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by Markus Kelle and Jörn Kleinert

German Firms in Service Trade ⋆

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Abstract

We provide firm-level evidence concerning four key facts of services trade in Germany. First, not only firms classified as service firms, but also firms from all industries export and import services. Second, service trade patterns are fairly similar to those in goods trade. Most notably, service trade is dominated by a few large firms that serve many countries, sell several service products, and often export and import services. Differences in firms' trade values are result from differences in all three margins of trade. Third, there is a strong concentration of firms on one core market and service. Fourth, the patterns are surprisingly similar for services exports and imports.

Keywords: service trade, firm heterogeneity, intensive and extensive margins of trade

JEL classification: D21, F14, L80

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1 Introduction

Service trade has become an important topic in international economic policy for at least two reasons. First, services play a continuously growing role in modern economies. The World Bank (2009) estimates that roughly 70% of global value added in 2007 was generated in the services sector. With proceeding economic development, a further increase of this share is rather likely. Second, services are increasingly tradable due to technological advances [1] and deregulation and liberalization policies. Growth rates in service trade have matched those of trade in goods in the last two decades. In particular, business services have contributed to this development. In 2007, world service exports stood at \$3,260 billion (WTO 2008), [2] constituting a 24% share of world trade. These facts explain the ongoing efforts to organize liberalization in services trade in the GATS, NAFTA and European Union to foster economic growth.

The literature on trade in services is quite sparse. Most empirical research and theoretical considerations are related to trade in goods. We contribute to the understanding of service trade by presenting a trade pattern at the firm level. We want to encourage further research in this field, because we believe that this is necessary to give guidance for future policy arrangements. We have collected some new facts on the pattern of services trade in Germany at the micro level. Many earlier studies of service trade (Fillat-Castejón et al. 2008, Lennon 2007) rely on aggregated trade data. Differences at the firm level, however, are aggregated away in studies at a higher level of aggregation.

We use a dataset that combines service trade through commercial presence

[1] Freund and Weinhold (2002) conclude that the growing availability of Internet accounts abroad promoted of cross-border services imports of the US in the 90s.
[2] The numbers refer to trade statistics from the Balance of Payments (BoP) Statistics and do not include sales through foreign affiliates.

in a foreign country (WTO mode 3) from the MIDI (MIcro data base Direct Investment) dataset of the Deutsche Bundesbank. The other three modes as defined by the WTO are as follows: cross-border supply (mode 1), trade via consumption abroad (mode 2) and via temporary presence of service suppliers abroad (mode 4) from the Balance of Payment Statistics (BoP). In sum, we can rely on comprehensive information about German service trade. [3]

Some important features that have been found to apply in the trade of manufacturing goods in other studies (e.g., Bernard et al. 2007) apply also to the service trade: (i) Only a small number of German service firms participates in the services trade. (ii) Trading firms vary a lot concerning their trade values, with (iii) large firms strongly dominating trade. (iv) Most large firms do both import and export services. (v) The dominance of large firms can be explained by all the margins of trade. (vi) Finally, the patterns of the imports are amazingly similar to those of the exports.

The dominance of a few large firms in trade has been found in goods trade before. Mayer and Ottaviano (2007) and Manova and Zhang (2008) present such evidence for manufacturing firms in several European countries and in China, respectively. Manova and Zhang (2008) and Bernard et al. (2007) report also that trade is dominated by firms that handle both import and export goods and that all margins of trade contribute to the differences in firms' trade. Thus, the service trade pattern that we report is very similar to the pattern in goods trade. This is also found by Breinlich and Criscuolo (2008) for service trade in the United Kingdom (UK).

The similarity to trade in goods holds also true for the positive relationship of the different margins of trade. We distinguish two extensive margins, one

[3] Mostly, we exclude sales through commercial presence to make exports and imports comparable.

concerning the number of countries traded with and one concerning the number of traded products, and the intensive margin. The extensive margin with respect to the number of products requires activities of multi-product firms as modeled by Mayer et al. (2008) and Bernard et al. (2006). They develop models with multi-product firms that face a firm-specific productivity and product-specific capabilities or expertise. These firm and product characteristics lead to a positive relationship between the number of products traded and the volume of sales, because more productive firms can sell more products and larger volumes of a given product. Arkolakis and Muendler (2009) use a similar model, with fixed costs for entering a foreign market and variable costs for placing a product, to study the export of Brazilian manufacturers. They find a positive relationship between product range and sales per product for a given destination. We investigate the relationship between the margins of service trade and find a similar relationship in our data, although the interrelation of all three margins is a bit more complex.

Additionally, we find a strong within-firm concentration of trade on a few markets and services. Such a concentration has already been found by Breinlich and Criscuolo (2008) for firms from the UK. Even firms that trade with many countries and trade many different services tend to concentrate their activities in only a few markets and services. Heterogenous firm models based on monopolistic competition are very helpful in organizing ideas about the relationship of the different margins, but they can explain the strong concentration of exporters in one or very few foreign markets only with relatively strong assumptions. The enormous concentration on the import side challenges the assumption of monopolistic competition even more.

