

German Firms in International Trade: Evidence from Recent Transaction-level Data*

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Abstract

We exploit novel and rich micro-data in order to analyze firm-level heterogeneity in exports and imports of the German economy, which is the third-largest trading economy of the world. We combine product-level detail and partner-country detail as well as information on firms' primary economic activity, including wholesaling and retailing, in order to dissect German trade along several intensive and extensive margins. In line with the recent literature on firms in international trade, we find significant levels of heterogeneity and right-skewness, and examine how these differ across different margins, firm activities, and between EU and non-EU partners.

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1 Introduction

The theoretical literature on heterogeneous firms (Melitz, 2003) has been inspired by empirical findings from micro-level data documenting (i) that internationally active firms differ substantially, particularly in productivity and size, from purely domestic firms and (ii) that, within the group of internationally active firms, exports as well as imports are highly concentrated. Detailed customs transaction data has been used to explore various aspects of firm heterogeneity in trade for a number of countries, most notably for the US in 1997 and 2007 by Bernard et al. (2007, 2018) and for France in 2003 by Mayer and Ottaviano (2008).¹ Wagner (2016, 2019, 2021) has used earlier versions of German firm-level trade data to answer a whole array of specific questions related to firm heterogeneity. He was also among the first to examine exporter premia among German firms, see Bernard and Wagner (1997) and Schank et al. (2007). In contrast, this paper squarely focuses on examining the distributions of exporting and importing activity of German firms along various intensive and extensive margins.

In this paper, we use a new and improved version of this data in order to portray a coherent “grand picture” of firm heterogeneity in German foreign trade of the year 2018. Our data set covers slightly more than 80 percent of all in- and outgoing German extra-EU foreign trade and slightly less than 80 percent of German intra-EU foreign trade. For each transaction, we can identify the year (2009–2018), the firm ID, the 8-digit product ID, the country of origin/destination, and the transaction value. This data allows for a very detailed dissection of German exports and imports along multiple firm-level margins, thus portraying a rich and coherent picture of German trade. We focus on the year 2018, the most recent year covered by our data, leaving a detailed analysis of changes over time to a separate paper. We contribute to the literature by exploiting novel and rich micro-data in order to analyze firm-level heterogeneity in trade for the third-largest trading economy of the world.

Aiming at an informative and coherent grand picture, we form broad categories of firms based on their main economic activity according to the Statistical Classification of Economic Activities in the European Community (NACE, Rev. 2). Specifically, and following Bernard et al. (2010, 2015), we distinguish manufacturing firms from wholesale and retail firms, singling out wholesale, retail and maintenance of vehicles, and a residual category (mainly firms with a main activity in agriculture, forestry, mining or quarrying). A further line of distinction is between foreign trade within the EU (labeled intra-EU) and foreign trade with partner countries not belonging to the EU (labeled extra-EU). We start out by analyzing the distribution of trading firms over the aforementioned categories, for total as well as intra- and extra-EU trade, compared to the value of trade (exports and

¹The first studies exploring firm-level trade are Bernard and Jensen (1995, 1999). Békés et al. (2011) present evidence for Hungary.

imports) along those same margins. The focus here lies on salient firm-level differences between intra-EU and extra-EU trade. A key feature of the picture we portray lies in merging the main activity of firms with our transaction data, and then distinguishing the type of product traded across 22 different sections of the Harmonized System (HS). For each product section, we examine the number of firms, HS 8-digit products, and countries (of origin and destination). Again, we do so separately for intra- and extra-EU trade. Moreover, for each of the product sections, we also examine how total trade and the number of trading firms is distributed across the aforementioned firm categories.

The second part of our analysis provides a complete decomposition of exports and imports into a whole cascade of intensive and extensive margins, from the number of firms and trade value per firm down to the trade value per firm \times HS8-product \times country. We calculate this decomposition for each of our five firm categories, and for each of the margins considered, we provide key statistics for the empirical distributions (across firms, products and countries). In particular, by reporting percentile values, we describe the skewness of the distribution for each of the margins considered, and how this skewness differs across the five firm categories. Finally, we describe the joint relative distribution of the number of partner countries and the number of traded products for both, the number of trading firms and the value of trade.

The most important results of our analysis are the following. At the extensive margin firm margin, there are significantly more firms engaged in trade with non-EU countries than firms trading intra-EU, which seems like a bit of a puzzle. This holds true regardless of whether we group firms according to their primary activity (firm categories) or whether we look at the products they trade. To a large extent, however, this can be explained by a threshold for intra-EU trade reporting which is not in place for extra-EU trade. Consequently, many small firms fail to appear in our intra-EU trade while extra-EU trade covers almost the entire universe of German firms. Moreover, the number of trading partners outside the EU is much larger than inside the EU.

In all types of trade, manufacturing firms loom largest among all firm categories. At the same time, however, the share of intermediated trade is relatively large (close to 50 percent). At the intensive margin, the value of trade per firm is consistently largest for manufacturing firms. Looking at the extensive product and country margins for the entirety of firms, the German economy comes across as a very well-diversified trading partner. But this picture of diversification does not reappear at the firm level.

The remainder of the paper is structured as follows. Section 2 highlights the important novel details of the German transaction-level data used in our analysis. Section 3 looks at descriptive results concerning the trading firms and their traded products, basically asking “who trades what?”. Section 4 conducts the detailed margin decompositions. Section 5 presents the country-product distributions. Finally, Section 6 concludes.

2 German Transaction-level Data

The data used in this paper was prepared by the German Federal Statistical Office (Destatis) within our joint project “Improving Methods for Policy Analysis of Foreign Trade and Investment”, which is funded by the German Federal Ministry of Economic Affairs and Energy. The data is not (yet) available to the general public. Moreover, the results in this version of the paper are preliminary and subject to change, since the data and the underlying methods are getting updated continuously.

Our main data set (labelled “AH-Core” for “Außenhandel-Core”) contains detailed data on German export and import transactions. For each transaction, we can – among other things – identify the year, the exporting or importing German firm, the origin or destination country, the HS 8-digit product code, the trade direction, and the transaction value. The data spans the time period 2009–2018.² A major purpose of the project is to merge AH-Core with other candidate data sets furnishing a host of firm-level covariates, such as total sales, employment or sector of activity. For this paper we use company register data (URS)³ in order to identify each firm’s primary sector of activity, which then allows us to separately analyze manufacturing firms, wholesalers, retailers, and others (see Bernard et al., 2010, 2015).

When collecting and preparing the data, two fundamental issues arise, both having to do with reporting practices. In Germany, firms’ trade reporting is connected to their value-added-tax (VAT) reporting. If firms engage in consolidated reporting, then trading activities are similarly reported in a consolidated fashion. That is, the “VAT-reporting” company summarily reports trading activities for all firms participating in the consolidated reporting, even if the individual firm remains a legally independent unit with full autonomy regarding trade. However, for most purposes, what is of interest is the trading activity of each individual firm, regardless of whether it participates in consolidated tax filing. To achieve this higher level of detail, the Federal Statistical Office distributes the trade value collectively reported to each subsidiary involved, using a variety of additional data sources. These redistribution methods are also subject to future improvement.

The second fundamental problem is the difference in data collection between extra-EU and intra-EU trade. Due to the presence of tariffs in trade with non-EU countries, extra-EU transactions are fully recorded by the German tariff authorities, virtually starting from the first euro. Since there are no tariff barriers for trade between European countries, reporting is subject to censoring from below. But the thresholds in place are relatively low, and Destatis estimates that as much as 97 percent of intra-EU exports and 93 percent of intra-EU imports are reported. Nonetheless, due to the well-known right-skewness of the export and import sales distribution, the censoring introduces a firm-level bias in that

²In fact, the data is even available at a monthly frequency, which should be a valuable feature for studies focusing on short-run impacts of shocks like trade wars or a pandemic and associated lockdowns.

³URS: Unternehmensregister-System.

only a relatively small fraction of all firms make it into the sample.

3 Who Trades What?

We start by dissecting the aggregate German trade volume in 2018 (the intensive margin) and count the number of firms, i.e., the trading entities, by firm category (the extensive margin). We use information on a firm’s major economic activity for a breakdown into five categories: manufacturing firms, wholesale firms, retail firms, firms engaging in wholesale, retail or maintenance of vehicles and parts thereof, simply labeled “motor vehicles”, and a residual category labeled “other”. The residual category has firms in agriculture and forestry as well as mining and quarrying. Note that manufacturing includes the production of vehicles. Note also that each category of firms potentially trades many different product types according to the HS (see below). The main idea is to separate manufacturing from non-manufacturing production and from wholesale or retail (see e.g. Bernard et al., 2010), thus separating trade handled by producers from intermediated trade. We identify these intensive and extensive margins separately for total trade as well as for intra-EU and extra-EU exports and imports.⁴

3.1 Trade by Firm Categories

We first turn to the “who” in our question. Tables 1 and 2 give the number of firms and the associated trade value, separately for our five firm categories, for exports and imports and for total as well as extra-EU and intra-EU trade. We present absolute numbers to convey a sense of the magnitudes involved.

A first observation is that for all firm categories, there are significantly more firms trading with extra-EU countries than with intra-EU countries. This seems like a puzzle, but we should bear in mind that the number of partner countries and their total size is much larger for extra-EU than for intra-EU trade. Perhaps more importantly, it also reflects the fact that reporting of intra-EU trade is subject to a minimum threshold which is not true for extra-EU trade. Due to the right-skewness of the distribution of trade over firm sizes, this implies that our intra-EU data cover a large part of trade in value terms (more than 90 percent), but fail to include firms at the left-hand tail of the distribution. For the manufacturing category, the share of exporting firms that export to extra-EU markets is 90.8 percent, and for importing firms that share is 92.3 percent. For intra-EU trade, the corresponding shares are 51.6 percent and 45.2 percent. Looking at intermediated trade (wholesale, retail, vehicles), we find broadly similar shares for extra-EU trade, but much lower shares for intra-EU trade.⁵ This is similar for the residual category (agricul-

⁴We offer a richer decomposition of trade along these two margins in Section 4 below.

⁵Admittedly, our measure of intermediated trade is somewhat rough. Firm categories are identified by

ture and forestry, mining and quarrying). The share of firms trading with both EU and non-EU partner countries is largest for manufacturing firms (42.4 percent of all firms for exports and 37.5 percent for imports). That share is somewhat lower (31.0 percent and 31.2 percent) for wholesale trade, and significantly lower (between 8 and 20 percent) for the remaining categories.

Table 1: Number of Trading Firms by Firm Category in 2018

| Firm Category | All Trade | | Extra-EU | | Intra-EU | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | # of exporters | # of importers | # of exporters | # of importers | # of exporters | # of importers |
| Manufacturing | 41,908 | 42,605 | 38,045 | 39,325 | 21,628 | 19,243 |
| Wholesale | 32,273 | 39,386 | 27,590 | 34,272 | 14,698 | 17,390 |
| Retail | 11,066 | 24,467 | 10,017 | 22,751 | 1,973 | 5,374 |
| Motor Vehicles | 12,341 | 7,796 | 11,323 | 5,762 | 3,292 | 3,551 |
| Other | 21,520 | 38,345 | 19,043 | 35,000 | 4,775 | 9,194 |
| Total | 119,108 | 152,599 | 106,018 | 137,110 | 46,366 | 54,752 |

Source: “AH-Core”; see Section 2.

Table 2: Traded Value by Firm Category in 2018

| Firm Category | Exports (bn. €) | Extra-EU share | Imports (bn. €) | Extra-EU share |
|----------------|-----------------|----------------|-----------------|----------------|
| Manufacturing | 809.4 | 47.5% | 420.7 | 40.3% |
| Wholesale | 156.7 | 28.8% | 260.8 | 49.4% |
| Retail | 17.8 | 34.3% | 44.2 | 47.7% |
| Motor Vehicles | 17.2 | 30.2% | 40.7 | 24.8% |
| Other | 44.8 | 35.3% | 69.1 | 53.5% |
| Total | 1045.9 | 43.7% | 835.5 | 43.9% |

Source: “AH-Core”; see Section 2.

The share of manufacturing firms in all firms is largest for intra-EU exports (46.6 percent) and lowest for extra-EU imports (28.7 percent). In terms of trade values, the shares of manufacturing firms are much larger, largest for extra-EU exports (84.1 percent) and again lowest for extra-EU imports (46.2 percent). The share of intermediated trade (wholesale, retail, vehicles) is generally much larger if measured by the number of firms, highest for intra-EU imports (48.1 percent) and lowest for intra-EU exports (43.1 percent), than if measured in trade value, where it is largest for extra-EU imports (43.6 percent) and lowest for extra-EU exports (12.3 percent).

Table 2 looks at the distribution of aggregate trade value across firm categories. Germany’s 2018 aggregate export volume in our data is 1,045.9 bn. €. ⁶ While firms in the manufacturing sector only make up about a third of the total number of exporting firms, they firms’ main activity according to the NACE Rev. 2 classification. A firm whose main activity is wholesaling may also be a producer of some goods that it is exporting. On the import side, it may also use some of its imported goods as intermediate inputs for its own production.

⁶This is about 250 bn. € less than what can be found in the official statistics, which goes back to our data coverage problems.

account for almost 80 percent of export value. 15 percent originates from wholesalers, whereas the other categories are negligible. Note that the extra-EU share of exports has an average below 50 percent, which is more in line with our gravity expectations. This reflects the fact that those firms not contained in our data set are primarily low-volume EU traders, indicating that the true extra-EU share should be even lower.

A slightly less concentrated picture is drawn for the import side, where we record 835.5 bn. € of aggregate import volume.⁷ Only about half of Germany’s imports in 2018 are handled by manufacturing firms; 30 percent by wholesalers, who now assume a greater role than on the export side. The import extra-EU shares are between 40 and 54 percent, except for the motor vehicles sector (24.8 percent), unveiling a strong preference for European cars among German consumers.

