

# International Trade in Services: A Portrait of Importers and Exporters\*

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## Abstract

We provide a novel set of stylized facts on firms engaging in international trade in services, using unique firm-level data on service exports and imports from the world's second largest service exporter, the United Kingdom. Less than 10% of firms trade in services but they can be found in all sectors of the UK economy. While the service sector accounts for over 80% of total exports and imports, the frequency and trade intensity of service traders is often higher in sectors such as high-tech manufacturing. Service traders are bigger, more productive and are more likely to be foreign owned or part of a multinational enterprise. These 'trade premia' are smaller for service traders than for goods traders, with the exception of skill intensity which is higher for service traders. There are also significant differences between exporters and importers of services. Service exporters are smaller and less capital intensive but more productive and skill intensive than service importers. We show that most firms only export or import a single type of service and trade with a small number of countries. Trade volume, employment, turnover and value added are highly concentrated among a small group of firms which trade with many countries and/or in many types of services. Interestingly, trade is also concentrated within firms. The top export and import destination make up 70% of the average firm's total trade and the top services type around 90%. We also decompose the cross-sectional variation in firm exports and imports of services into the extensive and intensive margins of trade and find that the intensive margin accounts for around 70% of the total variation.

KEY WORDS: International Trade, Services, Firm-Level Evidence

JEL CLASSIFICATION: F14, F19, F23

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# 1 Introduction

Trade in commercial services has been the fastest growing component of international trade over the past 15 years, with average annual growth rates of over 10% and a total export volume of 1,400 billion USD in 2006 (WTO, 2008). Given the importance of the service sector for developed economies, it is not surprising that the liberalization of service trade has also been a key issue in past and ongoing trade negotiations.

Despite this we know very little about the firms engaging in such trade. This is in stark contrast to the research on merchandise trade which has produced a large set of stylized facts on exporting and – more recently – importing firms. These firms have been shown to be larger and more productive, to use more capital intensive production processes and to employ a more highly skilled workforce (Bernard and Jensen, 1995 and 1999; Bernard et al., 2007a; Wagner, 2007, and Greenaway and Kneller, 2007, provide surveys of the literature). Likewise, this literature has shown that the fraction of exporting firms tends to be low and that even among exporters, most firms only serve a few foreign markets and make the majority of their sales on the domestic market (Bernard and Jensen, 1999; Eaton et al., 2004; Bernard et al., 2007a). These findings have inspired a burgeoning theoretical literature which tries to incorporate these stylized facts into different theoretical frameworks (e.g. Melitz, 2003; Eaton et al., 2007).

We present, for the first time, a comparable set of stylized facts for firms engaging in service trade, using unique firm-level data on service exports and imports in the United Kingdom from 2000 through 2005. The previous literature on trade in services has had little to say about these firms. Lacking the detailed micro-level data available to the trade-in-goods literature, existing papers focus instead on analysing country- or aggregate industry-level data on service trade (e.g. Freund and Weinhold, 2002; Amiti and Wei, 2005; Kimura and Lee, 2006; Head et al., 2007).<sup>1</sup> In our view, filling this gap in the literature is important for a number of reasons.

First, a better knowledge of the characteristics of service traders is crucial for our understanding of firms engaging in international transactions. The exclusive focus on merchandise exporters and importers may have been sufficient in the past when both economic activity and international trade were dominated by manufactured products. But given the vastly larger share of the service sector in developed economies, and the increasing tradeability of many types of service, this focus seems too narrow nowadays. This is particularly true for the United Kingdom, the focus of our study. In 2005, service production accounted for 75% of GDP and service exports and imports for 9.4% and 7.4% of GDP, respectively, making the UK the second largest exporter and the third largest importer of services in the world (ONS 2006/2007; WTO, 2008).

Second, liberalization of service trade has been very much on the policy agenda of developed economies like the U.S. and the EU who believe that they will gain from further liberalization. However, to understand the effects of service trade liberalization on economic activity, we need at least some basic knowledge about the firms that presently (or potentially) trade in services.

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<sup>1</sup>As part of investigations into the effects of trade in services on firm-level variables such as productivity, employment or wages, Criscuolo and Leaver (2005) and Hijzen et al. (2006, 2007) also report some descriptive statistics on the characteristics of UK service traders. Due to the different focus of these studies, their approaches rely on more selective samples and only look at a small number of variables.

Similar to trade in goods, liberalization is likely to lead to shifts in market shares between purely domestic firms and those engaged in international trade. To gauge the impact of these shifts on aggregate productivity, the demand for skills, and other important measures, we need to know more about the characteristics of exporting and importing firms.

Finally, a collection of stylised facts on service traders is in our view a first step towards more theoretical work in this area. While there has been enormous progress in recent years in modelling various aspects of trade in goods, there has been very little work on service exports and imports to date. We hope that the present paper provides some of the necessary basics for such research.

Our analysis proceeds in several parts. We begin by documenting how common participation in international trade in services is among UK firms. We find that only around 8% of firms trade in services.<sup>2</sup> Exporting is more common than importing (6.2% vs. 3.9%) and only 2% of firms both export and import. Even those firms that do trade only export around 30% of their sales and the average ratio of imports to turnover is just 10%. However, service traders are much more important in terms of economic activity, accounting for 22.5% of overall employment and 30% of value added.

Firms trading in services can be found in all sectors of the UK economy. While the service sector accounts for 85% of total exports and imports, the frequency and trade intensity of service trade is often more important in sectors such as high-tech manufacturing or mining. Services trade is also heavily concentrated among the top traders. We show that the 1% largest exporters and importers (representing around 0.05% of all UK firms each) carry out 74% of exports and 79% of imports.

Next, we compare the firm-level characteristics of service traders and non-traders. We find that service traders are larger, more productive, more capital intensive, pay higher wages, and are more likely to be foreign owned or part of a multinational enterprise (MNE). There are important differences between exporters and importers, however. Firms that only export tend to be significantly smaller and less capital intensive, but more productive and skill-intensive than firms that only import.

For a smaller subsample, we are able to directly compare services and goods exporters. While there are many similarities between the two groups, we also point out a number of interesting differences. For example, the “trade premia” of goods exporters for employment, sales, value added, capital intensity and the likelihood of foreign ownership are larger than those of service exporters. One important exception to this ranking is skill intensity, which is significantly higher among service exporters. Total factor productivity is also higher among service exporters although the difference to goods exporters is small.

We then proceed to an analysis of the export and import patterns of the firms in our sample. We show that most firms only export or import a single type of service and trade with a small number of countries (mostly three or less). Trade volume, employment, turnover and value added are again highly concentrated among a small group of firms trading with many countries and/or in many types of service. Not surprisingly, these firms are characterised by higher-than-average productivity and size.

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<sup>2</sup>A precise definition of what we understand by trade in services follows in section 2.

Trade is also concentrated *within* firms, in the sense that the average service trader makes 68% of export sales in a single foreign market, and procures 76% of imports from a single source country. Even firms exporting to or importing from as many as 40 markets concentrate 25-35% of their trade in their top market. Similarly, a single type of service accounts for 95% of exports and 86% of imports of the average firm. Again, these fractions remain high (over 50%) even for firms trading in many products.

We conclude with an investigation into the importance of the extensive and intensive margins of firm-level service trade – number of trading partners, number of types of services traded, and average trade per trading partner and type of service, respectively. We find that the intensive margin is much more important in explaining cross-firm variation in trade than the extensive margins. Firm-level characteristics such as size or productivity also correlate most strongly to the intensive margin, to a lesser extent to the trading-partner margin and only weakly to the number of services traded.

The rest of this paper is structured as follows. Section 2 discusses some conceptual issues related to how trade in services is defined in this paper. Section 3 describes the data underlying our analysis in more detail. Section 4 looks at the frequency and sectoral distribution of service trade as well as at the characteristics of service traders. Section 5 proceeds to an analysis of export and import destinations, number of services traded, the concentration of trade volumes across and within firms, and the relative importance of extensive and intensive margins. Section 6 concludes. Throughout the paper we try to stay as close as possible to comparable research on trade in goods and to compare our findings to this earlier literature (in particular, Bernard et al., 2007a/b; Manova and Zhang, 2008, Eaton et al., 2004).

## 2 What is International Trade in Services?

In this paper trade in services is defined in accordance with the residential definition of the IMF Balance of Payments Manual (5th edition) which also underlies the compilation of balance of payments statistics in the UK (see IMF, 1993). That is, international trade in services is defined as service transactions between residents and non-residents of an economy.<sup>3</sup> Our definition thus includes three of the four modes described in the General Agreement on Trade in Services (GATS): cross-border supply (mode 1), consumption abroad (mode 2), and presence of natural persons (mode 4).

For example, the provision of call-centre services to the UK from India would be a mode 1 transaction since both provider and consumer stay in their respective countries of residence. The attendance of a software programmer based in France at a training course in London would

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<sup>3</sup>There are different definitions of what is considered to be a “service transaction”. In its most restrictive definition, the Manual on Statistics of International Trade in Services (ESA, 2002, p.7) defines the term "services" as follows. “Services are not separate entities over which ownership rights can be established. They cannot be traded separately from their production. Services are heterogeneous outputs produced to order and typically consist of changes in the condition of the consuming units realised by the activities of the producers at the demand of the customers. By the time their production is completed they must have been provided to the consumers.” In this paper, we follow the definitions of the Office for National Statistics underlying our data which is somewhat less restrictive (ONS, 2007). For example, it also includes industries and activities whose output can be stored on physical objects such as disks, paper or DVDs (computer programs, consultancy reports etc.). See table 1 for a list of services types in our data.

be a mode 2 transaction, while a UK-based engineer working in Saudi Arabia on an oil drilling project would classify as a mode 4 service export (in the former example, the consumer moves to the country of the supplier while in the latter example, the supplier temporarily moves abroad).

In these examples, the concept of residence is crucial. While the subsidiary of a U.S. multinational in the UK might be foreign-owned, it is ordinarily resident in the UK. As such, its transactions with other UK firms or local consumers do not count as service trade under our definition. This is different from the GATS where such transactions would be classified under mode 2 supply (“commercial presence”).

Our main data sources, described in detail below, do not cover the entirety of the UK’s international services transactions. They focus primarily on producer, or intermediate, services. This means that our data exclude consumer services such as travel, passenger transport and higher education. They also exclude most services provided by the financial and banking industry, as well as film and television companies.<sup>4</sup> Overall, in 2005 the sectors and types of service covered in our data accounted for 46% of total UK service exports and 31% of imports as reported in the UK balance of payments (ONS, 2007). However, we have information on 67% of exports and 80% of imports of the balance-of-payment category “other commercial services”. This is by far the fastest growing category of international trade in services and the one that most of the public discussion about offshoring and related issues is concerned with (e.g. Head et al., 2008; Lipsey, 2006). See table 1 for the list of service types covered in our data

It is worth noting that the collection of data on service trade differs substantially from those of goods trade data. We rely entirely on surveys of firms conducted by the Office for National Statistics (ONS) as our source for service trade data. In contrast, studies focusing on trade in goods generally use information provided by customs on cross-border transactions matched with firm-level data on employment, sales and other characteristics (e.g. Bernard et al., 2007b). The measurement issues that affect the information on service trade are therefore quite different in nature from those that characterise goods trade. Services trade cannot be captured by a physical cross-border transaction of merchandise. Therefore, to measure its existence we have to rely on self-reported information from firms. This raises several concerns with regards to data quality. For example, issues of transfer pricing are likely to be more severe than for goods trade. There might also be a tendency towards underreporting of trade flows, in particular for transactions between domestic and foreign subsidiaries of multinationals. While these issues are likely to be relevant for our data, we note that the ONS has conducted several evaluations of their surveys to ensure that problems of misreporting are minimized as far as possible.<sup>5</sup>

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<sup>4</sup>Financial services are covered in a separate survey by the Bank of England, travel and passenger transport by the International Passenger Inquiry and higher education by the Higher Education Statistics Agency. See ONS (2007) for a detailed description of these and other data sources used in the compilation of the UK’s balance of payments. Unfortunately, none of these data sources are accessible to researchers.

<sup>5</sup>For example, a recent evaluation documented that 76 per cent of respondents found the information required was readily available from their accounts. 91 per cent said that the products on the form covered their trade in services. 94 per cent of responders were happy that the definition on the form/notes of what is considered a “service” was clear and concise.

### 3 Data Description

In the analysis that follows we use information from several data sources. We describe the three main sources in turn.

