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# Exporters of Services: A Look at U.S. Exporters outside of the Manufacturing Sector

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**Abstract**

Using transaction data for the U.S., this paper presents a series of stylized facts on exporters in services industries. We find that most of the basic facts on manufacturing exporters extend to the services sectors with three important differences. First, the participation rate of services firms in foreign markets is much lower than that of manufacturing firms. Second, the size premia at services exporters are significantly higher than those among manufacturers. Third, the survival rates of services exporters tend to be lower than that of manufacturing exporters. All three facts are compatible with the hypothesis that firms in services sectors face larger trade costs. A simple calibration suggests that services firms face two-to-three-time higher fixed costs than manufacturing exporters.

*Key words*: Exporters of Services, Firm Heterogeneity, Extensive and Intensive Margins, Trade Costs.

*JEL classification*: F14.

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†The views presented in this paper represent those of the authors and do not necessarily coincide with those of the Federal Reserve System.

# 1 Introduction

Services trade has grown rapidly over the last decade and now accounts for about 30 percent of U.S. exports. However, despite the increasing importance of the U.S. services sector in foreign markets, empirical work has mostly focused on manufacturing because of service-sector data limitations.[1] While a number of recent contributions has established new facts on European services firms engaged in foreign markets, little is known on services exporters located in the United States, the world's largest exporter of services.[2] Among the exceptions, Gervais and Jensen [2019] use data on the distribution of services within the United States to indirectly determine the worldwide "tradability" of services. Complementing the existing literature on trade in services, our paper establishes a new series of stylized facts on U.S. exporters of services: In addition to the standard margins of trade (countries and firms), our contribution dissects the customer margin and identifies its influence on firm heterogeneity.

We rely on the Compustat customer segment data, a source of unique firm-to-firm transactions across all sectors in the U.S. economy. Exploiting the customer name and the market segment of the buyer, we construct a foreign indicator that differentiates between domestic and foreign transactions. Our analysis focuses on the broadly defined services sector, including most industries outside of goods production: specifically, our definition encompasses wholesale and retail trade, transportation and warehousing, business and personal services. With no direct information on products, we characterize services exports as the exports of firms classified in services industries; while our definition may combine the export of different types of products, the availability on firm-to-firm transactions partly addresses that limitation.

Our results indicate that most of the basic facts documented in the trade literature for manufacturing exporters also apply to services industries; there are, however, three important distinctions. First, the participation rate of services firms in foreign market is lower than that of manufacturing firms. In our data, the share of exporters in services is, on average, 15 percentage points smaller than that of manufacturing firms, with large variation across 3-digit sectors. Second, the size premia at exporters of services are significantly higher than those among manufacturers. While there is no significant difference in the market value of equity between exporters and domestic firms in

[1] See Francois and Hoekman [2010] for an extensive literature review; Jensen [2011] focuses on the role of services in U.S. trade.

[2] See, among others, Ariu and Mion [2010] and Ariu [2016] on Belgium; Kelle and Kleinert [2010] on Germany; Walter and Dell'mour [2010] on Austria; Breinlich and Criscuolo [2011] on the U.K.; Gaulier et al. [2011] on France; Grubljesic and Damijan [2011] on Slovenia; Haller et al. [2014] on Finland, France, Ireland, and Slovenia; and Federico and Tosti [2017] on Italy.

manufacturing, exporters of services are 30 percent bigger than non-exporter with respect to that metric; other dimensions are, instead, not significantly different between the two groups. Third, the survival rates of services exporters tend to be lower than that of manufacturing exporters. Only 62 percent of the new services exporters continue to export the year after entry, while the 1-year survival probability among manufacturing exporters is 71 percent. Over time, the gap between the two sectors tends to shrink.

All three facts point to higher trade costs for services firms. With limited data that quantify trade costs in services, we combine our stylized facts with sector-level estimates of the elasticity of substitution from Gervais and Jensen [2019] to calibrate differences in trade costs across sectors. We find that the variation in export participation alone implies that fixed export costs for services firms are between 1.4 and 1.7 times as large as those for manufacturers. If taking into account also differences in the elasticity of substitutions, our estimates suggest a two-to-threefold divergence.

Our paper contributes to the growing literature on services trade, recently reviewed by Francois and Hoekman [2010]. With a focus on firm-level evidence, our paper is closely related to recent work on services exporters for a group of European countries.[3] An important novelty of our analysis is the decomposition of services exports along the customer margin, which has recently been receiving more attention in the literature on goods trade.[4]

The rest of the paper is organized as follows. Section 2 describes our data. Section 3 introduces new stylized facts on U.S. services exporters. Section 4 present a trade cost calibration, and section 5 concludes.

# 2 Data

Our analysis relies on a unique dataset, the Compustat customer segment, which collects the filings of public firms on their major customers–that is, customers that account for at least 10 percent of their total sales–, in compliance with Statement No. 14 (1976) and the Statement No. 131 (1997) of the Financial Accounting Standards. Thus, the Compustat customer segment is a source of unique firm-to-firm transactions across all sectors of the economy.

To identify foreign transactions, we rely on two main pieces of information from the dataset:

[3]Recent work on exporters of services include Ariu and Mion [2010] and Ariu [2016] on Belgium; Kelle and Kleinert [2010] on Germany; Walter and Dell'mour [2010] on Austria; Breinlich and Criscuolo [2011] on the U.K.; Gaulier et al. [2011] on France; Grubljesic and Damijan [2011] on Slovenia; Haller et al. [2014] on Finland, France, Ireland, and Slovenia; and Federico and Tosti [2017] on Italy.

[4]Among recent contributions, see Bernard et al. [2018b] and Carballo et al. [2018].

the customer name and the market segment of the buyer.[5] A brief description of our methodology follows.

First, we match the reported customer names to Compustat firms. To address the problem of non-standardized customer names, we adopt a similar strategy to Fee and Thomas [2004]. After excluding all customers with unreported names and those identified as governments or geographic regions, we run a text-matching program requiring the letters in the customer name to be sequentially present in a potential match. To ensure matching accuracy, we manually review the matched pairs: if there are multiple potential matches, and we cannot identify a unique match by looking at information on firm web sites or Google, we exclude all these possible firm-customer pairs from the sample. The name matching procedure results in 23,833 firm-customer or 74,353 firm-customer-year observations. Of the matched sample, we use the customer's headquarters to proxy for the firm's physical location in order to differentiate between domestic and foreign transactions.

Second, we complement the name matching strategy with additional geographic imputations based on the customer's name or the market segment. Finally, for the largest unmatched transactions, we look at publicly available information to identify the foreign status of the customer. Overall, we are able to assign a foreign status indicator to 449,015 firm-customer-year transactions– that is, to over 84 percent of the total number of observations. Because of a large number of zero dollar transactions, the share is even larger in terms of value: we identify the foreign status for more than 90 percent of the observations.[6]

With the inclusion of a foreign indicator, the Compustat customer segment parallels traditional data on firm-level U.S. exports with two important distinctions. First, the dataset includes annual transactions of U.S. firms with domestic and foreign customers.[7] Second, the dataset is not restricted to manufacturing firms but includes transactions of firms in all sectors of the economy. In our analysis, we focus on a broad definition of the service sector, considering most industries outside of goods production: retail and wholesale trade, transportation and warehousing, business services, and personal services.

However, the restrictions that identify the data–the exclusive inclusion of public firms and of large transactions–may affect the interpretation and the generalizabity of our results. Table A1 compares the distribution of firms by sector in our data to the economy-wide distribution from County Business Patterns data. The composition of our sample is skewed towards larger firms:

[5] For customers identified as geographic regions, the dataset records the location where the shipment is directed to.

[6] The reported value is zero for about 15,000 transactions.

[7] Information on domestic transactions is collected by the U.S. Census Bureau only every 5 years via the Commodity Flow Survey and is restricted to selected sectors.

enterprises with at least 500 employees represent more than 50 percent of the firms in our sample vs. 1-2 percent in the entire economy. While our data place more emphasis on large enterprises, the divergence in composition appears more contained if considering that large firms account for the largest fraction of overall employment, as detailed in table A2.[8] The skewness of our sample suggests that a straightforward comparison to other results for services firms in the literature might not be accurate. Thus, in our analysis, we'll be using the manufacturing sector as a reference point; in particular, we'll be looking at differences of services firms with respect to manufacturing firms in our sample and compare those differences to other available data.

