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.[4]

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.[5] 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, which have wholesale plus retail employment be-

[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 of the pure firms identified below are single-establishment firms.

[5] Firms with employment split between wholesale and retail are allocated to W or R according to whichever is higher.

tween 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.[6]

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 that differentiating among types of exporters and importers highlights similar heterogeneity *among* 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 two fixed effects, one for firms' major six-digit HS category and one for firms' major-partner-country, 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 also use employment-decile dummies to control for firm size.

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, the number of foreign partner firms (imports only) and the value-weighted mean per capita GDP of firms' country destinations or sources. Firm-product-country attributes considered in the bottom panel of the figure include value, 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] MPC and 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 substantially more foreign partner firms. MPC firms also trade significantly more value at the product-country level than PC firms, and are significantly 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

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

[7]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.

negative for both exporters and importers, indicating these firms' specialize in different sets of goods. Second, the shares of PC and 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 three 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 and third panels, the extensive and intensive components of log value, i.e., the log number of firm-product observations with positive trade and the log average value per firm-product observation with positive trade, are regressed on these variables. As these components sum to log aggregate value, the coefficients reported in the second and third panels sum to their respective coefficients reported in the first panel.

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[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.

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 is disproportionately due to the intensive margin. As indicated in the bottom panel, coefficients on log GDP are relatively larger for MWR and MPC versus other types of firms than in the middle panel.

Results for imports are less conventional. While we find the expected positive relationship between market size and import value across the three panels, 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. Some are small wholesalers and retailers trading relatively many products per country. Others are large, vertically-integrated firms encompassing both production and intermediation within their boundaries. We find that different types of trading firms specialize in different sets of goods and markets; as a result, they may respond differently to shocks such as trade liberalization, currency depreciation and the business cycle. Further research on these differences, as well as their origins and consequences, should be a priority.

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TABLE 1—DISTRIBUTION OF FIRM TYPES AND THE VALUE FOR WHICH THEY ACCOUNT, 2002

Firm Type	Exporting Firms				Importing Firms			
	Share of Firms	Share of Export Value	Share of Product-Countries	China Value Share	Share of Importing Firms	Share of Import Value	Share of Product-Countries	China Value Share
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: Table reports share of firms, the share of value for which they account, and share of product-country cells in which they are present, by type of firm (see text). Final column of each panel reports value exported to or imported from China as a share of total export or import value for that type of firm, respectively. Zeros are due to rounding. Data are for 2002.

TABLE 2—"PREMIA" RELATIVE TO PC FIRMS, 2002

	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(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
ln(Partners$_f$)	na	na	na	na	0.03 ***	0.09 ***	0.54 ***	0.49 ***
					0.01	0.01	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 (top panel) or firm-product-country (bottom panel) OLS regression of noted characteristic on dummy for noted firm type versus PC firms. Top-panel regressions include major six-digit HS category and major partner country fixed effects as well as dummy variables indicating firms' domestic employment decile (except first row). Bottom-panel regressions include product-country fixed effects and similar control for firm size. Robust standard errors clustered at the major six-digit HS (top panel) and product-country level (bottom panel) are 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

	Exports					Imports				
	W	R	PC	MWR	MPC	W	R	PC	MWR	MPC
	In(Value)									
ln(Distance$_c$)	-1.55 ***	-1.63 ***	-1.33 ***	-1.64 ***	-1.42 ***	-0.31	0.01	-1.19 ***	0.24	-0.99 ***
	0.21	0.18	0.17	0.24	0.20	0.23	0.31	0.26	0.41	0.26
ln(GDP$_c$)	0.93 ***	0.86 ***	0.92 ***	1.03 ***	1.13 ***	1.15 ***	1.15 ***	1.27 ***	1.28 ***	1.28 ***
	0.04	0.04	0.04	0.06	0.04	0.05	0.07	0.05	0.10	0.06
Constant	8.95 ***	8.34 ***	8.02 ***	5.07 *	4.67 **	-6.7 ***	-12.4 ***	-1.6	-16.1 ***	-3.1
	2.13	2.10	1.84	2.72	2.06	2.30	2.75	2.70	4.00	2.83
Observations	173	166	175	157	174	171	143	172	147	170
R^2	0.76	0.69	0.74	0.66	0.81	0.72	0.59	0.73	0.53	0.69
	In(Extensive Margin)									
ln(Distance$_c$)	-1.66 ***	-1.47 ***	-1.28 ***	-1.67 ***	-1.28 ***	-0.20	0.00	-0.73 ***	0.37	-0.72 ***
	0.19	0.14	0.14	0.21	0.17	0.18	0.18	0.16	0.24	0.16
ln(GDP$_c$)	0.73 ***	0.68 ***	0.82 ***	0.74 ***	0.80 ***	0.97 ***	0.98 ***	0.96 ***	0.93 ***	0.97 ***
	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.06	0.04
Constant	3.62 *	0.95	-1.36	1.37	-1.01	-15.5 ***	-18.9 ***	-10.7 ***	-21.1 ***	-11.0 ***
	2.01	1.68	1.70	2.24	1.88	1.80	1.81	1.77	2.25	1.73
Observations	173	166	175	157	174	171	143	172	147	170
R^2	0.75	0.73	0.79	0.68	0.73	0.74	0.74	0.79	0.60	0.79
	In(Intensive Margin)									
ln(Distance$_c$)	0.11	-0.16 *	-0.05	0.02	-0.14	-0.11	0.01	-0.46 **	-0.13	-0.26
	0.08	0.09	0.09	0.10	0.08	0.12	0.22	0.20	0.22	0.20
ln(GDP$_c$)	0.20 ***	0.18 ***	0.11 ***	0.30 ***	0.33 ***	0.18 ***	0.17 ***	0.31 ***	0.36 ***	0.31 ***
	0.02	0.02	0.03	0.03	0.02	0.03	0.05	0.05	0.06	0.05
Constant	5.33 ***	7.39 ***	9.39 ***	3.70 ***	5.68 ***	8.83 ***	6.46 ***	9.10 ***	5.05 **	7.91 ***
	0.74	0.98	0.84	1.11	0.83	1.36	2.00	2.10	2.51	2.20
Observations	173	166	175	157	174	171	143	172	147	170
Pseudo R^2	0.32	0.25	0.10	0.33	0.48	0.16	0.08	0.17	0.20	0.17

Notes: Table reports country-level OLS regressions for three dependent variables: log aggregate value per country (top panel), the log number of firm-product observations with positive trade per country (extensive margin; middle panel) and log average value per firm-product observation with positive trade per country (intensive margin, bottom panel). Robust standard errors reported below coefficients. Data are for 2002.