#### 3.1 The Annual Respondents Database

The first main data source used is the Annual Respondents Database (ARD). The ARD is the UK equivalent of the US Longitudinal Respondents Database and is made available by the Office for National Statistics (ONS) based on information from the Annual Business Inquiry (ABI), the mandatory annual survey of UK businesses.<sup>6</sup> The ARD is a stratified sample of UK businesses in both the production and the service sectors, with a random sample of smaller businesses and the full population of larger businesses (those with more than 100 or 250 employees depending on the exact year). Among other variables, the ARD contains information on employment, investment, intermediate inputs (both intermediates goods and services), value added, gross output, industry affiliation, location and foreign ownership.

Since 2000, the ABI includes two questions on exports and imports of producer services. Specifically, firms are asked whether or not they exported or imported commercial services and, if they did, what the value of the corresponding transactions was.<sup>7</sup>

To provide aggregate figures for the whole economy we construct inverse probability weights using employment information from the Interdepartmental Business Register (IDBR) that contains a list of all businesses in the UK. We also include information on MNE status from the Annual Foreign Direct Investment Register (see Criscuolo and Martin, 2007).

#### 3.2 International Trade in Services Inquiry (ITIS)

The second main source of information is the Inquiry into International Trade in Services (ITIS) which collects data on the international transactions in services of resident UK private sector companies. The key difference to the information provided in the ABI is that the ITIS also asks for the type of service exported or imported and for the country of destination or origin of exports and imports. Table 1 and appendix A.1 provide lists of the types of service and countries contained in the ITIS, respectively.<sup>8</sup>

Again, the ITIS mainly collects information on producer services and excludes travel and transport, higher education, the financial sector and the public sector, information on which is collected from other sources (see footnote 4). Since its inception in 1996, the results from the ITIS have been used as components of the Trade in Services account of the Balance of Payments and the expenditure measure of GDP. They have also served as an input into the industrial

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<sup>6</sup>A more extensive description of the ARD can be found in Criscuolo, Haskel and Martin (2003), Griffith (1999) and Oulton (1997)

<sup>7</sup>As with our second source of data (described below), the values reported should include, according to the notes of the surveys, “all transactions with individuals, enterprises and other organizations domiciled in a country other than the UK”. This definition includes subsidiaries and parents that are operating abroad. This means that the value of imported/exported services reported includes both inter- and intra-firm trade.

<sup>8</sup>Note that the services type coverage is identical in the ARD and ITIS, even though firms are not asked to individually list services types in the ARD. Indeed, the inclusion of filter questions about services trade in the ABI was undertaken with the single goal of improving the sample coverage of the ITIS (see below).

and non-industrial service product breakdowns of input-output data and have been used by the government’s export promotion desks.

ITIS covers firms with ten or more employees. The inquiry has always been statutory and consists of an annual and a quarterly inquiry. In this paper, we combine both enquiries which since 2001 have sampled more than 20,000 firms per year (previously 10,000). Sampling in the annual inquiry is by sector and size-band, with approximately 9,000 firms in production industries and 11,000 firms in non-production industries. The quarterly inquiry includes the approximately 650 firms with the largest trade transactions in services, i.e. those firms with total trade of over 10 million pounds (identified from the previous year’s results). Response rates since 1999 are above 80% for the annual inquiry and range between 60% and 85% for the quarterly inquiry. The aim of the overall survey sampling design is to capture most of the trade in ‘other commercial services’ in the UK (with the exceptions discussed above). To this end, various sampling methods are used.

First known traders, identified from the previous year, are selected. Firms are also selected if they give positive answers to the filter questions on the ABI mentioned in section 3.1 which identify the firms that trade in services. Finally there is stratified random sampling from the IDBR in “High Propensity Industries” - sectors with a higher likelihood of trading overseas. These include computer services, consultants industries, the music industry, the production sector and wholesaling. Additional industries - called “mop ups” - have been included after the expansion of the survey in 2001 to ensure full coverage of the economy. A large proportion of responses are “nils”, that is, contributors who had no international transactions. For example, in 2001 this proportion was fifty-nine percent. In section 5, we will use the ITIS to look at transactions of active service traders only and will thus exclude these non-traders.

### **3.3 The third Community Innovation Survey (CIS3)**

We also use the third Community Innovation Survey (CIS3) which covers the period 1998-2000 to get information on firms’ exports of goods and skill intensity, measured as the proportion of graduates in the workforce. This is the only available dataset that contains direct information on these variables.<sup>9</sup> Similar to the ABI, we observe the export status of a firm and the total value of exports, but not the specific product exported or the firm’s export destinations.

The survey is based on a stratified sample of UK businesses and a retrospective survey, response to which is voluntary. It covers manufacturing and services but not retailing and government. CIS3 sampled 19,625 firms with an overall response rate of 42%. The survey contains information on exporting in 1998 and 2000, and on skills for the year 2000.

### **3.4 Comparison of Samples**

In the remainder of this paper we use different combinations of the above samples. We initially work with the ARD only to look at the characteristics of service traders, both on their own and compared to non-traders (sections 4.1 and 4.2). For the comparison of services and goods

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<sup>9</sup>HM Revenue and Customs holds detailed data on export and import transactions of UK firms comparable to, for example, Bernard et al. (2007b) for the U.S. Unfortunately, these data are not accessible for researchers.

exporters (section 4.3) we use the match between ARD and CIS in 2000. The analysis of import and export patterns of active UK service traders (section 5) relies on the ARD-ITIS match in 2000-2005.<sup>10</sup> The results in that section on the skill intensity of traders also use data on the fraction of university graduates from the CIS3.

Table 2 shows descriptive statistics on these four samples. With close to 240,000 firm-year observations, the ARD is by far the largest sample. By its design it is also the one that is most representative of the UK economy. The other samples are biased towards larger and more productive firms. These differences are particularly pronounced for the ARD-ITIS and ARD-ITIS-CIS subsamples. The firms contained in these samples are also much more likely to be foreign owned or to be part of a UK multinational company. However, a large part of the differences to the ARD can be explained by the simple fact that these samples only contain firms that either export or import services (or both). If we restrict the ARD and ARD-CIS sample to known service traders (columns 5-6), size, productivity and ownership differences are reduced by about 50%. Also, in terms of the total value of service exports and imports accounted for by the sample firms, the ARD and the ARD-ITIS are actually very similar.<sup>11</sup>

## 4 Characteristics of Service Traders in the UK

### 4.1 Basic Facts on Service Traders

Tables 3 provides basic information from the ARD on exporters and importers of services in the UK in 2005. We show both aggregate figures as well as more disaggregated information for eight major sectors (see appendix table A.1 for details on this classification). Note that these are weighted figures, i.e., we use the ARD's inverse sampling probabilities to give more weight to firms with a lower likelihood of inclusion in the ARD.<sup>12</sup>

Service traders only make up 8.1% of the firms in our sample but account for 22.5% of employment and 29.6% of value added (panels 1-3). We distinguish between three subgroups of traders: firms that export only, firms that import only and firms that do both. Exporting services is more common than importing - 6.2% of firms export but only 3.9% import. Only 2% of firms both export and import but this group accounts for a substantially larger share of employment, turnover and value added. Firms in this group also account for 80% of exports and 86% of imports of services (panel 4). That is, around 2% of UK firms account for the vast majority of trade in services. However, even for this type of firms the value of exports and

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<sup>10</sup>The ITIS also contains data for 1997-1999 but we restrict our sample to the latter period for comparability with the analysis in section 4 (the ARD only has information on services trade from 2000 onwards).

<sup>11</sup>In 2005, total services exports reported in the ARD-ITIS sample were 96% of the exports reported in the ARD (87% for imports). Again, the goal of the ITIS's sampling procedure is to cover most of the UK's services trade in the designated sectors and services types. As such, the ITIS does not include some of the smaller services traders (present in the ARD) which only account for a very small proportion of overall trade. This explains the similarity to the ARD in terms of services trade accounted for, as well as the remaining size, productivity and ownership differences when looking at the ARD-subsample of active traders.

<sup>12</sup>Unweighted figures are qualitatively similar and are available from the authors upon request. Strictly speaking, our unit of observation is a so-called 'reporting unit' which is the unit for which businesses report their survey data to ONS. In the vast majority of cases, a reporting unit is the same as a firm or enterprise, although an enterprise might be part of a larger enterprise group (e.g. Vauxhall Motors UK is part of General Motors Corporation). See Criscuolo, Haskel and Martin (2003) for details.



imports is relatively small compared to their average turnover. The “export intensity”, i.e. the ratio of exports to turnover is around 31% and 27% for only-exporters and exporters-importers, respectively (panel 5). On the import side, these ratios are even lower at 9% for only-importers and 12.5% for exporters-importers. This mirrors the literature on goods trade (e.g. Bernard et al., 2003), which finds that most goods exporters only export a small fraction of total output.<sup>13</sup>

Looking across sectors, we see that all groups of industries have exporters and importers of services. The share of traders in the total number of firms varies widely, however, ranging from around 2% for construction and utilities to around 20% for Mining and High-Tech Manufacturing. There is also a strong variation among sectors in the fraction of economic activity made up by service traders. For example, service traders make up over half of value added and 40% of employment in Mining, High-Tech Manufacturing and Business Services, Computer and R&D, while for construction and utilities and wholesale and retail these figures are of the order of only 10-20%. These figures do not necessarily reflect the importance of a sector in overall exports and imports, however, since sectors vary substantially in size. For example, the sector “Other Services” makes up around a third of imports and exports by total value even though only a small fraction of these firms are engaged in trade (panel 6).

The aggregate figures on the relative importance of the three groups of traders and their average trade intensity also hide substantial sectoral variation. In general, exporters-importers do account for a far greater share of total trade than either only-importer or only-exporters. For some sectors, however, total trade values are more evenly split between the two groups or even dominated by one-way traders (e.g., in construction and utilities). Likewise, export intensity varies widely between 7% (exporters-importers in construction and utilities) and 63% (only-exporters in mining). Import intensity also shows some variation but is mostly below 10% and never reaches more than the 20% observed for exporters-importers in wholesale and retail.

Another important fact not visible from the aggregate figures in table 3 is the strong concentration of employment, turnover, value added and the value of trade among the largest importers and exporters. In tables 4a and 4b, we report the corresponding shares of the top 1%, top 5%, top 25% and top 50% of exporters and importers in terms of trade values.<sup>14</sup> For example, the 1% largest exporters only make up 0.06% of UK firms. However, in 2005 they accounted for 74% of total exports, 4.6% of employment, 6.9% of turnover and 9.2% of gross value added. The 1% largest importers similarly make up 0.04% of firms but were responsible for 79% of total imports, 2.9% of employment, 5.9% of turnover and 8% of gross value added (table 4b).

Interestingly, this extreme concentration of exports and imports among a few large traders is not too dissimilar from the concentration reported for manufacturing traders in the U.S. and China by Bernard et al. (2007b, BJS henceforth) and Manova and Zhang (2008, MZ henceforth). However, the share of employment accounted for by the top 1% of exporters and importers is lower than that reported by BJS (11% vs. 3-5% in our sample).

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<sup>13</sup>Bernard et al. (2003) report for U.S. manufacturing that 82% of exporting plants export less than 20% of their output.

<sup>14</sup>Again, these are weighted figures. The unweighted figures are available from the authors on request.

## 4.2 A Comparison of Service Traders and Non-Traders

The literature on goods traders has consistently found differences in firm size, productivity and other firm-level characteristics between non-traders and exporters and importers (e.g. Bernard and Jensen, 1999; Bernard et al., 2007a/b). We now examine the firm-level characteristics of service traders and non-traders through a number of descriptive regressions. Following BJS, we distinguish four groups: firms that only export services, firms that only import, firms that do both and firms that do not trade at all. We control for year and four-digit industry fixed effects to focus on the within-sectoral variation in the data. Our qualitative findings remain the same when we only use year fixed-effects (results available on request). We also report results of F-tests on the significance of the differences between the three types of service traders (rows 4 to 6)

As shown in table 5, exporters and importers of commercial services are larger in terms of employment and turnover, have higher gross value added, pay higher wages, are more capital intensive and are more productive, both in terms of simple labour productivity and TFP. Service traders are also more likely to be foreign owned or to be part of a UK multinational company.<sup>15</sup> These “trade premia” are particularly pronounced for firms that both export and import. Comparing only-importers and only-exporter, the former tend to be larger in terms of turnover and value added, are more capital intensive and are more likely to be foreign owned. However, there are no statistically significant labour productivity differences between the two groups, and only-exporter are actually more productive in terms of TFP and pay slightly higher wages.

For a smaller subsample for the year 2000, we also have information on the skill level of the workforce from the CIS as described in section 2 (skills are measured as the share of university graduates in all employees). Column 10 in table 5 shows that exporters-importers and service exporters employ more high-skill workers – around 6 percentage points more than non-traders. There is no statistically significant difference between service importers and non-traders in terms of skill levels.