# 3 The Margins of U.S. Firm-Level Exports in Services

Following the existing literature on trade at the firm-level, we analyze static and dynamic aspects of export flows in services and contrasts their features to the manufacturing sector as well as to other contributions on services trade. In our analysis, we characterize services exports as the exports of firms in the services sectors: with NAICS codes reflecting the activity that generates the largest share of total revenues, our definition should mainly capture transactions of services. Exploiting the disaggregation over the customer margin, we partly address the concern that the composition of exports is skewed towards a group of products that mostly includes goods or other services. Another missing piece of information is the identification of the precise mode of exporting. With the imputation of foreign status of transaction partly from firms' location, it is likely that the majoity of our dataset covers the cross-border supply of services (known as mode 1 in GATS-speak).[9] Next section describes the main elements that contribute to the cross-sectional variation in U.S. services exports; section 3.2 explores entry, exit, and survival of services firms in foreign markets.

## 3.1 Cross-Sectional Variation in U.S. Services Exports

In this section, we describe the cross-sectional features of U.S. services exporters. Table 1 highlights that firm exporting is a relatively rare activity in services industries, in line with the prediction in the trade literature on heterogeneous firms following Melitz [2003]. Replicating the analysis in Bernard et al. [2007] and Bernard et al. [2018a], column (2) reports the average share of firms in a given industry that export; we calculate the average for firms with reported transactions between

[8] Firms with at least 500 employees account for about 99 percent of total employment in our data.

[9] Sampson and Snape [1985] classify the different modes of supply in services trade; that classification has been subsequently included in the design of the General Agreement on Trade in Services (GATS).

2003 and 2007. On average, the share of exporters in 2-digit NAICS sectors ranges between 15 percent in retail trade industries and 35 percent in the transportation sector, with the variation likely reflecting differences in trade costs across sectors.[10] Within 2-digit sectors, the variation is even larger: industries, such as general merchandise stores, gasoline stations, and social assistance services, report no exporters, while in other sectors–the examples here are water transportation, accommodation services, and repair & maintenance services–at least half of all firms are exporters. Overall, the shares of services exporters in our data is roughly in line with the export participation rates of German business services firms reported by Vogel and Wagner [2010], which focus on a sample of large firms.[11] Relative to other contributions in the literature, the participation rate of U.S. firms is well above that of most studies on European services exporters, with most of the difference likely explained by the fact that the Compustat customer segment database is skewed toward larger firms and bigger transactions.[12]

For a more direct comparison, table A3 reports exporters' statistics for the manufacturing sector: we find that 41 percent of firms in manufacturing are exporters, a number somewhat above the average export participation of services firms within Compustat.[13] Comparing the shares of goods and services exporters, similar discrepancies also applies to European data, as shown in Haller et al. [2014] and Ariu [2016].

The differences in participation relative to the manufacturing sector partly disappear when looking at export values. Column (3) emphasizes that the average share of exports in firm shipments averages between 18 and 32 percent for 2-digit NAICS sectors, values which are below the export share for manufacturing (35 percent). A relatively higher similarity in the fraction of shipments sent to foreign markets between manufacturing and services exporters could stem from the prevalence of goods in the product composition of services exports. In particular, Haller et al. [2014] find that the shares of services exports in overall exports by services firms range from 18 percent in Finland to 42 percent in Ireland.[14] While product codes are not directly available in our data, we examined the NAICS codes of customers to differentiate between exports of goods and exports of services.[15] Table

[10] In a more extensive definition, trade costs encompass the intrinsic lower tradability of some services. In particular, services tend to be non-storable and, thus, frequently require either the provider or the customer to reach the other party.

[11] Using data on German enterprises with total sales above 250,000 euros, Vogel and Wagner [2010] report that the share of exporters in all enterprises was about 14 percent in 2003 and about 16 percent in 2005.

[12] The export participation rates among services firms vary between 0.14 percent for German firms (Kelle and Kleinert [2010]) and 50 percent for Slovenian firms (Haller et al. [2014]).

[13] Using micro-level data on U.S. establishments, Bernard et al. [2018a] document that 37 percent of manufacturing firms were exporters in 2007.

[14] Haller et al. [2014] also report that services account for 75 percent of overall exports by services firm. However, they explain that France could be an outlier because they are missing data on wholesale and retail trade, which typically have lower export participation rates.

[15] We assign customers' NAICS codes following a similar procedure to the identification of the foreign status of

A4 confirms that almost half of all export transactions are between services firms and customers in good-producing sectors; the share, however, is somewhat smaller in terms of value, 36 percent, but still points to the fact that firms in services industries are also exporters of goods.[16]

Next we investigate the contribution of the intensive and extensive margins to the cross-sectional differences between manufacturing and services. Following Bernard et al. [2009], we decompose firm-level export flows, $\mathrm{X}_{ft}$, as follows

$$\mathrm{X}_{ft} = n_{ft} c_{ft} d_{ft} \bar{x}_{ft}$$

where $n_{ft}$ represents the number of countries, $c_{ft}$ denotes the number of customers, $d_{ft}$ indicates the density of trade–that is, the share of customer-country combinations with positive trade, $d_{ft} \equiv \frac{\pi_{ft}}{n_{ft} c_{ft}}$–, and $\bar{x}_{ft}$ is the average exports of firm $f$ at time $t$ across customer-country combinations with positive trade, $\bar{x}_{ft} \equiv \frac{\mathrm{X}_{ft}}{\pi_{ft}}$. This decomposition identifies three extensive (number of countries, number of customers, and density) and one intensive (average value) margins.

Table 2 summarizes the distribution of services exporters across each margin; for comparison, table A5 reports analogous statistics for manufacturing exporters.[17] Services and manufacturing exporters appear remarkably similar along the extensive margins, with only minor differences towards the top of the distribution. The median exporter trades with one customer located in a single country. The average value of export transactions, instead, carries the bulk of the differences: transactions at services exporters are, on average, smaller than those of manufacturing firms, with more meaningful differences for the top traders. Part of this divergence reflects the distinct characteristics of the distribution of exporters within each sector. Figures A1 and A2 reveal that the size distribution of manufacturing exporters, measured either in terms of employment or in terms of sales, has a fatter right tail. If trade costs between the two industry groups were similar, higher size of manufacturers at the top of the distribution would directly translate into larger export transactions. However, differences in participation also suggest that trade costs have a higher incidence on services exports, contributing to the differences along the intensive margin.

Table 3 rephrases the dominant role of the intensive margin in the variation of exports across firms. Following Bernard et al. [2009], we separately regress the log of each margin against the log of total exports, $\ln X_{ft}$; the coefficient on $\ln X_{ft}$ in each regression represents the share of export variation explained by each margin. The intensive margin is the biggest source of variation,

transactions. In particular, we were able to impute NAICS codes for 119,725 firm-customer-year observations.

[16] We classify NAICS 11 (agriculture & forestry), NAICS 21 (mining), and NAICS 31-33 (manufacturing) as good-producing sectors.

[17] Sector-level details for each 2-digit service sector is available in table A7.

accounting for more than 80 percent of the variability in firm-level export flows. Recently, Breinlich and Criscuolo [2011] and Federico and Tosti [2017] have also documented that the intensive margin explains most of the firm-level variation in services exports. In our data, a quantitatively similar decomposition also applies to manufacturing firms, as shown in table A6; this result differs from the findings on the exports of goods by U.S. firms: in particular, Bernard et al. stress the importance of the extensive margins.[18] While the restriction to public firms and larger transactions in our data may have some effect on the OLS results for manufacturing, our findings may also be in part related to the application of the OLS decomposition at the customer level.

Despite making a small contribution to the cross-sectional variation in exports, the customer margin is a novel feature of our data that we'll exploit next to document a set of facts on exporters-customers' relationships. Figure 1 explores the distribution of services exporters across customers and confirms that the rare nature of the exporting activity extends to other margins of participation in international trade. While the majority of firms exports to a single customer, those firms account for about 7 percent of export value and 10 percent of employment. Firms that export to 6 or more customers, instead, represent more than 50 percent of the total export value and of employment.