The remainder of the paper is organized as follows: in Section 2, we give a description of the dataset we are using in the analysis. In Section 3, we

analyze the differences in service trade flows across service product groups and across the sectors of the trading firms. Section 4 examines firm-level differences concerning the volume of sales, the number of services supplied abroad, and the number of countries served. In Section 5, we document the great dominance of the most important market even for large "global and diversified" firms. In the last section, we conclude and discuss some issues for further research.

2 Data Description

We merge two confidential micro-level datasets from the Deutsche Bundesbank, which contain nearly the whole population of German services exporters and importers. The first dataset records service transactions between residents and non-residents, collected to compile the BoP-Statistics. For every service transaction between a German resident firm and a non-resident, with a value higher than 12,500 Euros, firms report to the Deutsche Bundesbank their sector classification, the partner country, the kind of transaction they conducted, and the value of the transaction (Deutsche Bundesbank 2009). These transactions include GATS modes 1, 2, and 4. We combine all service trade activities in this first dataset in the cross-border trade category.

Every reporting firm in the BoP-Statistics has been given a firm identifier from the Bundesbank. The same identifier is used in the MIDI dataset. The MIDI dataset provides a detailed breakdown of the foreign assets and liabilities of German multinational firms abroad and German affiliates of foreign multinational firms (Lipponer 2009). [4] The database contains information on

[4] German foreign direct investment is there defined as direct or indirect ownership or control by a single German entity of at least ten percent of the voting rights or capital shares of an incorporated foreign firm or the equivalent interest in an unincorporated foreign firm. The same criteria define a German affiliate of a foreign investor.

all foreign affiliates of German multinational firms, and on German affiliates of foreign multinational firms if they exceed the rather low reporting limit. The comprehensive database includes the balance-sheet data of foreign affiliates, including their sales, employment, and total assets in each of over 200 destinations. It also includes information on both the sector of activity of the parent firm and the affiliate at the NACE rev-1 two- or three-digit level. The data covers foreign affiliates' activities between 1989 and 2007. However, information for the parent company is limited to German parents and is available only since 2002.

Sales of service affiliates from the MIDI database are exports and imports by commercial presence (mode 3). One problem with this kind of data, which is known as "Foreign Affiliate Trade Statistics" (FATS) in the literature, is that we know only the sector classification of an affiliate and its total sales. There is no differentiation between different services or goods that are sold by the affiliate. On the one hand, therefore we overestimate the service sales of an affiliate in a specific product group, because it is very unlikely that an affiliate sells only services according to the group in which it is classified. Yet, on the other hand, we underestimate trade because we also do not account for sales of a particular service by affiliates that are classified in a different sector. Despite these underlying problems, the OECD (2008a) concludes that FATS data is the best we have and is preferable to estimating service trade by commercial presence using FDI stock or flow data.

We split our service trade data into eleven service sectors, which are listed in Table 1 and which represent mainly producer services. The first seven sectors are at the two-digit level. The last four are business services that we split into management services, advertising, personnel services, and holding activities using the three-digit level classification. We aggregate the values of

each firm's cross-border trade transactions for all combinations of firm, year, kind of service trade (export or import), and partner country from the trade database to match the structure of the observations from the MIDI database. The aggregation is necessary, because the sector classification of the foreign affiliates in the MIDI is more aggregated than for the services traded in the BoP-Statistics. Furthermore, there is no distinction between different transactions with customers of an affiliate. Table 14 in the appendix gives an overview of the kind of services included in both datasets and the matching of the data. The matching aims at obtaining the highest level of disaggregation possible with the two datasets.

We use data for 2005 in the entire paper to describe the basic pattern of service trade involving German firms at the micro level. Combining both datasets we can make use of 165,815 observations concerning service trade, which can differ along five dimensions: the firm, the type of service group traded, the trade mode (cross-border or commercial presence), the kind of transaction (export or import), and the partner country. Cross-border imports comprise the largest group with respect to the number of observations (124,768), followed by cross-border exports (36,239), sales of foreign affiliates of German firms (3,421), and German affiliates of foreign firms (1,387). Many firms are involved in foreign activities using more than one channel.

For the analysis at the sector and at the firm level, we use a sample with 18,004 cross-border importers, 5,058 cross-border exporters, and 542 German parent firms. [5] Table 1 shows trade values and the number of firms engaged in trade aggregated for the different trade modes. In 2005, the 542 German parents exporting services through their foreign affiliates had aggregated affiliate

[5] We reduce the sample by dropping holding services, because it is not so clear what exactly these services are.

Table 1. Sector Variation in Services Trade 2005 (billions of Euros)

	Cross-border		Cross-border		Comm. presence		
Sector	Exporter	Exports	Importer	Imports	Exporter	Exports	Imports
Construction	845	8.2	2,043	5.1	78	14.9	6.7
Transport	654	14.8	3,806	8.3	111	24.3	12.9
Auxiliary Transp.	372	5.8	2,152	8.5	116	40.7	5.2
Post & Tele-communications	172	2.7	1,053	4.0	43	46.3	23.3
Insurance	462	28.9	1,969	32.4	93	67.6	18.7
Data Processing	925	6.7	3,812	6.8	90	15.2	16.0
R & D	968	9.1	3,145	10.3	35	2.0	1.1
Management Serv.	1,422	5.4	6,297	7.7	28	1.4	3.3
Advertising	643	2.8	4,236	3.7	25	0.7	1.2
Personnel Serv.	471	0.9	2,266	1.5	-	2.7	1.6
Hold. activities	1,241	3.7	8,305	8,2	286	4.9	6.6
Total, excl. Hold.	-	86.5	-	88.3	-	215.8	90.0