To summarize, service traders show similar trade premia as those found in the goods trade literature - they are larger, more productive and more likely to be part of a UK or foreign MNE. There are some interesting differences between exporters and importers of services, however. While firms that only export tend to be smaller, less capital intensive and less likely to be foreign owned, they are more productive and skill intensive than only-importers. Interestingly, these qualitative differences are the exact opposite to what Bernard et al. (2007a) report for U.S. goods exporters and importers.

## 4.3 Services vs. Goods Exporters

We also have information on goods exports for a smaller subsample in the year 2000 (this is the ARD-CIS subsample described in section 2). This allows us to compare exporters of services

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<sup>15</sup>UK MNE status, capital-labour ratios and TFP are for 2000-2004 only since we do not have sufficient data for 2005. TFP is calculated as the residual of value added production functions, estimated in deviations from 3-digit sectoral medians via OLS. We use sectoral deflators from the EU KLEMS Project for both production and services industries.

and goods for the same set of firms. Since we have no information on import activities, we again split up firms into three groups – firms that export goods only, firms that export services only, firms that export both and firms that do not export at all. We use descriptive regressions to compare these firms in terms of size, wages, capital intensity, productivity, foreign ownership, UK MNE status and skill intensity. Again, results with and without sectoral fixed effects are qualitatively identical and we only present the latter (the former are available on request).

Not unsurprisingly, given our previous results and those in the existing literature on goods trade, we find that all three groups of exporters are larger than non-exporters in terms of employment, turnover and value added (table 6). They are also more capital intensive, more productive, pay higher wages, and are more likely to be part of a UK MNE or to be foreign owned. We also find that the size differences relative to non-exporters are particularly pronounced for firms exporting both goods and services as well as for firms exporting only goods. Firms exporting only services are larger than non-exporters but smaller than the other groups of exporters. They are also less likely to be foreign owned. On the other hand, differences in labour productivity between the three groups are less pronounced and not statistically significant. For the skill composition of the workforce (column 10) the picture actually reverses – the only-service exporters are the most skill intensive, followed by exporters of both goods and services and only-goods exporters. Similarly, service exporters have higher TFP than the other two groups, although these differences are only marginally statistically significant.

Again, the picture that emerges is one of service exporters as relatively small (compared to other internationally engaged firms) but very productive and human-capital intensive. One potential explanation for this finding might lie in the nature of service exporting itself. Many firms which export services are essentially exporting knowledge embodied in their workforce, customised to each of their customers, and the physical capital needed for these type of transaction is much less than the capital needed for producing and exporting goods.

## 5 Dissecting Services Trade

We now move on to a more detailed analysis of service exports and imports, using the match between the ARD and ITIS. For this sample we have information on destination specific exports and imports as well as the types of service a firm trades. Since we are interested in describing the trading patterns of firms, we focus on active traders only, i.e., those firms that either export or import (or both).

### 5.1 Aggregate figures - Types of Service and Trading Partners

We start by giving some aggregate figures on the types of service being traded and the top export and import destinations. As shown in table 7, business services are the most exported aggregate type of service in our sample, followed by telecommunication and technical services.<sup>16</sup> On the import side, royalties and licenses and telecommunication services come first, again followed by business services.

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<sup>16</sup>We present figures for ten aggregate service types for expositional clarity. Later results are based on the full range of around 40 services (see table 1 for a classification of our service types).

Turning to export and import destinations, the ranking of trading partners in service trade is not too dissimilar from what is observed for the UK's trade in goods (see table 8). However, the dominance of the USA is much more pronounced, with U.S. exports and imports accounting for around 25% of total service trade in our sample. For comparison, the USA's share in the UK's goods trade is around 16% (exports) and 12% (imports).<sup>17</sup> There are also some trading partners in the top 10 which would not make it onto a similar list for goods trade. For example, Switzerland is the fifth biggest export destination and the sixth biggest import destination. Likewise, Saudi Arabia ranks ninth among export destinations.

## 5.2 Export Values, Number of Destinations and Types of Service

We now turn to the firm-level data underlying these aggregate observations. As shown in table 9a, the average firm exports to 8.6 out of 218 markets (column 1) and sells 1.4 types of service out of a total of 38 (column 2).<sup>18</sup> On the import side, the average number of source countries is 5.5 and the average number of types of service imported is 2.3 (table 9b). As a direct consequence, the value of exports and imports is higher per service type than per destination or source market (columns 3-6).

These averages hide a strong skewness of the underlying distributions. In fact, the median number of markets served is just three (two on the import side) while the median number of services exported and imported is one. 28% of firms only export to a single market, 42% to at most two markets and only 39 out of around 15,000 firms (i.e. 0.26%) serve more than 100 markets. Similarly, 36% of importers only source from a single market, 52% from at most two markets and only 21 or 0.12% of firms record more than 100 source countries. A similar concentration is present for the number of services exported and imported. 78% of firms export and 53% import a single type of service, 92% export and 72% import at most two types, and only 31 firms export and 204 firms import more than 10 different service types.

To visualize the above results, figures 1a and 1b display the relationship between the number of firms and the number of markets they export to and import from, as well as the number of services sold and bought. For reasons of disclosure, we cannot report the number of firms exporting or importing to or from more than 40 countries, or more than 9 types of service.

For exporters, the negative slope of the number of firms in the number of markets served is similar to the slope reported by Eaton et al. (2004) for goods exports by French manufacturing firms. In both cases, the relationship between the number of markets served and the number of firms shows a tight log-linear fit, with a slope of, respectively, -2.5 (Eaton et al.) and -2.0 (our data). The  $R^2$  of the corresponding log-log regression is very high at 93%. We are not aware of comparable figures for manufacturing imports but the relationship between the number of source countries and the number of firms is similar to our results for exports (a coefficient of -2.1 and an  $R^2$  of 93% in a simple log-log regression).

A similar picture holds for the number of services exported and imported. The relation

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<sup>17</sup>Figures for 2002 from CEPII. Germany and France are the other two big partners for UK goods trade, accounting for 10% each of UK exports and 14% (Germany) and 8% (France) of imports.

<sup>18</sup>This table and the following tables and graphs are based on firm-year observations, i.e. a firm can appear several times. For simplicity, we refer to these firm-year observations as "firms".

between the number of services traded and the number of firms is again log-linear, this time with an elasticity of -3.3 (exports) and -3.0 (imports) and an even tighter fit than before (a regression of log number of services on log number of firms has an  $R^2$  of 98% for exports and 92% for imports). Again, we are not aware of a similar analysis for goods trade although the decline in the number of firms seems to be sharper than those reported by BJS or MZ.<sup>19</sup>

### 5.3 Concentration of Trading Activity across Firms

We now undertake a more thorough analysis of the strong heterogeneity across firms evident from tables 9a and 9b. First, we ask whether firms that trade with many countries and service types also account for a disproportional share of *overall* trade. From tables 10-11, this is clearly the case. In these tables, we categorize firms according to how many countries they trade with and in how many types of service. Clearly, activity is highly concentrated among a few top traders. Firms that export services to more than 50 destinations make up 2% of firms in the sample but account for 16% of overall exports, 12% of employment, 16% of turnover and 29% of value added. Firms importing services from more than 50 countries account for 0.9% of firms, 18% of imports, 8% of employment, 12% of turnover and 23% of GVA.

A similar pattern emerges when turning to the number of service types exported and imported. Firms exporting ten or more service types represent 0.2% of firms in our sample, 3.5% of exports, 1% of employment, 2.9% of turnover and 1.9% of GVA. Firms importing ten or more different types of service are slightly more numerous (1.7% of all firms) and correspondingly account for greater shares of activity than on the export side – 11% of imports, 3.4% of employment, 8.4% of turnover and 7.4% of GVA.

While the exact figures are hard to compare due to the very different settings and sampling techniques, the qualitative findings presented here match those of BJS and MZ for goods trade. That is, exporting and importing is highly concentrated among relatively few firms, trading with a large number of countries and in a large number of types of service.

### 5.4 Concentration of Trading Activities within Firms – Markets and Products

Trading activities are also concentrated within firms in the sense that most firms do a large fraction of total trade with their most important market and/or in their most important product. Tables 12 and 13 provide the corresponding evidence. In column 1 of tables 12a and 12b, we report the average share of exports (imports) across all firms which is derived from the most important export (import) market, the second most important export (import) market and so on. In the last row we also report a Herfindahl index as a standard measure of concentration. Column 1 of table 13a and 13b displays the same statistics, this time using the number of services rather than countries as the categorical variable.

The average firm's exports and imports are clearly highly concentrated in its top market and product. On average, the largest export market makes up 68% and the top source country

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<sup>19</sup>We stress that it is difficult to directly compare results since the product classifications used in BJS and MZ are considerably more detailed. However, the figures they report indicate a number of firms - number of products elasticity much smaller than -1 (see table 6 in MZ and table 4 in BJS).

76% of total exports and imports. Similarly, the top export and import types of service make up 95% of overall exports and 86% of overall imports, respectively.

These results are skewed by the fact that most firms export to and import from one market only, and usually not more than a single type of service. For these firms, the top market or type of service makes up 100% of total trade by construction. The remaining columns of tables 12a-12b thus shows the average export/import shares of the first to tenth most important market for firms exporting to or importing from exactly 1, 2, 5, 10, 25 and 40 markets (1, 2, 3, 5, 9 service types for tables 13a-13b). Naturally, the importance of the top market/type of service declines as we move rightwards in the tables. However, the top export or import market is always at least twice as big as the second most important market and makes up at least 25% of total firm exports or imports. The second-largest market in turn is again 50% larger than the third most important market. For types of service this pattern is even more pronounced. The top service type makes up at least 50% of a firm's total trade value and is two to three times larger than the second most important type (which in turn is roughly twice as important as the third most important service). Clearly, a firm's primary market and service product is of particular importance even for firms that are diversified both geographically and in product scope.

## 5.5 Margins of Trade and Firm Characteristics

We conclude with an analysis of the importance of the different margins of trade in explaining the cross-sectoral variation in exports and imports highlighted in table 9a and 9b. We consider two extensive margins – number of trading partners (destination and source countries) and number of services traded – in addition to the intensive margin (trade per service per trading partner). We start by noting that by definition, total firm exports and imports are the product of these three margins. We can thus write

$$\log X_{it} = \log N_{it} + \log S_{it} + \log \bar{x}_{it} \quad (1)$$

where  $X_{it}$  denotes total firm exports or imports of firm  $i$  in year  $t$ .  $N_{it}$  is the number of trading partners,  $S_{it}$  the number of different service types traded, and  $\bar{x}_{it} = X_{it}/(N_{it}S_{it})$  the average value of trade per service per trading partner.

Next, we perform a regression decomposition of total firm trade based on (1). We regress each of the three margins of trade on total firm exports or imports ( $X_{it}$ ). Since we express our dependent variables in logs, the reported OLS coefficient estimates of the margins add up to unity.

As displayed in panel A of table 14, the intensive margin is the most important source of inter-firm variation for both exports and imports.<sup>20</sup> It accounts for just above two-thirds of the total variation, with the country margin accounting for 22-26% and the service type margin for just 5-9%. Interestingly, results for the exports of goods by U.S firms tend to suggest a much more important role for the extensive margins in explaining the cross-sectional variation

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<sup>20</sup>We report results with year and industry fixed effects. Results with year fixed effects only are again qualitatively similar and available from the authors' upon request.

of firm-level exports (Bernard et al., 2008, table 4).<sup>21</sup> An opinion often stated in the policy literature on trade in services (e.g. OECD, 2007) is that the costs of entering new markets and products are very high for service trade relative to the costs of expanding existing trade relationships. The importance of the intensive margin in our data lends some support to this idea.

As a final step, we turn to an exploration of how some of the firm characteristics previously studied correlate with the three margins of trade. In panel B of table 14, we report regressions of total firm trade as well as its three margins on employment, labour productivity, foreign ownership and UK multinational status. Again, the reported OLS coefficient estimates of the margins add up to the coefficient on total trade.

As shown, higher employment and labour productivity are associated with exporting to and importing from more countries (columns 2 and 6), exporting and importing more types of service (columns 3 and 7), as well as with both higher export and import values per market and service (columns 4 and 8). The largest and most significant coefficient is the one on the intensive margin, followed by the coefficient on the number of trading partners while the coefficient on the number of service traded is considerably smaller.