Combining the two tables, we may describe the intensive margin, i.e., the trade value per firm. This is generally larger for the manufacturing category than for all other firm categories. Within that category, they are largest for intra-EU exports (19.6 mio. €), which is almost double the value for manufacturing extra-EU exports. Per-firm export values are larger for intra-EU exports than for extra-EU exports also for other firm categories. This seems at odds with standard trade models assuming monopolistic competition. If we assume, plausibly, that the fixed cost of entry into export markets is higher for extra-EU exports than for intra-EU trade, then per-firm exports to extra-EU countries should be larger than per-firm exports to intra-EU markets. Again, this most likely results from the sample’s underrepresentation of small firms in intra-EU trade.

Comparing per-firm values for imports to those of exports, we find that for intermediated trade (wholesale, retail, vehicles) these are larger for imports than for exports when looking at total trade and extra-EU trade, but for intra-EU trade, this holds true only for wholesale and vehicles. Note that a more detailed discussion of this intensive margin can be found in Section 4.

Table 3: Decomposition of the German Trade Surplus 2018

| Firm Category | Ratio of exports to imports | | |
|----------------|-----------------------------|-----------------|------------|
| | Total values | Values per firm | # of firms |
| Manufacturing | 1.924 | 1.956 | 0.984 |
| Wholesale | 0.601 | 0.733 | 0.819 |
| Retail | 0.403 | 0.890 | 0.452 |
| Motor Vehicles | 0.423 | 0.267 | 1.583 |
| Other | 0.648 | 1.155 | 0.561 |
| Total | 1.252 | 1.604 | 0.781 |

Source: “AH-Core”; see Section 2.

⁷Again, this is slightly below the official statistical value of 1,090 bn. €.

Germany is well known for its large and persistent export surplus in merchandise trade. Naturally, the explanation of this is beyond the scope of this paper. But what we can do is answer two very simple questions: First, to what extent is the trade surplus reflected in a lower number of importing firms than exporting firms (the extensive margin) and in lower imports per firm than exports per firm (the intensive margin)? And secondly, does this decomposition look differently for our five firm categories? We provide answers by looking at the ratio of export values (X) to import values (M), each expressed as a product of trade per firm, denoted by x and m , and the number of trading firms, denoted by n_x and n_m . In Table 3, column one gives X/M while column two gives x/m and column three has n_x/n_m . Of course, we have $X/M = (xn_x)/(mn_m)$. It is interesting to note that the overall trade surplus is reflected in a more than proportionately larger export value per firm relative to import value per firm (1.604 compared to 1.252), implying an opposite comparison for the number of firms (0.781 compared to 1.252). But this pattern is driven mainly by non-manufacturing firms (apart from motor vehicle traders). For manufacturing firms, we find that the trade surplus is mainly reflected at the intensive margin, with about the same number of importing and exporting firms.

3.2 Trade by Product Types

What are the types of goods that the different categories of firms trade with EU and non-EU partner countries? We aggregate products to the 22 sections of the Harmonized System, since more disaggregated levels (e.g. HS chapters) would be too difficult to display in an informative manner. We start by focusing on three extensive margins: the number of firms that trade products within a certain section, the number of traded products within that section, and the number of partner countries German firms trade with. Table 4 reports the results for exports, while Table 5 looks at imports.

Almost half of all exporters sell machinery and electronics, and about one third engages in trade with base metals or plastics and rubber. Chemicals, paper, textiles, vehicles, precision instruments and miscellaneous manufacturing are also relevant product categories. Note that the column totals in the first three columns are not the column sums, but the total numbers of firms from Table 1, as firms typically sell products from several sections. Comparing extra-EU and intra-EU exports, we see a picture already observed before: for the vast majority of products, the number of firms selling to extra-EU countries is significantly larger than the number of firms selling intra-EU, the four exceptions being live animals and animal products, vegetable products, fats and oils, and mineral products. The dominance of extra-EU trade is by far largest for art, but machinery and electronics as well as vehicles stick out, too. On average, the share of firms selling extra-EU dominates the intra-EU share by a margin of 23.6 percentage points.

The next four columns analyze the product-extensive export margin. The first col-

Table 4: Exported Commodities in 2018

| HS Section | Description | Number of firms | | | Number of products | | | Number of countries | | | |
|------------|-----------------------------------|-----------------|----------|----------|--------------------|-------|----------|---------------------|-------|----------|----------|
| | | Total | Extra-EU | Intra-EU | Maximum | Total | Extra-EU | Intra-EU | Total | Extra-EU | Intra-EU |
| 1 | Live Animals; Animal Products | 3,273 | 1,664 | 2,232 | 953 | 797 | 613 | 763 | 191 | 164 | 27 |
| 2 | Vegetable Products | 5,018 | 2,902 | 3,158 | 550 | 550 | 520 | 546 | 188 | 161 | 27 |
| 3 | Animal or Vegetable Fats and Oils | 2,076 | 1,054 | 1,438 | 129 | 118 | 106 | 115 | 157 | 130 | 27 |
| 4 | Food, Beverages, Tobacco | 8,979 | 6,218 | 4,784 | 864 | 781 | 702 | 772 | 206 | 179 | 27 |
| 5 | Mineral Products | 8,193 | 4,910 | 5,216 | 233 | 200 | 172 | 193 | 175 | 148 | 27 |
| 6 | Chemical Products | 24,734 | 18,522 | 13,050 | 1,225 | 1,172 | 1,142 | 1,142 | 219 | 192 | 27 |
| 7 | Plastics and Rubber | 38,410 | 30,738 | 19,233 | 301 | 300 | 297 | 300 | 220 | 193 | 27 |
| 8 | Leather | 10,056 | 7,439 | 5,035 | 130 | 108 | 98 | 102 | 201 | 174 | 27 |
| 9 | Wood | 11,576 | 7,394 | 6,549 | 233 | 210 | 199 | 202 | 184 | 157 | 27 |
| 10 | Paper | 23,504 | 18,212 | 11,276 | 195 | 191 | 189 | 190 | 203 | 176 | 27 |
| 11 | Textiles | 21,340 | 16,569 | 10,369 | 1,140 | 1,126 | 1,110 | 1,108 | 216 | 189 | 27 |
| 12 | Footwear and Headgear | 6,300 | 4,543 | 3,246 | 106 | 106 | 106 | 106 | 196 | 169 | 27 |
| 13 | Stone Products | 17,178 | 13,041 | 8,494 | 234 | 225 | 225 | 224 | 204 | 177 | 27 |
| 14 | Precious Metals | 3,495 | 2,619 | 1,618 | 56 | 51 | 50 | 51 | 164 | 137 | 27 |
| 15 | Base Metals | 40,695 | 33,070 | 19,708 | 950 | 943 | 925 | 940 | 220 | 193 | 27 |
| 16 | Machinery and Electronics | 56,015 | 48,853 | 23,089 | 1,362 | 1,361 | 1,349 | 1,344 | 229 | 202 | 27 |
| 17 | Vehicles | 24,117 | 19,985 | 8,884 | 268 | 262 | 258 | 251 | 212 | 185 | 27 |
| 18 | Precision Instruments | 27,754 | 23,285 | 11,687 | 313 | 312 | 311 | 310 | 221 | 194 | 27 |
| 19 | Weapons | 371 | 247 | 203 | 16 | 16 | 16 | 16 | 126 | 99 | 27 |
| 20 | Miscellaneous Manufacturing | 24,092 | 19,528 | 9,971 | 214 | 214 | 214 | 213 | 216 | 189 | 27 |
| 21 | Art | 1,230 | 1,158 | 147 | 7 | 7 | 7 | 7 | 113 | 86 | 27 |
| 22 | National Categories | 17,079 | 12,222 | 7,006 | - | 44 | 44 | 39 | 210 | 183 | 27 |
| | Total | 119,108 | 106,018 | 46,366 | 9,479 | 9,094 | 8,653 | 8,934 | 243 | 216 | 27 |

Source: “AH-Core”; see Section 2.

Notes: The column ‘Maximum’ contains the potential number of products per HS section. The column totals refer to the total number of firms, the total number of products, and the total number of destination countries.

umn displays the maximum number of product codes within a product section, which is followed by the number of product codes within that section exported to the rest of the world, to non-EU and to EU countries, respectively. The short story here is that in most of the product sections, German firms *in their entirety* export almost all products. The German economy thus appears highly diversified. As we shall document below, however, this does not hold true for each German firm. A similar story can be told for the last three columns, which state the number of destination countries for each product category. Unsurprisingly, within each section, Germany exports at least one product per commodity type to all 27 EU partners and to the vast majority of non-EU countries. Again, this masks much heterogeneity at the firm level, as will become evident below.

In Table 5, we repeat the analysis for Germany’s imports. Again, more than 80,000 firms of the almost 153,000 importers import machinery and electronics, but also chemicals, plastics and rubber, paper, textiles, base metals, precision instruments and miscellaneous manufacturing products are imported by at least 30,000 firms. While the numbers of products within the categories are similar to those for the German exports, the number of origin countries tends to be lower across the board. Animal or vegetable fats and oils and art are moreover imported from only 26 instead of all 27 EU partner countries.

3.3 Trade by Firm Categories and Product Types

In the two previous sections we looked at firms’ primary activity and products traded. We now cross-tabulate these two dimensions asking who trades what. “Who” refers to our

Table 5: Imported Commodities in 2018

| HS Section | Description | Number of firms | | | Number of products | | | Number of countries | | | |
|------------|-----------------------------------|-----------------|----------|----------|--------------------|-------|----------|---------------------|-------|----------|----------|
| | | Total | Extra-EU | Intra-EU | Maximum | Total | Extra-EU | Intra-EU | Total | Extra-EU | Intra-EU |
| 1 | Live Animals; Animal Products | 5,274 | 2,245 | 3,992 | 953 | 851 | 548 | 837 | 145 | 118 | 27 |
| 2 | Vegetable Products | 9,675 | 6,426 | 5,722 | 550 | 549 | 526 | 542 | 171 | 144 | 27 |
| 3 | Animal or Vegetable Fats and Oils | 3,312 | 1,353 | 2,411 | 129 | 122 | 97 | 117 | 108 | 82 | 26 |
| 4 | Food, Beverages, Tobacco | 12,028 | 7,876 | 6,525 | 864 | 793 | 614 | 762 | 170 | 143 | 27 |
| 5 | Mineral Products | 9,228 | 4,558 | 6,418 | 233 | 205 | 182 | 195 | 129 | 102 | 27 |
| 6 | Chemical Products | 32,763 | 23,243 | 17,598 | 1,225 | 1,162 | 1,106 | 1,124 | 172 | 145 | 27 |
| 7 | Plastics and Rubber | 58,502 | 47,216 | 25,112 | 301 | 301 | 301 | 298 | 154 | 127 | 27 |
| 8 | Leather | 18,218 | 14,752 | 5,893 | 130 | 116 | 112 | 101 | 131 | 104 | 27 |
| 9 | Wood | 16,159 | 9,804 | 8,355 | 233 | 210 | 197 | 193 | 130 | 103 | 27 |
| 10 | Paper | 38,740 | 29,968 | 15,310 | 195 | 191 | 183 | 188 | 164 | 137 | 27 |
| 11 | Textiles | 38,458 | 32,249 | 13,773 | 1,140 | 1,129 | 1,113 | 1,110 | 179 | 152 | 27 |
| 12 | Footwear and Headgear | 11,989 | 9,275 | 4,544 | 106 | 106 | 106 | 106 | 131 | 104 | 27 |
| 13 | Stone Products | 25,012 | 18,200 | 11,242 | 234 | 225 | 225 | 223 | 127 | 100 | 27 |
| 14 | Precious Metals | 8,334 | 7,135 | 1,979 | 56 | 54 | 54 | 51 | 169 | 142 | 27 |
| 15 | Base Metals | 59,530 | 48,556 | 25,353 | 950 | 946 | 931 | 936 | 164 | 137 | 27 |
| 16 | Machinery and Electronics | 80,266 | 70,939 | 29,615 | 1,362 | 1,351 | 1,341 | 1,321 | 180 | 153 | 27 |
| 17 | Vehicles | 21,387 | 14,671 | 10,205 | 268 | 254 | 241 | 249 | 134 | 107 | 27 |
| 18 | Precision Instruments | 38,122 | 32,726 | 13,307 | 313 | 313 | 313 | 309 | 189 | 162 | 27 |
| 19 | Weapons | 454 | 370 | 143 | 16 | 16 | 16 | 16 | 54 | 32 | 22 |
| 20 | Miscellaneous Manufacturing | 36,489 | 29,664 | 12,804 | 214 | 214 | 214 | 214 | 166 | 139 | 27 |
| 21 | Art | 2,358 | 2,140 | 341 | 7 | 7 | 7 | 7 | 142 | 116 | 26 |
| 22 | National Categories | 30,211 | 25,704 | 7,835 | - | 21 | 15 | 19 | 192 | 165 | 27 |
| | Total | 152,599 | 137,110 | 54,752 | 9,479 | 9,136 | 8,442 | 8,918 | 243 | 216 | 27 |

Source: “AH-Core”; see Section 2.

Notes: The column ‘Maximum’ contains the potential number of products per HS section. The column totals refer to the total number of firms, the total number of products, and the total number of destination countries.

five firm categories and “what” refers to our 22 HS sections of goods. Again we offer two separate tables, Table 6 for exports and Table 7 for imports. The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages.

A salient feature evidenced by Table 6 is the dominance (by a large margin) of machinery and electronics (29.7 percent) as well as vehicles (22.5 percent) in the value of German exports. In terms of the number of exporters, however, the shares of these products are considerably smaller (14.9 percent and 6.4 percent). Indeed, these are the two sections with the highest value of exports per firm, again by a large margin. In most of the other product sections we see the opposite pattern, i.e., larger shares when looking at the number of exporters than when looking at export values, including the two next-largest product sections which are base metals and plastics and rubber. Chemicals is the only further example of a major product section with a larger value share (11.4 percent) than firm share (6.6 percent).