Note: Firms that trade services from different sectors are counted more than once.
The total of the number of firms is meaningless.
Sources: MIDI (2007), BoP (2009), authors' computation.

service sales of 216 billion Euros (column 7). Affiliates' service sales were more than twice as large as the cross-border supply, which amounted to 86.5 billion Euro (column 3). Affiliates sales abroad were also higher than were foreign firms' German affiliates' sales (90.0 billion Euros, column 8), roughly equaling the 88.3 billion Euro aggregate cross-border service imports (column 5).

Unfortunately, we cannot conduct an analysis of total service imports at a disaggregated level, because we do not have information about the buyers of the services supplied by the German affiliates of foreign multinationals. We therefore drop imports through commercial presence from our further analysis and use only cross-border trade data for comparing imports and exports. On the export side, we can analyze both cross-border exports and those using a commercial presence in the foreign country. We highlight the important differences in the results for total and cross-border exports along the study.

German firms trade services with more than 200 countries and territories. The ten most important trading partners are ranked in Table 2 according to their share in total service exports and imports, including all modes. The ten countries account for roughly 65% of total exports and 80% of total imports.

3 Sector Analysis

In this section, we examine whether there are any regularities in service trade at the sector level. We distinguish two ways to aggregate service trade to the sector level: (i) according to the characteristics of the service traded and (ii) according to the classification of the trading firms. In the first step, we investigate export participation and intensities in ten different service product groups. In the second step, we analyze trade concerning the role of firms from

Table 2
German Service Trade by Country 2005 (billions of Euros)

	Total Exports			Total Imports		
Rank	Country	Share	Sales	Country	Share	Sales
1	USA	23.5%	71.1	Netherlands	18.9%	33.7
2	UK	12.6%	38.2	USA	13.5%	24.1
3	Italy	6.3%	19.2	UK	12.0%	21.5
4	Netherlands	5.3%	16.1	Switzerland	11.0%	19.5
5	Switzerland	4.9%	14.7	Luxembourg	9.2%	16.3
6	Austria	4.3%	13.0	France	5.9%	10.4
7	France	3.9%	11.8	Austria	4.6%	8.2
8	Spain	2.6%	7.9	Italy	2.6%	4.6
9	Belgium	2.6%	7.9	Denmark	2.1%	3.7
10	Canada	2.1%	6.4	Ireland	2.0%	3.6
Total		100.0%	302.1		100.0%	178.3
Sources: MIDI (2007), BoP (2009), authors' computation.						

different industries.

Information about the export participation of German firms and the importance of foreign markets is presented in Table 3. Export values refer to cross-border exports. We report the number of firms classified in the different sectors in Germany in column 6 and their production values in column 7 from the *Statistical Yearbook 2008*.[6] Based on these values, we calculate the participation ratio in column 4 as the share of exporters of a particular service product (column 2) in all firms in the sector (column 6). Export intensities in column 5 are derived by dividing cross-border exports (column 3) by the production in Germany (column 7).

Note a conceptual issue concerning Table 3. The number of exporters and the exports are lower than in Table 1. The reason is that we include only firms with the same sector classification with respect to the traded product and the classification of the trading firm. For instance, R&D exports of R&D firms are included, but transport service exports of these firms are not. In some

[6] Production value includes a firm's turnover in Germany and cross-border exports, but does not account for affiliate sales. Thus, it serves as a rough proxy for service sales in the different German service sectors.

Table 3
Cross-border Export in German Services Sectors 2005 (billions of Euros, %)

Sector	Cross-border Exporter	Cross-border Exports	Exporter Ratio(%)	Export Ratio(%)	Firms in Germany	Prod. in Germany
Construction	197	1.05	0.05	0.60	361,070	175.1
Transport	53	1.96	0.09	2.08	60,753	94.2
Auxiliary Transp.	65	1.83	0.28	1.93	23,379	94.6
Post & Tele-communications	47	1.74	0.54	1.65	8,636	105.4
Insurance	190	17.6	11.6	-	1,633	*a*
Data Processing	305	4.82	0.65	7.82	47,104	61.6
R & D	93	0.63	2.12	7.97	4,391	7.9
Management Serv.	5	0.02	0.00	0.03	129,073	54.7
Advertising	-	0.00	0.02	0.01	25,516	17.6
Personnel Serv.	-	0.00	0.02	0.00	4,268	11.4
Total	960	29.7	0.14	4.76	665,823	622.5

a No comparable number for sales in Germany. The trade figures include only the service component of the insurance contract.
Sources: MIDI (2007), BoP (2009), *Statist. Yearbook 2008*, authors' computation.

sectors, that causes a serious bias. R&D exporters, for example, come from all industries, particularly from manufacturing. Nevertheless, we include only firms exporting in the same sector to achieve comparability to the numbers from the statistical yearbook, which is organized according to the classification of the firm and not according to the product. [7]

We want to highlight three results from Table 3. First, the average export participation ratio (0.14%) is fairly low in services trade (column 4). This low trade participation matches results from earlier studies in manufacturing. For instance, Bernard et al. (2007) find that 3.1% of U.S. manufacturers exported and 2.2% imported goods in 2000. Vogel and Wagner (2010) find an export participation of 16% for German business services, but they neglect firms with total sales below 250,000 Euros, which leads to an upward bias in their results. Our values are downward biased, on the one side, by the notification threshold

[7] The import side is neglected because we do not know to whom the German affiliates of foreign multinational firms sell.

of 12,500 Euros per transaction in the BoP-Statistics and, on the other side, because we account only for firms that export the services according to their sector classification.

