several firms' attributes. This analysis should be interpreted
 15 as a complement to the previous set of regressions, aiming at establishing which
 16 of the different export and import margins has a stronger association with firms'
 17 performance. In order to estimate multiple correlations in a simple way, the depen-
 18 dent variables of these regressions are the performance indicators. More precisely,
 19 we estimate regressions of the form:
 20

$$21 \quad \log Y_{it} = \alpha + \beta_1 \log X_{it} + \beta_2 \log M_{it} + \beta_3 Z_{it} + \epsilon_{it}, \quad (3)$$

22 where Y_{it} is the dependent variable of interest: labour productivity (defined
 23 as gross value added per worker) or profitability (proxied by EBITDA over total
 24 assets), in log form. X_{it} and M_{it} are the log of the total value of exports and
 25 imports of a firm, respectively. A number of firms' characteristics that potentially
 26 affect productivity and profitability (and may be correlated with different levels of
 27 trade in services) are included in the vector Z_{it} , namely age, capital labour ratio,
 28 average wage per employee, leverage ratio, all in log form, and a dummy variable
 29 identifying large firms, according to the EU official classification (described in
 30 Table D.4). 2-digit sector and year fixed-effects are also included. In a more detailed
 31 version of Equation (3), we substituted the total value of exports and imports of
 32 a firm by the respective margins of firm-level trade, namely the average export
 33 and import value per country-service, number of exported and imported service
 34 types, number of export and import partner countries. Again, all trade variables
 35 are in log form. All regressions were also estimated separately for two-way traders
 36 to take into account that, as described previously, these firms differ from one-way
 37 traders in several dimensions.

38 The estimates in columns (1) and (5) of Table 7 show that the total values
 39 of exports and imports of a firm correlate positively with its labour productivity
 40 and profitability and the parameters are very similar for both flows.⁹ For two-
 41 way traders, no statistically significant relation is found between profitability and
 42 international trade in services (column (6)). On the contrary, the link between
 43 imports and exports of services and productivity is stronger for two-way traders
 44 than for other firms.

45 Taking into account the different margins of a firm's exports and imports,
 46 the results in columns (3)-(4) and (7)-(8) indicate that the intensive margin of
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48 ⁹ All controls have the expected signs. Results reporting the complete set of estimates are
 49 available from the authors upon request.
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1 exports and imports of services, i.e., the average trade value per country-service
 2 type combination, is positively related to both productivity and profitability. Re-
 3 garding the extensive margins of trade in services, the only statistically significant
 4 estimates are those of the number of services imported, for both productivity and
 5 profitability. This evidence suggests that having access to a large number of differ-
 6 ent foreign inputs is advantageous for firms. Moreover, all significant parameters
 7 of both margins are always higher for two-way traders.
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9 There is no statistically significant association between the geographical exten-
 10 sive margins and productivity of Portuguese international traders of services,
 11 which contrasts with results obtained for international trade in goods. This finding
 12 may be driven by the fact that the positive relation between firm size and exports
 13 results primarily from the number of partner countries. Hence, after controlling
 14 for firm size in the estimation of Equation (3), the link between firm performance
 15 and the number of export destinations is not statistically significant.
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20 Table 7: Productivity, profitability and firm-level international trade in services,
 21 2014-2015

	Productivity				Profitability			
	(1) All firms	(2) Two-way traders	(3) All firms	(4) Two-way traders	(5) All firms	(6) Two-way traders	(7) All firms	(8) Two-way traders
Total exports	0.023*** (0.0017)	0.043*** (0.0050)			0.005** (0.0018)	0.007 (0.0058)		
Total imports	0.029*** (0.0016)	0.045*** (0.0046)			0.009*** (0.0019)	0.010 (0.0054)		
Average exports			0.025*** (0.0020)	0.052*** (0.0059)			0.006** (0.0023)	0.013* (0.0066)
Average imports			0.029*** (0.0021)	0.052*** (0.0054)			0.010*** (0.0026)	0.013* (0.0064)
Number services exported			-0.037 (0.022)	-0.008 (0.025)			-0.029 (0.026)	-0.017 (0.030)
Number services imported			0.116*** (0.016)	0.126*** (0.020)			0.045* (0.020)	0.048* (0.024)
Number export countries			0.017 (0.011)	0.022 (0.014)			0.010 (0.013)	-0.013 (0.018)
Number import countries			-0.013 (0.012)	-0.016 (0.015)			-0.016 (0.016)	-0.012 (0.019)
Adjusted R^2	0.368	0.395	0.370	0.400	0.213	0.224	0.213	0.225
Observations	14,198	6,348	14,198	6,348	13,076	5,845	13,076	5,845