The share of manufacturing firms in total exports of the product-section is by far largest for vehicles (92.9 percent), to be followed by a large group of products with shares around 70 percent. We find only five product sections where this share is below 50 percent, viz. textiles (42.3 percent), leather (39.6 percent), vegetable products (32.2 percent), footwear and headgear (17.6 percent), and art (4.11 percent). These product sections exhibit a mirroring share of above 50 percent for wholesale and retail firms. The value share

of manufactures is larger than the firm-number share of manufacturers for most products, the only exception being footwear and headgear, and art. This indicates that manufacturing firms are generally larger exporters than non-manufacturing firms, and much more so on the import side than on the export side; see Table 6 and Table 7.

On average, the exporting firms are split three-fold between manufacturing, wholesale and the remaining three categories; whereas the export volume is largely concentrated on the manufacturing sector (61.47 percent). Finally, the differences between total, extra-EU and intra-EU trade are relatively minor, which is why we relegate these tables to the appendix (see Tables A.1 and A.2).

Table 6: Total Exports by Firm Sector and Commodity Type in 2018

| HS Section | Description | Total | | Manufacturing | | Wholesale | | Retail | | Motor Vehicles | | Other | |
|------------|-----------------------------------|-----------|---------|---------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
| | | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports |
| 1 | Live Animals; Animal Products | 0.87 | 1.49 | 23.95 | 67.43 | 45.22 | 24.48 | 7.79 | 0.33 | NA | NA | NA | NA |
| 2 | Vegetable Products | 1.34 | 0.90 | 20.92 | 32.16 | 50.82 | 59.32 | 11.04 | NA | 1.00 | NA | 16.22 | 4.47 |
| 3 | Animal or Vegetable Fats and Oils | 0.55 | 0.15 | 32.27 | 73.89 | 46.44 | 22.09 | 9.10 | 0.91 | 1.78 | 0.00 | 10.40 | 3.11 |
| 4 | Food, Beverages, Tobacco | 2.39 | 2.52 | 32.26 | 69.98 | 40.06 | 25.08 | 11.08 | 2.25 | 1.44 | 0.03 | 15.16 | 2.65 |
| 5 | Mineral Products | 2.18 | 1.64 | 40.69 | 52.23 | 37.13 | 20.85 | 4.46 | 0.14 | 3.19 | 0.37 | 14.54 | 26.41 |
| 6 | Chemical Products | 6.59 | 11.36 | 39.65 | 75.28 | 35.92 | 21.20 | 7.86 | 0.56 | 1.97 | 0.06 | 14.60 | 2.91 |
| 7 | Plastics and Rubber | 10.23 | 5.48 | 44.32 | 79.80 | 31.49 | 13.76 | 6.34 | 0.54 | 3.39 | 2.54 | 14.46 | 3.37 |
| 8 | Leather | 2.68 | 0.24 | 30.93 | 39.62 | 38.77 | 38.80 | 13.78 | 17.55 | 2.36 | 0.95 | 14.16 | 3.08 |
| 9 | Wood | 3.08 | 0.67 | 42.02 | 59.94 | 33.22 | 26.32 | 8.47 | NA | 1.19 | NA | 15.10 | 11.91 |
| 10 | Paper | 6.26 | 1.62 | 44.81 | 78.49 | 29.89 | 11.66 | 6.50 | 2.65 | NA | NA | NA | NA |
| 11 | Textiles | 5.68 | 2.41 | 37.39 | 42.31 | 34.74 | 32.31 | 10.97 | 22.80 | 2.34 | 0.25 | 14.56 | 2.34 |
| 12 | Footwear and Headgear | 1.68 | 0.45 | 26.98 | 17.62 | 39.78 | 42.73 | 16.00 | 37.66 | 2.86 | 0.85 | 14.38 | 1.14 |
| 13 | Stone Products | 4.57 | 1.17 | 42.25 | 75.94 | 32.43 | 15.57 | 8.23 | 1.37 | 2.72 | 1.08 | 14.37 | 6.04 |
| 14 | Precious Metals | 0.93 | 0.86 | 31.50 | 68.83 | 35.57 | 17.23 | 18.77 | 3.73 | 0.97 | NA | 13.19 | NA |
| 15 | Base Metals | 10.84 | 8.17 | 46.68 | 73.36 | 30.15 | 21.41 | 6.29 | 0.57 | 2.17 | 0.24 | 14.71 | 4.42 |
| 16 | Machinery and Electronics | 14.92 | 29.66 | 41.50 | 77.60 | 28.97 | 15.88 | 6.93 | 1.01 | 3.93 | 0.85 | 18.67 | 4.66 |
| 17 | Vehicles | 6.42 | 22.50 | 21.49 | 92.90 | 13.29 | 1.05 | 4.18 | 0.14 | 46.43 | 4.29 | 14.61 | 1.62 |
| 18 | Precision Instruments | 7.39 | 5.33 | 43.01 | 77.91 | 29.42 | 13.53 | 8.21 | 1.26 | 1.99 | 0.55 | 17.37 | 6.76 |
| 19 | Weapons | 0.10 | 0.04 | 32.08 | 70.72 | 32.88 | NA | 23.18 | NA | NA | NA | NA | NA |
| 20 | Miscellaneous Manufacturing | 6.42 | 1.89 | 36.17 | 59.97 | 31.47 | 27.19 | 13.56 | 7.55 | 2.52 | NA | 16.28 | NA |
| 21 | Art | 0.33 | 0.07 | 5.93 | 4.11 | 9.67 | NA | 39.27 | NA | NA | NA | NA | NA |
| 22 | National Categories | 4.55 | 1.37 | 44.93 | 62.20 | 26.82 | 15.26 | 5.52 | 2.10 | 5.82 | 12.85 | 16.92 | 7.58 |
| | Total/Mean | 100.00 | 100.00 | 34.63 | 61.47 | 33.96 | 22.26 | 11.25 | 7.31 | 4.79 | 1.51 | 15.07 | 6.10 |

Source: “AH-Core”; see Section 2.

Notes: The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages. Missing values result from anonymization.

Table 7 mirrors the previous analysis and thus aims to give answers to the question “who imports what?”. Somewhat surprisingly, looking at total trade we find a strong correlation between exports and imports in both dimensions, trade values (with a correlation coefficient of 0.93) and trading firms (with a correlation coefficient of 0.98). The rank correlations are somewhat lower but still very high, with 0.93 for trade values and 0.95 for firm numbers. Not surprisingly, at this relatively high level of commodity aggregation, German trade is revealed to be largely intra-industry in nature. At the same time, there is some inter-industry structure as well, with machinery and electronics as well as vehicles, the two leading product sections, exhibiting somewhat lower shares on the import side than on the export side, and with minerals and mineral products looming much larger on the import side (9.93 percent in value terms) than on the export side (1.64 percent). By and large, the pattern of differences between value shares and shares of trading firms that we have found for exports, we also find for imports: the dominating sectors exhibit

significantly larger value shares than firm shares, but the difference is somewhat less pronounced on the import side.

As a rule, for imports we observe a lower dominance of manufacturing within the different product sections than we do for exports. Moreover, the difference between the value share and the firm-number share of manufacturing firms, while still positive for almost all products, tends to be significantly smaller on the import side than on the export side. Thus, by analogy to exports, manufacturing firms tend to be larger importers than non-manufacturing firms. For instance, within the machinery and electronics section, 51 percent of the import value is handled by manufacturing firms, while the share of manufacturing importers make up only 36 percent of firms importing machinery and electronics. For vehicles, the value share of manufacturing importers is 62 percent whereas they make up only 26 percent of all vehicles importers.

Table 7: Total Imports by Firm Sector and Commodity Type in 2018

| HS Section | Description | Total | | Manufacturing | | Wholesale | | Retail | | Motor Vehicles | | Other | |
|------------|-----------------------------------|-----------|---------|---------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
| | | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports |
| 1 | Live Animals; Animal Products | 0.95 | 2.06 | 24.16 | 34.67 | 41.39 | 56.09 | 12.31 | 4.66 | NA | NA | NA | NA |
| 2 | Vegetable Products | 1.74 | 2.91 | 22.80 | 22.37 | 42.12 | 66.12 | 14.96 | NA | 0.44 | NA | 19.68 | 3.44 |
| 3 | Animal or Vegetable Fats and Oils | 0.60 | 0.33 | 29.92 | 70.46 | 39.19 | 25.93 | 15.52 | 2.14 | 0.42 | 0.01 | 14.95 | 1.45 |
| 4 | Food, Beverages, Tobacco | 2.16 | 3.04 | 26.06 | 35.75 | 38.08 | 52.25 | 13.42 | 8.41 | 0.68 | 0.07 | 21.76 | 3.52 |
| 5 | Mineral Products | 1.66 | 9.93 | 39.89 | 54.87 | 29.28 | 19.95 | 7.40 | 0.17 | 3.46 | 0.02 | 19.97 | 25.00 |
| 6 | Chemical Products | 5.89 | 9.88 | 37.49 | 54.62 | 28.00 | 37.45 | 11.63 | 1.61 | 2.07 | 0.11 | 20.80 | 6.21 |
| 7 | Plastics and Rubber | 10.51 | 4.88 | 35.27 | 62.31 | 28.04 | 26.77 | 13.12 | 2.16 | 3.52 | 5.54 | 20.05 | 3.22 |
| 8 | Leather | 3.27 | 0.46 | 18.86 | 19.79 | 31.41 | 42.43 | 26.01 | 32.84 | 2.90 | 0.94 | 20.81 | 4.01 |
| 9 | Wood | 2.90 | 0.78 | 30.16 | 39.88 | 30.68 | 47.82 | 18.45 | NA | 1.25 | NA | 19.46 | 4.87 |
| 10 | Paper | 6.96 | 1.42 | 29.07 | 54.47 | 29.40 | 27.12 | 15.53 | 10.97 | NA | NA | NA | NA |
| 11 | Textiles | 6.91 | 4.36 | 24.26 | 21.36 | 27.74 | 41.90 | 21.93 | 32.07 | 2.55 | 0.27 | 23.52 | 4.40 |
| 12 | Footwear and Headgear | 2.15 | 0.94 | 14.52 | 12.69 | 30.89 | 41.42 | 30.78 | 42.73 | 3.26 | 0.49 | 20.55 | 2.68 |
| 13 | Stone Products | 4.49 | 1.06 | 33.28 | 53.87 | 27.41 | 32.86 | 14.47 | 6.22 | 3.98 | 2.05 | 20.87 | 4.99 |
| 14 | Precious Metals | 1.50 | 1.65 | 22.88 | 50.33 | 25.85 | 25.76 | 30.05 | 5.14 | 1.76 | NA | 19.46 | NA |
| 15 | Base Metals | 10.70 | 8.55 | 38.03 | 56.36 | 26.95 | 36.74 | 12.24 | 1.57 | 3.19 | 0.54 | 19.59 | 4.79 |
| 16 | Machinery and Electronics | 14.42 | 26.28 | 36.04 | 51.16 | 24.42 | 35.35 | 10.06 | 3.45 | 3.96 | 1.49 | 25.52 | 8.55 |
| 17 | Vehicles | 3.84 | 13.71 | 26.46 | 62.48 | 15.77 | 3.48 | 9.30 | 0.43 | 27.33 | 28.43 | 21.12 | 5.17 |
| 18 | Precision Instruments | 6.85 | 3.79 | 35.38 | 48.62 | 25.65 | 37.22 | 12.95 | 3.21 | 3.29 | 1.30 | 22.73 | 9.65 |
| 19 | Weapons | 0.08 | 0.02 | 24.45 | 47.52 | 23.79 | NA | 30.18 | NA | NA | NA | NA | NA |
| 20 | Miscellaneous Manufacturing | 6.56 | 2.60 | 22.88 | 30.30 | 28.82 | 41.81 | 21.81 | 22.04 | 2.65 | NA | 23.84 | NA |
| 21 | Art | 0.42 | 0.05 | 10.39 | 0.96 | 11.41 | NA | 24.64 | NA | NA | NA | NA | NA |
| 22 | National Categories | 5.43 | 1.29 | 45.51 | 53.40 | 24.83 | 8.63 | 8.19 | 22.01 | 3.56 | 9.15 | 17.91 | 6.80 |
| Total/Mean | | 100.00 | 100.00 | 28.53 | 42.65 | 28.69 | 34.05 | 16.06 | 11.97 | 4.82 | 3.18 | 22.15 | 9.42 |

Source: “AH-Core”; see Section 2.

Notes: The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages. Missing values result from anonymization.

