Buyer-Seller Relationships in International Trade: Do Your Neighbors Matter?[1]

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Abstract

An exporter needs to locate an importer in order to conduct an international trade transaction. In this paper, we investigate if the presence of other exporters in the neighborhood of a firm, selling to a particular foreign buyer, facilitates a match between the firm and this buyer. In particular, we search for evidence of importer-specific spillovers in the decision of Bangladeshi textile manufacturers to sell to a U.S. importer using the universe of U.S. import transactions with Bangladesh in textile products. We find that the presence of neighboring exporters selling to a U.S. importer increases the likelihood of exporting to that U.S. importer. Results suggest that importer-specific spillovers account for a significant portion of export spillovers previously documented in the literature. We also find that these spillovers vary by both importer and exporter characteristics. Our study highlights the significance of spillovers from exporting, whose scope extends beyond the level of the export destination, to that of the importing firm. This suggests that knowledge and information gains are potentially realized at a disaggregated level, where the individual importer and exporter interact.

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1. Introduction

International trade involves numerous transactions between buyers and suppliers across borders. A foreign transaction is the result of a firm in one country trading with another firm located in a foreign country. Therefore, it is important to understand the factors influencing buyer and seller relationships in international trade. A large literature looks at the determinants of exporter status (Bernard and Jensen, 2004) and highlights the role of export spillovers that improve the likelihood of firms exporting to foreign destinations (Koenig, 2009; Koenig, Mayneris, and Poncet, 2010). These studies find that greater presence of exporters to a specific foreign destination close to a firm can increase the likelihood that the firm exports to the same destination.[3] However, to the best of our knowledge, there is no existing empirical evidence on importer-specific spillovers.

We fill this gap by looking at how the presence of exporters neighboring a firm and exporting to a particular foreign buyer, impacts the likelihood that the firm will export to the same buyer. Hence, our focus is on the match between the importing and exporting firm, the micro units at which international trade occurs. Our study differs from earlier studies in this area in a crucial way. Previous analyses focus on spillovers from information sharing or cost sharing while exporting to a destination country. The idea is that the presence of exporters nearby exporting to the same destination can facilitate knowledge of business norms and culture, of setting up foreign exchange accounts or service centers abroad, or of retaining customs agents, and hence lower the costs of exporting to a particular country. In our paper, we ask if these

[3] Bernard and Jensen (2004) consider the role of both geographic and sectoral spillovers in the export decision of a U.S. plant and find no role for spillovers in determining a plant's export status. Therefore, it differs in two main ways from Koenig (2009) and Koenig, Mayneris, and Poncet (2010) who consider the role of export spillovers on the decision of French firms to export to a particular country - the spillovers considered are not destination specific and geography is at the state level that is much more aggregated than the employment areas in France.

spillovers are specific to the buyer. Thus, our paper is a step further in the direction of isolating the nature of export spillovers and the channels through which they operate.

Importer-specific spillovers can operate through various channels. The presence of exporting firms in the neighborhood selling to the same buyer can facilitate information sharing about exporting to that particular buyer. This might include knowledge of any needs of the importer that require customization such as the buyer's product specifications, custom packaging requirements, and its clienteles' tastes and preferences. Additionally, there may be cost sharing, where costs might include search costs of locating a buyer, investing in activities that promote an exporter's product to a potential buyer such as advertising or participating in trade shows etc. The ability to obtain tacit knowledge and share in costs is likely to lower the fixed and/or variable costs of exporting to a particular buyer.

Recent contributions to the empirical literature on export spillovers highlight the role for destination-specific export spillovers. Koenig (2009) and Koenig et al (2010) use data on French exporters to find that greater presence of exporters nearby affects the decision to start exporting to a particular country, but not the volume of exports. Hence, the authors infer that destination-specific export spillovers affect the fixed, but not the variable cost of exporting. Koenig et al (2010) also find that spillovers exhibit spatial decay. Fernandes and Tang (2012) find that for Chinese exporters, new exporters' first-year sales and probability of survival are higher in cities where there are existing exporters selling to the same export destination–industry. They also find that spillovers are heterogeneous across firm types. Spillovers from processing exporters are weaker compared to those engaged in ordinary exports and foreign exporting firms located in China benefit less than their domestic counterparts from proximity to other exporters. Our

primary contribution to this strand of the literature is to isolate export spillovers that not only vary by country but also by buyers within a country.

By looking at the formation of buyer-supplier matches across borders, our paper also relates to the nascent body of work exploring buyer-seller matches in international trade. Eaton, Eslava, Jinkins, Krizan, Tybout (2013) document several patterns in trade relationships between Colombian exporters and U.S. importers and calibrate their structural model to replicate key patterns in the data. They find that initial cost of searching for and locating a buyer is more than thirteen times higher than the per shipment cost of maintaining the relationship. The model further quantifies the effects of learning on exporting dynamics. Monarch (2013) examines trade relationships between U.S. importers and Chinese exporters. The focus of the paper is to explain the frequency with which U.S. importers switch their Chinese trading partners using a dynamic discrete choice model. One of the key findings of the study is that importers weigh between price and quality of a product in their stay or switch decision. Our paper moves beyond characterizing buyer-seller relationships to examining a particular determinant of these relationships, namely importer-specific export spillovers.

In addition to contributing to the international trade literature, our work also sheds light on a specific mechanism of urban agglomeration economies. The theoretical literature explaining the existence of urban agglomeration economies posits that larger markets allow for a better match between buyers and suppliers (Duranton and Puga, 2004), however, empirical evidence is scant. Most of the empirical work examining the matching mechanism has focused on matches between employers and employees and Puga (2010) concludes that "[o]n the empirical side, evidence of matching as a source of agglomeration is perhaps most needed" (p. 216). In light of this, our work can be considered as taking a significant step towards establishing the empirical

association between agglomeration economies and better matches between buyers and suppliers, albeit across national borders.

By looking at the match between a buyer and a seller, we highlight the scope of spillovers beyond information sharing on country-specific transaction costs, or cost sharing in exporting to the destination country, to information and cost sharing to export to a particular buyer. Thus, we relate the presence of exporters neighboring exporter i, selling to an importer j, on the decision of exporter i to start exporting to importer j, as well as the continuing trading status of an exporter-importer pair. We use transaction level data on U.S. imports in textile products from Bangladeshi exporters, sourced from the U.S. Census Bureau. Focusing on trade transactions in textile products between the U.S. and Bangladesh is motivated by the need to construct our analysis dataset fairly easily while focusing on an important bilateral trade relationship.[4] Bangladesh is the fourth largest apparel exporter in the U.S.[5] Over three quarters of Bangladeshi exports are in textile and apparel products with U.S. being the second largest export destination (Tables 4 and 5, Trade Policy Review, 2012). Exporters in our sample are Bangladeshi textile manufacturing firms, while importers are U.S. firms operating in all sectors of the economy including manufacturing, wholesale, and retail.