Table 4 provides further details on the customer dimension. We classify the relationship between an exporting firm and its customer into four categories: one-to-one, including exporters and customers that have a single connection; many-to-one, referring to the group of exporters that has multiple connections and the set of customers with a single connection; one-to-many, denoting exporters with a unique connection and customers with multiple connections; and many-to-many, capturing exporters and customers with multiple connections. One-to-many matches account for more than 50 percent of aggregate services trade in our data, confirming the dominant role of a small group of exporters in shaping trade patterns through their extensive connections. In manufacturing, one-to-many connections also account for a large share of matches and exports (table A8).[19] While larger exporters tend to be well connected and sell to a variety of customers, figure 2 implies that smaller firms tend to be less connected are able to reach only the most important customers. After classifying each firm by the number of foreign market connections, we find that a 1 percent increase in the number of customers per exporter is associated with a 0.3 percent decline in the average number of connections among the customers–the slope of the fitted regression line in figure 2. The degree of negative assortativity in services trade in our data is just a little below

[18] Eaton et al. [2011], instead, find that the intensive margin adjustments also dominate firm-level variation in export flows across the French manufacturing firms.

[19] Bernard et al. [2018b] report a more significant role of many-to-many matches, which, in Norwegian data, account for two-thirds of aggregate trade.

an analogous estimate for the manufacturing sector; Bernard et al. [2018b], instead, finds quite a weaker degree of negative assortativity between Norwegian manufacturing exporters and their customers. The similarity between manufacturing and services in our data, however, hides large sectoral differences, which arise because of the size of the set of potential contacts and the magnitude of relationship-specific costs: Table A9 shows that, conditional on the number of customers per exporter, the average number of export connections across customers declines faster in personal and business services than in wholesale and retail trade, pointing to higher concentration and lower transaction costs in the trade sectors.

The negative degree assortativity over the number of connections coexists with positive assortative matching on firm size.[20] Figures 3 and 4 describes the sorting patterns between exporters and customers. Ranking firms according to their average size–measured by employment in figure 3 and total sales in 4–, we find that large exporters of services match with large customers. Dragusanu [2014], Benguria [2015], and Sugita et al. [2016] document qualitatively similar findings for the relationships between foreign exporters and U.S. buyers in the manufacturing sector. In our data, our estimates point to stronger sorting for services industries relative to the manufacturing sector, which could arise because of either technological differences or cross-sectoral variation in search costs.

**Firm Characteristics**

The literature on heterogeneous firms in trade has documented that exporters in manufacturing are different from non-exporters. Table 5 explores the margins of systematic differences between exporters and non-exporters in services industries in the spirit of Bernard et al. (2007) and (2018a). Each row of the table shows the implied average percent difference between exporters and non-exporters, estimated in a regression of firm characteristics against a dummy variable capturing the firm export status. Starting with the results in column (1), we confirm that exporters tend to be larger–41 percent larger in terms of employment, 52 percent in terms of shipments, and 87 percent in terms of market capitalization; another important margin that distinguishes exporters from non-exporters are capital expenditures, which are 79 percent higher at exporting firms than at non-exporters. Differences in terms of labor productivity or capital intensity are, instead, not significant in column (1). Column (2) suggests that unobserved heterogeneity across sectors dampens exporters' premia: we find that differences relative to non-exporters tend to be magnified after controlling for industry fixed effects. Finally, column (3) investigates the impact of differences in size, measured by

[20] Bernard et al. [2018b] proves that the negative degree assortativity is consistent with positive assortative matching on the intensive margin.

employment, on perfomance premia in foreign markets: in our most restricted specification, exporters are significantly different from non-exporters not only in terms of revenue, market capitalization, and capital expenditures, but also as to output per worker and capital intensity.

Table A10 includes manufacturing firms in our analysis. All specifications include time dummies, sector fixed effects, and a control for size (log Employment), as in column (3) of table 5. The interaction between the export dummy and the services sector dummy identifies the average percent difference of services export premia relative to premia of exporters in manufacturing. We find that the premia at services exporters are significantly higher than those of manufacturing exporters in terms of market valuation: Exporters of services are 30 percent bigger than non-exporters, while there is no significant difference between exporters and domestic firms in manufacturing along the same dimension. Looking at other characteristics, being an exporter is not associated with significant differences between the two industry groups.[21] In sum, our analysis suggests that exporters of services are different from non-exporters in services and manufacturing exporters.

## 3.2 Time-Series Variation in U.S. Services Exports

The change in aggregate U.S. exports between year $t$ and year $t-1$ can be decomposed into 3 margins: the increase due to new firm entry in foreign markets, the decrease due to the exit of existing exporters, and the expansion/contraction of exports at continuing firms. This section analyzes the contributions of each margin and the characteristics among entering, exiting, and continuing exporters.

Figure 5 offers an overview of export participation in each sector between 2000 and 2016. Confirming the cross-sectional results reported in tables 1 and A3, we find that export participation is higher in manufacturing than in services sectors in each year of our sample. The evolution of foreign participation appears roughly similar across sectors: all sectors share an upward trend over the years in our sample. In particular, export participation more than doubled in wholesale trade and business services between 2000 and 2016; the share of exporters also rose in other sectors, with increases ranging between 11 and 28 percentage points.

Table 6 decomposes overall participation in foreign markets into entry (entrants), exit (exiting), and survival (continuing firms). In all sectors, the share of entrants is larger than the share of exiting exporters, a finding that translates into the steady increase in participation shown in figure 5. Exit and entry rates tend to be higher across services firms relative to the manufacturing sector,

[21] Our estimates of exporter premia in the manufacturing sectors are in line with what has been reported by Bernard et al. [2007] and Bernard et al. [2018a].

resulting in higher turnover rates in services industries. The difference in turnover rates between manufacturing and services exporters occurs during a period of faster growth in the exports of services; Ariu [2016] documents a similar finding for Belgian exporters between 1995 and 2005. The faster growth and higher turnover of services exports are coupled with larger exit rates among entrants: 16 percent of firms in services industries leave the foreign markets the year after entry vs. 13 percent of manufacturing firms.

Table 7 highlights the characteristics of entrants and exiting firms. New and exiting firms represent a small share of total services exports–7 percent and 9 percent, respectively, as in **?**; the number of countries, the number of customers, and density among entrants and exiting firms are similar to those of the average exporter. Table 8 characterizes a systematic comparison of entrants/exiting firms relative to continuing exporters. We focus on the results of columns (3) for entrants and (6) for exiting firms, the specifications that include year dummies, sector fixed effects and a firm size (measured by employment). While entrants tend to be smaller–with insignificant export premia after controlling for firm size–exiting firms tend to be worse performer: firms that exit from foreign markets are not only smaller, but also less productive and less capital intensive relative to continuing exporters.

Our analysis so far suggests that continuing exporters account for the bulk of services exports. Given their importance, we'll next look at survival in more details. Figure 6 shows the survival probabilities $t$ years after starting to export: only 62 percent of the new services exporters continue to export the year after entry. The survival probability is noticeably higher for manufacturing firms, at 71 percent, a 10-percentage-point difference that carries forward for a few years after entry. Similarly, Ariu [2016] finds that trading services is much riskier than trading goods. The survival probabilities for services exporters exponentially decline but catch up some to the rates of survival among manufacturers: 20 years after entry, only 1 percent of manufacturing exporters continue to serve the foreign markets vs. 0.5 percent of services exporters.

We conclude our analysis with an investigation on the growth rates of services exports. Table 9 decomposes yearly growth into the contribution of the extensive margins and that of the intensive margin. In addition to entry and exit–summarized in column (2)–column (3) identifies a second extensive margin, changes in exports due to the addition or dropping of countries and customers. Finally, column (4) shows the contribution to growth of expanding/contracting transactions between exporters and their continuing customers. Services exports grew at about 4.5 percent per year over 2000-2016, with faster growth in the earlier part of our sample. Averaging at 4.2 percent per year between 2000 and 2016, the intensive margin contributed more than 90 percent to total export

growth; the two extensive margins, instead, average up at about 0.1 percent per year. An analogous time-series decomposition of export growth in manufacturing yields similar results, as shown in table A11.[22]

# 4 Trade Costs: Services vs. Manufacturing

The stylized facts that we have presented point to large differences in trade costs between manufacturing and services. Taking stock of our new evidence, this section offers a calibration of trade costs based on the empirical evidence.

