Wholesalers and Retailers in U.S. Trade

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International trade models typically assume that producers in one country trade directly with final consumers in another. In the real world, of course, trade can involve long chains of potentially independent actors who move goods through wholesale and retail distribution networks. These networks likely affect the magnitude and nature of trade frictions and hence both the pattern of trade and its welfare gains. To promote further understanding of how goods move across borders, this paper examines the extent to which U.S. exports and imports flow through wholesalers and retailers versus "producing and consuming" firms. We highlight a number of stylized facts about these intermediaries, and show that their attributes can deviate substantially from the portrait of trading firms that has emerged from microdata in recent years.[1]

[1] A longer version of this working paper is available in an online appendix and from the authors' websites. For theoretical explanations of intermediation see James E. Rauch and Joel Watson (2004), Bernardo Blum, Sebastian Claro and Ig Horstmann (2008), Anders Akerman (2009), JaeBin Ahn, Amit Khandelwal and Shang-Jin Wei (2009), Pol Antràs and Arnaud Costinot (2009) and Dimitra Petropoulou (2007).

II. Data

Our results focus on 2002 but we note that results for other years are similar. We use the U.S. Linked/Longitudinal Firm Trade Transaction Database (LFTTD), which matches individual U.S. trade transactions to U.S. firms in the Longitudinal Business Database (LBD).[2] For each export and import transaction, we observe the U.S.-based firm engaging in the transaction, the ten-digit Harmonized System (HS) classification of the product shipped, the value shipped, the shipment date, the destination or source country, and whether the transaction takes place at "arm's length" or between "related parties".[3] For imports, we also observe an identifier for the foreign manufacturer or shipper, and we use this field to identify each importer's number of foreign "partner firms". Via the LBD, we observe firms' employment according to the major-industry of each of its establishments. This information allows us to compute the share of firms' U.S. employment across nine broad sectors, including wholesale and retail (NAICS sectors 42 and 44 to 45, respectively). Firms with only a single U.S. establishment necessarily have 100 percent employment in a single sector.

We distinguish between two categories of "pure" intermediaries: pure wholesalers (W), who have 100 percent of their U.S. employment in wholesaling, and pure retailers (R) who have 100 percent of their U.S. employment in retailing.[4] We compare W and R to two other types of firms: "pure" producers or consumers (PC), which have zero wholesale and retail employment, and "mixed" firms,

[2] We link 80 percent of transactions by value; see Andrew B. Bernard, J. Bradford Jensen and Peter K. Schott (2009) for more details.

[3] Ownership thresholds for relatedness are 10 percent (exports) and 6 percent (imports).

[4] Most – but not all – of the "pure" firms are single-establishment firms. Firms with employment split between wholesale and retail are allocated to W or R according to whichever is higher. Firms with employment split between wholesale and retail are allocated to W or R according to whichever is higher.

which have wholesale plus retail employment between 0 and 100 percent. We explore the ramifications of using a sharp 100 percent cutoff in defining W and R firms by further dividing mixed firms into "mixed wholesale-retail" (MWR) and "mixed producer-consumer" (MPC) according to whether wholesaling *plus* retailing in these firms accounts for more or less than 75 percent of employment. Together, W, R, PC, MWR and MPC firms are mutually exclusive and exhaustive. Unfortunately, we cannot compare firms in the LFTTD to those which trade "indirectly" via wholesalers or retailers as we do not observe the latter's sales or purchases within the United States.

Table 1 reports a breakdown of trading firms and value by type of firm for 2002. Collectively, pure wholesalers and retailers account for large shares of trading firms but relatively little value, with wholesalers being around four times more prevalent and responsible for considerably more trade than retailers. PC firms are most numerous on the export side and as numerous as Ws on the import side, and represent roughly one fifth of export and import value. Mixed firms are rarest but account for the majority of trade. This dominance is stronger for exports than imports, though MWR importers are relatively more important for imports than for exports. The country composition of trade also varies substantially across firm types and between exports and imports, with W, R and MWR importers having by far the largest shares of trade with China.[5]