We estimate a linear probability model with exporter-year and importer fixed effects as well as time-varying importer controls. The results from our preferred specification indicate that a one percent increase in the number of exporters in the city selling to the same importer results in a 0.19% increase in the likelihood of matching with the same buyer for the first time; and a 0.34% increase in the likelihood of a match with the same buyer at any point in time. We also find that spillover effects differ by both exporter and importer characteristics. Spillovers are

[4] See Section 3 for further detail on data construction.
[5] See http://www.bdembassyusa.org/uploads/US%20-%20BD%20trade.pdf.

strongest for smaller exporters compared to those that have higher average export sales. This suggests that smaller exporters may not have the internal resources of larger exporters that facilitate buyer-seller relationships and therefore importer-specific spillovers are associated with higher likelihood of matching with U.S. buyers that transact with neighboring exporters. We further find that spillovers are stronger when the importer is small relative to when the importer is large. This suggests that U.S. importers vary in their behavior to procure and maintain supplier relationships.

The rest of the paper is organized as follows. Section 2 presents our empirical model and identification strategy. Section 3 describes the data and measurement of key variables. Section 4 discusses the empirical findings and the final section concludes.

2. Empirical model and strategy

We assume that exporter i starts exporting to importer j in a country at time t if the expected discounted profit from exporting to importer j is positive. Exporter i's present discounted value of future profits from exporting to importer j at period t can be written as,

$$V_{ijt}^{e} = \pi_{ijt}^{e} - f_{ijt} + \beta \max(V_{ij,t+1}^{e}, V_{ij,t+1}^{n}), \quad (2.1)$$

where f_{ijt} is the fixed cost of exporting; $V_{ij,t+1}^{n}$ is the present discounted value of future profits from not exporting to importer j at period t. Specifically,

$$V_{ijt}^{n} = \pi_{ijt}^{n} + \beta \max(V_{ij,t+1}^{e}, V_{ij,t+1}^{n}). \quad (2.2)$$

In a model of monopolistic competition, where the exporter charges a constant mark-up over marginal cost, π_{ijt}^{e} is a function of aggregate prices in the destination market, the exporter's input costs, exporter productivity, the average level of spending among importers and other

exporter and importer shocks. We assume that importer-specific spillovers operate through lowering both the sunk and per period fixed cost of searching for a buyer. Using U.S.-Colombian trade transactions data, Eaton et al. (2013) estimate that the initial search cost of locating one buyer per year is about $20,642 and it drops to $1,522 per shipment to maintain each client relationship once the relationship has been established. These estimates provide a sense of the magnitude of the initial and ongoing costs of maintaining exporter-importer relationships and our rationale for explicitly introducing importer-specific costs of exporting.

For ease of interpretation we decompose the fixed cost of exporting into four components as,

$$f_{ijt} = f^{M}_{ijt_0} + f^{M}_{ijt} + f^{D}_{it_0} + f^{D}_{it}, \tag{2.3}$$

where $f^{M}_{ijt_0}$ and $f^{D}_{it_0}$ are the initial costs incurred at time t_0 and f^{M}_{ijt} and f^{D}_{it} represent per-period fixed costs. Superscript M denotes importer-specific fixed costs that are specific to each importer and superscript D denotes destination-specific fixed costs of exporting that are common across all importers within a country. Therefore, fixed costs encompass both the sunk cost of searching and locating a buyer, $f^{M}_{ijt_0}$, as well as per period fixed costs of maintaining ongoing trade relationships, f^{M}_{ijt}, that include investing in activities that promote an exporter's product to a potential buyer such as advertising or participating in trade shows, learning about customized packaging requirements and the importer's clientele and tastes. They also incorporate sunk destination-specific fixed costs, $f^{D}_{it_0}$, that more broadly include learning about local business norms and culture as well as per period fixed costs of exporting to a country, f^{D}_{it}, such as retaining a customs agent and lawyers, creating and maintaining a foreign sales office, foreign currency accounts, etc.

To implement empirically we formulate,

$$f_{ijt} = g\left(z_{cj,t-1}\right) + X_{it}^{1} + X_{jt}^{2} + \varepsilon_{ijt}, \tag{2.4}$$

where $z_{cj,t-1}$ captures the number of exporters selling to importer j in city c at time $t-1$, X_{it}^{1} (X_{jt}^{2}) encompasses exporter-year (importer-year) shocks, and ε_{ijt} is an idiosyncratic error term. The probability that firm i exports to importer j at time t can be written as:

$$Pr\left(Exporting_{ijt}\right) = Pr\left(V_{ijt}^{e} - V_{ijt}^{n} \geq 0\right). \tag{2.5}$$

Substituting (2.4) into (2.5) we have,

$$Pr\left(Exporting_{ijt}\right) = Pr\left[\varepsilon_{ijt} \leq f\left(g\left(z_{cj,t-1}\right), X_{it}^{1}, X_{jt}^{2}, \pi_{ijt}^{e}, \pi_{ijt}^{n}\right)\right]. \tag{2.6}$$

We first estimate a simple linear probability model of the decision to start exporting by exporter i to importer j at time t as follows,

$$S_{ijt} = \beta_1 z_{cj,t-1} + \beta_2 X_{it}^{1} + \beta_3 X_{jt}^{2} + \varepsilon_{ijt}. \tag{2.7}$$

We employ a linear probability model (LPM) similar to Bernard and Jensen (2004) and Fernandes and Tang (2012) to estimate (2.7).[6] In our preferred specification, we include exporter-year, importer, and time-varying importer controls to account for time varying exporter and importer shocks. Note that the exporter-time specific variables that enter the profit function, like exporter productivity, are absorbed by the exporter–time specific effect and any other unobserved exporter–specific shocks that determine exporter status.[7] The exporter–time fixed effects also capture destination-specific fixed costs that are common across all U.S. buyers. The variable $z_{cj,t-1}$ captures spillovers from the presence of exporters to the same buyer j in exporter

[6] See Fernandes and Tang (2012) for a detailed explanation of the choice of LPM.