In a theoretical framework à la Melitz [2003], foreign sales at successful exporters, net of variable costs, are required to cover the fixed costs of exporting. Exploiting the property that variable profits are fraction of total sale, the condition for exporting requires that

$$\frac{r_i}{\sigma} \geq f \tag{1}$$

where $r_i$ denotes total revenue of firm $i$, $\sigma$ represent the demand elasticity, and $f$ the fixed cost of exporting. Exploiting the empirical distribution of total sales and the share of exporters, we can, thus, easily identify the fixed costs of exporting. In particular, the condition (1) implies that the share of exporters, $s_x$, coincides with the firms whose revenues are above $\sigma \cdot f$,

$$s_x = 1 - G(\sigma \cdot f) \tag{2}$$

where $G(\cdot)$ denotes the size distribution of firms in equilibrium. Under the assumption that $G(\cdot)$ is Pareto with slope parameter $\kappa$, condition (2) becomes

$$s_x = (\sigma \cdot f)^{-\kappa} \tag{3}$$

Assuming sectoral heterogeneity, the ratio of the fixed costs of exporting in services to the fixed costs in manufacturing takes the following expression

$$\frac{f_s}{f_m} = \frac{\sigma_m}{\sigma_s} \frac{(s_s^x)^{-1/\kappa_s}}{(s_s^x)^{-1/\kappa_m}} \tag{4}$$

[22] Bernard et al. [2009] also highlights the dominant role of the intensive margin in the time series decomposition of U.S. manufacturing exports.

Expression (4) implies that the variation in export participation across sectors is magnified by differences in the distribution of firms and differences in the elasticities of substitution. In particular, Gervais and Jensen [2019] estimates that firms in manufacturing face an elasticity of substitution of 8.14 vs. an average of 5.88 for services firms; this discrepancy alone implies that trade costs would be 1.5 times larger for services firms. To quantify the contribution of differences in distribution, we calibrate the slope parameter of the Pareto distribution to match the data on firm sales. In particular, in a Pareto distribution, the ratio between the unconditional and the conditional average of firm sales equals the participation cut-off

$$\frac{\mu_x}{\mu} = (s^x)^{-1/\kappa} \tag{5}$$

where $\mu$ indicate the unconditional sales average, $\mu_x$ is the average conditional on export status. With premia of $\frac{\mu_x}{\mu} = 1.68$ in manufacturing and of $\frac{\mu_x}{\mu} = 1.87$ in services, the scale parameters are

$$\begin{aligned} \kappa_m &= 1.72 \\ \kappa_s &= 3.03 \end{aligned}$$

Relative to the literature, which estimate that the slope parameters are close to one for manufacturers, our estimates are consistent with the empirical estimates of the exporter premia.[23] Our analysis, however, shows that the revenue export premium is not significantly different across the two sectors; therefore, in our calibration, we'll assume that the two distributions share the same slope parameter, which we set to be $\kappa_m \leq \kappa \leq \kappa_s$. With this range of possible values for $\kappa$, the difference in participation implies that the fixed costs of exporting are between 1.4 and 1.7 times larger for services firms than for manufacturers. Overall, factoring in differences in participation as well as of elasticities, fixed costs of exporting are about twice as large in the services sector than in manufacturing.

Survival probabilities also offer additional insights into the magnitude of trade costs. In particular, Albornoz et al. [2016] notes that differences in survival probabilities between services and manufacturing exporters relate to the variation in sunk relative to fixed costs between the two sectors and in market-specific characteristics. With broad similarities in the distribution of countries across firms, we abstract from the effect of market features and attribute the entire difference in survival probabilities to the relative variation of sunk-to-fixed costs. In particular, a lower probability of

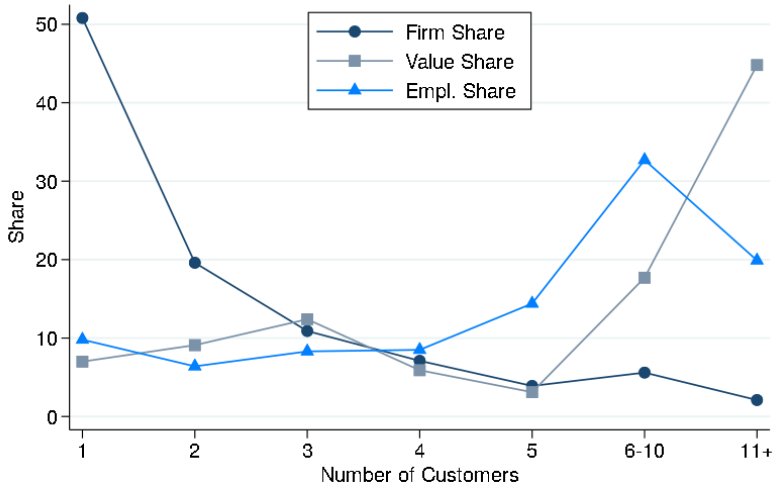
[23] In particular, Axtell [2001] estimates that the slope parameter of 1.024, while Luttmer [2007] recovers $\kappa = 1.065$. Those parameters, however, are not compatible with empirically consistent size premia among exporters.

survival in services is associated with a lower ratio of sunk-to-fixed costs relative to manufacturers. Exploiting the conditions on the ratio of fixed costs that we have derived above, this implies that the sunk costs faced by services firms are less-than-twice as large than those among manufacturers. Estimates in the literature have generally suggested that sunk costs are substantially above fixed costs; without a more articulated framework, our calibration does not have any direct implication on the absolute size of those costs, and it should be interpreted only in a relative sense, as a comparison between manufacturing and services exporters.[24]

# 5 Conclusion

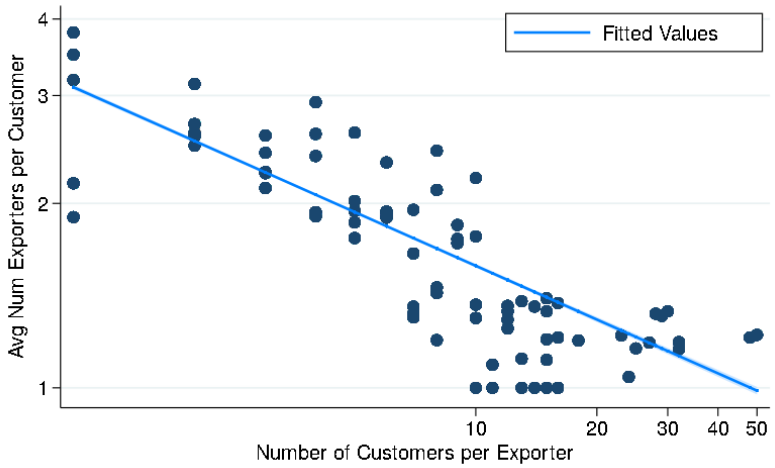
This paper presents a series of novel facts on U.S. exporters of services. Our analysis shows that most of the basic facts on exporters in manufacturing extend to services sectors, with three important distinctions. First, the participation rate of services firms in foreign markets is much lower than that of manufacturing firms. Second, the size premia at services exporters are significantly higher than those among manufacturers. Third, the survival rates of services exporters tend to be lower than that of manufacturing exporters. While our results partly rely on the composition of our data, which includes only major transactions of larger firms, the characteristics of U.S. services exporters we document are useful to infer some features of services trade, such as trade costs. Using a simple calibration, we find that services firms face two-to-three-time higher fixed costs than manufacturing exporters. These estimates are an important step to better understand and quantify the variation in the response of firms across sectors to changes in trade policy.

[24] Das et al. [2007] and Morales et al. [2014] estimate that sunk costs are substantially higher than fixed costs; Albornoz et al. [2016] find the opposite.




Source: S&P Global Market Intelligence, Compustat North America.
Note: Distribution of customers across exporters, the value of exports, and employment.