Second, export intensities in the analyzed sectors are much higher than the participation rates. The average export intensity over all sectors (excluding Insurance for data reasons) is 4.9% (column 5).[8] This implies that average exports per service exporter are relatively large compared to average domestic sales per firm. Third, export participation and intensity differ a lot among services. Participation rates range from nearly 0.0% for Management Services to 11.6% for Insurance. Export intensity is nearly 0.0% for Personnel Services and 8.0% in the R&D sector. These sector differences might arise from different reasons such as differences in comparative advantages, tradability of the services, or the mismatch in the classification of products and firms discussed above.

Next we present the sector aggregation with respect to the firm that trades the service. Information about service trade in ten German sector groups is collected in Table 4 and 5. The analysis is mostly restricted to cross-border trade to facilitate comparability between exports and imports. In Table 5, we also include exports through foreign affiliates.

The second column in Table 4 shows the value of the cross-border exports of a particular sector group. The third column presents the fraction of service exports conducted by this group in total cross-border exports. The fourth column gives the share of cross-border exports conducted by firms that do both export and import of services (E+I firms) in percent. The fifth, sixth, and seventh columns present the same information as the second, third, and

[8] When we also account for service traders from other sectors, the participation ratio increases to 1.0% and export intensity to 13.9%, on average.

Table 4
Cross-border Service Trade 2005 by Sector of the Firm (billions of Euros, %)

Industry	Exports (bn. Euro)	Share (%)	E+I Share	Imports (bn. Euro)	Share (%)	E+I Share
Primary	0.25	0.3	96.0	0.27	0.3	85.2
Motor Vehicles	5.6	5.7	100.0	4.0	4.5	81.5
Manufacturing low-tech	4.0	4.6	97.7	9.1	10.3	76.8
Manufacturing high-tech	12.4	14.3	98.4	10.8	12.3	91.5
Wholesale & Retail	2.5	2.9	82.8	3.3	3.7	35.5
Construction & Utilities	1.1	1.3	97.3	0.7	0.8	55.4
Transports	18.0	20.8	96.1	11.4	12.9	67.8
Finance, Insurance & Communication	21.1	24.4	99.1	25.9	29.4	95.0
Business, R&D & Computer	22.7	11.5	94.5	7.9	9.0	79.4
Holdings & Oth. Serv.	70.9	14.1	98.4	14.7	16.7	88.7
Total	86.4	100.0	97.2	88.1	100.0	83.5

Note: E+I firms: firms that export and import services.
Sources: MIDI (2007), BoP (2009), authors' calculations.

fourth columns do for imports, respectively.

Firms from all sectors export and import services. In sector-specific analyses of service trade it seems, therefore, more important than for trade in goods to account for the sector of the trading firm. Nevertheless, service firms account for the majority of service exports and imports. The three sector groups Transport; Finance, Insurance & Communication; and Business, R&D & Computer account together for more than 56% of cross-border exports (column 3) and 50% of cross-border imports (column 5). When holdings and other service firms are also taken into account, this share increases to roughly 70% and 75%, respectively.

The share of manufacturing firms is also very sizeable, with nearly 25% in total service exports and roughly 27% for imports. While we expected a share

Table 5
Total Exports and Cross-border Exports 2005 by Sector of the Firm (billions of Euros, %)

Industry	Total Exports	Share (%)	Cr.-border Exporter	E+I Share	Cr.-border Importer	E+I Share
Primary	0.3	0.1	37	70.3	120	21.7
Motor Vehicles	5.6	1.8	69	84.1	216	26.9
Manufacturing low-tech	7.7	2.5	577	77.6	3,106	14.4
Manufacturing high-tech	14.3	4.7	797	73.5	2,313	25.3
Wholesale & Retail	5.5	1.8	487	63.7	3,069	10.1
Construction & Utilities	13.8	4.5	227	52.4	663	17.9
Transports	43.3	14.3	871	81.6	2,391	29.7
Finance, Insurance & Communication	114.8	37.8	520	83.1	1,245	34.7
Business, R&D & Computer	27.1	8.9	1,064	52.8	3,123	18.0
Holdings & Oth. Serv.	71.0	23.4	271	66.3	1,758	15.4
Total	302.1	100.0	5,058	69.7	18,004	19.6

Sources: MIDI (2007), BoP (2009), authors' calculations.

like this for the import side, the 25% for cross-border service exports is higher than we expected. Breinlich and Criscuolo (2008) find a share of 12% for manufacturing firms in both exports and imports for the United Kingdom, using a slightly different composition of services in their analysis. The higher share of manufacturing in Germany might be due to the larger importance of the manufacturing industry for the Germany economy. Table 5 shows that the share of the manufacturers for exports would be smaller than 10% if we also accounted for exports through foreign affiliates (column 3). Service firms export more often through foreign affiliates and have, on average, larger sales abroad if compared to manufacturers.