[7] Since we are using U.S. import transaction records, we only observe the product and value associated with the exporter's transaction with a U.S. importer. We do not observe exporter characteristics that may influence the decision to export to a U.S. importer such as total factor productivity, total wages, total employment, etc. Therefore, exporter-year fixed effects control for all time varying exporter characteristics that may influence export behavior.

i's area c. As discussed earlier, these spillovers operate through the sunk and per-period fixed-costs of exporting. We hypothesize that for first-time matches, importer-specific spillovers lower the initial sunk cost of locating a buyer and initiating the first-time matches. ε_{ijt} is an idiosyncratic error term.

We next estimate a simple linear probability model of the exporting status of exporter i to importer j at time t as a function of other exporters selling to importer j in an area c at time $t-1$ as follows,

$$M_{ijt} = \beta_1 z_{cj,t-1} + \beta_2 X_{it}^1 + \beta_3 X_{jt}^2 + \varepsilon_{ijt}. \quad (2.8)$$

Here, we posit that spillovers operate by further lowering the per-period fixed cost of maintaining each client relationship in every period. As in (2.7), the exporter–time fixed effects control for destination-specific fixed costs that are common across all U.S. buyers. In both (2.7) and (2.8) we expect β_1 to be positive. *A priori*, we also expect that spillovers will be larger for all matches compared to first-time matches only since (2.8) includes first-time matches as well. However, we can compare β_1 in (2.7) and (2.8) to get a sense of the relative importance of the channels via which spillovers operate.

In both specifications (2.7) and (2.8), importer fixed effects control for time-invariant importer characteristics that may influence the decision to buy from a particular Bangladeshi exporter.[8] This may include factors like firm ownership or state level programs aimed at increasing exports of local firms by providing matching services with foreign buyers, as long as these programs do not change over the time period of our analysis. In our preferred specifications, we also include time-varying importer controls of age and employment. Age and

[8] All our results remain qualitatively unchanged with the inclusion of importer-year fixed effects.

size are correlated with other firm characteristics such as productivity that may influence a trade relationship.

After controlling for exporter-year and importer fixed effects, we still leave out the determinants of export behavior that vary across city-importer and time. For instance, if there are efforts by local governments or trade associations to promote textile exports to particular U.S. importers within a city, or if particular U.S. importers have preferences for trade with exporters in particular Bangladeshi cities due to reasons that cannot be observed, then the coefficient on our own-city spillover variable may not be consistently estimated. To a certain extent, this endogeneity problem is mitigated since we use a lagged measure of exporter spillovers, thus circumventing spurious correlation with any contemporaneous city-importer-specific unobserved factors. Standard errors in all our specifications are clustered at the importer-city level.

3. Data

3.1. Source

The data for this study are drawn from the Linked/Longitudinal Foreign Trade Transactions Database (LFTTD). The LFTTD is a transaction-firm linked database linking individual trade transactions, both export and imports, to the U.S. firms that make them.[9] The dataset contains information on the value, quantity, and date of transaction of a ten-digit Harmonized Commodity Description and Coding system (commonly called Harmonized System or HS) products. The Harmonized System is an internationally standardized system of names and numbers for classifying traded products. The LFTTD also contains information about the trading parties and in particular, U.S. Customs Border Protection requires U.S. importers to

[9] See http://www.census.gov/ces/dataproducts/datasets/lfttd.html for more information.

collect information about its foreign trading partner.[10] Therefore, we focus on the universe of all U.S. import transactions (LFTTD-IMP) that occurred between 2002 and 2009. Moreover, we consider all import transactions of textile products from Bangladesh aggregated at the exporter-importer and year level. Although, the LFTTD-IMP spans the years 1992 through 2009, we have chosen to focus on the most recent eight-year period for ease of constructing the analysis dataset.[11]

We focus on U.S. textile imports because we want to investigate the export behavior of goods producers and not trade intermediaries. In the case of trade intermediaries, we are worried that the actual match might potentially have occurred between the producer, who we cannot observe, and the U.S. importer, while the intermediary observed by us as shipping the data has no role in the matching process. The identifier for the exporter in the U.S. import transactions database is the manufacturer in case of textile products (see details below), and we exploit this useful feature of the data to circumvent this issue. In addition, we selected Bangladesh for two main reasons. First, textile exports account for close to 80% of total Bangladeshi exports over the sample period and this allows us to capture a significant portion of economic activity of this U.S. trading partner. Second, we wanted to choose a trading partner that is a major player within the textile sector but that would still allow us to construct our dataset with ease as explained in the following section.

3.2. Dataset Construction

We utilize two sets of firm identifiers in the LFTTD-IMP. The first identifies the U.S. firm (importer) and the second identifies the Bangladeshi textile manufacturer (exporter). The exporter is uniquely identified by the "Manufacturer ID" (MID), a required field on Form

[10] A U.S. exporter is not required to assign and report a unique identifier for the foreign trading entity it transacts with.
[11] At the time we began the study, 2009 was the latest available year. 2010 and 2011 have since become available.

7501.[12] The MID identifies the manufacturer or shipper of the merchandise by an alpha-numeric code that is constructed using a pre-specified algorithm with a maximum length of 15 characters (see Appendix for stylized examples).[13] For textile shipments, the MID represents the manufacturer only in accordance with Title 19 Code of Federal Regulations.[14] Therefore, our data captures Bangladeshi textile manufacturers who export directly to the U.S., rather than intermediaries who may or may not engage in production activities. The particular algorithm required to construct the MID also circumvents concerns about capturing multi versus single plant exporters since it is crucial to identify the establishment where the export originates in the analysis of local export spillovers. The last three characters in the MID designate the city where the manufacturer is located. Therefore, each manufacturer is assigned a MID that uniquely identifies its location.

We perform several basic data checks. First, we exclude transactions between related parties.[15] Over the sample period, only about 2% of the total value of imports of textile products between the U.S. and Bangladesh occurs between related parties. Since we are interested in exploring the role of export spillovers on an exporter's decision to begin and continue selling to an importer, we do not want to include trade transactions between the headquarters and subsidiaries of multinational firms. Next, we exclude transactions where the importer or exporter identifiers are missing or where the MID does not conform to the algorithm outlined in the CBP Form 7501 Instructions. Examples include a MID that begins or ends with numeric characters or the MID is a series of numbers.

[12] See form http://forms.cbp.gov/pdf/cbp_form_7501.pdf.
[13] See Block 13 (pg. 7) for description of MID and Appendix 2 (pg. 30) for instructions on constructing MID at http://forms.cbp.gov/pdf/7501_instructions.pdf.
[14] See http://www.gpo.gov/fdsys/pkg/CFR-2011-title19-vol1/pdf/CFR-2011-title19-vol1-sec102-23.pdf.
[15] "Related party" trade refers to trade between U.S. companies and their foreign subsidiaries as well as trade between U.S. subsidiaries of foreign companies and their foreign affiliates. For imports, firms are related if either owns, controls, or holds voting power equivalent to 6 percent of the outstanding voting stock or shares of the other organization (see Section 402[e] of the Tariff Act of 1930).