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 40 Notes: The table reports OLS estimates of Equation (3) for labour productivity and profitability,
 41 both in log form. Labour productivity is defined as gross value added per worker and profitability
 42 is defined as EBITDA over total assets. Only firms with positive profitability are included in the
 43 respective regressions. The regressors are reported in the row headings: log of total exports and
 44 imports of the firm, log of average export and import per country-service type combination (intensive
 45 margin), log of number of traded service types, log of number of partner countries. All regressions
 46 include a constant. Firm-level controls include age, capital labour ratio, average wage per employee,
 47 leverage ratio, all in log form, a dummy variable identifying large firms, and 2-digit sector and year
 48 fixed-effects. See the main text for more details. Standard errors in parenthesis are clustered at the
 49 firm-level and are robust to heteroscedasticity. Stars indicate significance levels of 5% (*), 1% (**),
 50 and 0.1% (***).
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4 Concluding remarks

This paper contributes to the growing firm-level literature on international trade in non-tourism services by examining the Portuguese case with a new detailed firm-level dataset. We identify several empirical regularities for Portugal, which are in line with most of the existing empirical research for other countries.

Two datasets are merged to combine information on Portuguese international trade in non-tourism services at the firm-level with balance-sheet and income statement information of the trading firms. Throughout the analysis, we distinguish between three types of international traders of services: firms that only export (one-way exporters); firms that only import (one-way importers); and firms that import and export (two-way traders). The richness of the data, which includes information on partner countries and types of services, allows us to provide a comparison with the stylised facts on service traders reported by previous literature, such as those of Breinlich and Criscuolo (2011) for the UK and Federico and Tosti (2017) for Italy, as well as with those on Portuguese international trade in goods described by Amador and Opromolla (2013).

We find that a significant share of Portuguese firms that participate in international trade in services are active in both flows (45 percent). In addition, there is a striking concentration of trade values in these firms: two-way traders account for 90 percent of total Portuguese international trade in services. As documented for other countries, firms that both export and import tend to outperform one-way traders in variables like size, age, productivity and profitability.

Two-way traders not only have higher levels of exports and imports than one-way traders, but they also have broader portfolios of partner countries and service types for both flows. In fact, a large proportion of Portuguese services trade is concentrated in a few two-way traders, which trade multiple services with many countries, i.e., the so-called “superstars”. However, even if these traders have diversified portfolios of services and partner countries, we still find evidence of within-firm concentration of trade values, i.e., the main service/partner country accounts for a substantial share of a firm’s trade.

Benefiting from the detail in the data, the paper also examines the intensive margin (trade per country and service type) and the extensive margins (number of trading partners and number of services traded) of firm-level trade. In line with findings for other countries, the intensive margin is much more important than the extensive margins in explaining the differences in traded values among Portuguese firms, for both exports and imports. In addition, larger and more productive firms have higher values of exports and imports of services, trade more per country and service type, and trade with more countries and in more types of services. For the three types of traders, the intensive margin of firm-level trade explains most of the correlations between firm productivity and size, on the one hand, and firm-level trade flows, on the other hand. The main exception is the link between firm size and exports, which depends mainly on the geographical extensive margin. The correlations between firm-level exports and imports of services and profitability are less clear, but more profitable firms tend to have higher total export values and to export more per country-service type.

Complementarily, considering all margins of firm-level services trade together and controlling for several firms’ characteristics, we find that the intensive margins of exports and imports are positively related to both productivity and profitability.

1 Regarding the extensive margins of trade, the number of different services imported
2 is significantly and positively linked to these two dimensions of firm performance,
3 suggesting that access to a wide range of foreign inputs is beneficial for firms.