Firms that both export and import services account for a surprisingly high share of total cross-border exports and imports. The share stands at 97.2% for exports and 83.5% for imports (Table 4). Breinlich and Criscuolo (2008)

obtain a similar value for imports (86.4%), but a slightly lower one (79.8%) for exports. Table 5 shows that the share of E+I firms decreases to 69.7% for exports (column 5) and 19.6% for imports (column 7) when the number of firms instead of the sales is considered.

4 Firm-level Differences

In the last section, we collected new facts about service export participation and trade values at the sector level. However, Eaton et al. (2004) report that export participation and export values in goods trade are more strongly affected by firm than by sector characteristics. In this section, we therefore look at differences at the firm-level. Although we have information only on firms that participate in trade, this group by itself is not composed of symmetric firms. In the first subsection, we study the heterogeneity in the values of exports and imports, in their intensive margin, and in their two extensive margins. In the second subsection, we analyze the relationship between the margins more deeply using multivariate regressions.

4.1 Concentration of Trade

To analyze trade at the firm level, we aggregate the exports and imports of each firm over all sectors and partner countries, and rank firms according to their sales in deciles. We find striking differences among the trading firms with respect to trade values. These differences can result from (i) differences in the value of trade of a particular service with a particular country (intensive margin), (ii) the number of countries traded with (the extensive margin with respect to countries), and (iii) the number of services traded (extensive margin

Table 6
Deciles of Cross-border Exporters 2005 (thousands of Euros)

Decile	Exports (bill. Euro)	Share (%)	Average Sales	Average Number of Countries Served	Average Number of Services Offered
1	0.001	0.00	18.0	1.12	1.02
2	0.03	0.03	44.1	1.41	1.09
3	0.06	0.07	81.7	1.85	1.16
4	0.12	0.14	151.9	2.32	1.21
5	0.24	0.28	240.9	3.49	1.32
6	0.48	0.56	415.7	4.45	1.35
7	0.9	1.04	775.5	5.72	1.42
8	1.8	2.07	1,441.7	6.68	1.53
9	4.2	4.87	2,507.1	9.02	1.64
10	78.5	91.0	7,934.1	21.43	1.96
Total	86.3	100.0	1,359.6	5.75	1.37
Sources: MIDI (2007), BoP (2009), authors' computation.					

with respect to products).

Table 6 lists the sum of cross-border exports (unweighted), average firm exports per sector-country combination, average number of countries served, and average number of service groups traded by a particular firm for each decile. These figures show a strong increase of total sales per firms in the higher deciles. Certainly, the increase is by construction, because we grouped the firms with the lowest exports in decile 1. Yet, the increase is impressive: the firms in the 10th decile account for nearly 91% of cross-border exports (column 3). The ten largest exporters, roughly 0.2% of firms, account for around 40% of cross-border exports. [9]

Similar results can be found for service imports in Table 7: 10% of cross-border importers, which are the largest firms, account for 93% (column 3) of total cross-border imports. The top 100 or 0.5% of the importers, account for roughly 60% of imports. Thus, large firms strongly dominate trade in services in Germany, for imports and for exports.

[9] We even find a slightly stronger concentration of sales for total exports. The firms in the tenth decile account for more than 95% of total exports.

Table 7
Deciles of Cross-border Importers 2005 (thousands of Euros)

Decile	Imports (bill. Euro)	Share (%)	Average Sales	Average Number of Source Countries	Average Number of Services Imported
1	0.02	0.02	11.1	1.13	1.06
2	0.05	0.05	22.6	1.20	1.1
3	0.08	0.09	35.9	1.48	1.23
4	0.14	0.16	55.4	1.67	1.3
5	0.23	0.26	77.7	2.22	1.49
6	0.38	0.43	115.9	2.64	1.6
7	0.67	0.76	174.4	3.31	1.75
8	1.32	1.50	261.4	4.6	2.0
9	3.39	3.85	495.1	7.0	2.35
10	81.9	93.0	2,375.1	16.4	3.29
Total	88.1	100.0	362.1	4.16	1.71

Sources: MIDI (2007), BoP (2009), authors' computation.

Comparing cross-border exports and imports, we find that, on average, importers trade more products: 1.7 compared to 1.4 for exports. In contrast, the average number of partner countries is larger for exports (5.8) than for imports (4.2). The intensive margin of trade (column 4) is more than three times larger on the export side. Columns 4-6 in Tables 4 and 5 show that the strong increase of trade volumes in the upper deciles can be explained by an increase of all three margins for both imports and exports: firms with larger imports or exports have larger average trade volumes in a given country and sector, trade with more countries, and trade services from more groups.

The intensive margin shows impressive differences for exports and for imports. For instance, average imports per country and product group by a firm in the fifth decile (77,700 Euro), for instance, are 7 times larger than the sales of a firm in the first decile (11,100 Euro), but only 5% of the sales of a firm in the tenth decile (2,375,100 Euro). [10]

[10] Cross-border exports in the tenth decile are 400 times larger than in the first, where cross-border imports are 210 times larger. When we consider total exports (cross-border and commercial presence), sales in the tenth decile are more than 3,500 times larger than in the first decile.