Once the basic data checks are complete, we construct firm trading pairs using the importer and exporter firm identifiers for each year in the sample. There are 2,329 and 8,104 unique number of importers and exporters, respectively, over the sample period that results in 18,874,216 possible trading pairs in any single year.[16] The final analysis dataset consists of observations at the importer-exporter pair and year level.

In order to explore heterogeneity in spillovers by importer characteristics, we further categorize U.S. importers into two size bins – firms that employ less than 250 workers and firms that employ 250 workers or more. There are 2,329 U.S. importers in our sample and we link 2,306 of these to the Longitudinal Business Database (LBD) to obtain information on firm employment, age, sector, and multi or single-unit status. The LBD consists of data on all private, non-farm U.S. establishments in existence that have at least one paid employee, including non-manufacturing establishments (Jarmin and Miranda, 2002). For multi-units or firms with multiple plants, age is calculated as the difference between the year of interest and the year of establishment of its oldest plant. Since multi-unit firms may operate in several sectors of the economy, the firm is considered to be operating in the sector where the largest share of its employment is housed.[17] Since the LBD is an establishment level dataset, employment is first aggregated up to the firm level by sector. The firm is then assigned its "predominant" sector and its employment is aggregated to the firm level.[18]

3.3. Variables

We consider two independent variables. The first is S_{ijt}, a dummy variable that takes on a value of 1 for the first year t that exporter i starts selling to importer j and 0 otherwise. For

[16] This illustrates why we focus on a particular sector and trading partner. The need to construct all possible trading pairs precludes considering the universe of U.S. import transactions.
[17] If instead payroll information is used to assign sectors, the categorization remains qualitatively unchanged.
[18] Sales data are not readily available for all firms in the sample. Therefore, employment is used to assign a sector.

instance, if we observe ABC Garments Company in Bangladesh exporting to XYZ Corporation in the U.S. from 2003 through 2007, S_{ijt} takes on value of 1 in 2003 and all other observations in the subsequent years are dropped from the data. The second independent variable of interest is M_{ijt}, a dummy variable that takes on a value of 1 if exporter i exports to importer j in year t and 0 otherwise. M_{ijt} captures the status of a trading pair in a given year. For instance, in the preceding example, S_{ijt} takes on a value of 1 for 2003 through 2007 and 0 in all other years in the sample.

The spillover variables, our main dependent variables of interest, refer to other exporters selling to importer j located in the same area as exporter i. The geographic area we consider is the city that is reported in the Manufacturer ID. The last three characters of the MID designates the city the manufacturer operates in. We verified the list of cities in our analysis sample against a list of all cities in Bangladesh. Bangladesh is divided into seven administrative divisions that are further divided into 64 districts (*zila*) and within districts, there are 1,009 sub-districts (*upazila*).[19] The city information extracted from the MID approximately conform to sub-districts.

Sub-districts are analogous to counties in the U.S. and are the second lowest tier of regional administration. Bangladesh is a small country with an area of about 57,000 square miles, roughly the size of the state of Iowa, therefore average area of a sub-district is about 56 square miles.[20] There are 282 cities in our analysis sample. Our main variable of interest is measured as the number of other exporters selling to importer j in the same city as exporter i.

[19] See list of geo codes at http://www.bbs.gov.bd/WebTestApplication/userfiles/Image/geocodeweb.pdf.
[20] The spillover measures in Koenig (2009) and Koenig et al (2010) are measured at the level of the French employment area that is on average 937 square miles. Therefore, our geographic unit is much smaller and we can expect to capture very localized effects. For a map of the sub-districts of Bangladesh see http://www.fao.org/fileadmin/templates/faobd/img/Administrative_Unit_Map.jpg.
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The spillover variable is lagged one year in our econometric specifications and will be referred to as "# exporters-importer *j*, same city" in the tables.

Table 1 presents summary statistics for the entire sample as well as differentiated by small and large U.S. importers. We find that the total number of HS ten-digit products transacted, the average export value, number of sellers per buyer and our spillover variable of interest are larger for exporters selling to large U.S. importers relative to those selling to smaller U.S. importers. For instance, a trading pair transacts an average of 8 HS ten-digit products over the sample period and this number increases to about 10 with large importers and is about 7 with small importers. We also see that a Bangladeshi textile exporter sells to about 3 U.S. importers on average, and this number remains similar across small and large importers.

4. Results

4.1 Spillover effects on matching between importers and exporters

Table 2 presents results for equation (2.7). We look at the impact of the presence firms exporting to the same buyer in the neighborhood of the exporter, defined by a city, on the probability of a first-time match between the importer and the exporter, successively adding exhaustive fixed effects in each column. Column (1) includes year fixed effects only; column (2) includes exporter-year and importer fixed effects; and column (3) additionally includes time-varying importer controls of age and employment. We focus on results from column (3) in our discussion below as it contains the most exhaustive set of controls, although results are very similar across the three specifications.

We find that, controlling for exporter–time and importer specific factors that might determine matches as well as importer age and employment, spillovers are positively associated

with the likelihood of a first–time match. Particularly, we find that an additional exporter in the city selling to the same importer is associated with an increase of 0.00007 in the likelihood of a first-time match between a Bangladeshi exporter and a U.S. importer. Our coefficient is statistically significant at the one percent level. In elasticity terms, our results in column (2) indicate that a one percent increase in the number of exporters in a city selling to a buyer results in a 0.51% increase in the likelihood of a match with the same buyer for the first time.[21] This figure drops to 0.19% after we account for buyer fixed effects and controls.

Next, we estimate equation (2.8) and present results in Table 3. We ask if spillovers from neighboring exporters selling to a particular importer are associated with a greater likelihood of exporting to the same importer. As before, in column (1) we include year fixed effects only; column (2) includes exporter-year and importer fixed effects; and column (3) additionally includes time-varying importer controls of age and employment. Under all specifications, we find that greater presence of firms exporting to an importer in the same city is positively associated with a higher likelihood of exporting to the same importer. The effect is highly statistically significant. Focusing on column (3), we find that an additional exporter in the city exporting to a U.S. importer increases the likelihood of exporting to the same importer by 0.0002. In elasticity terms, our results in column (2) indicate that a one percent increase in the number of exporters in a city selling to a buyer results in a 0.68% increase in the likelihood of a match with the same buyer. This figure drops to 0.34% once we account for buyer fixed effects and controls.