4 From a policy perspective, the positive link between firm performance and in-
5 ternational trade in services highlights the importance of services for economic
6 growth and structural transformation. In recent decades, the rapid growth of ser-
7 vices trade was mostly driven by technological progress. This process is likely to
8 deepen in the future as new digital technologies allow for a greater range of services
9 to be traded across borders. Nevertheless, there are still pervasive and complex
10 barriers to trade in services around the globe. Large potential gains could be
11 reaped through greater liberalisation of services trade and investment. Expanding
12 trade in services requires the implementation of trade policy frameworks that fo-
13 cus, for instance, on intellectual property protection rights, professional licensing,
14 government procurement, mutual recognition of professional credentials and other
15 regulations, as well on the reduction of restrictions on the operation of foreign
16 affiliates (see Hufbauer et al. (2012) for a discussion).
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Appendices

A Coverage of the firm-level sample of Portuguese international trade in non-tourism services, 2014-2015

Table A.1: Export values of non-tourism services, 2014-2015

Code	Description	Official BoP		Firm-level BoP data			Final sample		
		Value	Share	Value	Share	Coverage	Value	Share	Coverage
SB	Maintenance and repair services	771,782	3.0	765,456	3.2	99.2	750,845	3.4	97.3
SC	Transports	11,364,300	43.6	10,827,036	45.5	95.3	10,592,087	48.2	93.2
SE	Construction	1,106,740	4.2	1,014,027	4.3	91.6	975,247	4.4	88.1
SF	Insurance and pension services	217,452	0.8	216,582	0.9	99.6	80,207	0.4	36.9
SG	Financial services	662,729	2.5	462,877	1.9	69.8	99,430	0.5	15.0
SH	Charges for the use of intellectual property	129,162	0.5	128,187	0.5	99.2	119,173	0.5	92.3
SI	Telecommunications, computer, and information	2,402,807	9.2	2,357,692	9.9	98.1	2,329,265	10.6	96.9
SJ	Other business services	8,682,111	33.3	7,401,285	31.1	85.2	6,724,093	30.6	77.4
SK	Personal, cultural, and recreational services	422,601	1.6	365,351	1.5	86.5	289,778	1.3	68.6
SL	Government goods and services	294,714	1.1	275,258	1.2	93.4	177	0.0	0.1
	Total	26,054,398	100.0	23,813,750	100.0	91.4	21,960,303	100.0	84.3

Notes: The 10 categories are defined at the 2-digit level of the Extended Balance of Payments Services (EBOPS) 2010 classification. Trade values are in thousand euros. Values are pooled for 2014 and 2015. For each sample, the table presents the export value of each service and its percentage share in the respective total. The percentage coverage of each sample is computed in relation to the official Balance of Payments (BoP) statistics of exports of non-tourism services. The final sample results from merging the firm-level BoP data with the balance-sheet database IES.

Table A.2: Import values of non-tourism services, 2014-2015

Code	Description	Official BoP		Firm-level BoP data			Final sample		
		Value	Share	Value	Share	Coverage	Value	Share	Coverage
SB	Maintenance and repair services	633,168	3.6	616,873	4.4	97.4	567,084	4.9	89.6
SC	Transports	6,389,793	35.9	3,582,101	25.6	56.1	3,187,474	27.5	49.9
SE	Construction	202,667	1.1	185,558	1.3	91.6	172,660	1.5	85.2
SF	Insurance and pension services	688,066	3.9	450,588	3.2	65.5	119,101	1.0	17.3
SG	Financial services	1,034,955	5.8	524,989	3.7	50.7	130,646	1.1	12.6
SH	Charges for the use of intellectual property	1,129,976	6.3	1,114,686	8.0	98.6	1,058,610	9.1	93.7
SI	Telecommunications, computer, and information	2,122,961	11.9	2,084,993	14.9	98.2	1,813,057	15.6	85.4
SJ	Other business services	4,958,062	27.8	4,830,108	34.5	97.4	4,137,800	35.7	83.5
SK	Personal, cultural, and recreational services	470,160	2.6	450,427	3.2	95.8	400,496	3.5	85.2
SL	Government goods and services	174,038	1.0	173,952	1.2	100.0	218	0.0	0.1
	Total	17,803,845	100.0	14,014,276	100.0	78.7	11,587,146	100.0	65.1

Notes: The 10 categories are defined at the 2-digit level of the Extended Balance of Payments Services (EBOPS) 2010 classification. Trade values are in thousand euros. Values are pooled for 2014 and 2015. For each sample, the table presents the import value of each service and its percentage share in the respective total. The percentage coverage of each sample is computed in relation to the official Balance of Payments (BoP) statistics of imports of non-tourism services. The final sample results from merging the firm-level BoP data with the balance-sheet database IES.