Figure 1: Distribution of Customers across Exporters, Services Industries

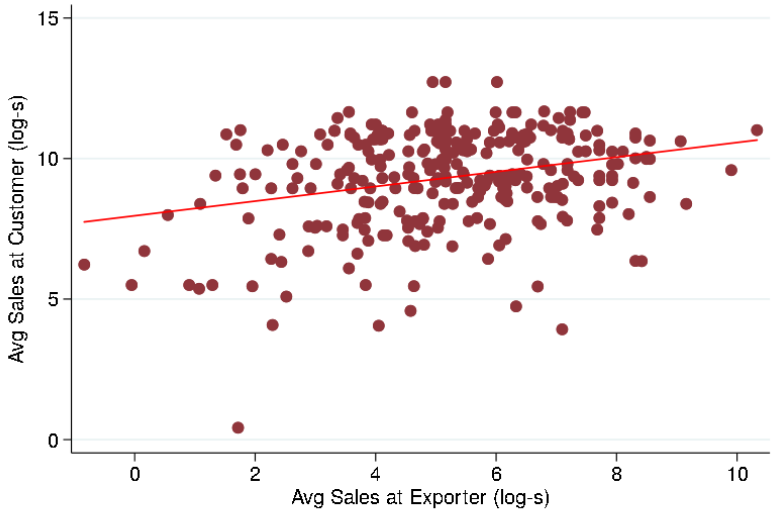



Source: S&P Global Market Intelligence, Compustat North America.
Note: Relation between the number of customers per exporter and the average number of connections among these customers. Axes are in log-s.

Figure 2: Firm-Customer Matching in Foreign Markets, Services Industries


Source: S&P Global Market Intelligence, Compustat North America.
Note: Relation between employment at exporters and employment at customers.

Figure 3: Assortative Matching in Services Industries: Employment Ranking




Source: S&P Global Market Intelligence, Compustat North America.
Note: Relation between sales at exporters and sales at customers.

Figure 4: Assortative Matching in Services Industries: Sales Ranking

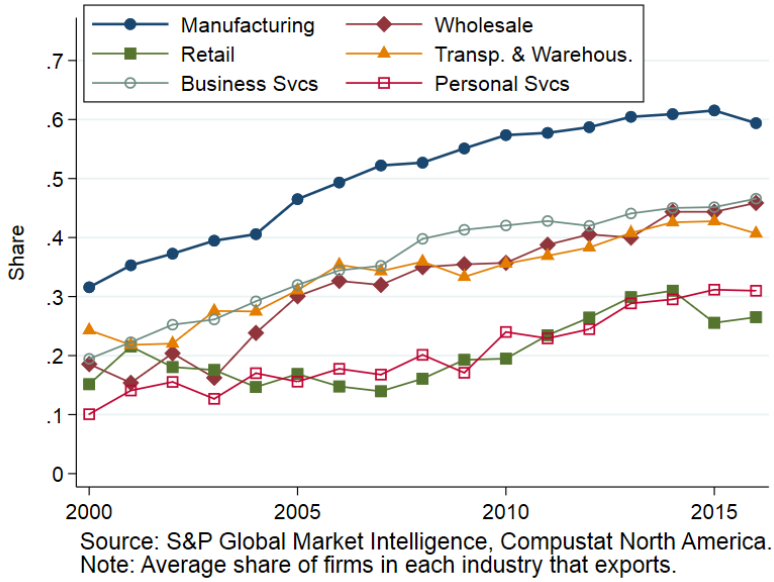



Figure 5: Exporters' Share, 2000-2016

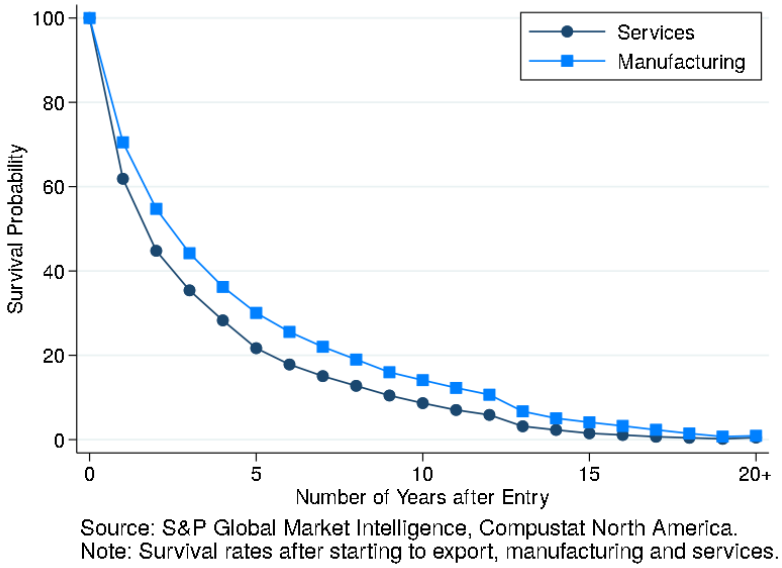



Figure 6: Evolution of the Share of Survivors, Manufacturing vs. Services

Table 1: Firm Exporting in Services

| NAICS | Sector | (1) Percent of Firms | (2) Fraction of Exporters | (3) Avg Share of Exports in Total Shipments |
|---|---|---|---|---|
| **42** | **Wholesale Trade** | **100.0** | **0.27** | **0.32** |
| 423 | Durable Goods | 60.1 | 0.30 | 0.28 |
| 424 | Nondurable Goods | 37.9 | 0.23 | 0.20 |
| 425 | Agents & Brokers | 1.2 | 0.12 | 0.50 |
| **44-45** | **Retail Trade** | **100.0** | **0.15** | **0.20** |
| 441 | Motor Vehicle & Parts Dealers | 7.1 | 0.17 | 0.14 |
| 442 | Furniture Stores | 3.1 | 0.00 | 0.00 |
| 443 | Appliance Store | 5.3 | 0.32 | 0.70 |
| 444 | Building & Garden | 2.4 | 0.00 | 0.00 |
| 445 | Food & Beverage Stores | 10.2 | 0.20 | 0.04 |
| 446 | Health Stores | 8.9 | 0.07 | 0.26 |
| 447 | Gasoline Stations | 2.4 | 0.00 | 0.00 |
| 448 | Clothing Stores | 21.2 | 0.31 | 0.15 |
| 451 | Sporting & Hobby | 7.6 | 0.25 | 0.02 |
| 452 | General Merchandise | 10.1 | 0.00 | 0.00 |
| 453 | Miscellaneous Stores | 4.7 | 0.08 | 0.10 |
| 454 | Nonstore Retailers | 16.9 | 0.09 | 0.20 |
| **48-49** | **Transportation & Warehousing** | **100.0** | **0.35** | **0.23** |
| 481 | Air Transportation | 19.5 | 0.40 | 0.42 |
| 482 | Rail Transportation | 5.6 | 0.16 | 0.08 |
| 483 | Water Transportation | 22.0 | 0.50 | 0.45 |
| 484 | Truck Transportation | 14.1 | 0.20 | 0.13 |
| 485 | Passenger Transportation | 2.2 | 0.00 | 0.00 |
| 486 | Pipeline Transportation | 18.7 | 0.13 | 0.08 |
| 488 | Support Activities | 11.7 | 0.43 | 0.24 |
| 492 | Couriers | 5.0 | 0.31 | 0.47 |
| **51-56** | **Business Services** | **100.0** | **0.29** | **0.30** |
| 511 | Publishing Industries | 9.7 | 0.40 | 0.34 |
| 512 | Motion Picture | 1.0 | 0.33 | 0.32 |
| 515 | Broadcasting | 1.9 | 0.39 | 0.31 |
| 517 | Telecommunications | 5.9 | 0.31 | 0.40 |
| 518 | Data Processing | 1.9 | 0.32 | 0.26 |
| 519 | Other Information Services | 3.7 | 0.31 | 0.38 |
| 522 | Credit Intermediation | 21.3 | 0.18 | 0.22 |
| 523 | Securities & Other Investments | 5.5 | 0.33 | 0.30 |
| 524 | Insurance Carriers | 5.6 | 0.37 | 0.27 |
| 525 | Funds & Trusts | 21.3 | 0.17 | 0.15 |
| 531 | Real Estate | 6.1 | 0.25 | 0.24 |
| 532 | Rental & Leasing | 1.1 | 0.38 | 0.43 |
| 533 | Lessors of Nonfinancial Intangible Assets | 1.5 | 0.40 | 0.43 |
| 541 | Professional Services | 9.1 | 0.29 | 0.28 |
| 561 | Administrative & Support Services | 3.1 | 0.16 | 0.26 |
| 562 | Waste Management & Remediation | 1.0 | 0.17 | 0.19 |
| **61-81** | **Personal Services** | **100.0** | **0.26** | **0.18** |
| 611 | Education Services | 7.6 | 0.19 | 0.20 |
| 621 | Ambulatory Health Care | 24.4 | 0.10 | 0.22 |
| 622 | Hospitals | 4.8 | 0.02 | 0.30 |
| 623 | Nursing & Residential Care | 4.6 | 0.07 | 0.14 |
| 624 | Social Assistance | 0.9 | 0.00 | 0.00 |
| 711 | Performing Arts | 3.0 | 0.30 | 0.31 |
| 713 | Amusement & Gambling | 12.3 | 0.32 | 0.14 |
| 721 | Accomodation | 11.2 | 0.50 | 0.21 |
| 722 | Food Services | 23.7 | 0.36 | 0.26 |
| 811 | Repair & Maintenance | 2.1 | 0.70 | 0.04 |
| 812 | Personal & Laundry | 5.2 | 0.26 | 0.04 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007