Column 4 in tables 2 and 3 examines whether the effect of an increase in the number of neighboring exporters selling to the same importer remains significant when we restrict the sample in terms of number of neighbors using the same specification as in column 3. The sample

[21] Elasticities are calculated using the "margins" command in STATA.

is restricted to observations for which the number of neighboring exporters exporting to the same importer is greater than 1. The purpose is to ensure that the importer-specific spillover effects are not only due to cases of textile exporters starting to export to a particular U.S. importer because the number of neighbors increase from 0 to 1. Results confirm that the impact of spillovers remains positive, significant, and almost identical in magnitude when considering cities with more than 1 neighboring exporter. Therefore, importer-specific export spillovers persist for exporters surrounded by one or more neighbors.

As discussed in Section 2, comparing the coefficients on our spillover coefficient in Tables 2 and 3 gives us a sense of the relative importance of the channels via which spillovers operate. Roughly, the coefficient on importer-specific spillovers for first-time matches only is about half of the coefficient on importer-specific spillovers for all matches. This suggests that importer-specific spillovers are especially beneficial in lowering the initial search costs that can be more than thirteen times higher than per period fixed costs as indicated by estimates in Eaton et al (2013).

In order to compare our results to that in the existing literature, we implement a conditional logit model as in Koenig et al (2010) with exporter-year fixed effects and time-varying importer controls and report the results in Table A2. Koenig et al (2010) search for destination-product specific spillovers on a French exporter's decision to start exporting. Implementing a conditional logit model with year and firm-product-country fixed effects, they find that an additional exporter in the neighborhood increases the likelihood of exporting to the same destination within a product category by 1.07 percentage points.

Our conditional logit estimation results imply that an additional exporter in the neighborhood increases the likelihood of exporting to the same buyer for the first time by 0.70

percentage points and overall by 0.80 percentage points.[22] In our theoretical framework, we posit that the 'overall' fixed costs of exporting are comprised of both importer-specific and destination-specific fixed costs. Previous studies, including Koenig et al (2010), look at spillovers from nearby exporters exporting to the same destination. Thus, they estimate spillover effects that lower the 'overall' fixed cost of exporting. On the other hand, in our empirical analysis, any spillover effect that lowers destination-specific fixed costs, which would be common across all US importers, are accounted for by exporter-time effects. Hence, our estimates only capture spillover effects that operate by lowering importer-specific fixed costs. This implies that our estimates isolate a part of the 'overall' spillover effect estimated in previous studies. Following this line of reasoning, the above results suggest that importer-specific spillovers account for about 65% (75%) of destination-specific spillovers for first time (ongoing) trade pair relationships. This is economically significant and indicates the importance of isolating export spillovers that are buyer-specific.

4.2 Heterogeneous spillover effects

In Tables 4 and 5, we estimate equations (2.7) and (2.8) separately for small, medium, and large exporters. Exporters are designated into three size categories based on their average export sales in each year – large exporters have sales in the first quantile, medium exporters have sales in the second quantile, and small exporters have sales in the third quantile. Figure 1 shows the distribution of export value over our sample period. We see that about three-quarters of annual Bangladeshi textile export transactions are valued at less than $500,000.

In addition to establishing the heterogeneity of the spillover effects based on exporter characteristics, this exercise addresses and alleviates concerns about results predominantly being driven by the presence of multi-plant firms. The concern about multi-plant firms is that although

[22] Marginal effects are calculated using the "margins" command in STATA.

our spillover variable correctly assigns manufacturers to the cities they are located in, it is possible that the headquarter, rather than the manufacturing location of a multi-plant firm, is the unit responsible for developing and maintaining trade relationships. Since we do not have firm level information for the Bangladeshi manufacturers in our sample, we offer two reasons why we believe our results are not disproportionately being driven by the presence of multi-plant firms.

First, the export-oriented Bangladeshi textile sector is characterized by a large number of small firms rather than a few large firms that are also likely to have multiple plants (Yamagata, 2007). Second, we re-run our regressions on three separate samples that are divided according to exporters' average sales. It is reasonable to assume that manufacturing units of multi-plant firms will tend to be larger in terms of total export value and therefore if the presence of such exporters in our sample are disproportionately driving our results we would expect the spillovers to be more pronounced for large exporters. However, we find the opposite result – spillovers are strongest for small exporters. Intuitively, this makes sense because we would expect smaller exporters to benefit more from the presence of neighboring exporters selling to the same buyer since large exporters are more likely to have well-established, internal networks that facilitate fostering and maintaining buyer-seller relationships.

In Table 6, we estimate equations (2.7) and (2.8) separately for small and large U.S. importers. This is motivated by evidence that there is substantial heterogeneity within U.S. trading firms in terms of size and this could mask interesting patterns in the spillover variable of interest. Bernard, Jensen, and Schott (2010) document that pure wholesalers and retailers (defined as importers with 100% of their employment in either of those two sectors) are smaller in terms of employment, trade value and domestic sales, operate fewer U.S. establishments and are present in fewer U.S. states. Meanwhile "mixed" firms (defined as firms with less than 100%

employment in retailing and/or wholesaling) are substantially larger, trade more products, trade with more countries, and are more likely to engage in related-party trade. In our sample, more than half of U.S. importers are wholesalers while a third are manufacturing and retail firms.

Figures 2 and 3 show that the average export value and number of exporters per importer differ vastly by importer size in each of the sample years. The average import value of small importers are less than half that of large importers. Large importers also transact with almost double the number of Bangladeshi exporters compared to small importers, on average. Large firms in the U.S. importing textiles from Bangladesh are likely to behave differently in procuring suppliers and trading with them and so we expect spillover effects to differ across size categories. For instance, small U.S. importers might be more reliant on their existing suppliers for information on potential future suppliers than large U.S. wholesalers and retailers, who might have alternative means of search. Similarly, on the Bangladeshi side, exporters might find it more difficult to search and match with smaller U.S. buyers.

Indeed, we do find support for the hypothesis that spillovers play a larger role in buyer-seller matches when the buyer is small. The results are presented in Table 6. We divide the sample by importer size – small and large. Columns (1) and (2) present results for the sample of small importers and columns (3) and (4) for the sample of large importers. Looking at columns (1) and (3) where the dependent variable is the probability of a first match, we find that spillover effects for large firms are smaller than that for small firms, though both effects are positive and statistically significant. Results in columns (2) and (4), where the dependent variable is the match status between pairs in general, exhibit a similar pattern. The spillover effects are larger when the Bangladeshi textile manufacturer exports to a small U.S. importer.