		Exporting Firms				Importing Firms		
		Share of	Share of	China		Share of	Share of	China
		Export	Product-	Value		Import	Product-	Value
Firm	Share of	Value	Countries	Share	Share of	Value	Countries	Share
Type	Firms				Importing Firms			
W	0.34	0.08	0.45	0.05	0.42	0.15	0.53	0.21
R	0.09	0.01	0.08	0.00	0.13	0.01	0.18	0.35
PC	0.52	0.22	0.58	0.03	0.40	0.21	0.56	0.07
MWR	0.01	0.02	0.11	0.00	0.01	0.08	0.18	0.30
MPC	0.04	0.67	0.60	0.04	0.04	0.55	0.55	0.06

Notes: First two columns of each panel reports a breakdown of firms and the share of value for which they account; these columns sum to unity. Second two columns of each panel report the share of all U.S. product-country cells in which each type of firm is present and each type's share of trade value with China. Zeros are due to rounding. Data are for 2002.

Table 1: Distribution of Firm Types and the Trade Value for Which They Account, 2002

III. Wholesaler and Retailer "Premia"

It is well known that trading firms differ from purely domestic firms along a number of dimensions. Here, we demonstrate substantial heterogeneity *within* trading firms.

Table 2 reports non-PC firms' "premia" relative to PC firms in 2002. Each cell reports the result of a different firm- (top panel) or firm-product-country- (bottom panel) level OLS regression of the noted characteristic on a dummy variable for the noted firm type. Each regression sample includes all firms of the noted type as well as PC firms. Regressions in the top panel include major six-digit HS category fixed effects as well as controls for firm employment deciles (except in the first row). Regressions summarized in the bottom panel include product-country fixed effects and analogous controls for firm size.

	Exporting Firms				Importing Firms			
	W	R	MWR	MPC	W	R	MWR	MPC
	Firm-Level OLS Regressions							
ln(Employment$_f$)	-0.91 ***	-0.80 ***	2.67 ***	2.76 ***	-1.16 ***	-0.96 ***	2.80 ***	2.77 ***
	0.01	0.03	0.06	0.05	0.02	0.04	0.08	0.04
ln(Value$_f$)	-0.02 ***	-0.02 **	0.11 ***	0.50 ***	0.00	-0.01	0.29 ***	0.35 ***
	0.00	0.01	0.02	0.02	0.00	0.00	0.03	0.03
ln(Countries$_f$)	-0.01	-0.05 ***	0.14 ***	0.40 ***	-0.08 ***	0.00	0.28 ***	0.38 ***
	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.02
ln(Products$_f$)	0.06 ***	-0.02 **	0.31 ***	0.52 ***	0.00	0.13 ***	0.46 ***	0.39 ***
	0.01	0.01	0.03	0.03	0.01	0.02	0.03	0.02
ln(Partners$_f$)	na	na	na	na	0.03 ***	0.09 ***	0.54 ***	0.49 ***
					0.01	0.01	0.03	0.02
ln(Mean PCGDP$_f$)	-0.13 ***	0.02 **	0.01	0.04 ***	-0.18 ***	-0.04 **	-0.05 **	0.11 ***
	0.01	0.01	0.02	0.02	0.01	0.02	0.03	0.02
	Product-Country-Level OLS Regressions							
ln(Value$_{fpc}$)	-0.09 ***	0.00	-0.16 ***	0.19 ***	0.16 ***	-0.08 ***	0.62 ***	0.29 ***
	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ln(Unit Value$_{fpc}$)	-0.14 ***	-0.08 ***	-0.17 ***	-0.06 ***	-0.20 ***	0.02 **	-0.03 ***	0.03 ***
	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ln(RP Share$_{fpc}$)	-0.83 ***	0.61 ***	4.08 ***	10.58 ***	3.44 ***	1.63 ***	0.14	7.06 ***
	0.07	0.15	0.25	0.11	0.11	0.14	0.16	0.13

Notes: Each cell reports the results of a different firm OLS regression of noted characteristic on a dummy variable for noted firm type versus PC firms. Top- (bottom-) panel regressions include major six-digit HS category (product-country) fixed effects. All regressions except those in first row control for firm size (see text). Robust standard errors clustered according to the fixed effects are reported below coefficients. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels. Data are for 2002.