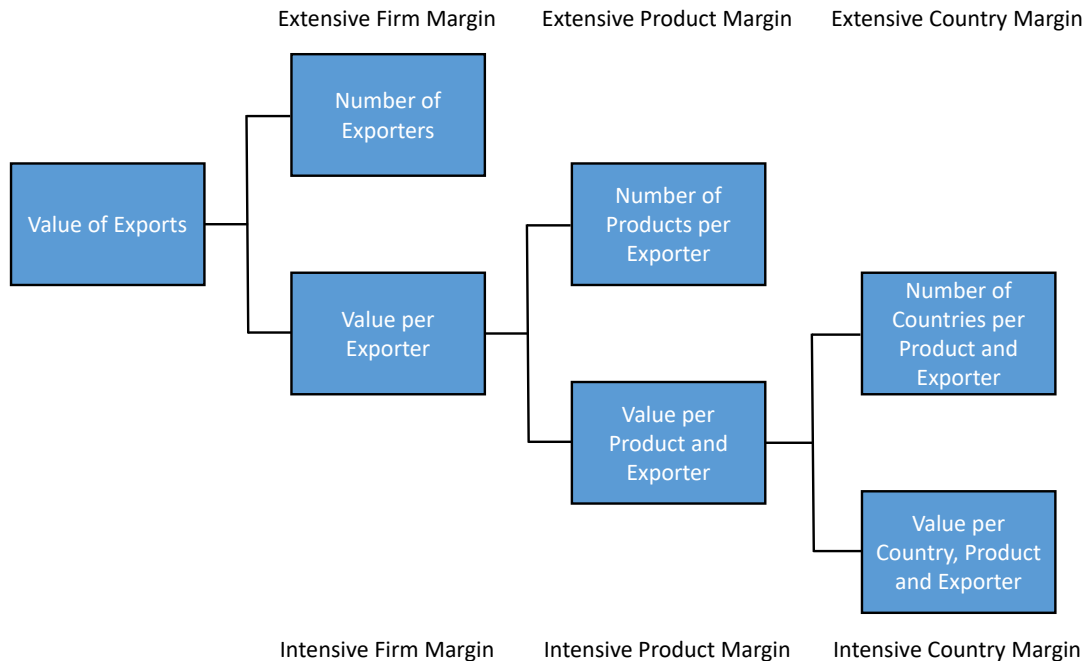
On average, comparing imports to exports, the composition of firms across all product categories shifts slightly from manufacturing and wholesale to retail and other firms, with the former two still being the most relevant sectors. Similarly, the value composition shifts from manufacturing to wholesale, with manufacturing still being the most relevant sector. Again the differences between total, extra-EU and intra-EU trade are more subtle and can be found in Tables A.3 and A.4.

4 Margin Decompositions

Since our firm-level trade data is broken down by products as well as partner countries, we may now generate further insights by investigating a whole cascade of decomposi-

tions into extensive and intensive margins as depicted in Figure 1, adapted from Mayer and Ottaviano (2008). The figure uses export terminology but the idea may analogously be applied also to imports.⁸ To characterize the distribution for each of these margins, we compute means, standard deviations and five different percentiles (P1, P25, P50, P75, P99). Moreover, we again distinguish between the five firm categories introduced above. Table 8 presents the results for German exports, while Table 9 looks at German imports.

Figure 1: Decomposition of Trade into Intensive and Extensive Margins



Source: Adapted from Mayer and Ottaviano (2008).

We see from Table 8 that on average manufacturing firms are much larger exporters (in terms of export values) than non-manufacturing firms. However the standard deviation of the export value distribution for manufacturing firms is also largest – about 24 times the mean, more than for non-manufacturing firms. When it comes to the average number of products exported, wholesalers lead the race with 27.5 products per firm, although manufacturing firms are not far behind with almost 24 products. On the other hand, wholesalers, as well as the other firm categories, have four or more times lower export sales per product. Especially retailers only sell €87,067 per product on average to buyers abroad. As expected, and in line with observations for other countries, the intensive margin distribution is heavily right-skewed, with a median (P50) of a mere 3.4 percent of the mean.

⁸Alternatively, the “value per exporter” could be first decomposed into country margins (“number of destinations”, “value per destination and exporter”) and then into product margins (“number of products per destination and exporter”, “value per product, destination and exporter”). Our decomposition reflects the idea that firms take their products as given, and then think about possible destinations (and not vice versa).

The skewness of the distribution is even more pronounced for retail firms, with a median just under 2 percent of the mean. The other non-manufacturing firms have a somewhat less pronounced right-skewness of their intensive export margins. The P99/P1 as well as the P75/P25 percentile ratios are by far largest for manufacturing firms.

The extensive product margin distribution (value per product and firm) is right-skewed as well, but somewhat less so than the intensive firm margin, measured by the ratio of the median to the mean. The numbers generally seem small compared to what one might have expected. For instance, 75 percent of the manufacturing firms export 17 products or less. For wholesale firms this number is somewhat larger at 20, but for the remaining firm categories it is even smaller. Turning to the intensive margin of values per firm, product and country, the right-skewness remains rather strong, but becomes considerably less so for the extensive margin (number of countries per firm and product), where the skewness is less pronounced than for the extensive product margin. A candidate explanation for this is that the total number of countries is much smaller than the total number of products (8-digit HS). Obviously, one could have chosen a different sequencing in the decomposition, looking at the number of countries per firm in step two, rather than the number of products per firm. Not surprisingly, the right-skewness of the country distribution is much lower (not shown) than in the sequencing chosen for Table 8.

The general pattern that emerges here may be described as follows: The right-skewness is smaller for extensive margins than for intensive margins. The skewness becomes larger the narrower the margins, at least for manufacturing firms, and except for the country margin. By and large, these tendencies hold for all firm categories. A further observation is that the right-skewness at the intensive margins tends to be larger for manufacturing firms than for non-manufacturing ones whereas the same is not true for the extensive margin.

The Appendix contains two additional tables where we split exports into exports to other EU countries and exports to non-EU countries. In Table A.5, we decompose Germany's extra-EU exports. Perhaps the most striking difference between total and extra-EU trade is that manufacturing firms' sales to non-EU countries (€10.1 mio.) are on average about seven times larger than those of wholesalers (€1.6 mio.), compared to a factor of four when considering total trade (€19.3 mio. vs. €4.9 mio.). This difference also carries through to the intensive product and country margins. In contrast, for intra-EU trade (see Table A.6), the difference in mean exports per firm only amounts to a factor of 2.5 (€19.6 mio. vs. €7.6 mio.), indicating that wholesalers tend to export much more to EU partner countries. Even the retailers are not far off (€5.9 mio.). This is mainly driven by the extensive product margin: The average intra-EU manufacturing firm exports 28.6 products, whereas wholesalers export 38.4 products and retailers even manage to bring it to 57 products on average.

Table 8: Margin Decomposition for Total Exports in 2018

| Margin | Firm Category | Mean | Std. Dev. | P1 | P25 | P50 | P75 | P99 |
|--|----------------|------------|-------------|-------|--------|---------|-----------|-------------|
| Value per firm | Manufacturing | 19,312,758 | 466,455,577 | 1,238 | 46,360 | 654,461 | 4,350,107 | 214,945,207 |
| | Wholesale | 4,853,957 | 50,981,476 | 1,066 | 27,504 | 241,645 | 1,681,189 | 72,265,616 |
| | Retail | 1,611,315 | 38,447,890 | 695 | 7,345 | 31,750 | 177,984 | 15,830,258 |
| | Motor Vehicles | 1,394,436 | 9,589,693 | 1,251 | 15,908 | 54,703 | 414,705 | 21,039,573 |
| | Other | 2,081,470 | 39,218,885 | 350 | 10,729 | 52,100 | 364,238 | 28,213,194 |
| # of products per firm | Manufacturing | 23.9 | 63.3 | 1 | 2 | 5 | 17 | 305 |
| | Wholesale | 27.5 | 76.6 | 1 | 2 | 5 | 20 | 360 |
| | Retail | 18.5 | 80.6 | 1 | 1 | 3 | 8 | 318 |
| | Motor Vehicles | 7.9 | 39.9 | 1 | 1 | 2 | 5 | 110 |
| | Other | 15.4 | 63.4 | 1 | 1 | 3 | 8 | 231 |
| Value per product per firm | Manufacturing | 808,282 | 33,584,734 | 0 | 273 | 2,456 | 22,916 | 10,677,176 |
| | Wholesale | 176,817 | 6,546,193 | 0 | 242 | 1,859 | 13,417 | 2,331,660 |
| | Retail | 87,067 | 1,374,757 | 0 | 145 | 1,280 | 8,700 | 1,257,474 |
| | Motor Vehicles | 177,132 | 1,930,131 | 0 | 208 | 3,163 | 25,998 | 2,859,507 |
| | Other | 134,874 | 4,007,334 | 0 | 53 | 755 | 6,031 | 1,604,956 |
| # of countries per product per firm | Manufacturing | 5.7 | 10.1 | 1 | 1 | 2 | 5 | 51 |
| | Wholesale | 4.1 | 6.8 | 1 | 1 | 1 | 4 | 34 |
| | Retail | 3.1 | 4.7 | 1 | 1 | 1 | 3 | 25 |
| | Motor Vehicles | 3.9 | 6.3 | 1 | 1 | 1 | 3 | 29 |
| | Other | 2.6 | 4.3 | 1 | 1 | 1 | 2 | 22 |
| Value per country per product per firm | Manufacturing | 140,660 | 6,365,609 | 0 | 141 | 1,100 | 8,731 | 1,885,958 |
| | Wholesale | 42,726 | 2,130,101 | 0 | 110 | 750 | 5,080 | 580,830 |
| | Retail | 28,521 | 557,335 | 0 | 64 | 477 | 3,348 | 395,161 |
| | Motor Vehicles | 45,916 | 525,228 | 0 | 44 | 805 | 11,900 | 720,764 |
| | Other | 52,526 | 1,477,676 | 0 | 27 | 410 | 3,696 | 720,004 |

Source: “AH-Core”; see Section 2.

Notes: This table reports summary statistics of the margin decomposition for German total exports, by margin and firm category. The intensive margins are in €. Note that in column one (Mean), the extensive margins multiplied by the corresponding intensive margins yield the associated trade values, except for rounding errors.

Switching to the import perspective, Table 9 replicates the margin decompositions for Germany’s total imports in 2018. Throughout all three intensive margins, we observe the same pattern: Manufacturing firms boast the highest average import value per firm, per product and firm, and per country, product and firm; followed closely by wholesalers and motor vehicle trades, with retailers and other firms trailing behind. The extensive margins, however, are much closer together, with especially the extensive country margin displaying almost no differences across sectors. Within the sectors, nonetheless, the variability and right-skewness of the distributions is still well-pronounced.

The right-skewness of the intensive firm margin (value per firm) distribution for imports is somewhat more pronounced than for exports if we consider manufacturing firms, but somewhat less pronounced for the non-manufacturing firms. The extensive margin (number of products per firm) distribution is less right-skewed for imports, except for the vehicles category. The general tendencies observed for exports when looking at ever narrower margins reappear also for imports.

Regarding extra-EU imports separately, as it is done in Table A.7, reiterates the stronger role of wholesalers in importing relative to exporting. The average import value per wholesaler (€3.8 mio.) is only about 13 percent below its manufacturing counterpart (€4.3 mio.). Starting at the 25th percentile, wholesaler imports even surpass manufactur-

Table 9: Margin Decomposition for Total Imports in 2018

| Margin | Firm Category | Mean | Std. Dev. | P1 | P25 | P50 | P75 | P99 |
|--|----------------|-----------|-------------|----|--------|---------|-----------|-------------|
| Value per firm | Manufacturing | 9,875,453 | 200,265,425 | 43 | 8,090 | 131,854 | 1,665,258 | 106,523,525 |
| | Wholesale | 6,621,141 | 66,603,319 | 45 | 23,177 | 338,778 | 2,236,827 | 97,752,638 |
| | Retail | 1,804,906 | 54,900,612 | 29 | 2,726 | 21,368 | 170,812 | 18,114,518 |
| | Motor Vehicles | 5,219,341 | 67,101,222 | 46 | 4,548 | 76,921 | 1,144,002 | 52,110,809 |
| | Other | 1,801,596 | 49,633,525 | 14 | 1,094 | 9,394 | 83,304 | 16,784,216 |
| # of products per firm | Manufacturing | 28.5 | 78.6 | 1 | 2 | 7 | 24 | 328 |
| | Wholesale | 25.6 | 61.2 | 1 | 2 | 7 | 24 | 272 |
| | Retail | 19.6 | 57.7 | 1 | 2 | 4 | 13 | 249 |
| | Motor Vehicles | 17.5 | 59.6 | 1 | 1 | 3 | 8 | 306 |
| | Other | 18.3 | 80.0 | 1 | 1 | 3 | 10 | 293 |
| Value per product per firm | Manufacturing | 346,843 | 13,908,057 | 0 | 120 | 1,239 | 13,996 | 3,822,322 |
| | Wholesale | 258,789 | 8,781,011 | 0 | 192 | 1,948 | 19,430 | 3,660,729 |
| | Retail | 91,879 | 2,775,857 | 0 | 128 | 1,136 | 9,514 | 1,294,265 |
| | Motor Vehicles | 298,671 | 9,069,717 | 0 | 51 | 409 | 5,403 | 2,804,858 |
| | Other | 98,322 | 10,728,687 | 0 | 7 | 154 | 1,739 | 677,348 |
| # of countries per product per firm | Manufacturing | 2.0 | 2.5 | 1 | 1 | 1 | 2 | 13 |
| | Wholesale | 1.7 | 1.8 | 1 | 1 | 1 | 2 | 10 |
| | Retail | 1.8 | 2.0 | 1 | 1 | 1 | 2 | 10 |
| | Motor Vehicles | 2.1 | 2.6 | 1 | 1 | 1 | 2 | 14 |
| | Other | 1.8 | 2.2 | 1 | 1 | 1 | 2 | 12 |
| Value per country per product per firm | Manufacturing | 177,001 | 6,907,832 | 0 | 49 | 654 | 7,803 | 2,131,812 |
| | Wholesale | 150,879 | 6,084,062 | 0 | 134 | 1,320 | 12,800 | 2,121,206 |
| | Retail | 51,171 | 1,734,767 | 0 | 71 | 754 | 6,418 | 770,400 |
| | Motor Vehicles | 141,761 | 5,567,281 | 0 | 18 | 178 | 2,165 | 1,270,779 |
| | Other | 53,639 | 7,737,558 | 0 | 1 | 61 | 823 | 362,357 |

Source: “AH-Core”; see Section 2.

Notes: This table reports summary statistics of the margin decomposition for German total imports, by margin and firm category. The intensive margins are in €. Note that in column one (Mean), the extensive margins multiplied by the corresponding intensive margins yield the associated trade values, except for rounding errors.

ing imports per firm. Throughout the remaining margins, there are only minor differences between manufacturing firms and wholesalers in the extra-EU part of German trade. Mirroring the differences between total and extra-EU trade, Table A.8 shows that for intra-EU imports, the average margin values for manufacturers and wholesalers diverge again.