5. Conclusion

This paper finds a statistically positive and economically significant role for spillovers that are specific to the buyer in the decision to begin and continue trade relationships between an exporter and importer, thus, building on the existing empirical body of evidence that documents positive export spillovers specific to destinations and products. Our work also adds to the nascent investigations on matches between buyers and sellers in both the international trade and urban agglomeration economies literatures. Specifically, we investigate if the presence of other exporters in the neighborhood of a firm, selling to a particular foreign buyer, facilitates a match between the firm and this buyer.

Our results suggest that a one percent increase in the number of exporters in a city selling to a buyer results in a 0.19% (0.34%) increase in the likelihood of a match with the same buyer for first time (ongoing) trade pair relationships. Comparison with existing evidence suggests that this effect is economically significant – importer-specific spillovers account for about three-quarters of export spillovers previously documented in the literature. We also find evidence of positive importer-specific export spillovers that vary with both exporter and importer characteristics. In particular, spillovers are stronger for small exporters and small importers. Together, these results establish the importance of isolating the buyer-specific component of export spillovers and recognizing that there may be further variation in spillovers depending on exporter and importer characteristics, namely size. Our study underscores the importance of linking firm-trade transactions data between country pairs to shed further light on the determinants of the relationship between buyers and sellers transacting across borders.

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Table 1 Summary Statistics.

	All Importers		Small Importers		Large Importers	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of HS-10 products/pair	8.45	9.67	7.13	8.65	9.88	10.89
Export value/pair (in thousands)	524	1,552	342	945	784	2,111
Number of exporters/importer	39.10	60.77	17.97	31.45	71.47	76.84
Number of importers/exporter	3.27	3.00	3.30	2.96	3.24	3.06
Number of Exporters-Importer j, Same City	0.53	3.20	0.37	1.81	1.42	6.85

Notes: The statistics are based on the sample of U.S. import transactions with Bangladesh in textile products only between 2002 and 2009; "Pair" refers to a unique importer-exporter combination; Export values are in nominal U.S. dollars and rounded to the nearest integer. "Small" refers to importers that employ 1-249 workers and "Large" refers to importers that employ 250+ workers.

Table 2 First Match, Importer-Specific Spillovers.

	(1) First Match	(2) First Match	(3) First Match	(4) First Match
# exporters-importer j, same city	0.00013***	0.00013***	0.000069***	0.000067***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	131,965,095	99,454,323	99,454,323	93,183,914
Year Fixed Effect	Y	-	-	-
Exporter x Year Fixed Effect	-	Y	Y	Y
Importer Controls	-	Y	Y	Y
Importer Fixed Effect	-	-	Y	Y

Notes: The dependent variable, "First Match", takes on the value1 in the first year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The independent variable is lagged one year. Standard errors are clustered at the importer-city level. Significance: *10%, **5%, ***1%. In column 4, the sample is restricted to observations for which the number of exporters in the area exporting to a particular U.S. importer is greater than 1.

Table 3 Match Status, Importer-Specific Spillovers.

	(1) Match Status	(2) Match Status	(3) Match Status	(4) First Match
# exporters-importer j, same city	0.00030***	0.00030***	0.00021***	0.0002***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	132,119,512	99,581,952	99,581,952	93,307,760
Year Fixed Effect	Y	-	-	-
Exporter x Year Fixed Effect	-	Y	Y	Y
Importer Controls	-	Y	Y	Y
Importer Fixed Effect	-	-	Y	Y

Notes: The dependent variable, "Match Status", takes on the value1 in any year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The independent variable is lagged one year. Standard errors are clustered at the importer-city level. Significance: *10%, **5%, ***1%. In column 4, the sample is restricted to observations for which the number of exporters in the area exporting to a particular U.S. importer is greater than 1.

Table 4 First Match, By Exporter Size.

	Large	**Medium**	**Small**
	First Match	First Match	First Match
# exporters-importer j, same city	0.00005***	0.00004***	0.00012***
	(0.000)	(0.000)	(0.000)
Observations	32,004,507	31,985,128	31,927,890
Exporter x Year Fixed Effect	Y	Y	Y
Importer Controls	Y	Y	Y
Importer Fixed Effect	Y	Y	Y

Notes: The dependent variable, "First Match", takes on the value1 in the first year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The independent variable is lagged one year. Standard errors are clustered at the importer-city level. Significance: *10%, **5%, ***1%. Exporters are designated as small, medium, large based on three size quantiles using average value of export sales each year in the sample period.

Table 5 Match Status, By Exporter Size.

	Large	**Medium**	**Small**
	Match Status	Match Status	Match Status
# exporters-importer j, same city	0.00009***	0.00007***	0.00047***
	(0.000)	(0.000)	(0.000)
Observations	32,022,528	32,010,240	32,010,240
Exporter x Year Fixed Effect	Y	Y	Y
Importer Controls	Y	Y	Y
Importer Fixed Effect	Y	Y	Y

Notes: The dependent variable, "Match Status", takes on the value1 in any year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The independent variable is lagged one year. Standard errors are clustered at the importer-city level. Significance: *10%, **5%, ***1%. Exporters are designated as small, medium, large based on three size quantiles using average value of export sales each year in the sample period.

Table 6 Importer-specific Spillovers, By Importer Size.

	Small		**Large**	
	(1)	(2)	(3)	(4)
	First Match	Match Status	First Match	Match Status
# exporters-importer j, same city	0.000091***	0.00027***	0.000061***	0.00018***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	81,514,392	81,591,072	17,939,931	17,990,880
Exporter x Year Fixed Effect	Y	Y	Y	Y
Importer Controls	Y	Y	Y	Y
Importer Fixed Effect	Y	Y	Y	Y

Notes: The dependent variable, "First Match", takes on the value1 in the first year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The dependent variable, "Match Status", takes on the value1 in any year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The independent variable is lagged one year. Standard errors are clustered at the importer-city level. Significance: *10%, **5%, ***1%. Importers are categorized into two size bins using average number of employees over the sample period. "Small" refers to 1-249 employees and "Large" refers to 250+ employees.

Figure 1 Distribution of Total Export Value, 2002 – 2009.