Table 2: "Premia" Relative to PC Firms, 2002

Firm-level attributes considered in the top panel of Table 2 include domestic employment, total trade value, the number of country partners, the number of products traded and the number of foreign partner firms.[6] Firm-product-country attributes considered in the bottom panel of the figure include value,

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[5]See Emek Basker and Pham Hoang Van (2008a,b) for further evidence of the contribution retailers to import growth from China.

[6]The coefficient in the first cell of the top panel, for example, indicates that exporting wholesalers have on average 60 percent $(1 - e^{-0.91})$ of the employment of PC firms.

unit value (i.e., value divided by quantity) and share of value with related parties.

Relative to PC firms, W and R exporters and importers have lower employment and, within size deciles, trade less value but trade more products per country.[7] MWR exporters and importers, in contrast, are substantially larger than PC firms: they trade more products, trade with more countries, trade more products per country and, on the import side, interact with more foreign partner firms, though only W importers trade with more foreign partners per product per country than PC firms. MPC firms are also relatively large; they trade significantly more value at the product-country level than PC firms and are substantially more likely to engage in trade with related parties. W, R and MWR importers all trade with countries with a lower average GDP per capita than PC firms.

Results with respect to unit values are less clear. Perhaps intuitively, W, R and MWR exporters have relatively low unit values within product-country cells and firm size deciles than either MPC or PC firms. On the other hand, while W and MWR importers have relatively low unit values, we find that R importers have relatively high unit values.

IV. Product-Country Determinants of Intermediation

The third column of each panel in Table 1 reveals that R and MWR firms participate in fewer product-country markets than W, PC and MPC firms. Even among the latter, however, participation is well below 100 percent. In this section, we examine product and country characteristics that influence market participation.

We correlate the share of trade value accounted for by each type of firm across products. As reported in our online appendix, two features stand out. First, intermediaries' correlations with non-intermediaries are negative for both exports and imports, indicating these firms' specialize in different sets of goods. Second, the shares of product trade due to PC versus MPC firms are also negatively correlated. This result suggests producer and consumer firms may develop in-house wholesaling or retailing capabilities depending on the products they produce, or *vice versa*.

In our online appendix, we report the share of export and import value accounted for by each type of firm across two-digit HS categories. Pure wholesalers

tend to concentrate in agriculture-related sectors such as Animal and Vegetable products in both exports and imports. PC and MPCs, on the other hand, focus more on industries more likely to contain differentiated goods, such as Transportation. Among importers, we find that MWRs are disproportionately active in Textiles, Clothing and Footwear. Correlations between the product value shares of exporters versus importers within firm types are positive and statistically significant.

Finally, as reported in our online appendix, we find that the share of exports and imports mediated by pure wholesalers declines with market size, from 0.20 (0.25) for the smallest quintile of destination (source) markets to 0.07 (0.14) for the largest. Pure wholesalers therefore have relatively greater penetration of small markets, whereas for MPC firms we find the opposite pattern.

V. Gravity

A long line of research in international trade highlights the importance of "gravity" in determining trade flows. Here, we examine the role of country characteristics in influencing market participation by estimating gravity equations for each firm type.

Table 3 reports the results of two country-level OLS regressions. In the top panel, log aggregate trade value for each type of firm is regressed on partner countries' log GDP and log great-circle distance from the United States (in km).[8] In the second panel, the "extensive" component of log value, i.e., the log number of firm-product observations with positive trade, is regressed on these variables. The difference between the coefficients in the top and bottom panels is the contribution of the "intensive" component of log value, i.e., the log average value per firm-product observation with positive trade. Explicit results for the intensive margin, and for pure retailers, are available in our online appendix.