Table A.3: Shares of international traders of non-tourism services in the total of Portuguese non-financial firms by main sector of activity, 2014-2015

Main sector of activity of the firm	No. firms	Turnover	Employment	Output	Value added	Labour costs	Capital stock
Primary	2.0	24.3	12.6	23.8	26.2	22.1	28.6
Manufacturing	5.6	52.9	28.6	54.0	45.7	39.2	51.3
Electricity, gas, water	11.5	86.3	41.1	83.9	70.9	58.4	71.4
Construction	2.6	27.0	26.5	44.5	38.7	39.6	29.5
Wholesale and retail trade	3.0	42.2	30.1	44.5	41.0	37.8	38.5
Transportation and storage	7.2	69.8	52.5	72.7	72.3	66.8	47.9
Hotels and restaurants	1.1	20.9	15.4	23.1	26.9	22.0	37.2
Information and communication	8.4	80.9	60.9	81.9	81.0	73.0	93.8
Financial and insurance activities	3.0	41.2	20.8	39.6	38.6	42.3	9.8
Real estate activities	1.3	15.3	7.8	14.8	13.0	20.1	14.2
Professional, scientific and technical act.	3.8	46.4	28.3	54.9	50.8	44.4	69.0
Administrative activities	6.0	41.1	34.4	43.4	42.2	41.9	41.0
Others	0.8	28.5	18.1	28.4	29.0	26.0	33.0
Largest 5 traders	0.0	7.0	2.9	8.6	5.7	3.7	12.5
Total	3.4	48.6	29.3	53.6	47.5	41.2	45.2

Notes: Values are based on firm-year observations pooled for 2014-2015. The table reports the percentage shares of international traders of services in the total of Portuguese non-financial firms available in the balance-sheet database IES. The largest 5 traders are defined in terms of the respective variable. For example, the 5 traders with the largest value of turnover account for 7 percent of the overall turnover of the universe of Portuguese non-financial firms of IES.

B Breakdown of the 29 service types in the final firm-level sample of Portuguese international trade in non-tourism services, 2014-2015

Table B.1: Types of services exported: Values, firms, countries and transactions, 2014-2015

Code	Description	Exports		Firms		Countries		Transactions	
		Level	Share	No.	Share	No.	Share	No.	Share
SB	Maintenance and repair services n.i.e.	750,845	3.4	853	5.1	104	3.3	2,357	3.3
SC1	Sea transport	1,278,382	5.8	606	3.6	179	5.6	6,919	9.8
SC2	Air transport	7,238,084	33.0	528	3.2	198	6.2	4,632	6.5
SC3	Other modes of transport	1,871,417	8.5	1,947	11.7	156	4.9	9,263	13.1
SC4	Postal and courier services	204,204	0.9	100	0.6	123	3.9	571	0.8
SE	Construction	975,247	4.4	1,118	6.7	90	2.8	2,148	3.0
SF	Insurance and pension services	80,207	0.4	566	3.4	87	2.7	1,340	1.9
SG	Financial services	99,430	0.5	359	2.2	84	2.6	820	1.2
SH1	Franchises and trademarks licensing fees	53,349	0.2	85	0.5	40	1.3	145	0.2
SH3	Licenses to reproduce or distribute computer software	5,250	0.0	43	0.3	47	1.5	166	0.2
SH4	Licenses to reproduce or distribute audio-visual	60,574	0.3	100	0.6	74	2.3	462	0.7
SH	Telecommunications services	1,037,562	4.7	212	1.3	191	6.0	1,560	2.2
SI2	Computer services	1,261,934	5.7	1,026	6.2	156	4.9	4,402	6.2
SI3	Information services	29,770	0.1	149	0.9	70	2.2	613	0.9
SJ1	Research and development services	168,137	0.8	166	1.0	56	1.8	468	0.7
SJ211	Legal services	283,157	1.3	248	1.5	140	4.4	2,659	3.8
SJ212	Accounting, auditing, bookkeeping, and tax consulting	223,073	1.0	266	1.6	118	3.7	1,714	2.4
SJ213	Business and management consulting and public relations	542,116	2.5	673	4.0	110	3.5	2,129	3.0
SJ22	Advertising, market research, and public opinion polling	540,719	2.5	819	4.9	102	3.2	2,783	3.9
SJ311	Architectural services	92,774	0.4	268	1.6	88	2.8	851	1.2
SJ312	Engineering services	457,938	2.1	394	2.4	110	3.5	1,325	1.9
SJ313	Scientific and other technical services	750,156	3.4	1,546	9.3	131	4.1	4,018	5.7
SJ32	Waste treatment and de-pollution, agricultural and mining	34,678	0.2	166	1.0	37	1.2	266	0.4
SJ33	Operating leasing services	216,728	1.0	448	2.7	103	3.2	1,506	2.1
SJ34	Trade-related services	531,173	2.4	1,881	11.3	196	6.2	8,956	12.7
SJ35	Other business services n.i.e.	2,883,445	13.1	1,453	8.7	139	4.4	5,285	7.5
SK1	Audio-visual and related services	114,485	0.5	148	0.9	115	3.6	775	1.1
SK2	Other personal, cultural, and recreational services	175,293	0.8	470	2.8	133	4.2	2,645	3.7
SL	Government goods and services n.i.e.	177	0.0	4	0.0	2	0.1	4	0.0
	Total	21,960,303	100.0	16,642	100.0	3,179	100.0	70,782	100.0