Table 8
Cross-border Export 2005, Extensive Margins (billions of Euros, %)

Number of Countries	Exports (bn. Euros)	Share (%)	Number of Exporters	Share (%)
1	3.1	3.6	2,082	41.2
2	1.8	2.1	760	15.0
3-5	3.8	4.4	828	16.4
6-10	5.1	5.9	595	11.8
11-50	30.8	35.7	744	14.7
> 50	41.8	48.4	49	1.0

Number of Sectors	Exports (bn. Euros)	Share (%)	Number of Exporters	Share (%)
1	38.1	44.1	4,030	79.7
2-3	28.0	32.4	795	15.7
4-5	10.3	11.9	195	3.9
> 5	10.0	11.6	38	0.8

Sources: MIDI (2007), BoP (2009), authors' calculation.

Table 8 shows the extensive margins for cross-border exports. Apparent is a strong concentration of exports on the few firms in the highest category. The 49 firms that export to more than 50 countries account for almost half of the exports, although they are only about 1% of all exporters. On the other end of the distribution, we have many exporters that export to just one country. These firms account for only a small share of German service exports. The dominance of the highest category with respect to the number of services supplied is less pronounced. The 38 firms exporting more than 5 product groups account for more than 10% of the exports. [11]

Table 9 displays similar results for cross-border imports. The 81 importers that import from more than 50 countries, roughly 0.5% of the firms, account for nearly 50% of German service imports. Similarly, the 483 firms importing from more than five product groups account for almost half of the imports. Thus, services trade in Germany is dominated by globally engaged, multi-product firms.

[11] Considering total exports further strengthens the dominance of large firms.

Table 9
Cross-border Import 2005, Extensive Margins (billions of Euros, %)

Number of Countries	Imports (bn. Euros)	Share (%)	Number of Importers	Share (%)
1	3.0	3.4	8,410	46.7
2	1.8	2.0	2,943	16.4
3-5	4.3	4.9	3,287	18.3
6-10	8.1	9.2	1,810	10.1
11-50	28.9	32.8	1,473	8.2
> 50	42.1	47.7	81	0.5

Number of Sectors	Imports (bn. Euros)	Share (%)	Number of Importers	Number of (%)
1	17.7	20.1	11,666	64.8
2-3	13.5	15.3	4,711	26.2
4-5	16.3	18.5	1,144	6.4
> 5	40.6	46.1	483	2.7

Sources: MIDI (2007), BoP (2009), authors' calculation.

To assess the role of the different margins in explaining the differences in firm sales, we simply regress the three margins on total firm sales in three different OLS regressions in log-log form. The intensive margin on the firm level is calculated as in Tables 6 and 7: the average trade volume per sector-country combination on the firm level. The results for cross-border exports and imports in the six different regressions are presented in Table 10. All coefficients are significant at the 1%-level. The coefficient is highest for the intensive margin (column 2) followed by the number of partner countries (column 3) and the number of service types traded (column 4). Breinlich and Criscuolo (2008) find similar results for firms in the UK. The coefficient of the intensive margin is slightly higher for cross-border exports than for cross-border imports.

The small coefficient of the number of services traded is probably due to the high aggregation level of the service groups in our data, which leads to low variation of this variable (particularly for exports) as shown in Tables 6 and 7. Bernard et al. (2006) use goods trade data at the 10-digit level and find a stronger positive effect from the number of products exported on the intensive

Table 10
Log-log Regression of Sales on Different Margins

Explaining Variables	Avg. Sales per Countr.-Sector	Number of Countries	Number of Services
Cross-border Exports	0.68***	0.30***	0.05***
	(131.7)	(60.2)	(22.2)
R^2	0.77	0.42	0.09
Cross-border Imports	0.63***	0.33***	0.13***
	(247.3)	(134.0)	(76.7)
R^2	0.77	0.50	0.25

*** significantly different from 0 at 1% level. Std. errors in parantheses.
Sources: MIDI (2007), BoP (2009), authors' computation.

margin of exports than we find here. In addition to the level of aggregation, another explanation for the differences in the results may be differences in fixed costs. Providing an additional service in a foreign market might be more expensive than exporting an additional good. This idea is proposed by the OECD (2008b).

4.2 Margins of Service Trade

After having studied the three margins explaining the differences in firms' trade values, we now analyze their correlation. According to the theory sketched in the introduction, the relationship should be positive. The correlation between the two extensive margins is positive and significant at the 1% level. The correlation coefficient for cross-border imports (0.48) is larger than for cross-border exports (0.28) and total exports (0.3).

To analyze the relationship between the intensive margin and the extensive margins, we run log-log regressions for the value of trade in every given firm-sector-country combination on the two extensive margins. This has the advantage that we can control for country and sector biases by including country and sector dummies. Additionally, we include a dummy variable for the sector

of the trading firms.