Foreign ownership is not or even negatively correlated with the number of destination and source markets. It is positively correlated with the number of types of service and even more strongly with trade per service/partner. A potential explanation for this slightly surprising pattern is that foreign owned firms may predominantly exchange producer services with their mother companies and thus export and import from fewer countries. UK multinational status enters positively for exports but not for imports - for the latter, positive extensive margins are cancelled out by a strongly negative intensive margin. This could again be due to a headquarter hub-effect, with UK MNE headquarters trading many services with their affiliates but not very much with any particular one of them.<sup>22</sup>

## 6 Conclusions

In this paper, we provided a novel set of stylized facts on firms engaging in international trade in services, using unique firm-level data on service exports and imports for the United Kingdom in 2000-2005.

Many of the stylized facts on service traders are strikingly similar to goods traders. Only few firms trade in services but they represent a much larger share of economic activity in terms of employment and value added. And among the active service traders, it is again a very small number of firms that accounts for the largest proportion of service trade and for a much larger

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<sup>21</sup>In a regression similar to (1), these authors estimate coefficients of 0.384 and 0.347 for the product and country margin, respectively. A potential caveat is that their product classification is much more disaggregated than ours (8,000 different products as opposed to 40 services types in our data). This difference will tend to understate the importance of the product extensive margin in our analysis.

<sup>22</sup>In unreported results, we also used the match between ITIS, ARD and CIS3 to look at the correlation between skill levels and export and import patterns. For both exports and imports, skills were strongly positively correlated with the country extensive margin as well as the intensive margin. There was no significant correlation with the service type margin. Interestingly, the country extensive margin explained an equal share of the total impact of skills on exports as the intensive margin and was considerably more important on the import side.

than proportional share of employment and value added.

Similar to goods trade, we also found that trade intensities of service traders are low, especially for importers. Most service traders trade a small number of services with only a few foreign countries; and even those who trade with several partner countries and/or in more than one type of service concentrate most of their exports and imports in a single main destination or from a single source country and a single type of service.

Trade premia are also qualitatively similar to those reported for goods traders. Relative to firms that do not trade in services, service traders are larger, more capital and skill intensive, they have higher labour and total factor productivity and are more likely to be part of a domestic or a foreign multinational.

However, when we distinguished between firms that only import, firms that only export and firms that both import and export services, we found some interesting features that are in contrast with the evidence on goods trade. Firms that only export services are smaller in terms of employment, turnover and value added, less capital intensive and less likely to be foreign owned than only-importers but are also more skill intensive and productive. This is in contrast with evidence on goods trade from the US where only-exporters have lower TFP, are larger, more capital intensive but less skill intensive than only-importers (Bernard et al., 2007a).

The high skill and relatively low size premium for service traders is confirmed in additional analysis that we carried out on a subset of firms for which we have information on export activity in both service and merchandise trade. The evidence confirms that the skill premia for service exporters are higher than for goods exporters while size, ownership and capital intensity premia are all higher for goods traders. One possible explanation for these findings is that firms which export services in fact export knowledge embodied in their workforce customised to each of their customers and the capital needed for these type of transaction is much less than the capital needed for producing export goods.

We also documented that the extensive margins of trade (number of trading partners and types of service) play a less important role in explaining the cross-sectional variation in firm-level trade than the intensive margin (exports/imports per country and type of service). Again, this seems to be different from available evidence for trade in goods and could reflect significant barriers to the entry into new markets in service trade. When correlating firm characteristics such as size and productivity with the intensive and extensive margins of firm-level trade, we also found the intensive margin to be more important. That is, larger and more productive firms export and import more principally because they trade with more countries and/or in more types of service.

Most of the ongoing theoretical and empirical research that looks at firm-level trade concentrates on trade in goods. Our evidence shows that although service traders are similar to goods traders in many ways, there are some noteworthy differences. These findings provide insights both for future theoretical research and for policy making. They also raise some important questions. For example, do the predictions from existing theoretical models fit the evidence on service trade as well as that on goods trade? Why is the intensive margin so important for service trade? The richness of our data will allow to answer these and other questions in future work. We are confident that such work will also provide further insights for ongoing policy



debates, such as the debates on offshoring and service trade liberalization.

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## A Data description

### A.1 List of Countries Codes used in the paper

Aruba; Afghanistan; Angola; Anguilla; Albania; Andorra; Netherlands Antilles; United Arab Emirates; Argentina; Armenia; Antigua and Barbuda; Australia; Austria; Azerbaijan; Burundi; Belgium; Benin; Burkina Faso; Bangladesh; Bulgaria; Bahrain; Bahamas; Bosnia and Herzegovina; Belarus; Belize; Bermuda; Bolivia; Brazil; Barbados; Brunei Darussalam; Bhutan; Botswana; Central African Republic; Canada; Cocos-Keeling Island; Switzerland; Chile; China; Cote d’Ivoire; Cameroon; Democratic Republic of the Congo; Congo; Cook Islands; Colombia; Comoros; Cape Verde; Costa Rica; Cuba; Christmas Islands; Cayman Islands; Cyprus; Czech Republic; Germany; Djibouti; Dominica; Denmark; Dominican Republic; Algeria; Ecuador; Egypt; Eritrea; Western Sahara; Spain; Estonia; Ethiopia; Finland; Fiji; Falkland Islands (Malvinas); France; Faeroe Islands; Micronesia, Federated States of; Gabon; United Kingdom; Georgia; Ghana; Gibraltar; Guinea; Guadeloupe; Gambia; Guinea-Bissau; Equatorial Guinea; Greece; Grenada; Greenland; Guatemala; French Guiana; Guyana; China, Hong Kong Special Administrative Region; Honduras; Croatia; Haiti; Hungary; Indonesia; India; Ireland; Iran (Islamic Republic of); Iraq; Iceland; Israel; Italy; Jamaica; Jordan; Japan; Kazakhstan; Kenya; Kyrgyzstan; Cambodia; Kiribati; Saint Kitts and Nevis; Korea, Republic of; Kuwait; Lao People’s Democratic Republic; Lebanon; Liberia; Libyan Arab Jamahiriya; Saint Lucia; Sri Lanka; Lesotho; Lithuania; Luxembourg; Latvia; China, Macao Special Administrative Region; Morocco; Moldova; Madagascar; Maldives; Mexico; Marshall Islands; The former Yugoslav Republic of Macedonia; Mali; Malta; Myanmar; Mongolia; Northern Mariana Islands; Mozambique; Mauritania; Montserrat; Martinique; Mauritius; Malawi; Malaysia; Namibia; New Caledonia; Niger; Norfolk Islands; Nigeria; Nicaragua; Niue; Netherlands; Norway; Nepal; Nauru; New Zealand; Oman; Pakistan; Palestinian Territories; Panama; Pitcairn Islands; Peru; Philippines; Palau; Papua New Guinea; Poland; Puerto Rico; Korea, Democratic People’s Republic of; Portugal; Paraguay; French Polynesia; Qatar; Reunion; Romania; Russian Federation; Rwanda; Saudi Arabia; Sudan; Senegal; Singapore; Saint Helena; Solomon Islands; Sierra Leone; El Salvador; San Marino; Somalia; Saint Pierre and Miquelon; Sao Tome and Principe; Suriname; Slovakia; Slovenia; Sweden; Swaziland; Seychelles; Syrian Arab Republic; Turks and Caicos Islands; Chad; Togo; Thailand; Tajikistan; Tokelau; Turkmenistan; Timor Portugese (East Timor); Tonga; Trinidad and Tobago; Tunisia; Turkey; Tuvalu; Taiwan; United Republic of Tanzania; Uganda; Ukraine; Uruguay; United States; Uzbekistan; Saint Vincent and the Grenadines; Venezuela; British Virgin Islands; Vietnam; Vanuatu; Wallis and Futuna; Samoa; Yemen; Yugoslavia (Serbia and Montenegro); South Africa; Zambia; Zimbabwe.

Table 1: Services types in the ITIS (also underlying total exports and imports in the ARD)

| <i>Aggregate Service Types (10)</i> | <i>Disaggregated Service Types (38)</i>  |
|-------------------------------------|--|
| Business Services                   | Legal services<br>Accounting and auditing<br>Management consulting and public relations<br>Advertising<br>Market research and polling<br>Property management<br>Procurement<br>Publishing services<br>Recruitment and training<br>Other business services<br>Operational leasing |
| R&D                                 | Research and development   |
| Financial Services                  | Insurance: Premiums<br>Insurance: Claims<br>Financial services<br>Auxiliary services   |
| Affiliated                          | Management charges   |
| Telecommunication Services          | Telephone services<br>Postal services<br>Computer services<br>Information services   |
| Technical Services                  | Architectural<br>Engineering<br>Surveying<br>Agricultural services<br>Mining services<br>Other technical services<br>Waste treatment and depollution<br>Other on-site maintenance  |
| Construction                        | Construction services  |
| Cultural Services                   | TV and radio related services<br>Other cultural and recreational services<br>Health services   |
| Royalties and Licences              | Payments/Receipts for the use of intangible assets<br>Payments/Receipts for the outright purchase or sale of intangible assets   |
| Trade Related Services              | Merchanting<br>Earnings from trading in commodities<br>Any other trade in services not shown elsewhere   |

**Table 2: Comparison of samples used**

|    | (1)                      | (2)       | (3)      | (4)              | (5)              | (6)                  |       |
|----|--------------------------|-----------|----------|------------------|------------------|----------------------|-------|
|    | ARD                      | ARD-CIS   | ARD-ITIS | ARD-ITIS-<br>CIS | ARD<br>(traders) | ARD-CIS<br>(traders) |       |
| 1  | No. of firm-<br>years    | 239,831   | 3,062    | 16,566           | 2,039            | 34,489               | 685   |
| 2  | Years                    | 2000-2005 | 2000     | 2000-2005        | 2000             | 2000-2005            | 2000  |
| 3  | Employment               | 222       | 300      | 835              | 576              | 403                  | 419   |
| 4  | Turnover                 | 23267     | 41926    | 119864           | 76994            | 50743                | 69097 |
| 5  | Gross Value<br>Added     | 7096      | 14436    | 39204            | 28948            | 16427                | 24632 |
| 6  | Average wages            | 19        | 21       | 35               | 33               | 29                   | 25    |
| 7  | Capital-<br>Labour ratio | 54        | 62       | 152              | 105              | 92                   | 67    |
| 8  | Labour<br>productivity   | 29        | 35       | 56               | 56               | 44                   | 41    |
| 9  | TFP (logs)               | 0.03      | 0.02     | 0.17             | 0.12             | 0.10                 | 0.07  |
| 10 | Foreign<br>ownership     | 8.0%      | 13.1%    | 37.7%            | 42.5%            | 22.4%                | 23.4% |
| 11 | UK MNE                   | 4.8%      | 11.0%    | 16.1%            | 19.6%            | 10.6%                | 16.1% |
| 12 | % Services<br>importers  | 9.7%      | 18.3%    | 77.1%            | 80.3%            | 67.7%                | 68.8% |
| 13 | % Services<br>exporters  | 9.7%      | 19.8%    | 66.7%            | 63.4%            | 67.5%                | 74.3% |

**Source:** Authors' calculations on the Annual Respondents Database (ARD); the Community Innovation Survey (CIS); the International Trade in Services Inquiry (IT IS); the Interdepartmental Business Register (IDBR) and the Annual Foreign Direct Investment (IDBR) Register.

**Notes:** Rows 3 to 9 report sample averages. 'Average wages' are defined as total labour costs divided by the number of employees. 'Labour productivity' is defined as gross value added per employee. 'TFP' is calculated as the residual of value added production functions, estimated in deviations from 3-digit sectoral medians via OLS. Row 10 to row 13 report shares. In row 10 information on UK MNEs come from the AFDI register. Columns (5) and (6) report sample statistics for the ARD and ARD-CIS subsamples of active services traders only (i.e. firms that either export or import or do both).