Notes: The table reports the 29 service types considered and the corresponding code according to the Extended Balance of Payments Services (EBOPS) 2010 classification. The breakdown used is a combination of 2, 3 and 5 digit levels of the EBOPS 2010 classification. Exports are in thousand euros. Values are pooled for 2014 and 2015. Firms are counted each time they export a particular service type at the disaggregated breakdown level in the current year, implying that a firm-year can appear more than once across the listed service types. For that reason the total number of firms-year differs from the one reported in the main text where no service breakdown is used in the count. Countries are counted within the respective service type (service-country combination), and thus independent of firm and year. A transaction is defined as firm-year-service-country in the database, i.e., an observation in the sample.

Table B.2: Types of services imported: Values, firms, countries and transactions, 2014-2015

Code	Description	Imports		Firms		Countries		Transactions	
		Level	Share	No.	Share	No.	Share	No.	Share
SB	Maintenance and repair services n.i.e.	567,084	4.9	2,038	7.9	104	3.5	4,258	6.4
SC1	Sea transport	183,295	1.6	522	2.0	145	4.9	2,945	4.5
SC2	Air transport	2,704,447	23.3	936	3.6	175	5.9	3,968	6.0
SC3	Other modes of transport	155,889	1.3	1,312	5.1	103	3.5	3,406	5.2
SC4	Postal and courier services	143,842	1.2	218	0.8	135	4.5	744	1.1
SE	Construction	172,660	1.5	715	2.8	109	3.7	1,670	2.5
SF	Insurance and pension services	119,101	1.0	1,187	4.6	79	2.7	1,773	2.7
SG	Financial services	130,646	1.1	1,366	5.3	152	5.1	2,939	4.4
SH1	Franchises and trademarks licensing fees	671,716	5.8	388	1.5	54	1.8	583	0.9
SH3	Licenses to reproduce or distribute computer software	109,629	0.9	135	0.5	30	1.0	253	0.4
SH4	Licenses to reproduce or distribute audio-visual	277,265	2.4	227	0.9	75	2.5	916	1.4
SI1	Telecommunications services	950,790	8.2	1,001	3.9	198	6.7	2,689	4.1
SI2	Computer services	836,546	7.2	2,783	10.8	118	4.0	7,056	10.7
SI3	Information services	25,721	0.2	808	3.1	63	2.1	1,610	2.4
SJ1	Research and development services	255,436	2.2	423	1.6	60	2.0	913	1.4
SJ211	Legal services	72,105	0.6	1,140	4.4	142	4.8	2,775	4.2
SJ212	Accounting, auditing, bookkeeping, and tax consulting	86,996	0.8	670	2.6	112	3.8	1,427	2.2
SJ213	Business and management consulting and public relations	382,631	3.3	1,398	5.4	110	3.7	3,139	4.7
SJ22	Advertising, market research, and public opinion polling	374,203	3.2	2,635	10.3	120	4.0	6,971	10.5
SJ311	Architectural services	48,517	0.4	320	1.2	91	3.1	849	1.3
SJ312	Engineering services	120,851	1.0	373	1.5	79	2.7	886	1.3
SJ313	Scientific and other technical services	652,998	5.6	490	1.9	118	4.0	2,072	3.1
SJ32	Waste treatment and de-pollution, agricultural and mining	36,362	0.3	401	1.6	53	1.8	749	1.1
SJ33	Operating leasing services	451,107	3.9	1,645	6.4	115	3.9	2,815	4.3
SJ34	Trade-related services	490,265	4.2	418	1.6	102	3.4	2,041	3.1
SJ35	Other business services n.i.e.	1,166,330	10.1	609	2.4	122	4.1	2,346	3.5
SK1	Audio-visual and related services	249,962	2.2	246	1.0	82	2.8	816	1.2
SK2	Other personal, cultural, and recreational services	150,535	1.3	1,241	4.8	110	3.7	3,451	5.2
SL	Government goods and services n.i.e.	218	0.0	41	0.2	21	0.7	51	0.1
	Total	11,587,146	100.0	25,686	100.0	2,977	100.0	66,111	100.0