5 Joint Country-Product Distributions

Following Mayer and Ottaviano (2008) and Bernard et al. (2018), we turn to the analysis of joint country-product distributions. We do so separately for the value of trade flows as well as the number of trading firms, and separately for exports and imports. As in Bernard et al. (2018), we distinguish between seven numeric categories: one, two, three, four, five, six to ten, or at least eleven HS 8-digit products, and the same for partner countries.

Table 10 presents the joint value and firm-number distributions for Germany’s total exports in 2018. On the extensive margin (top panel), two mass points can be identified: specialized firms that export one product to one destination country (21 percent) and multi-product firms that export many (at least eleven) products to many destination countries (16 percent). However, as evidenced by the bottom panel, the first set of firms

commands little more than 1 percent of the German export value whereas the second set of firms generates an export value share of almost 80 percent.

Table 10: Distribution of Total Exports by Number of Countries and Products in 2018

| Share of Firms in % | | Number of Countries | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 20.72 | 2.71 | 1.06 | 0.64 | 0.40 | 0.87 | 0.79 | 27.19 |
| 2 | 5.76 | 3.44 | 1.25 | 0.68 | 0.43 | 1.01 | 0.99 | 13.55 |
| 3 | 2.73 | 1.57 | 1.07 | 0.63 | 0.38 | 0.95 | 1.05 | 8.38 |
| 4 | 1.63 | 0.95 | 0.63 | 0.47 | 0.35 | 0.95 | 1.02 | 5.99 |
| 5 | 1.09 | 0.65 | 0.41 | 0.32 | 0.26 | 0.76 | 0.96 | 4.45 |
| 6-10 | 2.53 | 1.47 | 0.96 | 0.78 | 0.66 | 2.14 | 3.90 | 12.45 |
| 11+ | 2.85 | 1.83 | 1.34 | 1.04 | 0.95 | 3.75 | 16.22 | 27.98 |
| Total | 37.31 | 12.61 | 6.73 | 4.57 | 3.42 | 10.43 | 24.93 | 100.00 |

| Share of Value in % | | Number of Countries | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 1.33 | 0.31 | 0.57 | 0.15 | NA | NA | NA | NA |
| 2 | 0.27 | 0.45 | 0.11 | 0.13 | NA | NA | NA | NA |
| 3 | 0.14 | 0.26 | 0.13 | 0.07 | 0.09 | 0.28 | 0.71 | 1.67 |
| 4 | 0.09 | 0.18 | 0.09 | 0.05 | 0.07 | 0.36 | 0.65 | 1.48 |
| 5 | 0.07 | 0.10 | 0.07 | 0.19 | 0.08 | 0.27 | 0.73 | 1.50 |
| 6-10 | 0.15 | 0.20 | 0.21 | 0.18 | 0.19 | 0.86 | 3.58 | 5.38 |
| 11+ | 0.39 | 0.50 | 0.40 | 0.59 | 0.51 | 3.28 | 79.32 | 84.98 |
| Total | 2.44 | 2.00 | 1.57 | 1.35 | NA | NA | NA | NA |

Source: "AH-Core"; see Section 2.

Notes: This table reports the shares of exporting firms and export value by the number of exported products and destination countries. Row and column totals refer to the sums of shares and contain NA whenever one of their components is missing. Missing values result from anonymization.

Comparing our results to those of Bernard et al. (2018) for the US exports in 2007, we see a very similar picture for the relative distribution of export value. However, the US exhibits significantly more firms that export few products to few countries and fewer large multinationals. The same is true, although to a lesser extent, for the French 2003 data used by Mayer and Ottaviano (2008). As can be seen from Tables A.9 and A.10, these differences are mainly driven by the intra-EU trade data. In Table A.10, which reports the joint distribution of intra-EU imports, we observe that only less than 6 percent of firms export one product to one country, but almost 28 percent of firms export 11+ products to 11+ countries, yet still accounting for only 70 percent of the intra-EU export volume. On the other hand, the extra-EU distribution in Table A.9 is much more comparable to the results for the other countries. Finally, the Hungarian data for 1999 found in Békés et al. (2011) are well comparable to our results for Germany.

Table 11: Distribution of Total Imports by Number of Countries and Products in 2018

| Share of Firms in % | | Number of Countries | | | | | | |
|---------------------|-------|---------------------|------|------|------|-------|-------|--------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 21.02 | 1.09 | 0.27 | 0.13 | 0.08 | 0.14 | 0.03 | 22.76 |
| 2 | 6.60 | 4.11 | 0.62 | 0.19 | 0.11 | 0.20 | 0.03 | 11.87 |
| 3 | 3.16 | 2.62 | 1.26 | 0.34 | 0.15 | 0.23 | 0.05 | 7.81 |
| 4 | 1.89 | 1.72 | 1.13 | 0.50 | 0.21 | 0.26 | 0.05 | 5.77 |
| 5 | 1.20 | 1.24 | 0.91 | 0.51 | 0.26 | 0.33 | 0.06 | 4.51 |
| 6-10 | 2.61 | 2.93 | 2.51 | 1.81 | 1.22 | 2.15 | 0.41 | 13.66 |
| 11+ | 1.91 | 2.46 | 2.42 | 2.30 | 2.16 | 8.51 | 13.86 | 33.62 |
| Total | 38.40 | 16.18 | 9.12 | 5.78 | 4.20 | 11.83 | 14.51 | 100.00 |

| Share of Value in % | | Number of Countries | | | | | | |
|---------------------|------|---------------------|------|------|------|------|-------|-------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 0.67 | 0.17 | 0.06 | 0.04 | NA | NA | NA | NA |
| 2 | 0.25 | 0.26 | 0.12 | 0.07 | NA | NA | NA | NA |
| 3 | 0.12 | 0.16 | 0.16 | 0.08 | 0.04 | 0.13 | 0.05 | 0.75 |
| 4 | 0.09 | 0.13 | 0.12 | 0.09 | 0.12 | 0.12 | 0.07 | 0.74 |
| 5 | 0.07 | 0.08 | 0.20 | 0.07 | 0.06 | 0.18 | 0.12 | 0.78 |
| 6-10 | 0.17 | 0.24 | 0.35 | 0.34 | 0.31 | 1.23 | 0.78 | 3.43 |
| 11+ | 0.24 | 0.39 | 0.42 | 0.71 | 1.13 | 6.13 | 83.14 | 92.15 |
| Total | 1.61 | 1.44 | 1.44 | 1.39 | NA | NA | NA | NA |

Source: “AH-Core”; see Section 2.

Notes: This table reports the shares of importing firms and import value by the number of imported products and origin countries. Row and column totals refer to the sums of shares and contain NA whenever one of their components is missing. Missing values result from anonymization.

A very similar picture emerges for total German imports in Table 11. Again, 21 percent of firms import just one product from just one country and thereby account for less than 1 percent of the import volume. On the other side, firms that import 11+ products from either 6 to 10 or 11+ countries together account for over 22 percent of firms and almost 90 percent of German import value. In the 2007 US data, only 3 percent of firms fall into this category, yet they account for almost 80 percent of import volume, signaling that the trade volume is distributed much more unevenly than in Germany.⁹ Once more, we can trace this disparity back to the influence of intra-EU trade. In Table A.12, it becomes apparent that 34 percent of firms import 11+ products from six or more countries, but account for the same 80 percent of import volume as their few US counterparts.

⁹The results from Békés et al. (2011) for Hungarian imports are again similar to ours. Unfortunately, Mayer and Ottaviano (2008) conduct their analysis only for French exports, which is why we cannot compare our results for imports with theirs.

6 Conclusion

In this paper, we use novel micro-data to conduct a descriptive analysis of German firms in international trade. We dissect the data along several dimensions: firms, products and countries. We find that differences in these dimensions matter. Among our results, we find that firms' trading activities are highly concentrated and right-skewed, both for merchandise exports and merchandise imports. But we go further by breaking down the roughly 120 thousand exporting and 150 thousand importing firms into different categories: manufacturing firms, wholesale and retail firms and firms with a primary activity in agriculture, forestry or mining. We find that the distribution of the intensive margin of trade is right-skewed for all firm categories, but to different degrees, mostly more skewed for manufacturing firms than for non-manufacturing ones.

Digging deeper, we identify systematic differences between intra-EU and extra-EU trade. Most importantly, we decompose aggregate exports and imports into a cascade of intensive and extensive margins. Using the median-to-mean ratio as a simple measure of skewness, we find that the product-level intensive firm margin of exporting exhibits a much more right-skewed distribution than the aggregate intensive firm margin of exporting. In contrast, the product-level extensive margin exhibits a much lower level of right-skewness than either intensive margin of exporting. Again, we observe large differences across the aforementioned firm categories. Moving further "down" to the product-and-country margins, both the extensive and intensive margin distributions become slightly less right-skewed for almost all firm categories.

The empirical significance of firm heterogeneity in trade and the need to take this into account in quantitative trade modeling is unquestioned. The key message of this paper is that there is significant heterogeneity of firm heterogeneity in trade. The quantitative trade policy modeler faces a multitude of different distributions of trading activities among firms that she may wish her model to match, and that she may therefore target when calibrating the model. Quantitative models will probably never be able to match all of the many distributions regarding the extensive and intensive margins of trade that we have highlighted in this paper. The challenge therefore is to identify the right, or most important, subset of these distributions when calibrating trade models.

Meanwhile, many questions remain unanswered also regarding descriptive analysis. An obvious route for useful further research is to add the time dimension and examine salient dynamic features of the different margins over the recent years, or even detect striking patterns over different months of the year. Future work should also shed light on the two-way-trader status among firms, thus highlighting the prevalence of intra-industry trade on the firm level, possibly raising new challenges for theoretical explanations. A further question worth pursuing is how the skewness of the intensive firm margin varies across products and may be explained by product characteristics – or, adding the country

margin, by country-specific covariates.

Another natural avenue of fruitful descriptive research is to add firm-level covariates, such as total revenues or the number of employees, and to examine how these correlate with the margins, thus quantifying so-called exporter or importer premia (e.g., with regard to employment or revenues) across different types of products and/or countries. One could also analyze the correlations between exporter- and importer-status-shares and trade values. It would also seem desirable to extend the research design to allow for simple gravity regressions (e.g. with standard country-level covariates) towards a differential analysis (across different margins) of trade agreements. And finally, a firm-level analysis of trade in services could reveal interesting insights into the relationship between goods trade and services trade.

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A Appendix

A.1 Additional Tables

A.1.1 Who Trades What

Table A.1: Extra-EU Exports by Firm Sector and Commodity Type in 2018

| HS Section | Description | Total | | Manufacturing | | Wholesale | | Retail | | Motor Vehicles | | Other | |
|------------|-----------------------------------|-----------|---------|---------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
| | | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports |
| 1 | Live Animals; Animal Products | 0.57 | 0.61 | 20.01 | 69.99 | 40.50 | 19.55 | 9.19 | 0.41 | NA | NA | NA | NA |
| 2 | Vegetable Products | 0.99 | 0.57 | 19.37 | 41.02 | 47.86 | 50.95 | 11.85 | NA | 1.27 | NA | 19.64 | 6.74 |
| 3 | Animal or Vegetable Fats and Oils | 0.36 | 0.05 | 30.46 | 66.93 | 43.55 | 28.99 | 11.95 | 1.84 | 2.94 | 0.02 | 11.10 | 2.22 |
| 4 | Food, Beverages, Tobacco | 2.11 | 1.31 | 31.44 | 65.46 | 37.26 | 27.82 | 12.61 | 3.31 | 1.59 | 0.07 | 17.10 | 3.34 |
| 5 | Mineral Products | 1.67 | 0.90 | 41.55 | 54.68 | 35.46 | 21.90 | 4.85 | 0.17 | 3.26 | 0.92 | 14.89 | 22.34 |
| 6 | Chemical Products | 6.30 | 12.87 | 39.49 | 79.19 | 34.99 | 17.58 | 8.04 | 0.37 | 1.93 | 0.06 | 15.54 | 2.80 |
| 7 | Plastics and Rubber | 10.45 | 4.47 | 45.11 | 84.52 | 30.47 | 10.87 | 6.26 | 0.38 | 3.38 | 1.20 | 14.78 | 3.03 |
| 8 | Leather | 2.53 | 0.19 | 31.56 | 40.66 | 36.99 | 29.58 | 14.41 | 25.66 | 2.37 | 1.07 | 14.67 | 3.03 |
| 9 | Wood | 2.51 | 0.51 | 40.37 | 59.37 | 31.77 | 29.17 | 10.05 | NA | 1.12 | NA | 16.69 | 10.01 |
| 10 | Paper | 6.19 | 1.01 | 45.94 | 78.16 | 28.54 | 11.65 | 6.25 | 1.57 | NA | NA | NA | NA |
| 11 | Textiles | 5.63 | 1.80 | 36.63 | 48.21 | 33.99 | 19.68 | 11.85 | 29.56 | 2.35 | 0.25 | 15.17 | 2.30 |
| 12 | Footwear and Headgear | 1.54 | 0.34 | 27.54 | 13.91 | 38.34 | 31.96 | 16.40 | 52.73 | 2.53 | 0.24 | 15.19 | 1.17 |
| 13 | Stone Products | 4.43 | 1.03 | 42.17 | 76.79 | 31.03 | 10.77 | 8.94 | 1.15 | 2.77 | 0.82 | 15.08 | 10.47 |
| 14 | Precious Metals | 0.89 | 0.94 | 31.27 | 63.24 | 34.98 | 20.09 | 19.85 | 3.21 | 0.76 | NA | 13.13 | NA |
| 15 | Base Metals | 11.24 | 5.98 | 47.68 | 79.85 | 28.92 | 15.76 | 6.53 | 0.40 | 2.09 | 0.20 | 14.78 | 3.78 |
| 16 | Machinery and Electronics | 16.61 | 33.60 | 41.78 | 87.43 | 28.39 | 7.99 | 6.88 | 0.31 | 3.90 | 0.65 | 19.04 | 3.61 |
| 17 | Vehicles | 6.79 | 23.02 | 18.55 | 95.65 | 11.48 | 0.68 | 4.22 | 0.12 | 51.44 | 2.66 | 14.30 | 0.89 |
| 18 | Precision Instruments | 7.92 | 7.43 | 43.65 | 85.67 | 28.28 | 9.63 | 8.07 | 0.96 | 1.86 | 0.27 | 18.14 | 3.46 |
| 19 | Weapons | 0.08 | 0.04 | 37.65 | 62.53 | 25.91 | NA | 26.32 | NA | NA | NA | NA | NA |
| 20 | Miscellaneous Manufacturing | 6.64 | 1.35 | 35.85 | 69.44 | 30.16 | 16.88 | 14.36 | 7.57 | 2.50 | NA | 17.13 | NA |
| 21 | Art | 0.39 | 0.12 | 5.79 | 3.85 | 8.03 | NA | 39.98 | NA | NA | NA | NA | NA |
| 22 | National Categories | 4.15 | 1.84 | 48.35 | 63.63 | 23.60 | 18.11 | 4.15 | 0.63 | 4.49 | 9.73 | 19.41 | 7.90 |
| | Total/Mean | 100.00 | 100.00 | 34.65 | 63.19 | 32.10 | 19.35 | 11.96 | 8.73 | 5.06 | 1.17 | 15.96 | 6.06 |

Source: “AH-Core”; see Section 2.