Running separate regressions for the extensive margins, we obtain, in line with theory, positive coefficients that are significant at the 1% level for both margins and for imports and exports. The explanatory power of Internationality, the number of partner countries, is larger compared to Diversity, the number of service products traded. [12] The results become more complex when we include both margins in one regression, as can be seen in Table 11. We find that Internationality still has a positive impact on the trade values of a firm for both cross-border imports and exports as well as for total exports. The coefficients of Internationality are significantly larger than zero at the 1% level in all columns in Table 11.

For Diversity, we obtain significantly negative coefficients. As a robustness check we split the sample in manufacturing and service firms and run separated regressions for total exports. The results are presented in columns 5 and 6. The coefficient of Diversity is significantly negative for manufacturers (column 5). For service firms, however, it is positive, although insignificant (column 6). Arkolakis and Muendler (2009) find as well, both theoretically and empirically, that there is not necessarily a positive relationship between a firm‘s Diversity and its intensive margin.

The Affiliate-Dummy in columns 4-6, which is set to one if the export is conducted by a foreign affiliate, is highly significant in the regressions for total exports and has a large positive coefficient. Obviously, trade volumes are much larger when firms choose commercial presence as their export mode. Moreover, columns 2 and 3 report that firms which both import and export have larger intensive margins: the exporter dummy in column 3 and importer

[12] This result concerns both the size of the coefficients and the adjusted residual square sum.

Table 11
Regression of the Intensive Margin on the Extensive Margins

	Cross-border		Total	Total Exports	
	Exports	Imports	Exports	Manufact.	Serv. Firms
Internationality	0.30***	0.23***	0.35***	0.42***	0.36***
	(24.7)	(29.4)	(32.0)	(20.8)	(25.0)
Diversity	-0.21***	-0.26**	-0.08***	-0.15***	0.04
	(9.5)	(20.6)	(3.5)	(4.7)	(1.2)
Exp.-Dummy	-	0.29***	-	-	-
		(19.6)			
Imp.-Dummy	0.27***	-	-	-	-
	(7.1)				
Out.-MNE Dummy	0.81***	0.87***	-	-	-
	(20.9)	(34.9)			
Inw.-MNE Dummy	0.26***	0.31***	-	-	-
	(5.6)	(10.6)			
Affiliate-Dummy	-	-	5.00***	5.08***	4.89***
			(92.7)	(31.0)	(81.5)
Adj.R^2	0.15	0.12	0.32	0.19	0.39
Observations	33,737	95,105	34,999	12,572	19,376

All regressions included sector, country, and firm sector classification dummy variables. Standard errors in parantheses: *, **, *** significantly different from 0 at 10% level, at 5% level, at 1% level.

dummy in column 2 are positive and significant at the 1% level. This supports the evidence from Table 4 that E+I firms dominate trade. One reason for this dominance is a larger intensive margin. Additionally, we include a dummy that indicates whether a firm is a German multinational (Outward MNE) or if it belongs to a foreign multinational (Inward MNE). Both type of firms have larger cross-border trade, with German MNEs having particularly high trade levels.

This section highlighted the high concentration of sales in a few (large) firms and the role of the different margins to explain the heterogeneity among firms that trade services. We found that all three margins of adjustment contribute to this heterogeneity. The analysis has mainly focused on the averages of the margins across firms. Yet, so far we have said nothing about the distribution of sales across different trading partner countries and traded services within

Table 12
Concentration on Destinations for Cross-border Exports and Imports, %

Markets ranked	All firms	Firms with export relationships with exactly		
		5 countries	15 countries	40 countries
Most important	0.75	0.57	0.44	0.41
Second	-	0.22	0.19	0.16
Third	-	0.11	0.11	0.11
Observations	5,058	186	59	7
Markets ranked	All firms	Firms with import relationships with exactly		
		5 countries	15 countries	40 countries
Most important	0.80	0.57	0.43	0.27
Second	-	0.22	0.18	0.20
Third	-	0.11	0.11	0.12
Observations	18,004	704	128	7

Sources: MIDI (2007) BoP (2009), authors' calculations.

a single trading firm. The following section therefore analyzes the within-firm concentration of trade activities in particular markets.

5 Composition of Trade Within Firms

In this section, we illustrate to what extent firms' trade activities are concentrated on the most important partner countries or service products. We find that there is not only a large concentration of trade activities in a few firms, but also a pronounced concentration of trade within these firms.

To show this, we calculate the market share of cross-border export and import values in the first, second, and third important partner country of a particular firm. We average this firm-specific market share for all firms and present the result in column 2 of Table 12. Columns 3, 4, and 5 give the average market share for all firms that have exactly 5, 15, and 40 partner countries, respectively. This gives us the average relative importance of a single country and service for the total trade value of a firm.

Table 13
Concentration on Service Products for Cross-border Exports and Imports, %

Service group Ranked	All firms	Firms with exports in exactly 2 groups	3 groups	5 groups
Most important	0.96	0.83	0.75	0.66
Second	-	0.17	0.19	0.22
Third	-	-	0.06	0.08
Observations	5,058	576	219	63

Service group Ranked	All firms	Firms with imports in exactly 2 groups	3 groups	5 groups
Most important	0.91	0.80	0.73	0.67
Second	-	0.20	0.20	0.20
Third	-	-	0.07	0.09
Observations	18,004	3,260	1,404	403

Sources: MIDI (2007) BoP (2009), authors' calculations.