Notes: The table reports the 29 service types considered and the corresponding code according to the Extended Balance of Payments Services (EBOPS) 2010 classification. The breakdown used is a combination of 2, 3 and 5 digit levels of the EBOPS 2010 classification. Imports are in thousand euros. Values are pooled for 2014 and 2015. Firms are counted each time they import a particular service type at the disaggregated breakdown level in the current year, implying that a firm-year can appear more than once across the listed service types. For that reason the total number of firms-year differs from the one reported in the main text where no service breakdown is used in the count. Countries are counted within the respective service type (service-country combination), and thus independent of firm and year. A transaction is defined as firm-year-service-country in the database, i.e., an observation in the sample.

C Main partner countries in Portuguese international trade in non-tourism services, 2014-2015

Table C.1: Main partner countries - shares in total trade and firms, 2014-2015

Countries	Exports	Exporters	Countries	Imports	Importers
UK	12.1	5.9	Spain	17.7	14.2
Spain	11.1	10.5	UK	13.4	8.8
France	10.3	7.6	Germany	10.2	7.5
Germany	7.9	6.8	USA	9.0	5.0
Angola	7.2	2.9	France	8.4	8.0
Brazil	5.7	1.6	Netherlands	6.2	5.3
USA	5.5	3.2	Switzerland	4.1	2.9
Switzerland	4.8	3.2	Belgium	3.9	3.8
Netherlands	3.7	4.7	Ireland	3.3	3.6
Italy	3.3	3.4	Brazil	3.3	1.7
Other	28.4	50.1	Other	20.6	39.1
Total	100.0	100.0	Total	100.0	100.0

Notes: Values are based on firm-year observations pooled for 2014-2015 of the final sample. Firms are counted each time they trade with a different partner country in the current year, implying that a firm-year can appear more than once across the listed countries.

D Distribution of Portuguese international trade in non-tourism services (values and number of firms) by firm type, 2014-2015

Table D.1: International traders of services by firm type and sector of activity, 2014-2015

Sector of activity	No. firms	Shares in total				
		Within sectors			By sector	
		Total	Exp Only	Imp Only	Exp & Imp	Exporters
Primary	331	11.2	64.4	24.5	1.0	2.5
Manufacturing	3,285	18.7	49.6	31.7	14.2	23.0
Electricity, gas, water	211	9.0	55.9	35.1	0.8	1.7
Construction	1,230	33.2	15.2	51.6	8.9	7.1
Wholesale and retail trade	3,917	30.8	36.3	33.0	21.4	23.4
Transportation and storage	1,993	41.6	4.1	54.3	16.4	10.0
Hotels and restaurants	439	23.5	45.1	31.4	2.1	2.9
Information and communication	1,016	14.9	7.0	78.1	8.1	7.4
Financial and insurance activities	234	17.1	21.8	61.1	1.6	1.7
Real estate activities	182	34.6	23.6	41.8	1.2	1.0
Professional, scientific and technical act.	1,862	28.5	9.1	62.4	14.5	11.5
Administrative activities	963	45.1	12.8	42.2	7.2	4.6
Others	454	15.9	27.3	56.8	2.8	3.3
Total	16,177	28.0	27.5	44.6	100.0	100.0

Notes: Values are based on firm-year observations pooled for 2014-2015. The table reports the percentage shares of the different firm types within each sector (columns 2 to 4) and the percentage share of each sector in the total number of exporters and importers. In the two last columns, an exporter (importer) is defined as a firm-year exporting (importing) services regardless of its import (export) dimension.