Notes: Column 1 summarizes the average distribution of firms across services industries. Column 2 reports the average share of firms in each industry that export. Column 3 reports the average share of exports in total shipments across all exporters. Percentages in the third column do not sum exactly to 100 because of some omitted sectors and rounding.

Table 2: Anatomy of Services Exports

| | Services | | | |
|---|---|---|---|---|
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.8 | 0.1 |
| 10 | 1 | 1 | 1.0 | 1.9 |
| 25 | 1 | 1 | 1.0 | 9.2 |
| 50 | 1 | 1 | 1.0 | 56.6 |
| 75 | 2 | 1 | 1.0 | 318.1 |
| 90 | 4 | 2 | 1.0 | 1,433.0 |
| 99 | 11 | 5 | 1.0 | 14,074.5 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.
Note: Decomposition of U.S. services exports across customers along extensive (number of countries, number of customers, customer density) and intensive (average export values) margins. Services sectors include wholesale and retail trade, transportation and warehousing, business and personal services.

Table 3: OLS Decomposition

| | (1) Customers | (2) Countries | (3) Density | (4) Intensive |
|---|---|---|---|---|
| Exports | 0.045*** | 0.084*** | -0.003*** | 0.874*** |
| | (0.002) | (0.003) | (0.0003) | (0.004) |
| Obs. | 10,807 | 10,807 | 10,807 | 10,807 |

Source: S&P Global Market Intelligence, Compustat North America.
*Legend*: *** significant at 1%.
Note: OLS Decomposition of services exports across customers along extensive and intensive margins. Each specification also includes sector-time dummies.

Table 4: Type of Matches, Services Exporters

| | One-to-one | Many-to-one | One-to-many | Many-to-many |
|---|---|---|---|---|
| Share of Matches | 11.7 | 8.7 | 52.3 | 27.3 |
| Share of Value | 4.1 | 5.4 | 50.7 | 39.8 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.
Note: Distribution of firm-customer matches by type.

Table 5: Exporter Premia in Services

| Dep. Variable | (1) | (2) Exporter Premia | (3) |
|---|---|---|---|
| log L | 0.415*** | 0.727*** | - |
| log R | 0.520*** | 0.787*** | 0.119* |
| log Mkt Val | 0.875*** | 0.928*** | 0.351*** |
| log Y/L | 0.098 | 0.064 | 0.122* |
| log CapEx | 0.795*** | 1.007*** | 0.300*** |
| log K/L | 0.264 | 0.157** | 0.251*** |
| Add Vars | Year FE | Industry, Year FE | Industry and Year FE, log L |

Source: S&P Global Market Intelligence, Compustat North America.
log L: Employment (in log-s).
log R: Revenues (in log-s).
log Mkt Val: Market Valuation (in log-s).
log Y/L: Real output per worker (in log-s).
log CapEx: Capital Expenditure (in log-s).
log K/L: Capital per worker (in log-s).
*Legend*: *** significant at 1%, ** at 5%, * at 10%.
*Notes*: Average percent differences between exporters and non-exporters in a regression of firm characteristics on an export dummy.

Table 6: Exit and Entry in Export Markets

| Sector | Entrants | Exiting | Continuing | Exit by Entrants |
|---|---|---|---|---|
| Manufacturing | 11.8% | 10.2% | 79.6% | 13.0% |
| Wholesale | 12.5% | 10.2% | 79.2% | 15.2% |
| Retail | 23.0% | 19.9% | 61.9% | 20.9% |
| Transp. & Warehous. | 13.5% | 10.0% | 78.2% | 12.7% |
| Business Svcs | 15.4% | 12.7% | 74.2% | 16.0% |
| Personal Svcs | 18.1% | 12.7% | 71.9% | 14.9% |

Source: S&P Global Market Intelligence, Compustat North America.
Note: The table reports the share of new exporters over the total number of exporters (entrants), the share of firms that will not export the next year (exiting), the share of firms that were already exporting the previous year (continuing), and the share of entrants that will not export the following year (exit by entrants).

Table 7: Characteristics of Entrants and Exiting Firms, Services

| | Entrants | Exiting |
|---|---|---|
| Share of Firms | 15.5% | 12.6% |
| Share of Export Value | 6.8% | 9.4% |
| Avg. Num Customers | 1 | 1 |
| Avg. Num. Countries | 2 | 2 |
| Density | 1.0 | 1.0 |

Source: S&P Global Market Intelligence, Compustat North America.
Note: Characteristics of firms entering and exiting the foreign market.

Table 8: Export Premia in Services: Entrants, Exiting, and Continuing Firms

| Dep. Variable | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | | Entrants | | | Exiting | |
| log L | -0.108 | -0.305*** | - | -0.591*** | -0.612*** | - |
| log R | -0.239*** | -0.340*** | -0.078* | -0.744*** | -0.701*** | -0.185** |
| log Mkt Val | -0.168** | -0.205** | 0.037 | -0.926*** | -0.881*** | -0.394*** |
| log Y/L | -0.135* | -0.040 | -0.083* | -0.160** | -0.093* | -0.189** |
| log CapEx | -0.348*** | -0.364*** | -0.086 | -0.782*** | -0.705*** | -0.152 |
| log K/L | -0.154 | 0.022 | -0.028 | -0.179 | -0.110 | -0.227** |
| Add Vars | Year FE | Industry, Year FE | Industry and Year FE, log L | Year FE | Industry, Year FE | Industry and Year FE, log L |

Source: S&P Global Market Intelligence, Compustat North America.
log L: Employment (in log-s).
log R: Revenues (in log-s).
log Mkt Val: Market Valuation (in log-s).
log Y/L: Real output per worker (in log-s).
log CapEx: Capital Expenditure (in log-s).
log K/L: Capital per worker (in log-s).
*Legend*: *** significant at 1%, ** at 5%, * at 10%.
*Notes*: Average percent differences relative to the group of continuing exporters in a regression of firm characteristics on an entry/exit dummy.

Table 9: Time Series Decompositions, Services Exports

| Year | (1) Total Growth | (2) Net Entry | (3) Net Customer | (4) Net Intensive |
|---|---|---|---|---|
| 2001 | 12.7 | -0.4 | -2.3 | 15.4 |
| 2002 | 6.9 | 1.2 | -1.0 | 6.6 |
| 2003 | 2.2 | -1.1 | -2.4 | 5.8 |
| 2004 | 12.6 | 1.2 | 14.3 | -2.9 |
| 2005 | 12.8 | 5.3 | 2.7 | 4.7 |
| 2006 | 3.2 | -4.2 | -7.1 | 14.5 |
| 2007 | 3.0 | -1.6 | -1.6 | 6.3 |
| 2008 | 2.0 | -0.2 | -0.9 | 3.1 |
| 2009 | 1.1 | 0.9 | 5.3 | -5.1 |
| 2010 | 1.6 | -0.4 | -5.9 | 7.8 |
| 2011 | 5.3 | 3.3 | 2.7 | -0.7 |
| 2012 | 4.3 | -1.6 | 3.7 | 2.1 |
| 2013 | 2.8 | 1.4 | -0.5 | 1.8 |
| 2014 | 0.5 | -2.4 | -1.4 | 4.3 |
| 2015 | 4.2 | 1.0 | -1.4 | 4.7 |
| 2016 | 2.8 | 0.1 | -0.5 | 3.3 |

Source: S&P Global Market Intelligence, Compustat North America.
*Notes*: Changes in U.S. services exports and decomposition along extensive (net entry and net customer) and intensive margins.