The shares of the most important market are very high for both exports and imports. For a firm with 15 partner countries, the most important market accounts for an impressive 44% of the exports and 43% of the imports (column 4). For comparison, note that the average market share is 6.7%. Even an exporter with 40 partner countries (average market share 2.5%) exports 41% of all services to its most important partner country (column 5). The three most important destinations account for 68% of all exports. An importer with 40 partner countries buys 27% of all services from its most important and 59% from its three most important source countries.

We find that concentration is even more pronounced with respect to the number of service groups in which a firm trades. We show this in Table 13, which is organized as Table 12 above, but which contains information about the concentration of firms' trade in the three most important product groups. The concentration in the most important product group is high. Breinlich and Criscuolo (2008) find similar results for the trade of firms in the UK. While concentration with respect to both products and partner countries is, on the export side, in line with models where a single or multi-service producer sells

services to different markets that differ in market size and trade barriers, the high concentration on the import side is more puzzling.

6 Conclusion

We present an empirical overview on service trade at the micro level. We combine two datasets compiled by the Deutsche Bundesbank: the Balance of Payments Statistics and the MIcro database Direct Investment to create a dataset that includes all service exports of German firms and all service imports to Germany. We show that rather few firms trade services. The differences between the sectors are sizable, but much less pronounced than within sector differences between firms. The bulk of exports and imports are concentrated in few global and diversified firms. All three margins of trade contribute to this concentration. But even within these firms, activities are very much concentrated on one partner country and service group.

Furthermore, we find some evidence that the intensive and extensive margins of trade are positively linked at the firm level, but we identify some differences between manufacturers and service firms. Additionally, the number of service products exported seems to have a weaker correlation to the intensive margin, as it does in goods trade.

We see three main issues for future research arising from the analysis. First, the high share of non-service firms and particular manufacturing firms in services trade deserves a more detailed analysis. Moreover, the analysis of the different margins of trade reveals that the determinants of service trade may be different for firms from manufacturing.

Second, the high concentration of trade in firms that are both importing and

exporting deserves further research. Taking the first steps in this direction, Breinlich and Criscuolo (2008) find that employment, capital-intensity, or productivity are larger for firms that both import and export. Bernard et al. (2007) propose increasing international fragmentation of production as a possible reason for the dominance of firms with export and import activities. They argue that there is a positive effect on the export activities of firms from reducing their costs by offshoring. Amiti and Wei (2006) find that in the last decade, offshoring of business activities has not only been sizable, but has also contributed significantly to the increase in productivity in developed countries.

Third, the large concentration at the firm-level is particularly surprising for imports, for which empirical evidence and theoretical considerations are still scarce. It seems as if service imports are channeled through a few large firms. But if both the export side and the import side is so strongly concentrated, models of perfect and also of monopolistic competition probably do not describe trade appropriately. Strategic interaction and monopolistic behavior might play a much larger role than the models suggest. The concentration on the import side is particularly hard to explain in the frameworks that model consumers on the buyers side. The data, in contrast, point to a "business-to-business" relationship in service trade.

This is not just an academic point. Market structure heavily influences the welfare effects of trade liberalization. Raff and Schmitt (2009) make this point in a model showing the buyer power of importers. Welfare gains from lower trade costs are thereby strongly reduced by the buyer's power. Thus, it is important to understand the import behavior of firms more deeply in order to give profound guidance for further liberalization of trade in producer services.

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8 Appendix

Table 14
Match of MIDI and BoP Data

Sector	MIDI (Nace rev. 1)	BoP (knz's)
Construction	4500: Construction	570, 580: Construction, Installation, Reparation
Transport	6000: Land Transport, Pipelines	20: Air Transport
	6100: Water Transport	210, 220: Water Trans., Goods Trade
	6200: Air Transport	230, 240: Land Trans. Rail + Road
Auxiliary Transport	6300: Supporting and Auxiliary Transport Activities, Travel Agencies	300: Seaports 310, 320: Airports, Inland Harbor, Ocean Traffic and Road Transport 330: Carrier 560: Reparation Means of Transport
Post & Telecommunication	6400: Post & Telecommunications	518: Communication Services (Satellite, Telephone, Wire) 591: Post & Courier Services
Insurance	6600: Insurance and Pension Funding, except Social Security	400-461: Life, Pension and Reinsurance
Data Processing	7200: Computer and related Activities	513: Electronic Data Processing
R&D	7300: Research & Development	511: R&D Products, Procedures 501: Artistic Copyrights 504, 505, 506: Patents, Licenses, Inventions
Management Services	7411: Legal Advice 7412: Accounting, Bookkeeping and Auditing Activities, Tax Consultancy 7413: Market Research, Public Opinion Polling 7414: Business and Management Consultancy	516: Entrepreneurship, Management, Organisation, Administration, Market Research 519: Other Entrepreneurial Activities
Advertising	7440: Advertising	540: Advertising and Fair Costs
Personnel Services	7450: Labor Recruitment and Provision of Personnel	517: Personal Leasing 521: Non-self-employed Work
Holding Activities	7490: Management Activities of Holding Companies	523: Commission for Intermediation in Goods and Services Deals 530: Subsidies to Subsidiaries

Sources: Lipponer (2009), Deutsche Bundesbank (2009)