Table D.2: Exports and imports of services by firm type and sector of activity, 2014-2015

(A) Exports				
Sector of activity	Exports	Shares in total		
	Total	Within sectors		By sector
		Exp Only	Exp & Imp	Exports
Primary	51,988	15.7	84.3	0.2
Manufacturing	1,306,592	9.0	91.0	5.9
Electricity, gas, water	23,832	13.0	87.0	0.1
Construction	1,164,858	12.3	87.7	5.3
Wholesale and retail trade	1,359,003	13.9	86.1	6.2
Transportation and storage	10,801,095	7.9	92.1	49.2
Hotels and restaurants	36,283	30.5	69.5	0.2
Information and communication	2,445,279	1.7	98.3	11.1
Financial and insurance activities	161,383	5.7	94.3	0.7
Real estate activities	72,712	29.6	70.4	0.3
Professional, scientific and technical act.	3,515,690	23.4	76.6	16.0
Administrative activities	818,762	15.5	84.5	3.7
Others	202,825	19.7	80.3	0.9
Total	21,960,303	10.9	89.1	100.0

(B) Imports				
Sector of activity	Imports	Shares in total		
	Total	Within sectors		By sector
		Imp Only	Exp & Imp	Imports
Primary	56,922	25.7	74.3	0.5
Manufacturing	1,502,506	16.1	83.9	13.0
Electricity, gas, water	113,364	18.4	81.6	1.0
Construction	385,898	7.3	92.7	3.3
Wholesale and retail trade	1,542,319	12.8	87.2	13.3
Transportation and storage	4,239,237	0.8	99.2	36.6
Hotels and restaurants	125,885	22.8	77.2	1.1
Information and communication	2,388,423	1.0	99.0	20.6
Financial and insurance activities	204,187	24.8	75.2	1.8
Real estate activities	48,964	42.6	57.4	0.4
Professional, scientific and technical act.	598,366	5.3	94.7	5.2
Administrative activities	197,202	13.9	86.1	1.7
Others	183,876	9.7	90.3	1.6
Total	11,587,146	6.4	93.6	100.0

Notes: Trade values are in thousand euros and are based on firm-year observations pooled for 2014-2015. The table reports the percentage shares of the trade values of the different firm types within each sector and the percentage share of each sector in total exports or imports.

Table D.3: Percentage shares of traders and trade values by firm type and age group, 2014-2015

Firm age	Exports						Exporters					
				By firm type						By firm type		
	Exp Only	Exp & Imp	Total	Exp Only	Exp & Imp		Exp Only	Exp & Imp	Total	Exp Only	Exp & Imp	
1-5	0.7	3.7	4.4	6.3	4.2		5.2	6.2	11.5	13.6	10.1	
6-10	1.3	9.7	11.0	11.8	10.9		7.7	11.4	19.1	20.0	18.5	
11-20	2.3	21.6	23.9	20.9	24.2		12.7	19.4	32.1	32.9	31.6	
> 20	6.6	54.1	60.7	61.0	60.7		12.9	24.4	37.3	33.5	39.7	
Total	10.9	89.1	100.0	100.0	100.0		38.6	61.4	100.0	100.0	100.0	

Firm age	Imports						Importers					
				By firm type						By firm type		
	Imp Only	Exp & Imp	Total	Imp Only	Exp & Imp		Imp Only	Exp & Imp	Total	Imp Only	Exp & Imp	
1-5	0.5	5.0	5.4	7.5	5.3		2.8	6.3	9.1	7.3	10.1	
6-10	1.1	8.0	9.1	16.5	8.6		5.8	11.4	17.2	15.1	18.5	
11-20	1.8	23.1	24.9	29.0	24.6		10.9	19.6	30.5	28.5	31.6	
> 20	3.0	57.6	60.6	46.9	61.5		18.7	24.6	43.3	49.1	39.7	
Total	6.4	93.6	100.0	100.0	100.0		38.2	61.8	100.0	100.0	100.0	

Notes: Values are based on firm-year observations pooled for 2014-2015.