**Table 3 – Importers and Exporters of Services in the UK (2005, aggregate, weighted)**

|                                     | (1) Weighted Share of Firms |             |             |             | (2) Weighted Employment Share |             |              |             |
|-------------------------------------|-----------------------------|-------------|-------------|-------------|-------------------------------|-------------|--------------|-------------|
|                                     | Notrade                     | EnoI        | InoE        | EandI       | Notrade                       | EnoI        | InoE         | EandI       |
| <b>TOTAL</b>                        | <b>91.90%</b>               | <b>4.2%</b> | <b>1.9%</b> | <b>2.0%</b> | <b>77.6%</b>                  | <b>5.6%</b> | <b>10.1%</b> | <b>6.8%</b> |
| Mining                              | 77.00%                      | 10.7%       | 3.8%        | 8.5%        | 64.5%                         | 8.9%        | 12.5%        | 14.1%       |
| Low-Mediumtech                      | 90.80%                      | 3.4%        | 2.1%        | 3.7%        | 81.3%                         | 4.2%        | 8.8%         | 5.7%        |
| High-tech Manuf                     | 80.30%                      | 9.6%        | 4.0%        | 6.1%        | 58.1%                         | 8.6%        | 12.4%        | 21.0%       |
| Construction-utilities              | 98.10%                      | 0.5%        | 1.1%        | 0.3%        | 93.4%                         | 1.5%        | 3.0%         | 2.1%        |
| Wholesale & retail                  | 94.00%                      | 2.3%        | 2.3%        | 1.4%        | 83.1%                         | 7.4%        | 7.1%         | 2.5%        |
| Other services                      | 94.80%                      | 2.9%        | 1.2%        | 1.1%        | 85.1%                         | 4.1%        | 4.6%         | 6.3%        |
| Business Services; Computer and R&D | 85.40%                      | 8.5%        | 2.6%        | 3.5%        | 60.5%                         | 6.9%        | 22.1%        | 10.5%       |

|                                     | (3) Weighted Value Added Share |             |             |              | (4) Share of total trade |              |              |              |
|-------------------------------------|--------------------------------|-------------|-------------|--------------|--------------------------|--------------|--------------|--------------|
|                                     | Notrade                        | EnoI        | InoE        | EandI        | Exports                  |              | Imports      |              |
|                                     |                                |             |             |              | (EnoI)                   | (I&E)        | (InoE)       | (I&E)        |
| <b>TOTAL</b>                        | <b>70.4%</b>                   | <b>6.4%</b> | <b>9.8%</b> | <b>13.4%</b> | <b>20.2%</b>             | <b>79.8%</b> | <b>13.7%</b> | <b>86.4%</b> |
| Mining                              | 34.4%                          | 3.6%        | 30.9%       | 31.2%        | 36.5%                    | 63.5%        | 15.1%        | 84.9%        |
| Low-Medium tech                     | 78.1%                          | 5.0%        | 9.5%        | 7.5%         | 27.0%                    | 73.0%        | 25.5%        | 74.5%        |
| High-tech Manuf                     | 51.6%                          | 9.2%        | 12.6%       | 26.6%        | 26.5%                    | 73.5%        | 20.9%        | 79.1%        |
| Construction-utilities              | 86.6%                          | 1.3%        | 5.7%        | 6.4%         | 43.6%                    | 56.4%        | 79.8%        | 20.2%        |
| Wholesale & retail                  | 81.1%                          | 7.5%        | 6.8%        | 4.5%         | 37.9%                    | 62.1%        | 26.4%        | 73.6%        |
| Other services                      | 79.9%                          | 3.2%        | 4.9%        | 12.0%        | 8.0%                     | 92.0%        | 11.6%        | 88.4%        |
| Business Services; Computer and R&D | 51.0%                          | 11.2%       | 17.7%       | 20.0%        | 23.5%                    | 76.5%        | 8.6%         | 91.4%        |

|                                     | (5) Trade Intensity |              |             |              | (6) Weighted Share of Sector in total |               |               |               |
|-------------------------------------|---------------------|--------------|-------------|--------------|---------------------------------------|---------------|---------------|---------------|
|                                     | Exports             |              | Imports     |              | Employment                            | Turnover      | Export        | Import        |
|                                     | EnoI                | EandI        | InoE        | EandI        |                                       |               |               |               |
| <b>TOTAL</b>                        | <b>30.7%</b>        | <b>27.2%</b> | <b>9.0%</b> | <b>12.5%</b> | <b>100.0%</b>                         | <b>100.0%</b> | <b>100.0%</b> | <b>100.0%</b> |
| Mining                              | 63.3%               | 23.4%        | 1.4%        | 5.5%         | 0.5%                                  | 0.8%          | 0.5%          | 0.4%          |
| Low-Mediumtech                      | 14.2%               | 16.6%        | 7.8%        | 17.3%        | 15.3%                                 | 8.2%          | 2.6%          | 2.8%          |
| High-tech Manuf                     | 25.0%               | 22.1%        | 6.4%        | 10.6%        | 7.7%                                  | 6.8%          | 9.6%          | 9.3%          |
| Construction-utilities              | 12.5%               | 7.2%         | 5.5%        | 4.7%         | 8.5%                                  | 6.5%          | 0.1%          | 0.4%          |
| Wholesale & retail                  | 28.4%               | 19.1%        | 13.7%       | 20.8%        | 27.1%                                 | 37.6%         | 7.6%          | 7.5%          |
| Other services                      | 24.0%               | 29.5%        | 10.5%       | 10.9%        | 25.8%                                 | 25.0%         | 31.2%         | 35.5%         |
| Business Services; Computer and R&D | 35.5%               | 31.8%        | 6.3%        | 10.3%        | 15.2%                                 | 15.1%         | 48.4%         | 44.1%         |

**Source:** Authors' calculations on the Annual Respondents Database (ARD); 2005.

**Notes:** Figures reported are weighted by inverse sampling probabilities and refer to 2005 only. "Notrade" are firms that do not export nor import services. "EnoI" are firms that export but do not import services. "InoE" are firms that import but do not export services. "EandI" are firms that both import and export services. Panels (1)-(4) show the numbers of firms, and the shares of employment, value added and trade for these four groups of firms, by major sector and in total. Panel (5) shows the trade intensity of these groups, by major sector and in total. Export intensity is defined as the average of the ratio of firms' services export over total turnover. Import intensity is defined as the average of the ratio of firms services imports over total turnover. Panel (6) shows the shares of major sectors in total employment, turnover, exports and imports.

**Table 4a (figures for 2005, weighted) – Concentration of activity across exporting firms**

|                               | (1)        | (2)              | (3)                 | (4)               | (5)                  |
|-------------------------------|------------|------------------|---------------------|-------------------|----------------------|
| Top exporters by export value | % of firms | Share of Exports | Share of Employment | Share of Turnover | Share of Value Added |
| Top 1%                        | 0.06%      | 73.90%           | 4.59%               | 6.93%             | 9.24%                |
| Top 5%                        | 0.29%      | 87.04%           | 7.17%               | 11.73%            | 13.35%               |
| Top 25%                       | 1.53%      | 96.66%           | 9.45%               | 14.05%            | 16.33%               |
| Top 50%                       | 3.07%      | 99.37%           | 10.71%              | 15.40%            | 18.01%               |
| All Exporters                 | 6.15%      | 100.00%          | 12.32%              | 16.49%            | 19.74%               |

**Source:** Authors' calculations on the Annual Respondents Database (ARD); 2005.

**Notes:** The table shows what fraction of firms, exports, employment, turnover and value added is accounted for by the 1%, 5%, 25%, 50% biggest exporters. Figures reported are weighted by inverse sampling probabilities and refer to 2005 only. The ranking of exporters is based on firms with positive exports only. Shares in column (1)-(5) refer to the share of these exporters relative to all firms, both exporters and non-exporters.

**Table 4b (figures for 2005, weighted) – Concentration of activity across importing firms**

|                               | (1)        | (2)              | (3)                 | (4)               | (5)                  |
|-------------------------------|------------|------------------|---------------------|-------------------|----------------------|
| Top importers by import value | % of firms | Share of Imports | Share of Employment | Share of Turnover | Share of Value Added |
| Top 1%                        | 0.04%      | 79.34%           | 2.91%               | 5.85%             | 8.02%                |
| Top 5%                        | 0.19%      | 90.58%           | 5.28%               | 10.03%            | 12.23%               |
| Top 25%                       | 0.97%      | 98.99%           | 13.90%              | 16.98%            | 20.08%               |
| Top 50%                       | 1.91%      | 99.80%           | 15.79%              | 18.94%            | 22.22%               |
| All Importers                 | 3.87%      | 100.00%          | 16.90%              | 19.60%            | 23.30%               |

**Source:** Authors' calculations on the Annual Respondents Database (ARD); 2005.

**Notes:** The table shows what fraction of firms, imports, employment, employment, turnover and value added is accounted for by the 1%, 5%, 25%, 50% biggest importers. Figures reported are weighted by inverse sampling probabilities and refer to 2005 only. The ranking of importers is based on firms with positive imports only. Shares in column (1)-(5) refer to the share of these importers relative to all firms, both importers and non-importers.

**Table 5: Regressions of firm-level variables on trading status (2000-2005)**

|                                 | (1)                          | (2)                          | (3)                          | (4)                              | (5)                          | (6)                          | (7)                          | (8)                          | (9)                          | (10)                                 |
|---------------------------------|------------------------------|------------------------------|------------------------------|----------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|--------------------------------------|
|                                 | Employment                   | Turnover                     | Value Added                  | Capital Labour Ratio (2000-2004) | Wages                        | Labour Productivity          | TFP (2000-2004)              | Foreign ownership            | UK MNE (2000-2004)           | Fraction of highly skilled employees |
| Importer only                   | 0.886<br>(0.022)**           | 1.232<br>(0.025)**           | 1.104<br>(0.025)**           | 0.467<br>(0.015)**               | 0.279<br>(0.007)**           | 0.219<br>(0.009)**           | 0.053<br>(0.005)**           | 0.153<br>(0.006)**           | 0.034<br>(0.004)**           | 0.014<br>(0.014)                     |
| Exporter only                   | 0.456<br>(0.023)**           | 0.674<br>(0.026)**           | 0.683<br>(0.025)**           | 0.272<br>(0.016)**               | 0.308<br>(0.008)**           | 0.226<br>(0.009)**           | 0.089<br>(0.006)**           | 0.044<br>(0.004)**           | 0.033<br>(0.004)**           | 0.073<br>(0.017)**                   |
| Exporter-Importer               | 1.147<br>(0.024)**           | 1.647<br>(0.027)**           | 1.492<br>(0.027)**           | 0.576<br>(0.016)**               | 0.497<br>(0.008)**           | 0.344<br>(0.010)**           | 0.128<br>(0.006)**           | 0.165<br>(0.006)**           | 0.058<br>(0.004)**           | 0.081<br>(0.014)**                   |
| Imp only – Exp only<br>(F-Stat) | 0.429<br>(201.49)**          | 0.557<br>(257.35)**          | 0.422<br>(155.15)**          | 0.195<br>(85.10)**               | -0.029<br>(7.71)**           | -0.007<br>(0.34)             | -0.036<br>(21.51)**          | 0.109<br>(256.45)**          | 0.000<br>(0.00)              | -0.060<br>(7.76)**                   |
| ImpExp – Imp only<br>(F-Stat)   | 0.262<br>(77.49)**           | 0.415<br>(146.08)**          | 0.387<br>(131.18)**          | 0.109<br>(28.64)**               | 0.218<br>(514.04)**          | 0.125<br>(94.53)**           | 0.076<br>(102.25)**          | 0.011<br>(2.12)              | 0.025<br>(19.64)**           | 0.067<br>(13.98)**                   |
| ImpExp – Exp only<br>(F-Stat)   | 0.691<br>(522.05)**          | 0.973<br>(794.52)**          | 0.809<br>(563.51)**          | 0.303<br>(221.17)**              | 0.189<br>(318.98)**          | 0.118<br>(85.31)**           | 0.040<br>(22.70)**           | 0.120<br>(327.77)**          | 0.025<br>(22.70)**           | 0.008<br>(0.120)                     |
| R-squared                       | 0.23                         | 0.29                         | 0.28                         | 0.35                             | 0.33                         | 0.35                         | 0.09                         | 0.14                         | 0.07                         | 0.39                                 |
| Observations                    | 240293                       | 240293                       | 240293                       | 200643                           | 239782                       | 240293                       | 162715                       | 240293                       | 240293                       | 2523                                 |
| Fixed effects                   | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry     | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry | Year,<br>4-digit<br>industry         |

**Source:** Authors' calculations on the Annual Respondents Database (ARD) 2000-2005 and Third Community Innovation Survey (CIS3).

**Notes:** “Exporter Only” are firms that export but do not import services. “Importer Only” are firms that import but do not export services. “Exporter-Importer” are firms that both import and export services. The reference group is “Non-trader”; i.e. are firms that do not export nor import services. In brackets, we report standard errors clustered at the firm-level. Dependent variables in logs with the exception of Foreign Ownership, UK MNE status (binary variables) and Skills (fraction of workforce with diplomas, between 0 and 1). + significant at the 10% level. \* significant at the 5% level. \*\* significant at the 1% level.