Results for exports are straightforward: trade value falls with distance and rises with market size. Moreover, gravity's stronger effect on extensive versus intensive margins across the board is consistent with recent research on the margins of trade. Comparing the coefficient on GDP across columns, we find W trade is less sensitive to market size than MPC trade, consistent with the former's declining market share across GDP quintiles noted above. This differential response

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[7]Manipulation of the coefficients in Table 2 allows comparison of products per country and, on the import side, foreign firms per product per country.

[8]These data are from the World Bank and CEPII, respectively. The mean (standard deviation) of these variables are 25 (2) and 8 (0.7), respectively.

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is disproportionately due to the intensive margin. The difference in coefficients on log GDP between MWR and MPC firms versus other types of firms is larger for the intensive margin than the extensive margin.

	Exports				Imports			
	W	PC	MWR	MPC	W	PC	MWR	MPC
	ln(Value)							
ln(Distance$_c$)	-1.55 ***	-1.33 ***	-1.64 ***	-1.42 ***	-0.31	-1.19 ***	0.24	-0.99 ***
	0.21	0.17	0.24	0.20	0.23	0.26	0.41	0.26
ln(GDP$_c$)	0.93 ***	0.92 ***	1.03 ***	1.13 ***	1.15 ***	1.27 ***	1.28 ***	1.28 ***
	0.04	0.04	0.06	0.04	0.05	0.05	0.10	0.06
Constant	8.95 ***	8.02 ***	5.07 *	4.67 **	-6.7 ***	-1.6	-16.1 ***	-3.1
	2.13	1.84	2.72	2.06	2.30	2.70	4.00	2.83
Observations	173	175	157	174	171	172	147	170
R^2	0.76	0.74	0.66	0.81	0.72	0.73	0.53	0.69
	ln(Extensive Margin)							
ln(Distance$_c$)	-1.66 ***	-1.28 ***	-1.67 ***	-1.28 ***	-0.20	-0.73 ***	0.37	-0.72 ***
	0.19	0.14	0.21	0.17	0.18	0.16	0.24	0.16
ln(GDP$_c$)	0.73 ***	0.82 ***	0.74 ***	0.80 ***	0.97 ***	0.96 ***	0.93 ***	0.97 ***
	0.04	0.03	0.04	0.04	0.04	0.04	0.06	0.04
Constant	3.62 *	-1.36	1.37	-1.01	-15.5 ***	-10.7 ***	-21.1 ***	-11.0 ***
	2.01	1.70	2.24	1.88	1.80	1.77	2.25	1.73
Observations	173	175	157	174	171	172	147	170
R^2	0.75	0.79	0.68	0.73	0.74	0.79	0.60	0.79

Notes: Table reports country-level OLS regressions for two dependent variables: log aggregate value per country (top panel) and log number of firm-product observations with positive trade per country (bottom panel). Robust standard errors reported below coefficients. ***, ** and * denote statistical significance at the 1, 5 and 10 percent levels. Data are for 2002.

Table 3: Country-Level Gravity, 2002

Results for imports are less conventional. While we find the expected positive relationship between market size and import value, distance has a negative and statistically significant relationship with import value and the extensive margin only for PC and MPC firms. For intermediaries, the relationship is negative but statistically insignificant for Ws and positive but statistically insignificant for Rs and MWRs. One factor contributing to this result is the relatively heavy concentration of Rs and MWRs in consumer goods (e.g., footwear) that are disproportionately imported from far-away China, as reflected in the results reported in Tables 1 and 2. Indeed, across industries, R and MWR importers' value shares are strongly positively correlated with China's import market shares. Analogous correlations with respect to PC and MPC firms' shares are statistically insignificant but negative.

VI. Conclusions

Trading firms exhibit substantial heterogeneity and can be quite different from the "stylized" trading firm emphasized in much of the recent literature in international trade. While pure wholesalers are relatively numerous, they are on average smaller than pure produc-ers, and account for a relatively small share of trade value. While pure wholesalers are concentrated in agriculture-related sectors, pure producers and mixed firms are more prevalent in industries more likely to contain differentiated goods such as transportation. Pure wholesalers are relatively less sensitive to market size and import disproportionately from China and other low-wage countries. Together with differences in product specialization, this leads to departures on the import side from the standard gravity equation predictions for trade.

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