Table D.4: Percentage shares of traders and trade values by firm type and size category, 2014-2015

Firm size	Exports						Exporters					
				By firm type						By firm type		
	Exp Only	Exp & Imp	Total	Exp Only	Exp & Imp		Exp Only	Exp & Imp	Total	Exp Only	Exp & Imp	
Micro	1.7	2.5	4.1	15.3	2.8		19.2	14.4	33.6	49.7	23.4	
Small	3.1	10.2	13.2	28.1	11.4		14.2	24.1	38.2	36.7	39.2	
Medium	2.3	17.4	19.6	20.7	19.5		4.5	16.0	20.5	11.7	26.0	
Large	3.9	59.1	63.0	35.9	66.3		0.7	7.0	7.7	1.9	11.4	
Total	10.9	89.1	100.0	100.0	100.0		38.6	61.4	100.0	100.0	100.0	

Firm size	Imports						Importers					
				By firm type						By firm type		
	Imp Only	Exp & Imp	Total	Imp Only	Exp & Imp		Imp Only	Exp & Imp	Total	Imp Only	Exp & Imp	
Micro	0.3	2.3	2.6	5.2	2.5		8.9	14.5	23.4	23.4	23.4	
Small	1.4	8.3	9.8	22.7	8.9		16.6	24.2	40.8	43.5	39.2	
Medium	1.8	18.6	20.4	28.3	19.9		10.2	16.1	26.2	26.6	26.0	
Large	2.8	64.4	67.2	43.7	68.8		2.5	7.0	9.5	6.5	11.4	
Total	6.4	93.6	100.0	100.0	100.0		38.2	61.8	100.0	100.0	100.0	

Notes: Values are based on firm-year observations pooled for 2014-2015. The four size categories are defined according to the EU official classification of the "Commission Recommendation 2003/361/EC of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises". The category of micro, small and medium-sized enterprises (SMEs) comprises firms that employ fewer than 250 persons and that have an annual turnover not exceeding EUR 50 million, and/or an annual balance-sheet total not exceeding EUR 43 million. Within the SME category, a small firm is defined as employing less than 50 persons and having an annual turnover and/or annual balance-sheet total that does not exceed EUR 10 million. Within the SME category, a micro-firm is defined as employing fewer than 10 persons and whose annual turnover and/or annual balance-sheet total does not exceed EUR 2 million. All other firms not classified as SMEs are considered as large firms.

E Descriptive statistics on firm-level trade margins of Portuguese international traders of non-tourism services, 2014-2015

	Mean	Std. Dev.	P25	P50	P75
(A) Exports					
Total sample of exporters					
Total value of a firm's exports	1879.0	33122.3	17.2	139.3	596.2
Average value per service-country	200.6	822.3	6.1	35.6	140.3
Number of services	1.4	1.0	1.0	1.0	2.0
Number of countries	5.3	9.4	1.0	2.0	5.0
One-way exporters					
Total value of a firm's exports	530.4	10101.9	9.8	77.7	263.7
Average value per service-country	129.0	394.7	4.8	28.4	114.4
Number of services	1.1	0.4	1.0	1.0	1.0
Number of countries	4.1	8.5	1.0	1.0	3.0
Two-way traders					
Total value of a firm's exports	2725.3	41469.4	26.5	217.5	939.2
Average value per service-country	245.5	998.7	7.5	40.6	161.7
Number of services	1.6	1.2	1.0	1.0	2.0
Number of countries	6.0	9.9	1.0	3.0	7.0
(B) Imports					
Total sample of importers					
Total value of a firm's imports	998.0	13653.1	2.2	20.5	188.9
Average value per service-country	99.6	1259.7	0.9	4.7	24.6
Number of services	2.2	1.9	1.0	1.0	3.0
Number of countries	4.1	7.0	1.0	2.0	4.0
One-way importers					
Total value of a firm's imports	166.2	1074.5	0.8	5.1	36.4
Average value per service-country	38.4	390.2	0.4	2.0	9.5
Number of services	1.8	1.3	1.0	1.0	2.0
Number of countries	2.2	2.7	1.0	1.0	3.0
Two-way traders					
Total value of a firm's imports	1511.1	17320.9	6.0	53.5	370.4
Average value per service-country	137.4	1571.1	1.6	8.0	36.8
Number of services	2.5	2.1	1.0	2.0	3.0
Number of countries	5.3	8.5	1.0	3.0	6.0

Notes: Values of exports and imports are in thousand euros. The firm-level statistics are based on firm-year observations in 2014-2015. The intensive margin of firm-level exports (imports) refers to the average exported (imported) value by a firm per country-service type combination. The service extensive margin of firm-level exports (imports) refers to the number of services exported (imported) by a firm. The geographical extensive margin of firm-level exports (imports) refers to the number of destination (source) countries of a firm. See the main text for more details.