**Table 6: Services and Manufacturing exporters (2000, industry fixed effects)**

|                                     | (1)                 | (2)                 | (3)                 | (4)                  | (5)                 | (6)                 | (7)                 | (8)                 | (9)                 | (10)                |
|-------------------------------------|---------------------|---------------------|---------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
|                                     | Employment          | Turnover            | Value Added         | Capital-Labour Ratio | Wages               | Labour Productivity | TFP                 | Foreign Ownership   | UK MNE              | Skills              |
| Export both                         | 1.272<br>(0.116)**  | 1.824<br>(0.131)**  | 1.556<br>(0.129)**  | 0.566<br>(0.082)**   | 0.370<br>(0.031)**  | 0.283<br>(0.049)**  | 0.087<br>(0.027)**  | 0.183<br>(0.030)**  | 0.113<br>(0.029)**  | 0.095<br>(0.017)**  |
| Goods Export Only                   | 1.193<br>(0.083)**  | 1.661<br>(0.096)**  | 1.463<br>(0.093)**  | 0.596<br>(0.060)**   | 0.283<br>(0.024)**  | 0.270<br>(0.035)**  | 0.055<br>(0.019)**  | 0.123<br>(0.020)**  | 0.084<br>(0.019)**  | 0.033<br>(0.011)**  |
| Services Export only                | 0.727<br>(0.113)**  | 1.072<br>(0.129)**  | 0.932<br>(0.127)**  | 0.343<br>(0.076)**   | 0.284<br>(0.037)**  | 0.205<br>(0.050)**  | 0.104<br>(0.031)**  | 0.064<br>(0.022)**  | 0.056<br>(0.022)*   | 0.101<br>(0.017)**  |
| Goods only – Serv. Only<br>(F-Stat) | 0.466<br>(15.62)**  | 0.589<br>(18.95)**  | 0.531<br>(16.08)**  | 0.253<br>(10.65)**   | -0.001<br>(0.00)    | 0.065<br>(1.65)     | -0.049<br>(2.84)+   | 0.059<br>(4.85)*    | 0.028<br>(1.18)     | -0.069<br>(15.84)** |
| Both – Goods only<br>(F-Stat)       | 0.079<br>(0.50)     | 0.163<br>(1.62)     | 0.092<br>(0.54)     | -0.029<br>(0.15)     | 0.087<br>(9.88)**   | 0.013<br>(0.07)     | 0.032<br>(1.72)     | 0.059<br>(3.31)+    | 0.029<br>(0.94)     | 0.063<br>(13.04)**  |
| Both – Serv. Only<br>(F-Stat)       | 0.545<br>(14.84)**  | 0.752<br>(21.93)**  | 0.624<br>(15.50)**  | 0.223<br>(5.67)*     | 0.086<br>(4.88)*    | 0.078<br>(1.65)     | -0.017<br>(0.22)    | 0.118<br>(11.45)**  | 0.058<br>(2.89)+    | -0.006<br>(0.07)    |
| R-squared                           | 0.28                | 0.37                | 0.32                | 0.34                 | 0.25                | 0.25                | 0.38                | 0.19                | 0.11                | 0.35                |
| Observations                        | 2576                | 2576                | 2576                | 2556                 | 2572                | 2576                | 2096                | 2576                | 2576                | 2242                |
| Fixed effects                       | 3-digit<br>Industry | 3-digit<br>Industry | 3-digit<br>Industry | 3-digit<br>industry  | 3-digit<br>industry | 3-digit<br>Industry | 3-digit<br>industry | 3-digit<br>Industry | 3-digit<br>Industry | 3-digit<br>Industry |

**Source:** Authors' calculations on the Annual Respondents Database (ARD) and Third Community Innovation Survey (CIS3).

**Notes** “Export both” are firms that export both manufacturing and services. “Manufacturing exports Only” are firms that only export goods but not services.

“Services exports Only” are firms that export services but do not export goods. “Non-traders” are firms that do not export services nor goods. The reference group is “Non-trader”; i.e. are firms that do not export nor import services. In brackets, we report standard errors clustered at the firm-level. Dependent variables in logs with the exception of Foreign Ownership, UK MNE status (binary variables) and Skills (fraction of workforce with diplomas, between 0 and 1). + significant at the 10% level. \* significant at the 5% level. \*\* significant at the 1% level.

**Table 7: Export and import shares of aggregate services types (yearly averages 2000-2005)**

| Aggregate Service Type     | Export Share | Import Share |
|----------------------------|--------------|--------------|
| Business Services          | 22.0%        | 18.3%        |
| Telecommunication Services | 17.6%        | 21.7%        |
| Technical Services         | 15.8%        | 8.1%         |
| Trade Related Services     | 12.5%        | 10.3%        |
| R&D                        | 12.1%        | 6.7%         |
| Royalties and Licences     | 11.3%        | 21.7%        |
| Affiliated                 | 6.5%         | 9.6%         |
| Financial Services         | 1.1%         | 2.0%         |
| Cultural Services          | 0.9%         | 0.8%         |
| Construction               | 0.4%         | 0.6%         |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Table shows shares of ten aggregate services types in the total exports and imports reported in the ARD-ITIS sample.

**Table 8: Top export and import destinations (yearly averages for 2000-2005)**

| Exports       |              | Imports     |              |
|---------------|--------------|-------------|--------------|
| Country       | Export Share | Country     | Import Share |
| USA           | 23.9%        | USA         | 25.2%        |
| Germany       | 7.2%         | Germany     | 9.9%         |
| Netherlands   | 6.8%         | France      | 8.8%         |
| Ireland       | 6.5%         | Netherlands | 6.1%         |
| Switzerland   | 5.6%         | Japan       | 4.2%         |
| France        | 4.1%         | Switzerland | 3.7%         |
| Japan         | 4.1%         | Ireland     | 3.4%         |
| Europe n.e.c. | 3.0%         | Belgium     | 3.3%         |
| Saudi Arabia  | 2.9%         | Sweden      | 3.3%         |
| Belgium       | 2.9%         | Italy       | 2.6%         |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Table shows the shares of the top ten export destinations and import source countries in the total exports and imports reported in the ARD-ITIS sample.

**Table 9a: Export Patterns of Firms in ARD-ITIS (Firms with positive Exports only, 2000-2005)**

|             | (1)          | (2)      | (3)           | (4)                           | (5)                               | (6)                                       |
|-------------|--------------|----------|---------------|-------------------------------|-----------------------------------|---|
|             | Destinations | Services | Total Exports | Mean Firm Exports per Service | Mean Firm Exports per Destination | Mean Firm Exports per Service-Destination |
| Mean        | 8.6          | 1.4      | 8442.4        | 5855.3                        | 1764.2                            | 1439.2                                    |
| Percentiles |              |          |               |                               |                                   |   |
| 1st         | 1            | 1        | 1.6           | 1.6                           | 1.4                               | 1.4                                       |
| 25th        | 1            | 1        | 95.7          | 82.1                          | 34.6                              | 33.0                                      |
| 50th        | 3            | 1        | 563.9         | 462.9                         | 125.5                             | 114.5                                     |
| 75th        | 10           | 1        | 3137.9        | 2486.2                        | 499.5                             | 449.4                                     |
| 99th        | 68           | 6        | 155887.1      | 99051.8                       | 32295.2                           | 25667.4                                   |
| Firm-years  | 11048        | 11048    | 11048         | 11048                         | 11048                             | 11048                                     |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Columns 1-3 show means and percentiles of the number of export destinations served by firms, the number of unique service types exported and total firm exports. For columns 4-6, we first calculate means for individual firms of exports per service type, per destination country, and per service type and destination, based on observations with positive exports only. The table reports means and percentiles of these means (thus (1) \* (5) need not equal (3), for example). All figures are based on firms with positive exports only.

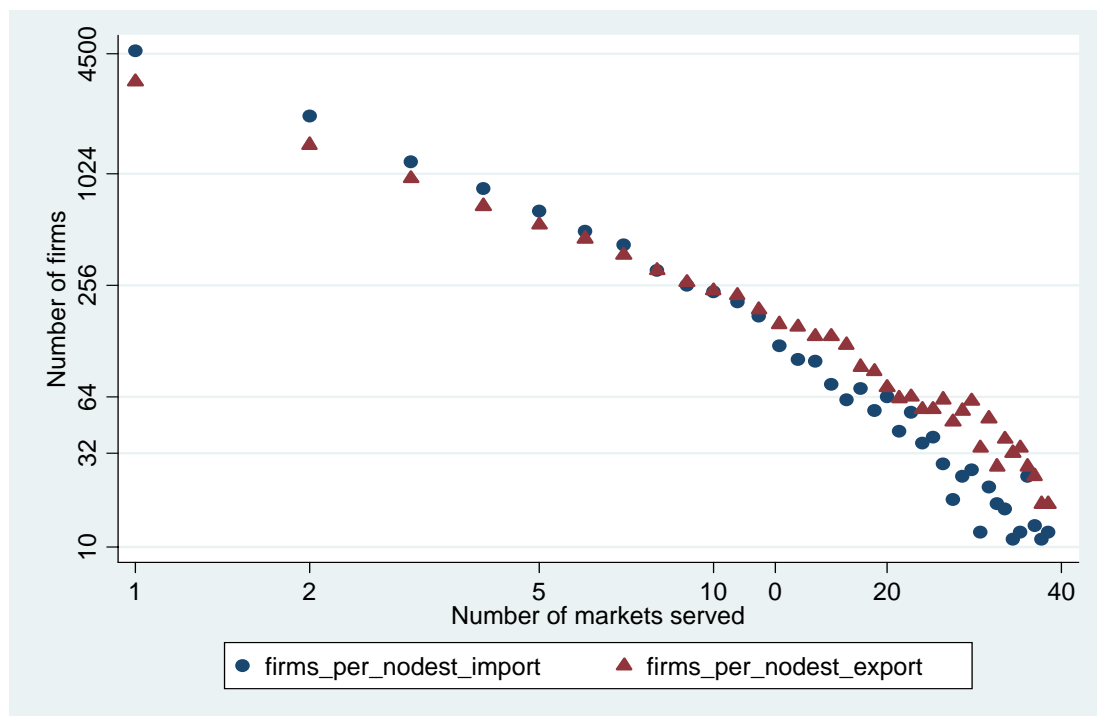
**Table 9b: Import Patterns of Firms in ARD-ITIS (firms with positive imports only, 2000-2005)**

|             | (1)          | (2)      | (3)           | (4)                           | (5)                                  | (6)  |
|-------------|--------------|----------|---------------|-------------------------------|--------------------------------------|--|
|             | Destinations | Services | Total Imports | Mean Firm Imports per Service | Mean Firm Imports per Source country | Mean Firm Imports per Service-Source country |
| Mean        | 5.5          | 2.3      | 3933.2        | 2220.9                        | 1008.7                               | 769.5  |
| Percentiles |              |          |               |                               |                                      |  |
| 1st         | 1            | 1        | 1.4           | 1.1                           | 1.0                                  | 1.0  |
| 25th        | 1            | 1        | 62.4          | 38.1                          | 25.1                                 | 21.3   |
| 50th        | 2            | 1        | 297.3         | 163.5                         | 93.0                                 | 73.4   |
| 75th        | 6            | 3        | 1484.7        | 728.7                         | 418.5                                | 302.2  |
| 99th        | 48           | 11       | 67499.1       | 37814.3                       | 17822.4                              | 14225.6                                      |
| Firm-years  | 12777        | 12777    | 12777         | 12777                         | 12777                                | 12777  |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Columns 1-3 show means and percentiles of the number of countries firms import from, the number of unique service types imported and total firm imports. For columns 4-6, we first calculate means for individual firms of imports per service type, per source country, and per service type and source country, based on observations with positive imports only. The table reports means and percentiles of these means (thus (1) \* (5) need not equal (3), for example). All figures are based on firms with positive imports only.