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# A Additional Figures and Tables

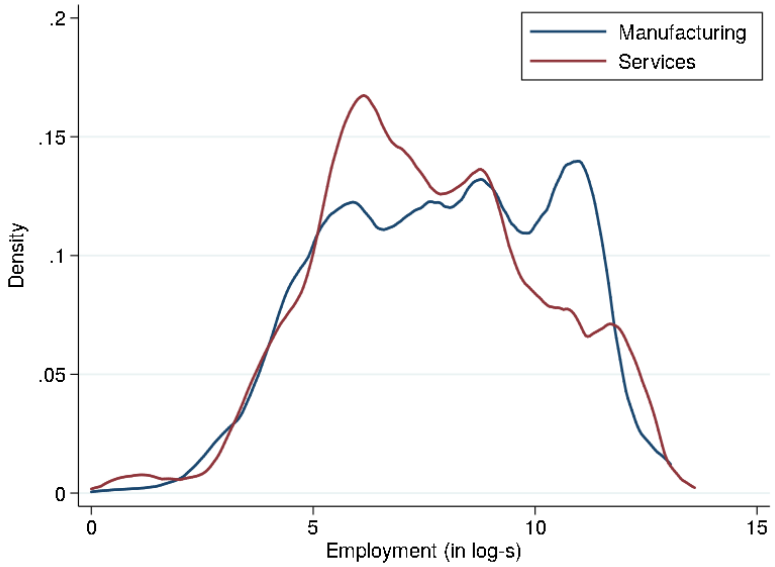


Figure A1: Distribution of Employment at Exporters, Manufacturing vs. Services

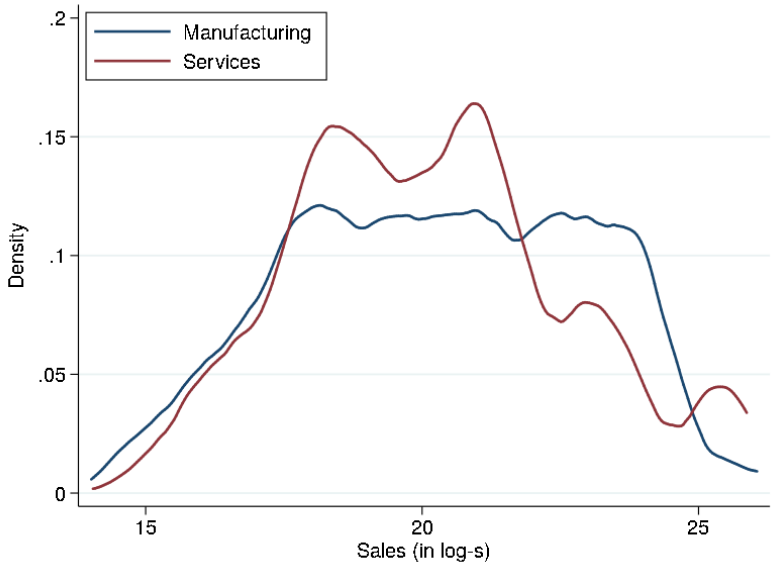


Figure A2: Distribution of Total Sales at Exporters, Manufacturing vs. Services

Table A1: Distribution of Firms by Sector: Compustat vs. CBP

| | | | Compustat | | | |
|---|---|---|---|---|---|---|
| Num Empl | Manufacturing | Wholesale | Retail | Trans. & Warehous. | Business | Personal |
| 0-4 | 1.2 | 2.8 | 0.7 | 9.8 | 4.6 | 0.5 |
| 5-9 | 1.3 | 0.8 | 0.9 | 1.7 | 0.9 | 0.4 |
| 10-19 | 2.7 | 1.0 | 0.9 | 2.1 | 3.2 | 0.8 |
| 20-99 | 10.1 | 12.1 | 5.7 | 4.2 | 12.8 | 4.2 |
| 101-499 | 19.3 | 11.2 | 10.2 | 7.4 | 24.6 | 10.1 |
| 500+ | 65.6 | 72.0 | 81.6 | 74.8 | 53.9 | 84.0 |
| | | | County Business Patterns | | | |
| Num Empl | Manufacturing | Wholesale | Retail | Trans. & Warehous. | Business | Personal |
| 0-4 | 39.6 | 56.0 | 58.7 | 63.6 | 70.7 | 53.6 |
| 5-9 | 18.2 | 17.2 | 20.4 | 14.2 | 13.6 | 20.2 |
| 10-19 | 15.1 | 11.7 | 11.2 | 9.5 | 7.4 | 12.7 |
| 20-99 | 18.9 | 11.2 | 7.9 | 8.9 | 6.0 | 10.8 |
| 101-499 | 5.3 | 2.6 | 1.3 | 2.2 | 1.5 | 2.0 |
| 500+ | 2.9 | 1.3 | 0.4 | 1.5 | 0.8 | 0.7 |

Source: County Business Patterns (CBP) and S&P Global Market Intelligence, Compustat North America.

Note: Average distribution of firms within manufacturing and services sectors, 2002, 2007, and 2012.

Table A2: Distribution of Employment by Sector, County Business Patterns

| Num Employees | Manufacturing | Wholesale | Retail | Trans. & Warehous. | Business | Personal |
|---|---|---|---|---|---|---|
| 0-4 | 1.7 | 5.4 | 5.0 | 4.1 | 6.2 | 4.8 |
| 5-9 | 2.8 | 6.5 | 6.5 | 4.1 | 5.2 | 6.8 |
| 10-19 | 4.7 | 9.0 | 7.2 | 5.5 | 5.7 | 8.7 |
| 20-99 | 17.2 | 23.2 | 14.0 | 14.3 | 13.4 | 21.0 |
| 101-499 | 18.1 | 17.2 | 8.2 | 11.9 | 13.2 | 16.1 |
| 500+ | 55.6 | 38.6 | 58.9 | 60.1 | 56.2 | 42.5 |

Source: County Business Patterns (CBP).

Note: Average distribution of employment within manufacturing and services sectors, 2002, 2007, and 2012.

Table A3: Firm Exporting in Manufacturing

| NAICS | Sector | (1) Percent of Firms | (2) Fraction of Exporters | (3) Avg Share of Exports in Total Shipments |
|---|---|---|---|---|
| **31-33** | **Manufacturing** | **100.0** | **0.41** | **0.35** |
| 311 | Food | 3.8 | 0.32 | 0.26 |
| 312 | Beverage & Tobacco | 1.8 | 0.46 | 0.30 |
| 313 | Textile Mills | 0.4 | 0.26 | 0.11 |
| 314 | Textile Prod | 0.1 | 0.22 | 0.76 |
| 315 | Apparel | 1.9 | 0.31 | 0.35 |
| 316 | Leather | 0.7 | 0.44 | 0.17 |
| 321 | Wood | 1.2 | 0.31 | 0.38 |
| 322 | Paper | 2.0 | 0.40 | 0.54 |
| 323 | Printing | 0.9 | 0.15 | 0.36 |
| 324 | Petroleum & Coal | 1.6 | 0.48 | 0.39 |
| 325 | Chemicals | 25.3 | 0.38 | 0.40 |
| 326 | Plastics & Rubber | 2.2 | 0.36 | 0.28 |
| 327 | Nonmetallic Prod | 1.2 | 0.50 | 0.35 |
| 331 | Primary Metals | 2.7 | 0.48 | 0.34 |
| 332 | Fabricated Metals | 2.8 | 0.38 | 0.29 |
| 333 | Machinery | 8.0 | 0.53 | 0.42 |
| 334 | Electronics | 27.1 | 0.53 | 0.40 |
| 335 | Electrical Eq | 3.4 | 0.43 | 0.43 |
| 336 | Transportation Eq | 5.5 | 0.56 | 0.36 |
| 337 | Furniture | 1.0 | 0.38 | 0.12 |
| 339 | Miscellaneous | 6.4 | 0.44 | 0.28 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.