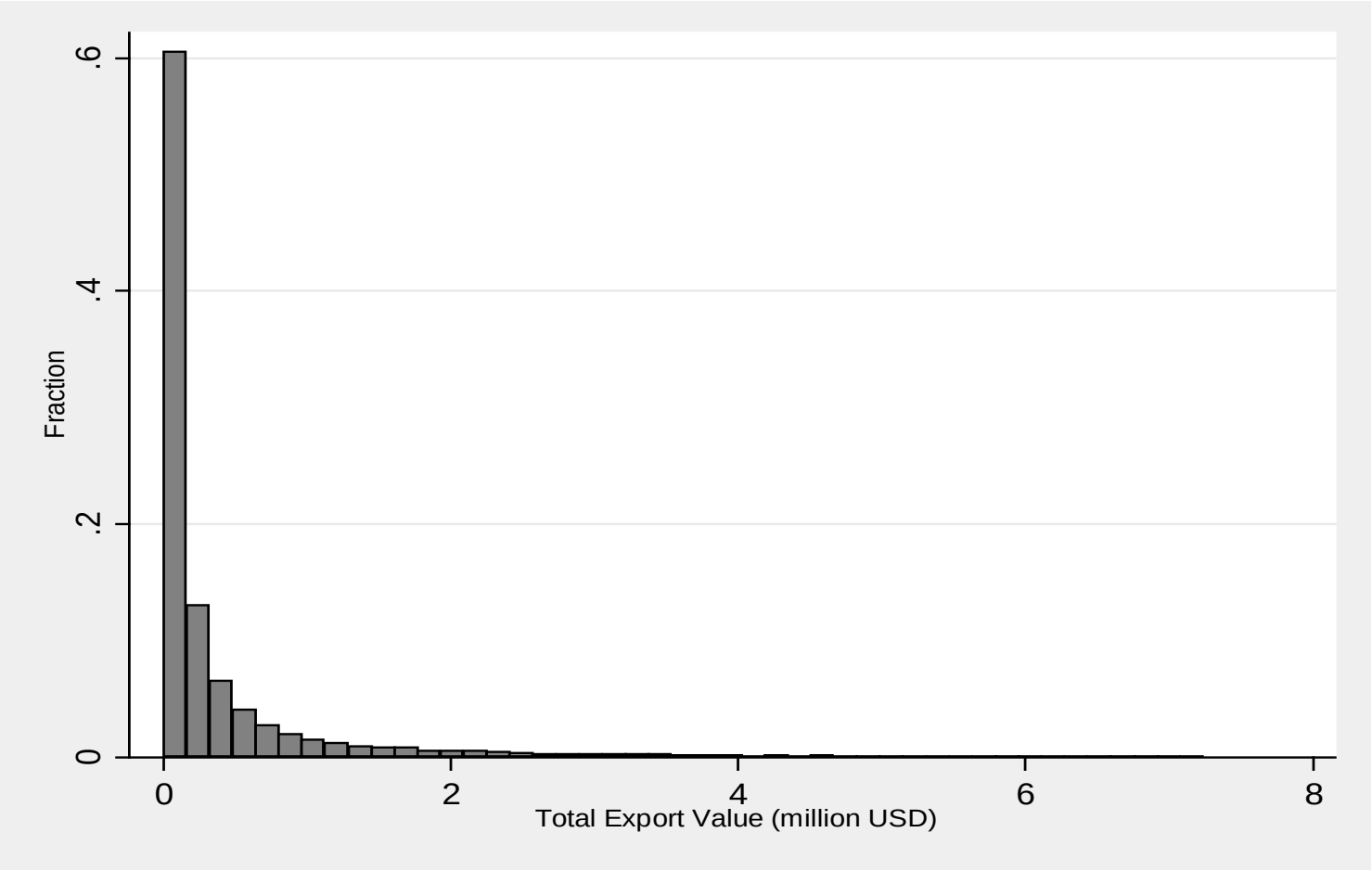
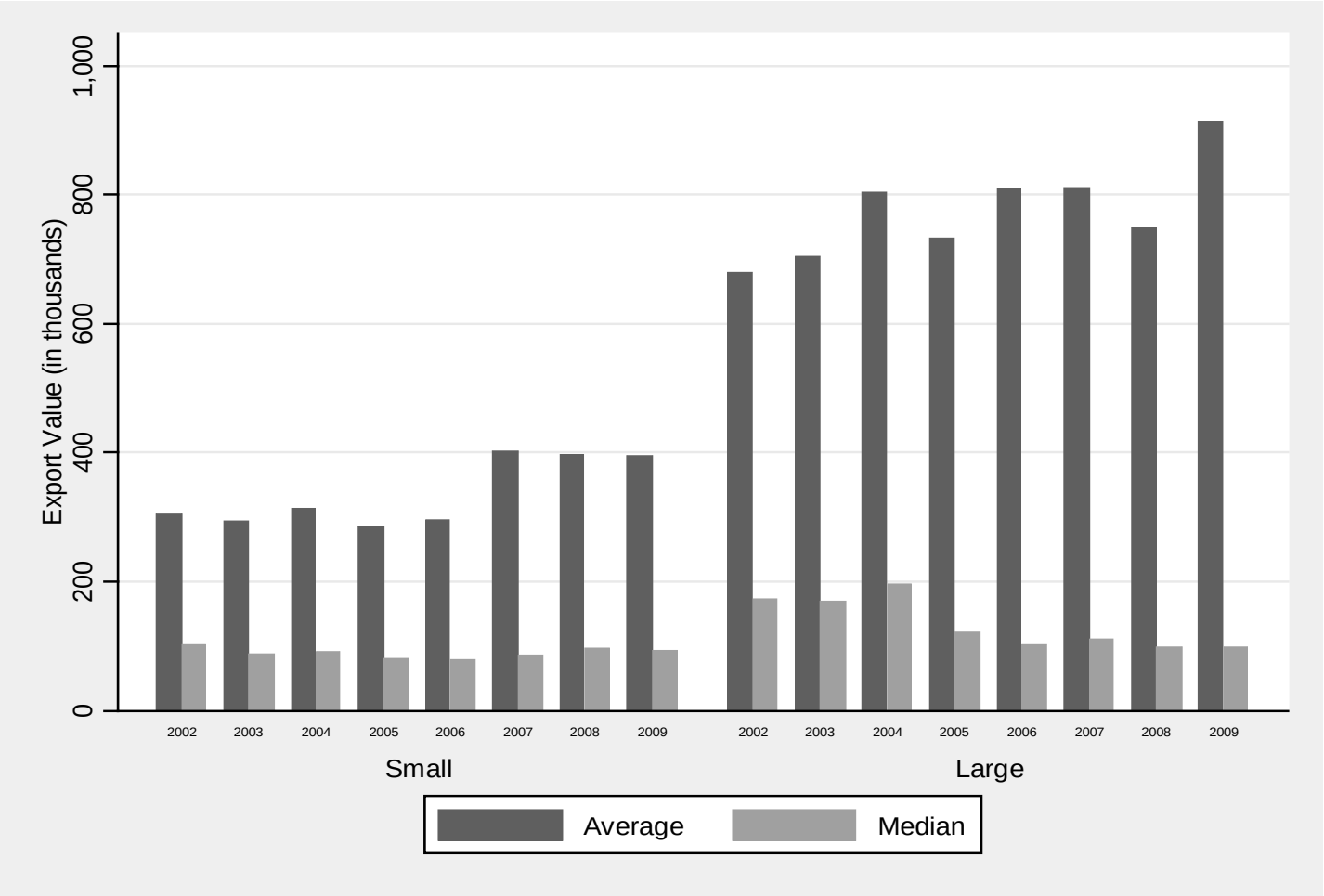
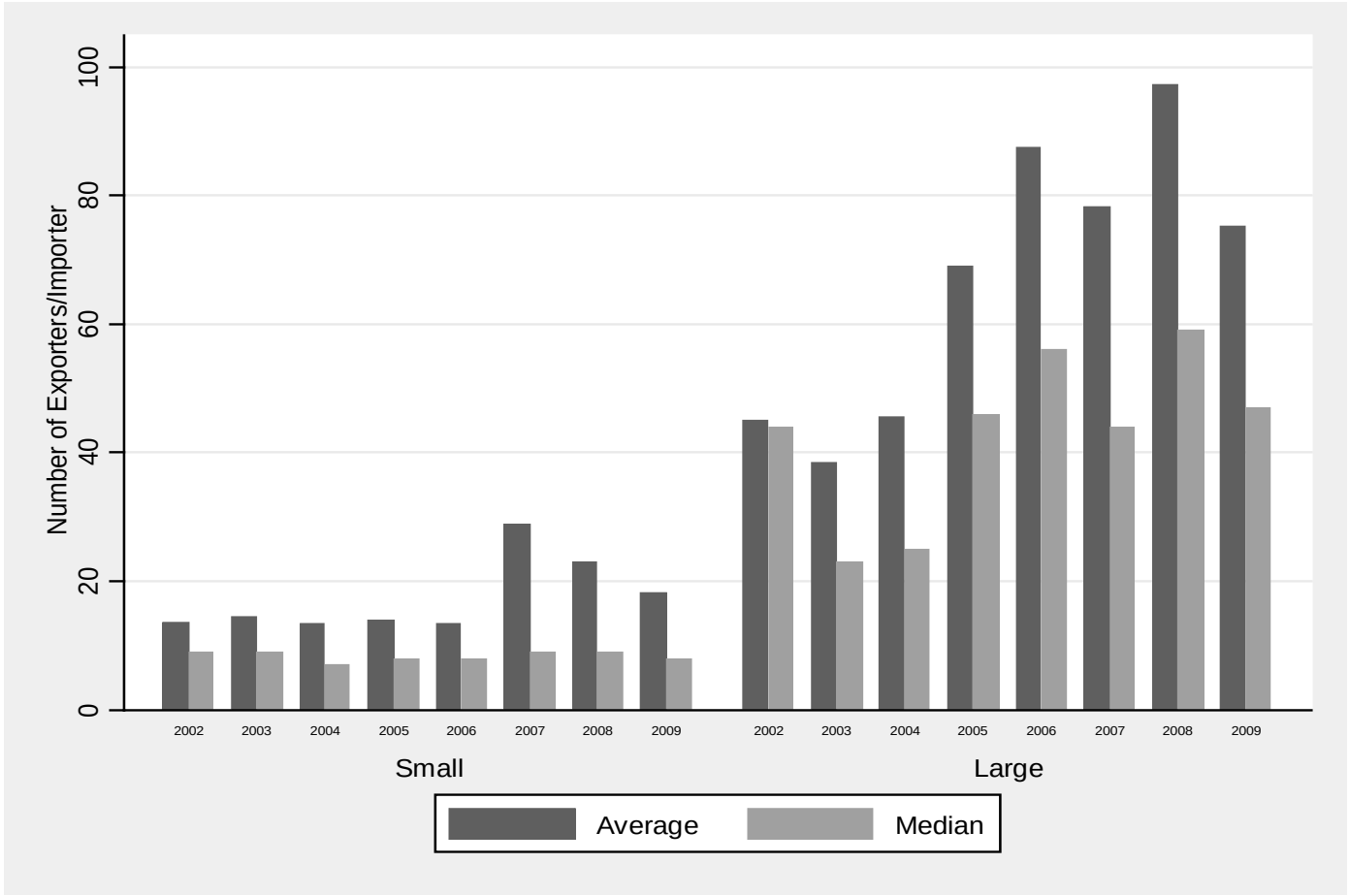