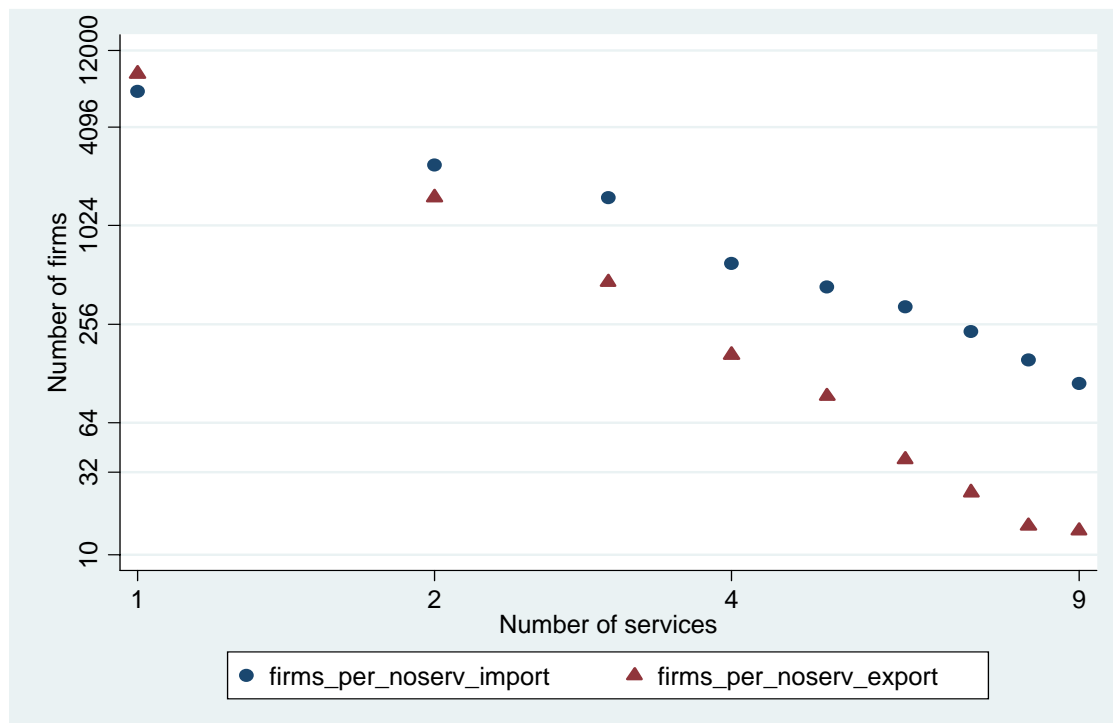
Figure 1a – Number of firms exporting to and importing from a given number of markets



**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Figure shows the number of firms exporting to, or importing from, the number of markets indicated on the horizontal axis.

Figure 1b - Number of firms exporting and importing a given number of types of services



**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Figure shows the number of firms exporting or importing the number of service types shown on the horizontal axis.

**Table 10a (figures for 2000-2005) – Exporters (firms with positive exports only)**  
**- concentration of activity among firms exporting to at least 1, 2, 3-4 etc. destinations**

|                        | (1)             | (2)        | (3)                  | (4)                     | (5)                   | (6)                      |
|------------------------|-----------------|------------|----------------------|-------------------------|-----------------------|--------------------------|
| Number of destinations | Number of firms | % of firms | Share of Exports (%) | Share of Employment (%) | Share of Turnover (%) | Share of Value Added (%) |
| At least 1             | 11048           | 100.0      | 100.0                | 100.0                   | 100.0                 | 100.0                    |
| At least 2             | 7855            | 71.1       | 90.3                 | 76.7                    | 79.6                  | 86.1                     |
| At least 3             | 6396            | 57.9       | 84.7                 | 69.8                    | 71.8                  | 80.8                     |
| At least 5             | 4753            | 43.0       | 71.9                 | 59.9                    | 60.6                  | 71.2                     |
| At least 10            | 2810            | 25.4       | 58.5                 | 47.3                    | 46.6                  | 60.0                     |
| At least 31            | 654             | 5.9        | 25.9                 | 15.3                    | 19.7                  | 34.0                     |
| >50                    | 236             | 2.1        | 15.8                 | 11.6                    | 16.2                  | 29.0                     |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Table shows the fraction of firms, exports, employment, turnover and value added accounted for by firms exporting to at least 1, 2, 3, 5, 10, 31 and more than 50 destinations. Figures are based on firms with positive exports.

**Table 10b (figures for 2000-2005) – Importers (firms with positive exports only)**  
**- concentration of activity among firms importing from at least 1, 2, 3-4 etc. destinations**

|                            | (1)             | (2)        | (3)              | (4)                 | (5)               | (6)                  |
|----------------------------|-----------------|------------|------------------|---------------------|-------------------|----------------------|
| Number of source countries | Number of firms | % of firms | Share of Exports | Share of Employment | Share of Turnover | Share of Value Added |
| 1                          | 12777           | 100.0      | 100.0            | 100.0               | 100.0             | 100.0                |
| 2                          | 8107            | 63.5       | 86.4             | 65.1                | 75.8              | 80.4                 |
| 3-4                        | 6028            | 47.2       | 75.4             | 50.1                | 62.4              | 69.1                 |
| 5-9                        | 4001            | 31.3       | 66.7             | 40.2                | 51.2              | 59.4                 |
| 10-30                      | 1874            | 14.7       | 52.8             | 22.3                | 33.5              | 45.5                 |
| 31-50                      | 307             | 2.4        | 25.7             | 10.9                | 16.3              | 27.3                 |
| >50                        | 116             | 0.9        | 17.6             | 8.3                 | 12.4              | 23.0                 |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Table shows the fraction of firms, imports, employment, turnover and value added accounted for by firms importing from at least 1, 2, 3, 5, 10, 31 and more than 50 countries. Figures are based on firms with positive imports.

**Table 11a (figures for 2000-2005) – Exporters (firms with positive exports only)**  
**- concentration of activity among firms exporting at least 1, 2, 3 etc. services**

|                             | (1)             | (2)        | (3)              | (4)                 | (5)               | (6)                  |
|-----------------------------|-----------------|------------|------------------|---------------------|-------------------|----------------------|
| Number of exporter services | Number of firms | % of firms | Share of Exports | Share of Employment | Share of Turnover | Share of Value Added |
| 1+                          | 11048           | 100.0%     | 100.0%           | 100.0%              | 100.0%            | 100.0%               |
| At least 2                  | 2358            | 21.3%      | 45.7%            | 35.9%               | 39.9%             | 32.7%                |
| At least 3                  | 834             | 7.5%       | 29.6%            | 26.5%               | 27.2%             | 22.1%                |
| At least 4                  | 373             | 3.4%       | 18.1%            | 18.5%               | 18.4%             | 13.4%                |
| At least 7                  | 76              | 0.7%       | 7.0%             | 9.7%                | 8.5%              | 5.6%                 |
| 10+                         | 23              | 0.2%       | 3.5%             | 1.0%                | 2.9%              | 1.9%                 |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Table shows the fraction of firms, exports, employment, turnover and value added accounted for by firms exporting at least 1, 2, 3, 4, 7 and more than 10 unique service types. Figures are based on firms with positive exports only.

**Table 11b (figures for 2000-2005) – Importers (firms with positive exports only)**  
**- concentration of activity among firms importing at least 1, 2, 3 etc. services**

|                             | (1)             | (2)        | (3)              | (4)                 | (5)               | (6)                  |
|-----------------------------|-----------------|------------|------------------|---------------------|-------------------|----------------------|
| Number of importer services | Number of firms | % of firms | Share of Imports | Share of Employment | Share of Turnover | Share of Value Added |
| 1+                          | 12777           | 100.0%     | 100.0%           | 100.0%              | 100.0%            | 100.0%               |
| At least 2                  | 5998            | 46.9%      | 60.6%            | 42.8%               | 55.3%             | 48.8%                |
| At least 3                  | 3596            | 28.1%      | 42.6%            | 27.6%               | 36.5%             | 33.7%                |
| At least 4                  | 2080            | 16.3%      | 31.9%            | 17.0%               | 26.3%             | 25.2%                |
| At least 7                  | 719             | 5.6%       | 17.3%            | 7.5%                | 13.3%             | 12.9%                |
| 10+                         | 223             | 1.7%       | 11.0%            | 3.4%                | 8.4%              | 7.4%                 |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Table shows the fraction of firms, imports, employment, turnover and value added accounted for by firms importing at least 1, 2, 3, 4, 7 and more than 10 unique service types. Figures are based on firms with positive imports only.

**Table 12a – Concentration of Firm Exports in Principal Markets (2000-2005)**

|                       | (1)                         | (2)                      | (3)                      | (4)                      | (5)                       | (6)                       | (7)                       |
|-----------------------|-----------------------------|--------------------------|--------------------------|--------------------------|---------------------------|---------------------------|---------------------------|
| Export Market Ranking | Share of Market (all firms) | Share of Market (Dest=1) | Share of Market (Dest=2) | Share of Market (Dest=5) | Share of Market (Dest=10) | Share of Market (Dest=25) | Share of Market (Dest=40) |
| 1                     | 68.0%                       | 100.0%                   | 77.8%                    | 57.6%                    | 46.1%                     | 36.7%                     | 25.9%                     |
| 2                     | 14.2%                       |                          | 22.2%                    | 21.6%                    | 20.2%                     | 14.0%                     | 13.9%                     |
| 3                     | 6.1%                        |                          |                          | 11.1%                    | 11.4%                     | 9.6%                      | 10.2%                     |
| 4                     | 3.4%                        |                          |                          | 6.4%                     | 7.3%                      | 7.0%                      | 7.2%                      |
| 5                     | 2.1%                        |                          |                          | 3.3%                     | 5.1%                      | 5.6%                      | 5.9%                      |
| 6                     | 1.4%                        |                          |                          |                          | 3.6%                      | 4.6%                      | 4.7%                      |
| 7                     | 1.0%                        |                          |                          |                          | 2.6%                      | 3.8%                      | 3.7%                      |
| 8                     | 0.7%                        |                          |                          |                          | 1.8%                      | 3.1%                      | 3.0%                      |
| 9                     | 0.6%                        |                          |                          |                          | 1.1%                      | 2.6%                      | 2.8%                      |
| 10                    | 0.4%                        |                          |                          |                          | 0.7%                      | 2.1%                      | 2.5%                      |
| Herfindahl            | 0.60                        | 1.00                     | 0.70                     | 0.45                     | 0.32                      | 0.21                      | 0.13                      |
| Observations          | 11048                       | 3193                     | 1459                     | 542                      | 239                       | 62                        | 17                        |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Column 1 shows the average fraction of a firm's exports accounted for by its ten most important markets. Columns 2-7 report the same figures for firms exporting to exactly 1, 2, 5, 10, 25 or 40 countries. Figures are based on firms with positive exports only.

**Table 12b – Concentration of Firm Imports in Principal Source Countries (2000-2005)**

|                       | (1)                         | (2)                        | (3)                        | (4)                        | (5)                         | (6)                         | (7)                         |
|-----------------------|-----------------------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Source Market Ranking | Share of Market (all firms) | Share of Market (Source=1) | Share of Market (Source=2) | Share of Market (Source=5) | Share of Market (Source=10) | Share of Market (Source=25) | Share of Market (Source=40) |
| 1                     | 75.8%                       | 100.0%                     | 79.9%                      | 60.3%                      | 48.8%                       | 40.4%                       | 33.2%                       |
| 2                     | 12.6%                       |                            | 20.1%                      | 21.3%                      | 19.7%                       | 15.9%                       | 14.7%                       |
| 3                     | 4.6%                        |                            |                            | 10.3%                      | 10.6%                       | 9.1%                        | 10.1%                       |
| 4                     | 2.3%                        |                            |                            | 5.4%                       | 6.9%                        | 6.9%                        | 5.9%                        |
| 5                     | 1.3%                        |                            |                            | 2.7%                       | 4.7%                        | 5.4%                        | 4.4%                        |
| 6                     | 0.9%                        |                            |                            |                            | 3.3%                        | 4.2%                        | 3.9%                        |
| 7                     | 0.6%                        |                            |                            |                            | 2.4%                        | 3.4%                        | 3.3%                        |
| 8                     | 0.4%                        |                            |                            |                            | 1.7%                        | 2.7%                        | 2.7%                        |
| 9                     | 0.3%                        |                            |                            |                            | 1.2%                        | 2.1%                        | 2.2%                        |
| 10                    | 0.2%                        |                            |                            |                            | 0.6%                        | 1.7%                        | 2.1%                        |
| Herfindahl            | 0.69                        | 1.00                       | 0.73                       | 0.48                       | 0.35                        | 0.25                        | 0.19                        |
| Observations          | 12778                       | 4670                       | 2079                       | 641                        | 236                         | 28                          | 10                          |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Column 1 shows the average fraction of a firm's imports accounted for by its ten most important source countries. Columns 2-7 report the same figures for firms importing from exactly 1, 2, 5, 10, 25 or 40 countries. Figures are based on firms with positive imports only.