Notes: The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages. Missing values result from anonymization.

Table A.2: Intra-EU Exports by Firm Sector and Commodity Type in 2018

| HS Section | Description | Total | | Manufacturing | | Wholesale | | Retail | | Motor Vehicles | | Other | |
|------------|-----------------------------------|-----------|---------|---------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
| | | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports | Exporters | Exports |
| 1 | Live Animals; Animal Products | 1.27 | 2.17 | 29.48 | 66.87 | 50.94 | 25.56 | 5.91 | 0.31 | NA | NA | NA | NA |
| 2 | Vegetable Products | 1.79 | 1.16 | 24.92 | 28.75 | 56.93 | 62.54 | 8.36 | NA | 0.44 | NA | 9.34 | 3.60 |
| 3 | Animal or Vegetable Fats and Oils | 0.82 | 0.24 | 36.30 | 74.91 | 49.24 | 21.08 | 6.54 | 0.77 | 0.49 | 0.00 | 7.44 | 3.24 |
| 4 | Food, Beverages, Tobacco | 2.71 | 3.45 | 40.30 | 71.32 | 44.29 | 24.27 | 6.54 | 1.94 | 0.79 | 0.02 | 8.07 | 2.45 |
| 5 | Mineral Products | 2.96 | 2.21 | 45.30 | 51.45 | 37.54 | 20.52 | 3.30 | 0.13 | 2.59 | 0.20 | 11.27 | 27.70 |
| 6 | Chemical Products | 7.40 | 10.19 | 48.36 | 71.44 | 37.04 | 24.75 | 4.84 | 0.75 | 1.46 | 0.05 | 8.31 | 3.02 |
| 7 | Plastics and Rubber | 10.90 | 6.26 | 53.33 | 77.19 | 32.27 | 15.36 | 3.94 | 0.62 | 2.31 | 3.28 | 8.16 | 3.56 |
| 8 | Leather | 2.85 | 0.28 | 34.46 | 39.06 | 44.53 | 43.80 | 9.79 | 13.16 | 1.95 | 0.88 | 9.28 | 3.11 |
| 9 | Wood | 3.71 | 0.79 | 46.68 | 60.22 | 37.47 | 24.88 | 5.25 | NA | 1.07 | NA | 9.53 | 12.87 |
| 10 | Paper | 6.39 | 2.09 | 50.21 | 78.62 | 32.73 | 11.66 | 4.85 | 3.06 | NA | NA | NA | NA |
| 11 | Textiles | 5.88 | 2.88 | 46.16 | 39.44 | 37.76 | 38.43 | 6.29 | 19.52 | 1.67 | 0.24 | 8.13 | 2.36 |
| 12 | Footwear and Headgear | 1.84 | 0.54 | 29.85 | 19.45 | 45.81 | 48.00 | 12.69 | 30.27 | 2.87 | 11.52 | 8.78 | 1.12 |
| 13 | Stone Products | 4.82 | 1.28 | 50.68 | 75.42 | 34.51 | 18.57 | 4.56 | 1.50 | 1.87 | 1.25 | 8.38 | 3.27 |
| 14 | Precious Metals | 0.92 | 0.80 | 36.46 | 73.89 | 38.44 | 14.64 | 13.97 | 4.20 | 1.24 | NA | 9.89 | NA |
| 15 | Base Metals | 11.17 | 9.87 | 54.86 | 70.30 | 31.89 | 24.06 | 3.17 | 0.65 | 1.56 | 0.27 | 8.51 | 4.72 |
| 16 | Machinery and Electronics | 13.09 | 26.61 | 53.00 | 67.98 | 30.75 | 23.61 | 3.72 | 1.69 | 2.50 | 1.03 | 10.02 | 5.69 |
| 17 | Vehicles | 5.04 | 22.11 | 36.26 | 90.68 | 17.65 | 1.34 | 2.81 | 0.16 | 32.76 | 5.61 | 10.52 | 2.21 |
| 18 | Precision Instruments | 6.63 | 3.71 | 52.49 | 65.85 | 31.67 | 19.58 | 5.13 | 1.73 | 1.65 | 0.97 | 9.06 | 11.87 |
| 19 | Weapons | 0.12 | 0.04 | 32.02 | 77.98 | 44.33 | NA | 13.30 | NA | NA | NA | NA | NA |
| 20 | Miscellaneous Manufacturing | 5.65 | 2.31 | 44.99 | 55.68 | 37.27 | 31.86 | 7.27 | 7.54 | 1.75 | NA | 8.73 | NA |
| 21 | Art | 0.08 | 0.03 | 8.84 | 5.09 | 28.57 | NA | 34.69 | NA | NA | NA | NA | NA |
| 22 | National Categories | 3.97 | 1.00 | 44.79 | 60.18 | 31.07 | 11.21 | 6.87 | 4.20 | 8.38 | 17.30 | 8.89 | 7.11 |
| | Total/Mean | 100.00 | 100.00 | 40.90 | 60.08 | 37.66 | 24.09 | 7.90 | 6.07 | 3.78 | 1.95 | 9.14 | 6.21 |

Source: “AH-Core”; see Section 2.

Notes: The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages. Missing values result from anonymization.

Table A.3: Extra-EU Imports by Firm Sector and Commodity Type in 2018

| HS Section | Description | Total | | Manufacturing | | Wholesale | | Retail | | Motor Vehicles | | Other | |
|------------|-----------------------------------|-----------|---------|---------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
| | | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports |
| 1 | Live Animals; Animal Products | 0.51 | 0.85 | 18.57 | 23.96 | 43.79 | 68.34 | 11.45 | 3.65 | NA | NA | NA | NA |
| 2 | Vegetable Products | 1.46 | 2.49 | 21.02 | 28.24 | 44.23 | 64.36 | 14.91 | NA | 0.50 | NA | 19.34 | 1.99 |
| 3 | Animal or Vegetable Fats and Oils | 0.31 | 0.28 | 29.86 | 84.48 | 36.88 | 14.04 | 12.12 | 0.22 | 0.37 | 0.00 | 20.77 | 1.25 |
| 4 | Food, Beverages, Tobacco | 1.79 | 1.59 | 25.70 | 39.26 | 36.74 | 51.56 | 14.49 | 3.10 | 0.46 | 0.02 | 22.61 | 6.06 |
| 5 | Mineral Products | 1.04 | 14.11 | 44.23 | 60.05 | 26.39 | 21.58 | 6.03 | 0.01 | 2.85 | 0.00 | 20.49 | 18.36 |
| 6 | Chemical Products | 5.29 | 9.49 | 37.11 | 66.01 | 27.13 | 23.81 | 12.24 | 0.66 | 1.91 | 0.07 | 21.62 | 9.44 |
| 7 | Plastics and Rubber | 10.75 | 3.29 | 34.94 | 46.96 | 28.06 | 35.64 | 13.33 | 3.43 | 3.68 | 9.18 | 19.99 | 4.79 |
| 8 | Leather | 3.36 | 0.60 | 17.53 | 13.46 | 32.69 | 55.30 | 26.88 | 23.99 | 2.81 | 1.25 | 20.08 | 6.00 |
| 9 | Wood | 2.23 | 0.46 | 23.68 | 22.24 | 31.32 | 63.31 | 23.99 | NA | 1.29 | NA | 19.72 | 3.92 |
| 10 | Paper | 6.83 | 0.74 | 25.95 | 68.23 | 30.35 | 17.94 | 17.25 | 4.63 | NA | NA | NA | NA |
| 11 | Textiles | 7.34 | 7.11 | 21.56 | 14.04 | 27.78 | 46.92 | 24.10 | 33.99 | 2.60 | 0.27 | 23.95 | 4.78 |
| 12 | Footwear and Headgear | 2.11 | 1.31 | 13.64 | 11.14 | 32.55 | 45.66 | 29.40 | 39.86 | 3.23 | 0.49 | 21.18 | 2.85 |
| 13 | Stone Products | 4.15 | 0.90 | 31.39 | 50.81 | 27.60 | 34.19 | 15.71 | 7.08 | 4.63 | 3.01 | 20.66 | 4.90 |
| 14 | Precious Metals | 1.63 | 2.23 | 21.29 | 36.69 | 26.53 | 34.42 | 31.52 | 5.61 | 1.61 | NA | 19.05 | NA |
| 15 | Base Metals | 11.06 | 6.12 | 37.75 | 55.88 | 26.40 | 36.86 | 13.18 | 2.05 | 3.39 | 0.71 | 19.26 | 4.51 |
| 16 | Machinery and Electronics | 16.16 | 31.45 | 36.45 | 42.03 | 23.84 | 43.20 | 10.12 | 2.15 | 4.01 | 1.35 | 25.58 | 11.27 |
| 17 | Vehicles | 3.34 | 7.44 | 28.57 | 64.10 | 15.94 | 5.02 | 8.44 | 0.61 | 25.79 | 23.59 | 21.27 | 6.68 |
| 18 | Precision Instruments | 7.45 | 5.49 | 35.62 | 45.69 | 25.48 | 39.61 | 13.02 | 2.78 | 3.32 | 1.63 | 22.55 | 10.29 |
| 19 | Weapons | 0.08 | 0.03 | 21.89 | 43.28 | 22.43 | NA | 35.14 | NA | NA | NA | NA | NA |
| 20 | Miscellaneous Manufacturing | 6.76 | 2.47 | 20.86 | 16.99 | 28.73 | 55.72 | 23.63 | 20.22 | 2.64 | NA | 24.15 | NA |
| 21 | Art | 0.49 | 0.09 | 9.95 | 0.90 | 10.93 | NA | 23.64 | NA | NA | NA | NA | NA |
| 22 | National Categories | 5.85 | 1.46 | 48.36 | 51.91 | 23.72 | 6.27 | 7.80 | 33.45 | 2.35 | 0.79 | 17.76 | 7.57 |
| | Total/Mean | 100.00 | 100.00 | 27.54 | 40.29 | 28.61 | 36.72 | 16.34 | 11.16 | 4.73 | 2.84 | 22.41 | 10.36 |

Source: “AH-Core”; see Section 2.

Notes: The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages. Missing values result from anonymization.