Notes: Column 1 summarizes the average distribution of firms across manufacturing industries. Column 2 reports the average share of firms in each industry that export. Column 3 reports the average share of exports in total shipments across all exporters. Percentages in the third column do not sum exactly to 100 because of rounding.

Table A4: Exports of Services Firms: Goods vs. Services

| | Customers in Services |
|---|---|
| Share of Transactions | 55.2% |
| Share of Value | 64.0% |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.

Note: Share of exports of firms in services industries to customers in services industries.

Table A5: Anatomy of Manufacturing Exports

| | Manufacturing | | | |
|---|---|---|---|---|
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.7 | 0.1 |
| 10 | 1 | 1 | 1.0 | 1.4 |
| 25 | 1 | 1 | 1.0 | 7.5 |
| 50 | 1 | 1 | 1.0 | 61.1 |
| 75 | 3 | 1 | 1.0 | 468.8 |
| 90 | 6 | 2 | 1.0 | 2,112.1 |
| 99 | 10 | 6 | 1.0 | 21,594.9 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.

Note: Decomposition of U.S. manufacturing exports across customers along extensive (number of countries, number of customers, customer density) and intensive (average export values) margins.

Table A6: OLS Decomposition, Manufacturing

| | (1) Customers | (2) Countries | (3) Density | (4) Intensive |
|---|---|---|---|---|
| Exports | 0.060*** | 0.064*** | -0.006*** | 0.881*** |
| | (0.002) | (0.002) | (0.000) | (0.003) |
| Obs. | 20,215 | 20,215 | 20,215 | 20,215 |

Source: S&P Global Market Intelligence, Compustat North America.

*Legend*: *** significant at 1%.

Note: OLS Decomposition of manufacturing exports across customers along extensive and intensive margins. Each specification also includes sector-time dummies.

Table A7: Anatomy of Services Exports, Sectoral Detail

| | | **Wholesale Trade** | | |
|---|---|---|---|---|
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.9 | 0.1 |
| 10 | 1 | 1 | 1.0 | 2.9 |
| 25 | 1 | 1 | 1.0 | 18.0 |
| 50 | 1 | 1 | 1.0 | 160.4 |
| 75 | 2 | 1 | 1.0 | 623.7 |
| 90 | 4 | 2 | 1.0 | 2,288.0 |
| 99 | 8 | 4 | 1.0 | 18,276.8 |
| | | **Retail Trade** | | |
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.9 | 0.1 |
| 10 | 1 | 1 | 1.0 | 5.9 |
| 25 | 1 | 1 | 1.0 | 26.0 |
| 50 | 1 | 1 | 1.0 | 177.9 |
| 75 | 2 | 1 | 1.0 | 686.5 |
| 90 | 4 | 2 | 1.0 | 2,647.0 |
| 99 | 7 | 5 | 1.0 | 31,339.7 |
| | | **Transportation & Warehousing** | | |
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.7 | 0.7 |
| 10 | 1 | 1 | 1.0 | 8.3 |
| 25 | 1 | 1 | 1.0 | 32.7 |
| 50 | 1 | 1 | 1.0 | 87.7 |
| 75 | 1 | 2 | 1.0 | 373.0 |
| 90 | 4 | 3 | 1.0 | 2,050.6 |
| 99 | 10 | 8 | 1.0 | 12,295.0 |
| | | **Business Services** | | |
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.9 | 0.1 |
| 10 | 1 | 1 | 1.0 | 1.7 |
| 25 | 1 | 1 | 1.0 | 7.9 |
| 50 | 1 | 1 | 1.0 | 45.5 |
| 75 | 2 | 1 | 1.0 | 246.6 |
| 90 | 4 | 2 | 1.0 | 1,139.0 |
| 99 | 11 | 5 | 1.0 | 14,020.2 |
| | | **Personal Services** | | |
| Centiles | Num Countries | Num Cust. | Density | Avg. Exports |
| 1 | 1 | 1 | 0.8 | 0.1 |
| 10 | 1 | 1 | 1.0 | 1.1 |
| 25 | 1 | 1 | 1.0 | 5.5 |
| 50 | 1 | 1 | 1.0 | 35.1 |
| 75 | 1 | 1 | 1.0 | 350.3 |
| 90 | 3 | 2 | 1.0 | 2,000.0 |
| 99 | 10 | 11 | 1.0 | 4,840.0 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.

Note: Sectoral decomposition of U.S. services exports across customers along extensive (number of countries, number of customers, customer density) and intensive (average export values) margins.

Table A8: Type of Matches, Manufacturing Exporters

| | One-to-one | Many-to-one | One-to-many | Many-to-many |
|---|---|---|---|---|
| Share of Matches | 6.8 | 7.0 | 46.3 | 39.8 |
| Share of Value | 4.1 | 6.8 | 43.0 | 46.1 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.

Note: Distribution of firm-customer matches by type.

Table A9: Exporter-Customer Interactions

| Sector | Coefficient |
|---|---|
| Manufacturing | -0.41 |
| Wholesale | -0.24 |
| Retail | -0.18 |
| Transp. & Warehous. | -0.42 |
| Business Svcs | -0.38 |
| Personal | -0.35 |

Source: S&P Global Market Intelligence, Compustat North America, 2003-2007.

Note: OLS estimates from a regression of the average number of exporters per customers on the number of customers per exporter.

Table A10: Exporter Premia, Manufacturing vs. Services

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | log R | log Mkt Val | log Y/L | log CapEx | log K/L |
| Export | 0.147*** | 0.019 | 0.198*** | 0.131*** | 0.150*** |
| | (0.027) | (0.060) | (0.038) | (0.035) | (0.044) |
| Export * Services | -0.078 | 0.310*** | -0.148 | 0.105 | 0.024 |
| | (0.072) | (0.101) | (0.088) | (0.082) | (0.091) |
| Obs. | 28,833 | 28,833 | 28,833 | 28,833 | 28,833 |
| $R^2$ | 0.847 | 0.626 | 0.238 | 0.748 | 0.398 |

Source: S&P Global Market Intelligence, Compustat North America.
log R: Revenues (in log-s).
log Mkt Val: Market Valuation (in log-s).
log Y/L: Real output per worker (in log-s).
log CapEx: Capital Expenditure (in log-s).
log K/L: Capital per worker (in log-s).
Export: dummy indicator for exporters.
Services: dummy indicator for firms in the services sectors (NAICS 42, 44-45, 48-49, 51-56, and 61-81).
*Legend*: *** significant at 1% and ** at 5%.
*Notes*: Average percent differences between exporters and non-exporters in a regression of firm characteristics on an export dummy. All specification include time dummies, sector dummies, and a control for size (log Employment).

Table A11: Time Series Decompositions, Manufacturing Exports

| Year | (1) Total Growth | (2) Net Entry | (3) Net Customer | (4) Net Intensive |
|---|---|---|---|---|
| 2001 | -3.6 | -4.3 | -10.7 | 11.4 |
| 2002 | 11.1 | -2.0 | 7.6 | 5.5 |
| 2003 | -1.1 | -2.1 | -6.9 | 8.0 |
| 2004 | 6.2 | 0.6 | 8.8 | -3.2 |
| 2005 | 12.4 | -0.2 | 10.9 | 1.8 |
| 2006 | 11.7 | 5.4 | -9.1 | 15.4 |
| 2007 | 0.1 | -3.1 | -2.1 | 5.2 |
| 2008 | 3.5 | -0.4 | 2.9 | 1.0 |
| 2009 | -4.4 | -0.7 | -2.7 | -1.0 |
| 2010 | 6.4 | 1.5 | 1.3 | 3.6 |
| 2011 | 4.2 | -2.2 | 2.9 | 3.4 |
| 2012 | 3.2 | 0.4 | 1.8 | 1.0 |
| 2013 | 5.0 | 0.4 | 1.5 | 3.1 |
| 2014 | 1.9 | 0.8 | -4.4 | 5.5 |
| 2015 | 1.3 | -0.5 | 1.3 | 0.5 |
| 2016 | 2.5 | -0.1 | -0.1 | 2.6 |

Source: S&P Global Market Intelligence, Compustat North America.

*Notes*: Changes in U.S. manufacturing exports and decomposition along extensive (net entry and net customer) and intensive margins.