**Table 13a – Concentration of Firm Exports in Principal Service Type (2000-2005)**

|                 | (1)                          | (2)                       | (3)                       | (4)                       | (5)                       | (6)                       |
|-----------------|------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Service Ranking | Share of Service (all firms) | Share of Service (Serv=1) | Share of Service (Serv=2) | Share of Service (Serv=3) | Share of Service (Serv=5) | Share of Service (Serv=9) |
| 1               | 94.57%                       | 100.00%                   | 79.49%                    | 69.79%                    | 62.23%                    | 50.08%                    |
| 2               | 4.53%                        |                           | 20.51%                    | 22.71%                    | 21.52%                    | 22.11%                    |
| 3               | 0.65%                        |                           |                           | 7.50%                     | 9.38%                     | 12.15%                    |
| 4               | 0.16%                        |                           |                           |                           | 4.84%                     | 5.00%                     |
| 5               | 0.05%                        |                           |                           |                           | 2.03%                     | 3.86%                     |
| 6               | 0.02%                        |                           |                           |                           |                           | 2.28%                     |
| 7               | 0.01%                        |                           |                           |                           |                           | 1.78%                     |
| 8               | 0.01%                        |                           |                           |                           |                           | 1.54%                     |
| 9               | 0.00%                        |                           |                           |                           |                           | 1.20%                     |
| Herfindahl      | 0.93                         | 1.00                      | 0.72                      | 0.60                      | 0.50                      | 0.38                      |
| Observations    | 11048                        | 8690                      | 1524                      | 461                       | 93                        | 14                        |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Column 1 shows the average fraction of a firm's exports accounted for by its nine most important service types. Columns 2-7 report the same figures for firms exporting exactly 1, 2, 3, 5 or 9 unique service types. Figures are based on firms with positive exports only.

**Table 13b – Concentration of Firm Imports in Principal Service Type (2000-2005)**

|                 | (1)                          | (2)                       | (3)                       | (4)                       | (5)                       | (6)                       |
|-----------------|------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Service Ranking | Share of Service (all firms) | Share of Service (Serv=1) | Share of Service (Serv=2) | Share of Service (Serv=3) | Share of Service (Serv=5) | Share of Service (Serv=9) |
| 1               | 86.03%                       | 100.00%                   | 78.47%                    | 69.56%                    | 62.31%                    | 57.23%                    |
| 2               | 10.09%                       |                           | 21.53%                    | 22.53%                    | 22.00%                    | 18.11%                    |
| 3               | 2.48%                        |                           |                           | 7.91%                     | 9.37%                     | 10.42%                    |
| 4               | 0.78%                        |                           |                           |                           | 4.44%                     | 6.02%                     |
| 5               | 0.32%                        |                           |                           |                           | 1.88%                     | 3.61%                     |
| 6               | 0.15%                        |                           |                           |                           |                           | 2.09%                     |
| 7               | 0.07%                        |                           |                           |                           |                           | 1.28%                     |
| 8               | 0.04%                        |                           |                           |                           |                           | 0.76%                     |
| 9               | 0.02%                        |                           |                           |                           |                           | 0.47%                     |
| Herfindahl      | 0.81                         | 1.00                      | 0.71                      | 0.59                      | 0.51                      | 0.44                      |
| Observations    | 12777                        | 6779                      | 2402                      | 1516                      | 431                       | 111                       |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD) and International Trade in Services Survey (ITIS), 2000-2005.

**Notes:** Column 1 shows the average fraction of a firm's imports accounted for by its ten most important service types. Columns 2-7 report the same figures for firms importing exactly 1, 2, 3, 5 or 9 unique service types. Figures are based on firms with positive imports only.



**Table 14 – Extensive and Intensive Margins (ARD-ITIS sample)**

|                    | (1)                | (2)                      | (3)                           | (4)                     | (5)                | (6)                      | (7)                           | (8)                     |
|--------------------|--------------------|--------------------------|-------------------------------|-------------------------|--------------------|--------------------------|-------------------------------|-------------------------|
|                    | Log(value of exp.) | Log(No. of export dest.) | Log(No. of services exported) | Log(exp. per dest/serv) | Log(value of imp.) | Log(No. of import dest.) | Log(No. of services imported) | Log(imp. per dest/serv) |
| <b>Panel A</b>     |                    |                          |                               |                         |                    |                          |                               |                         |
| Log(value of exp.) | 1.000<br>(0.000)** | 0.264<br>(0.006)**       | 0.045<br>(0.003)**            | 0.691<br>(0.007)**      | 1.000<br>(0.000)** | 0.219<br>(0.006)**       | 0.088<br>(0.004)**            | 0.692<br>(0.008)**      |
| R-squared          | 1.00               | 0.43                     | 0.16                          | 0.75                    | 1.00               | 0.37                     | 0.20                          | 0.67                    |
| <b>Panel B</b>     |                    |                          |                               |                         |                    |                          |                               |                         |
| Log(employment)    | 0.622<br>(0.023)** | 0.179<br>(0.013)**       | 0.028<br>(0.005)**            | 0.415<br>(0.020)**      | 0.681<br>(0.022)** | 0.170<br>(0.012)**       | 0.052<br>(0.008)**            | 0.459<br>(0.020)**      |
| Log(labour prod.)  | 0.934<br>(0.041)** | 0.323<br>(0.020)**       | 0.042<br>(0.008)**            | 0.569<br>(0.034)**      | 0.817<br>(0.035)** | 0.247<br>(0.017)**       | 0.080<br>(0.012)**            | 0.490<br>(0.031)**      |
| Foreign ownership  | 0.822<br>(0.065)** | 0.025<br>(0.037)         | 0.096<br>(0.014)**            | 0.702<br>(0.059)**      | 1.073<br>(0.056)** | -0.019<br>(0.029)        | 0.185<br>(0.020)**            | 0.907<br>(0.053)**      |
| UK MNE             | 0.410<br>(0.078)** | 0.161<br>(0.045)**       | 0.078<br>(0.017)**            | 0.170<br>(0.065)**      | 0.121<br>(0.075)   | 0.216<br>(0.039)**       | 0.098<br>(0.026)**            | -0.193<br>(0.067)**     |
| R-squared          | 0.37               | 0.26                     | 0.13                          | 0.28                    | 0.37               | 0.23                     | 0.15                          | 0.27                    |
| Observations       | 11048              | 11048                    | 11048                         | 11048                   | 12777              | 12777                    | 12777                         | 12777                   |
| Fixed effects      | Year, 3-digit ind. | Year, 3-digit ind.       | Year, 3-digit ind.            | Year, 3-digit ind.      | Year, 3-digit ind. | Year, 3-digit ind.       | Year, 3-digit ind.            | Year, 3-digit ind.      |

**Source:** Authors' calculations on the matched Annual Respondents Database (ARD); International Trade in Services Survey (ITIS) and Third Community Innovation Survey (CIS3).

**Notes:** Table shows results of OLS regressions of total firm exports and imports and the three margins of trade on total firm exports/imports (panel A); and employment, labour productivity, foreign ownership and UK MNE status (panel B). All variables in logs except for foreign ownership and UK MNE status (binary variables). See text for details of the construction of the trade margins. Standard errors in brackets, clustered at the firm-level. + significant at the 10% level. \* significant at the 5% level. \*\* significant at the 1% level.

**Table A1 Description of industry aggregation used**

| 2-digit | sic 2-digit description   | Industry Group           |
|---------|---|--------------------------|
| 10      | MINING OF COAL AND LIGNITE; EXTRACTION OF PEAT  | Mining                   |
| 11      | EXTRACTION OF CRUDE PETROLEUM AND NATURAL GAS; SERVICE ACTIVITIES INCIDENTAL TO OIL AND GAS EXTRACTION EXCLUDING SURVEYING      | Mining                   |
| 14      | OTHER MINING AND QUARRYING  | Mining                   |
| 15      | MANUFACTURE OF FOOD PRODUCTS AND BEVERAGES  | Low-medium tech manuf    |
| 16      | MANUFACTURE OF TOBACCO PRODUCTS   | Low-medium tech manuf    |
| 17      | MANUFACTURE OF TEXTILES   | Low-medium tech manuf    |
| 18      | MANUFACTURE OF WEARING APPAREL; DRESSING AND DYING OF FUR   | Low-medium tech manuf    |
| 19      | TANNING AND DRESSING OF LEATHER; MANUFACTURE OF LUGGAGE, HANDBAGS, SADDLERY, HARNESS AND FOOTWEAR                               | Low-medium tech manuf    |
| 20      | MANUFACTURE OF WOOD AND OF PRODUCTS OF WOOD AND CORK, EXCEPT FURNITURE; MANUFACTURE OF ARTICLES OF STRAW AND PLAITING MATERIALS | Low-medium tech manuf    |
| 21      | MANUFACTURE OF PULP, PAPER AND PAPER PRODUCTS   | Low-medium tech manuf    |
| 22      | PUBLISHING, PRINTING AND REPRODUCTION OF RECORDED MEDIA   | Low-medium tech manuf    |
| 23      | MANUFACTURE OF COKE, REFINED PETROLEUM PRODUCTS AND NUCLEAR FUEL  | Low-medium tech manuf    |
| 24      | MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS  | High tech manuf          |
| 25      | MANUFACTURE OF RUBBER AND PLASTIC PRODUCTS  | Low-medium tech manuf    |
| 26      | MANUFACTURE OF OTHER NON-METALLIC MINERAL PRODUCTS  | Low-medium tech manuf    |
| 27      | MANUFACTURE OF BASIC METALS   | Low-medium tech manuf    |
| 28      | MANUFACTURE OF FABRICATED METAL PRODUCTS, EXCEPT MACHINERY AND EQUIPMENT  | Low-medium tech manuf    |
| 29      | MANUFACTURE OF MACHINERY AND EQUIPMENT NOT ELSEWHERE CLASSIFIED   | High tech manuf          |
| 30      | MANUFACTURE OF OFFICE MACHINERY AND COMPUTERS   | High tech manuf          |
| 31      | MANUFACTURE OF ELECTRICAL MACHINERY AND APPARATUS NOT ELSEWHERE CLASSIFIED  | High tech manuf          |
| 32      | MANUFACTURE OF RADIO, TELEVISION AND COMMUNICATION EQUIPMENT AND APPARATUS  | High tech manuf          |
| 33      | MANUFACTURE OF MEDICAL, PRECISION AND OPTICAL INSTRUMENTS, WATCHES AND CLOCKS   | High tech manuf          |
| 34      | MANUFACTURE OF MOTOR VEHICLES, TRAILERS AND SEMI-TRAILERS   | High tech manuf          |
| 35      | MANUFACTURE OF OTHER TRANSPORT EQUIPMENT  | High tech manuf          |
| 36      | MANUFACTURE OF FURNITURE; MANUFACTURING NOT ELSEWHERE CLASSIFIED  | Low-medium tech manuf    |
| 37      | RECYCLING   | Low-medium tech manuf    |
| 40      | ELECTRICITY, GAS, STEAM AND HOT WATER SUPPLY  | Construction & Utilities |
| 41      | COLLECTION, PURIFICATION AND DISTRIBUTION OF WATER  | Construction & Utilities |
| 45      | CONSTRUCTION  | Construction & Utilities |
| 50      | SALE, MAINTENANCE AND REPAIR OF MOTOR VEHICLES AND MOTORCYCLES; RETAIL SALE OF AUTOMOTIVE FUEL                                  | Wholesale & Retail       |
| 51      | WHOLESALE TRADE AND COMMISSION TRADE, EXCEPT OF MOTOR VEHICLES AND MOTORCYCLES  | Wholesale & Retail       |
| 52      | RETAIL TRADE, EXCEPT OF MOTOR VEHICLES AND MOTORCYCLES; REPAIR OF PERSONAL AND HOUSEHOLD GOODS                                  | Wholesale & Retail       |
| 55      | HOTELS AND RESTAURANTS  | Other Services           |
| 60      | LAND TRANSPORT; TRANSPORT VIA PIPELINES   | Other Services           |
| 61      | WATER TRANSPORT   | Other Services           |
| 62      | AIR TRANSPORT   | Other Services           |
| 63      | SUPPORTING AND AUXILIARY TRANSPORT ACTIVITIES; ACTIVITIES OF TRAVEL AGENCIES  | Other Services           |
| 64      | POST AND TELECOMMUNICATIONS   | Other Services           |
| 70      | REAL ESTATE ACTIVITIES  | Other Services           |
| 71      | RENTING OF MACHINERY AND EQUIPMENT WITHOUT OPERATOR AND OF PERSONAL AND HOUSEHOLD GOODS   | Other Services           |
| 72      | COMPUTER AND RELATED ACTIVITIES   | Computer                 |
| 73      | RESEARCH AND DEVELOPMENT  | R&D                      |
| 74      | OTHER BUSINESS ACTIVITIES   | Business Services        |
| 80      | EDUCATION   | Other Services           |
| 85      | HEALTH AND SOCIAL WORK  | Other Services           |
| 90      | SEWAGE AND REFUSE DISPOSAL, SANITATION AND SIMILAR ACTIVITIES   | Other Services           |
| 91      | ACTIVITIES OF MEMBERSHIP ORGANISATIONS NOT ELSEWHERE CLASSIFIED   | Other Services           |
| 92      | RECREATIONAL, CULTURAL AND SPORTING ACTIVITIES  | Other Services           |
| 93      | OTHER SERVICE ACTIVITIES  | Other Services           |