Figure 2 Export Value by Importer Size, 2002 – 2009.



Notes: Importers are categorized into two size bins using average number of employees over the sample period. "Small" refers to importers that employ 1-249 workers and "Large" refers to importers that employ 250+ workers.

Figure 3 Number of Exporters per Importer, 2002 – 2009.



Notes: Importers are categorized into two size bins using average number of employees over the sample period. "Small" refers to importers that employ 1-249 workers and "Large" refers to importers that employ 250+ workers.

APPENDIX

Table A1 Manufacturer ID example

Country	Exporter Name	Address	City	MANUFID
Bangladesh	Red Fabrics	1234 Tiger Road	Dhaka	BDREDFAB1234DHA
Bangladesh	Green Fabrics	1111 Lion Road	Dhaka	BDGREFAB1111DHA
Bangladesh	Blue Fabrics	88 Zebra Road	Chittagong	BDBLUFAB88CHI

Note: The above examples are based on fictitious names and addresses and are meant for illustrative purposes only.

Table A2 Importer-Specific Spillovers, Conditional Logit.

	(1) First Match	(2) Match Status
# exporters-importer j, same city	0.03536***	0.03179***
	(0.000)	(0.000)
Observations	29,413,835	20,695,095
Exporter x Year Fixed Effect	Y	Y
Importer Controls	Y	Y

Notes: The dependent variable, "First Match", takes on the value1 in the first year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. The dependent variable, "Match Status", takes on the value1 in any year a transaction is observed between a unique importer-exporter pair and is 0 otherwise. Independent variables are lagged one year. Standard errors are clustered at the importer-city level. Significance: *10%, **5%, ***1%. All regressions contain importer specific controls for age and employment.