Table A.4: Intra-EU Imports by Firm Sector and Commodity Type in 2018

| HS Section | Description | Total | | Manufacturing | | Wholesale | | Retail | | Motor Vehicles | | Other | |
|------------|-----------------------------------|-----------|---------|---------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
| | | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports | Importers | Imports |
| 1 | Live Animals; Animal Products | 1.75 | 3.01 | 27.13 | 37.02 | 42.54 | 53.40 | 11.70 | 4.88 | NA | NA | NA | NA |
| 2 | Vegetable Products | 2.50 | 3.23 | 24.92 | 18.84 | 45.19 | 67.19 | 13.16 | NA | 0.19 | NA | 16.53 | 4.31 |
| 3 | Animal or Vegetable Fats and Oils | 1.06 | 0.36 | 31.94 | 61.86 | 40.69 | 33.22 | 15.76 | 3.32 | 0.37 | 0.02 | 11.24 | 1.57 |
| 4 | Food, Beverages, Tobacco | 2.86 | 4.18 | 28.06 | 34.71 | 41.38 | 52.45 | 11.86 | 9.99 | 0.78 | 0.08 | 17.92 | 2.77 |
| 5 | Mineral Products | 2.81 | 6.66 | 38.59 | 46.28 | 30.59 | 17.25 | 7.45 | 0.43 | 4.07 | 0.05 | 19.31 | 35.99 |
| 6 | Chemical Products | 7.70 | 10.19 | 42.79 | 46.32 | 28.61 | 47.38 | 9.81 | 2.30 | 2.19 | 0.14 | 16.60 | 3.85 |
| 7 | Plastics and Rubber | 10.99 | 6.12 | 45.17 | 68.77 | 27.63 | 23.04 | 8.31 | 1.62 | 3.02 | 4.01 | 15.87 | 2.56 |
| 8 | Leather | 2.58 | 0.35 | 24.01 | 28.28 | 28.34 | 25.15 | 22.06 | 44.71 | 4.60 | 0.53 | 20.99 | 1.33 |
| 9 | Wood | 3.66 | 1.03 | 38.84 | 46.07 | 31.55 | 42.38 | 11.61 | NA | 1.15 | NA | 16.85 | 5.20 |
| 10 | Paper | 6.70 | 1.96 | 40.94 | 50.41 | 26.83 | 29.83 | 10.83 | 12.84 | NA | NA | NA | NA |
| 11 | Textiles | 6.03 | 2.21 | 35.53 | 39.73 | 27.97 | 29.30 | 16.58 | 27.23 | 2.76 | 0.29 | 17.16 | 3.44 |
| 12 | Footwear and Headgear | 1.99 | 0.64 | 15.98 | 15.16 | 28.37 | 34.65 | 34.99 | 47.28 | 4.53 | 0.48 | 16.13 | 2.43 |
| 13 | Stone Products | 4.92 | 1.18 | 40.42 | 55.69 | 27.09 | 32.07 | 10.79 | 5.71 | 3.31 | 1.48 | 18.39 | 5.04 |
| 14 | Precious Metals | 0.87 | 1.19 | 30.77 | 70.27 | 23.70 | 13.11 | 24.00 | 4.46 | 1.82 | NA | 19.71 | NA |
| 15 | Base Metals | 11.10 | 10.45 | 46.25 | 56.58 | 28.00 | 36.68 | 7.45 | 1.35 | 2.41 | 0.47 | 15.90 | 4.92 |
| 16 | Machinery and Electronics | 12.96 | 22.25 | 44.13 | 61.26 | 26.26 | 26.66 | 7.07 | 4.88 | 3.09 | 1.65 | 19.45 | 5.55 |
| 17 | Vehicles | 4.47 | 18.61 | 26.93 | 61.97 | 14.95 | 3.00 | 8.84 | 0.38 | 29.59 | 29.94 | 19.69 | 4.71 |
| 18 | Precision Instruments | 5.82 | 2.47 | 39.90 | 53.73 | 25.69 | 33.05 | 11.20 | 3.96 | 3.47 | 0.72 | 19.73 | 8.53 |
| 19 | Weapons | 0.06 | 0.02 | 34.97 | 52.04 | 32.17 | NA | 13.99 | NA | NA | NA | NA | NA |
| 20 | Miscellaneous Manufacturing | 5.60 | 2.71 | 29.92 | 39.79 | 29.86 | 31.88 | 17.98 | 23.34 | 2.96 | NA | 19.28 | NA |
| 21 | Art | 0.15 | 0.02 | 9.97 | 1.17 | 12.32 | NA | 38.71 | NA | NA | NA | NA | NA |
| 22 | National Categories | 3.43 | 1.16 | 40.65 | 54.87 | 28.54 | 10.95 | 7.79 | 10.76 | 7.75 | 17.38 | 15.28 | 6.05 |
| | Total/Mean | 100.00 | 100.00 | 33.54 | 45.49 | 29.47 | 31.58 | 14.70 | 13.62 | 4.73 | 3.24 | 18.98 | 7.33 |

Source: “AH-Core”; see Section 2.

Notes: The first two columns give the shares of product sections in the total number of trading firms and the total value of trade, respectively, while the remaining columns give shares of the different firm categories in trade within each product section, with the column-totals interpreted as the unweighted averages. Missing values result from anonymization.

A.1.2 Margin Decompositions

Table A.5: Margin Decomposition for Extra-EU Exports in 2018

| Margin | Firm Category | Mean | Std. Dev. | P1 | P25 | P50 | P75 | P99 |
|--|----------------|------------|-------------|-------|--------|---------|-----------|-------------|
| Value per firm | Manufacturing | 10,105,720 | 289,831,737 | 1,225 | 28,890 | 204,826 | 1,499,691 | 108,687,364 |
| | Wholesale | 1,639,358 | 24,670,169 | 1,053 | 16,695 | 81,495 | 430,839 | 23,915,632 |
| | Retail | 613,461 | 23,514,484 | 915 | 6,643 | 25,875 | 105,296 | 5,826,676 |
| | Motor Vehicles | 460,115 | 4,629,829 | 1,287 | 14,200 | 40,294 | 142,900 | 7,838,576 |
| | Other | 827,091 | 7,637,343 | 400 | 9,081 | 37,990 | 178,474 | 13,360,693 |
| # of products per firm | Manufacturing | 17.9 | 52.2 | 1 | 1 | 4 | 11 | 251 |
| | Wholesale | 18.2 | 53.4 | 1 | 2 | 4 | 13 | 235 |
| | Retail | 12.3 | 56.7 | 1 | 1 | 2 | 7 | 179 |
| | Motor Vehicles | 5.4 | 22.5 | 1 | 1 | 2 | 4 | 63 |
| | Other | 10.9 | 38.1 | 1 | 1 | 2 | 7 | 155 |
| Value per product per firm | Manufacturing | 565,192 | 27,669,484 | 3 | 344 | 2,578 | 20,042 | 6,711,136 |
| | Wholesale | 90,312 | 3,754,467 | 4 | 321 | 1,911 | 10,537 | 1,054,115 |
| | Retail | 49,909 | 1,004,307 | 5 | 262 | 1,478 | 7,302 | 587,853 |
| | Motor Vehicles | 85,710 | 1,117,043 | 5 | 453 | 4,150 | 22,260 | 1,140,730 |
| | Other | 75,798 | 1,903,286 | 3 | 240 | 1,426 | 7,600 | 951,760 |
| # of countries per product per firm | Manufacturing | 4.0 | 7.4 | 1 | 1 | 1 | 4 | 39 |
| | Wholesale | 2.4 | 4.2 | 1 | 1 | 1 | 2 | 22 |
| | Retail | 1.5 | 2.2 | 1 | 1 | 1 | 1 | 10 |
| | Motor Vehicles | 2.1 | 3.8 | 1 | 1 | 1 | 2 | 17 |
| | Other | 1.8 | 3.0 | 1 | 1 | 1 | 1 | 14 |
| Value per country per product per firm | Manufacturing | 140,465 | 6,997,496 | 2 | 200 | 1,380 | 9,364 | 1,762,534 |
| | Wholesale | 37,282 | 1,477,563 | 3 | 195 | 1,122 | 5,862 | 473,461 |
| | Retail | 33,842 | 750,247 | 5 | 227 | 1,242 | 5,700 | 409,697 |
| | Motor Vehicles | 40,851 | 427,793 | 3 | 250 | 2,794 | 14,377 | 608,962 |
| | Other | 41,400 | 1,186,726 | 3 | 183 | 1,100 | 5,710 | 568,348 |

Source: “AH-Core”; see Section 2.

Notes: This table reports summary statistics of the margin decomposition for German extra-EU exports, by margin and firm category. The intensive margins are in €. Note that in column one (Mean), the extensive margins multiplied by the corresponding intensive margins yield the associated trade values, except for rounding errors.

Table A.6: Margin Decomposition for Intra-EU Exports in 2018

| Margin | Firm Category | Mean | Std. Dev. | P1 | P25 | P50 | P75 | P99 |
|--|----------------|------------|-------------|-------|---------|-----------|-----------|-------------|
| Value per firm | Manufacturing | 19,645,227 | 288,979,715 | 3,684 | 827,117 | 2,203,512 | 7,781,111 | 205,268,137 |
| | Wholesale | 7,580,750 | 56,173,007 | 1,571 | 486,800 | 1,289,713 | 3,788,558 | 102,992,356 |
| | Retail | 5,922,845 | 72,801,102 | 173 | 80,450 | 635,978 | 1,700,777 | 85,822,571 |
| | Motor Vehicles | 3,644,852 | 12,831,912 | 2,900 | 369,674 | 996,904 | 2,431,313 | 54,710,323 |
| | Other | 6,082,292 | 79,124,934 | 280 | 150,812 | 810,341 | 2,266,947 | 84,835,696 |
| # of products per firm | Manufacturing | 28.6 | 65.3 | 1 | 2 | 7 | 25 | 308 |
| | Wholesale | 38.4 | 93.9 | 1 | 3 | 10 | 33 | 499 |
| | Retail | 57.0 | 157.9 | 1 | 1 | 7 | 42 | 882 |
| | Motor Vehicles | 14.5 | 67.4 | 1 | 2 | 4 | 7 | 305 |
| | Other | 30.7 | 110.9 | 1 | 1 | 4 | 15 | 540 |
| Value per product per firm | Manufacturing | 686,015 | 21,515,281 | 0 | 207 | 2,059 | 23,457 | 10,134,809 |
| | Wholesale | 197,567 | 6,430,307 | 0 | 176 | 1,630 | 15,320 | 2,765,374 |
| | Retail | 103,932 | 1,477,368 | 0 | 63 | 882 | 9,479 | 1,611,998 |
| | Motor Vehicles | 252,034 | 2,167,556 | 0 | 78 | 1,989 | 40,879 | 4,205,045 |
| | Other | 198,060 | 5,044,198 | 0 | 2 | 140 | 3,596 | 2,531,494 |
| # of countries per product per firm | Manufacturing | 4.9 | 5.7 | 1 | 1 | 2 | 6 | 24 |
| | Wholesale | 4.3 | 5.2 | 1 | 1 | 2 | 5 | 24 |
| | Retail | 3.9 | 4.9 | 1 | 1 | 2 | 5 | 24 |
| | Motor Vehicles | 5.2 | 5.9 | 1 | 1 | 2 | 7 | 26 |
| | Other | 3.2 | 4.1 | 1 | 1 | 1 | 4 | 21 |
| Value per country per product per firm | Manufacturing | 140,837 | 5,732,360 | 0 | 102 | 862 | 8,108 | 1,991,554 |
| | Wholesale | 45,418 | 2,387,774 | 0 | 83 | 593 | 4,642 | 634,453 |
| | Retail | 26,342 | 455,364 | 0 | 41 | 295 | 2,411 | 386,504 |
| | Motor Vehicles | 48,529 | 568,982 | 0 | 16 | 342 | 9,550 | 786,244 |
| | Other | 61,487 | 1,675,626 | 0 | 3 | 109 | 1,962 | 859,669 |

Source: “AH-Core”; see Section 2.

Notes: This table reports summary statistics of the margin decomposition for German intra-EU exports, by margin and firm category. The intensive margins are in €. Note that in column one (Mean), the extensive margins multiplied by the corresponding intensive margins yield the associated trade values, except for rounding errors.

Table A.7: Margin Decomposition for Extra-EU Imports in 2018

| Margin | Firm Category | Mean | Std. Dev. | P1 | P25 | P50 | P75 | P99 |
|--|----------------|-----------|------------|----|-------|--------|---------|------------|
| Value per firm | Manufacturing | 4,313,271 | 80,718,223 | 26 | 4,299 | 41,626 | 371,848 | 45,420,097 |
| | Wholesale | 3,761,042 | 50,057,554 | 20 | 8,815 | 82,623 | 695,298 | 51,347,164 |
| | Retail | 927,364 | 21,195,226 | 21 | 2,226 | 14,591 | 82,069 | 7,047,549 |
| | Motor Vehicles | 1,744,774 | 26,957,360 | 31 | 1,554 | 15,110 | 106,395 | 21,694,514 |
| | Other | 1,055,913 | 32,758,231 | 4 | 808 | 5,929 | 40,369 | 7,248,663 |
| # of products per firm | Manufacturing | 17.5 | 43.3 | 1 | 2 | 5 | 16 | 191 |
| | Wholesale | 17.7 | 39.1 | 1 | 2 | 6 | 17 | 180 |
| | Retail | 12.9 | 37.1 | 1 | 1 | 4 | 10 | 142 |
| | Motor Vehicles | 13.6 | 34.9 | 1 | 1 | 3 | 9 | 169 |
| | Other | 11.5 | 56.2 | 1 | 1 | 3 | 8 | 151 |
| Value per product per firm | Manufacturing | 246,343 | 12,632,058 | 0 | 133 | 974 | 8,405 | 2,300,659 |
| | Wholesale | 212,389 | 8,602,681 | 1 | 174 | 1,499 | 14,193 | 2,726,473 |
| | Retail | 71,750 | 2,847,048 | 0 | 120 | 887 | 6,795 | 991,701 |
| | Motor Vehicles | 127,860 | 4,643,180 | 0 | 69 | 362 | 3,172 | 973,915 |
| | Other | 91,850 | 8,652,148 | 0 | 40 | 300 | 2,332 | 495,457 |
| # of countries per product per firm | Manufacturing | 1.5 | 1.5 | 1 | 1 | 1 | 1 | 8 |
| | Wholesale | 1.4 | 1.2 | 1 | 1 | 1 | 1 | 7 |
| | Retail | 1.4 | 1.3 | 1 | 1 | 1 | 1 | 7 |
| | Motor Vehicles | 1.5 | 1.3 | 1 | 1 | 1 | 2 | 7 |
| | Other | 1.5 | 1.7 | 1 | 1 | 1 | 1 | 8 |
| Value per country per product per firm | Manufacturing | 159,583 | 7,732,223 | 0 | 94 | 700 | 6,049 | 1,598,244 |
| | Wholesale | 148,376 | 6,389,440 | 0 | 144 | 1,188 | 11,049 | 1,957,982 |
| | Retail | 49,563 | 2,179,437 | 0 | 89 | 706 | 5,593 | 751,644 |
| | Motor Vehicles | 82,550 | 3,151,112 | 0 | 44 | 234 | 1,973 | 608,459 |
| | Other | 61,089 | 6,778,760 | 0 | 24 | 204 | 1,498 | 334,836 |

Source: “AH-Core”; see Section 2.

Notes: This table reports summary statistics of the margin decomposition for German extra-EU imports, by margin and firm category. The intensive margins are in €. Note that in column one (Mean), the extensive margins multiplied by the corresponding intensive margins yield the associated trade values, except for rounding errors.

Table A.8: Margin Decomposition for Intra-EU Imports in 2018

| Margin | Firm Category | Mean | Std. Dev. | P1 | P25 | P50 | P75 | P99 |
|--|----------------|------------|-------------|----|---------|-----------|-----------|-------------|
| Value per firm | Manufacturing | 13,050,163 | 205,792,710 | 34 | 227,124 | 1,213,451 | 4,409,644 | 126,750,377 |
| | Wholesale | 7,583,774 | 56,029,209 | 91 | 322,997 | 1,223,744 | 3,678,661 | 108,805,058 |
| | Retail | 4,291,433 | 101,884,290 | 42 | 34,504 | 577,295 | 1,558,481 | 41,343,745 |
| | Motor Vehicles | 8,627,597 | 89,324,004 | 40 | 204,646 | 1,000,633 | 2,821,916 | 69,140,719 |
| | Other | 3,494,156 | 75,944,889 | 7 | 3,677 | 143,625 | 1,045,443 | 38,275,390 |
| # of products per firm | Manufacturing | 35.8 | 95.2 | 1 | 3 | 11 | 30 | 457 |
| | Wholesale | 29.6 | 71.0 | 1 | 2 | 9 | 27 | 337 |
| | Retail | 47.5 | 88.4 | 1 | 3 | 9 | 60 | 412 |
| | Motor Vehicles | 21.7 | 75.3 | 1 | 1 | 3 | 7 | 368 |
| | Other | 41.1 | 115.2 | 1 | 2 | 6 | 26 | 747 |
| Value per product per firm | Manufacturing | 364,301 | 10,242,009 | 0 | 79 | 1,449 | 20,672 | 4,596,566 |
| | Wholesale | 256,374 | 7,676,705 | 0 | 201 | 2,401 | 24,011 | 3,903,659 |
| | Retail | 90,268 | 2,193,777 | 0 | 81 | 1,140 | 10,661 | 1,270,695 |
| | Motor Vehicles | 397,795 | 10,793,443 | 0 | 23 | 336 | 7,099 | 3,833,582 |
| | Other | 85,102 | 11,547,734 | 0 | 1 | 24 | 737 | 758,150 |
| # of countries per product per firm | Manufacturing | 1.9 | 2.0 | 1 | 1 | 1 | 2 | 11 |
| | Wholesale | 1.7 | 1.5 | 1 | 1 | 1 | 2 | 8 |
| | Retail | 1.7 | 1.5 | 1 | 1 | 1 | 2 | 8 |
| | Motor Vehicles | 2.1 | 2.2 | 1 | 1 | 1 | 2 | 12 |
| | Other | 1.8 | 1.8 | 1 | 1 | 1 | 2 | 10 |
| Value per country per product per firm | Manufacturing | 191,089 | 6,160,874 | 0 | 22 | 606 | 9,868 | 2,553,922 |
| | Wholesale | 153,408 | 5,759,046 | 0 | 122 | 1,482 | 14,820 | 2,286,797 |
| | Retail | 52,737 | 1,146,786 | 0 | 52 | 814 | 7,294 | 788,018 |
| | Motor Vehicles | 185,399 | 6,820,200 | 0 | 6 | 132 | 2,380 | 1,711,382 |
| | Other | 47,040 | 8,496,991 | 0 | 0 | 7 | 305 | 386,995 |

Source: “AH-Core”; see Section 2.

Notes: This table reports summary statistics of the margin decomposition for German intra-EU imports, by margin and firm category. The intensive margins are in €. Note that in column one (Mean), the extensive margins multiplied by the corresponding intensive margins yield the associated trade values, except for rounding errors.

A.1.3 Country-Product Distributions

Table A.9: Distribution of Extra-EU Exports by Number of Countries and Products in 2018

| Share of Firms in % | | Number of Countries | | | | | | |
|---------------------|-------|---------------------|------|------|------|-------|-------|--------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 24.04 | 3.01 | 1.10 | 0.60 | 0.36 | 0.61 | 0.26 | 29.98 |
| 2 | 6.93 | 4.26 | 1.52 | 0.75 | 0.46 | 0.87 | 0.37 | 15.15 |
| 3 | 3.31 | 2.01 | 1.32 | 0.75 | 0.45 | 0.89 | 0.46 | 9.19 |
| 4 | 1.98 | 1.20 | 0.80 | 0.61 | 0.41 | 0.93 | 0.45 | 6.38 |
| 5 | 1.35 | 0.80 | 0.56 | 0.39 | 0.31 | 0.75 | 0.45 | 4.62 |
| 6-10 | 3.01 | 1.89 | 1.32 | 1.02 | 0.79 | 2.16 | 1.88 | 12.06 |
| 11+ | 3.15 | 2.14 | 1.61 | 1.34 | 1.17 | 4.28 | 8.92 | 22.61 |
| Total | 43.77 | 15.31 | 8.23 | 5.46 | 3.94 | 10.49 | 12.78 | 100.00 |

| Share of Value in % | | Number of Countries | | | | | | |
|---------------------|------|---------------------|------|------|------|------|-------|-------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 2.29 | 0.56 | 0.18 | 0.05 | NA | NA | NA | NA |
| 2 | 0.67 | 0.89 | 0.18 | 0.08 | NA | NA | NA | NA |
| 3 | 0.28 | 0.48 | 0.21 | 0.24 | 0.10 | 0.27 | 0.47 | 2.05 |
| 4 | 0.18 | 0.26 | 0.13 | 0.15 | 0.15 | 0.23 | 0.36 | 1.45 |
| 5 | 0.15 | 0.89 | 0.36 | 0.12 | 0.06 | 0.34 | 0.35 | 2.29 |
| 6-10 | 0.39 | 0.44 | 0.60 | 0.29 | 0.36 | 1.29 | 2.13 | 5.50 |
| 11+ | 0.87 | 1.01 | 0.77 | 0.79 | 1.15 | 6.32 | 72.04 | 82.95 |
| Total | 4.83 | 4.53 | 2.43 | 1.72 | NA | NA | NA | NA |

Source: “AH-Core”; see Section 2.

Notes: This table reports the shares of exporting firms and export value by the number of exported products and destination countries for Germany’s extra-EU exports. Row and column totals refer to the sums of shares and contain NA whenever one of their components is missing. Missing values result from anonymization.

Table A.10: Distribution of Intra-EU Exports by Number of Countries and Products in 2018

| Share of Firms in % | | Number of Countries | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 5.57 | 1.84 | 1.29 | 1.14 | 0.92 | 3.43 | 4.98 | 19.17 |
| 2 | 1.21 | 1.26 | 0.83 | 0.69 | 0.62 | 2.39 | 2.98 | 9.98 |
| 3 | 0.62 | 0.61 | 0.67 | 0.50 | 0.43 | 1.73 | 2.24 | 6.81 |
| 4 | 0.45 | 0.41 | 0.38 | 0.37 | 0.35 | 1.50 | 1.86 | 5.33 |
| 5 | 0.26 | 0.31 | 0.27 | 0.31 | 0.27 | 1.23 | 1.78 | 4.42 |
| 6-10 | 0.79 | 0.65 | 0.64 | 0.70 | 0.81 | 3.46 | 6.85 | 13.91 |
| 11+ | 1.64 | 1.24 | 1.13 | 1.17 | 1.19 | 6.46 | 27.56 | 40.40 |
| Total | 10.54 | 6.32 | 5.21 | 4.89 | 4.60 | 20.19 | 48.26 | 100.00 |

| Share of Value in % | | Number of Countries | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 1.06 | 0.38 | 0.93 | 0.29 | NA | NA | NA | NA |
| 2 | 0.27 | 0.24 | 0.16 | 0.14 | NA | NA | NA | NA |
| 3 | 0.16 | 0.18 | 0.11 | 0.11 | 0.09 | 0.64 | 1.22 | 2.51 |
| 4 | 0.08 | 0.06 | 0.08 | 0.07 | 0.29 | 0.56 | 1.08 | 2.22 |
| 5 | 0.07 | 0.08 | 0.05 | 0.07 | 0.09 | 0.42 | 0.91 | 1.69 |
| 6-10 | 0.17 | 0.17 | 0.25 | 0.18 | 1.27 | 1.28 | 4.39 | 7.71 |
| 11+ | 0.49 | 0.39 | 0.49 | 0.73 | 0.65 | 4.62 | 69.94 | 77.31 |
| Total | 2.30 | 1.52 | 2.08 | 1.59 | NA | NA | NA | NA |

Source: “AH-Core”; see Section 2.

Notes: This table reports the shares of exporting firms and export value by the number of exported products and destination countries for Germany’s intra-EU exports. Row and column totals refer to the sums of shares and contain NA whenever one of their components is missing. Missing values result from anonymization.

Table A.11: Distribution of Extra-EU Imports by Number of Countries and Products in 2018

| Share of Firms in % | | Number of Countries | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 24.32 | 0.98 | 0.15 | 0.05 | 0.02 | 0.02 | 0.01 | 25.55 |
| 2 | 7.59 | 4.80 | 0.53 | 0.12 | 0.03 | 0.04 | 0.01 | 13.11 |
| 3 | 3.59 | 3.12 | 1.39 | 0.27 | 0.07 | 0.06 | 0.01 | 8.52 |
| 4 | 2.12 | 2.05 | 1.27 | 0.50 | 0.15 | 0.09 | 0.01 | 6.19 |
| 5 | 1.35 | 1.45 | 1.05 | 0.56 | 0.21 | 0.14 | 0.01 | 4.79 |
| 6-10 | 2.75 | 3.45 | 3.05 | 2.04 | 1.23 | 1.36 | 0.11 | 13.99 |
| 11+ | 1.80 | 2.66 | 2.80 | 2.77 | 2.65 | 8.17 | 6.99 | 27.86 |
| Total | 43.53 | 18.52 | 10.24 | 6.32 | 4.37 | 9.88 | 7.15 | 100.00 |

| Share of Value in % | | Number of Countries | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total |
| 1 | 0.85 | 0.10 | 0.02 | 0.01 | NA | NA | NA | NA |
| 2 | 0.35 | 0.33 | 0.10 | 0.02 | NA | NA | NA | NA |
| 3 | 0.17 | 0.23 | 0.26 | 0.06 | 0.02 | 0.06 | 0.02 | 0.82 |
| 4 | 0.12 | 0.18 | 0.16 | 0.21 | 0.06 | 0.06 | 0.02 | 0.82 |
| 5 | 0.13 | 0.12 | 0.15 | 0.15 | 0.06 | 0.08 | 0.29 | 1.00 |
| 6-10 | 0.22 | 0.37 | 0.62 | 0.63 | 0.48 | 1.65 | 0.34 | 4.30 |
| 11+ | 0.29 | 0.66 | 0.79 | 1.28 | 1.80 | 11.11 | 75.02 | 90.96 |
| Total | 2.14 | 2.00 | 2.10 | 2.37 | NA | NA | NA | NA |

Source: “AH-Core”; see Section 2.

Notes: This table reports the shares of importing firms and import value by the number of imported products and origin countries for Germany’s extra-EU imports. Row and column totals refer to the sums of shares and contain NA whenever one of their components is missing. Missing values result from anonymization.

Table A.12: Distribution of Intra-EU Imports by Number of Countries and Products in 2018

| Share of Firms in % | | Number of Countries | | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|--|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total | |
| 1 | 12.21 | 1.74 | 0.85 | 0.59 | 0.45 | 1.13 | 0.38 | 17.36 | |
| 2 | 2.93 | 2.93 | 0.97 | 0.52 | 0.37 | 0.75 | 0.23 | 8.69 | |
| 3 | 1.38 | 1.37 | 1.43 | 0.66 | 0.33 | 0.73 | 0.16 | 6.06 | |
| 4 | 0.99 | 0.85 | 1.04 | 0.82 | 0.41 | 0.67 | 0.13 | 4.92 | |
| 5 | 0.70 | 0.57 | 0.72 | 0.76 | 0.51 | 0.79 | 0.12 | 4.15 | |
| 6-10 | 1.98 | 1.30 | 1.63 | 1.93 | 1.89 | 4.34 | 0.59 | 13.65 | |
| 11+ | 1.97 | 1.73 | 2.02 | 2.45 | 3.08 | 18.04 | 15.88 | 45.17 | |
| Total | 22.15 | 10.47 | 8.66 | 7.73 | 7.04 | 26.45 | 17.49 | 100.00 | |

| Share of Value in % | | Number of Countries | | | | | | | |
|----------------------------|----------|----------------------------|----------|----------|----------|-------------|------------|--------------|--|
| Number of Products | 1 | 2 | 3 | 4 | 5 | 6-10 | 11+ | Total | |
| 1 | 1.20 | 0.38 | 0.25 | 0.14 | NA | NA | NA | NA | |
| 2 | 0.38 | 0.53 | 0.20 | 0.15 | NA | NA | NA | NA | |
| 3 | 0.23 | 0.24 | 0.25 | 0.23 | 0.09 | 0.29 | 0.17 | 1.50 | |
| 4 | 0.11 | 0.36 | 0.17 | 0.21 | 0.19 | 0.25 | 0.18 | 1.47 | |
| 5 | 0.12 | 0.13 | 0.12 | 0.24 | 0.14 | 0.33 | 0.14 | 1.24 | |
| 6-10 | 0.25 | 0.27 | 0.54 | 0.49 | 0.63 | 2.10 | 0.75 | 5.02 | |
| 11+ | 0.55 | 1.24 | 0.77 | 0.70 | 2.31 | 13.81 | 66.44 | 85.82 | |
| Total | 2.85 | 3.15 | 2.30 | 2.16 | NA | NA | NA | NA | |

Source: “AH-Core”; see Section 2.

Notes: This table reports the shares of importing firms and import value by the number of imported products and origin countries for Germany’s intra-EU imports. Row and column totals refer to the sums of shares and contain NA whenever one of their components is missing. Missing values result from anonymization.