

Global Sourcing and Domestic Production Networks

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What we know about the domestic segment of GVC

- ▶ In the last few decades, firms have been sourcing intermediate inputs more globally.
- ▶ An extensive literature studies both the causes and consequences of such trend.
- ▶ Research about the dynamics of the domestic segment of global value chains has been sparse.
- ▶ Who is trading with whom in the domestic economy?
- ▶ How are buyer-seller relationships affected by firms' global sourcing decisions?

What is this paper about?

- ▶ Study both theoretically and empirically how firms' global sourcing, triggered by external shocks, affect their choices of domestic suppliers.
- ▶ Built a model based on Antràs, Fort, and Tintelnot (2016; AFT henceforth):
 - ▶ Two-sided heterogeneity in efficiency;
 - ▶ Trade costs for domestic and foreign trade;
 - ▶ Multiple input sectors with varying degrees of relationship specificity;
 - ▶ Firms' (endogenous) trade costs, due to endogenous choices of face-to-face communication.
- ▶ Use production network data (4.5 million buyer-supplier links) for Japanese firms to examine model predictions.
- ▶ Propose a firm-level instrument for offshoring to study the causal effects of offshoring.

Main Empirical Findings

- ▶ Firms are less likely to source relation-specific inputs from distant and foreign suppliers.
- ▶ The impact of global sourcing on firms' domestic production networks:
 1. Offshoring (for exogenous reasons) triggers domestic buyers to add and drop suppliers; the net effect is positive.
 2. After offshoring, firms are more likely to
 - ▶ Drop larger and more distant domestic suppliers (relative to their existing suppliers).
 - ▶ Add smaller domestic suppliers.
 - ▶ Add domestic suppliers from relation-specific industries.
 3. These choices of suppliers reduce the average distance of domestic sourcing, strengthening industry agglomeration.

Data

Data from the Tokyo Shoko Research, Ltd. (TSR)

- ▶ Basic firm-level balance sheet info of over 800,000 firms in Japan, for 2005 and 2010.
 - ▶ employment, sales, location, up to three main industries (4-digit), establishment year, number of factories.
- ▶ Info on between-firm relationships: the names of a firm's main suppliers (up to 24) and buyers (up to 24).
- ▶ Use a two-way matching method to construct the domestic production network in Japan.
- ▶ The top seller in our constructed Japanese production network has over 11,000 buyers in 2010; the top buyer has close to 8,000 suppliers.

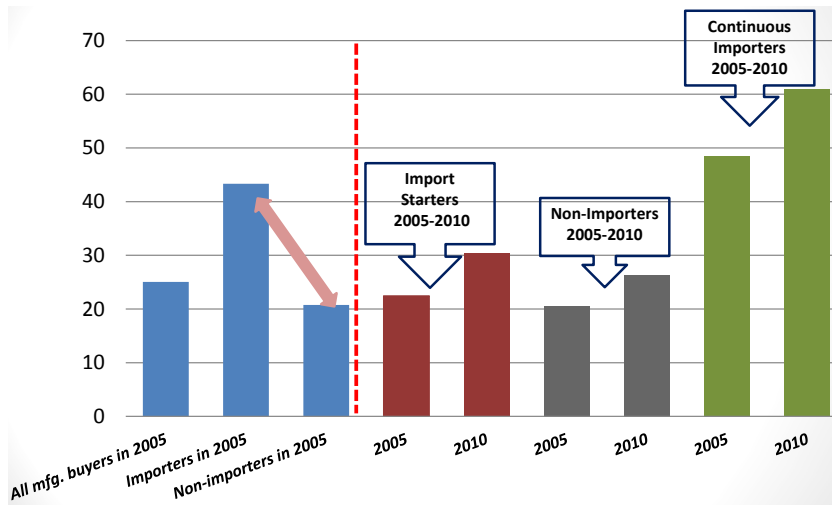
Data

Basic Survey on Business Structure and Activities (BSBSA), from Japan's Ministry of Economy, Trade and Industry (METI).

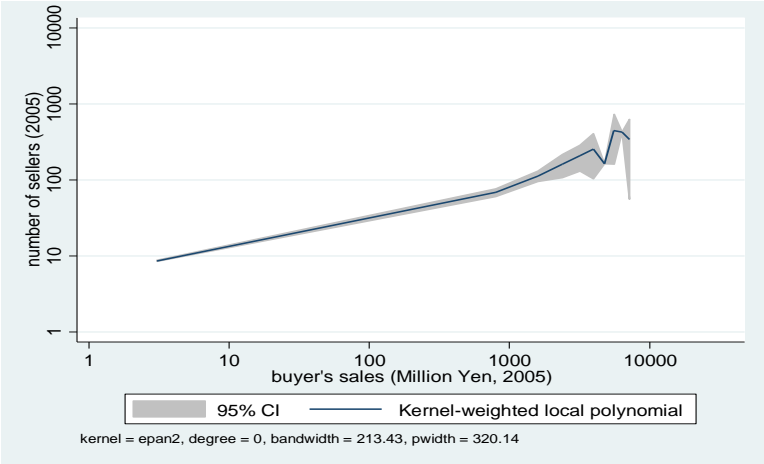
- ▶ All firms with at least 50 employees or 30 million yen of paid-in capital in the Japanese manufacturing, mining, wholesale and retail, and several other service sectors.
- ▶ 22,939 and 24,892 firms in 2005 and 2010, respectively.
- ▶ Detailed information on firms' business activities: main industry code (3 digit), employment, sales, purchases, exports, and imports (continents of imports and exports).

▶ Firm-Size Rank

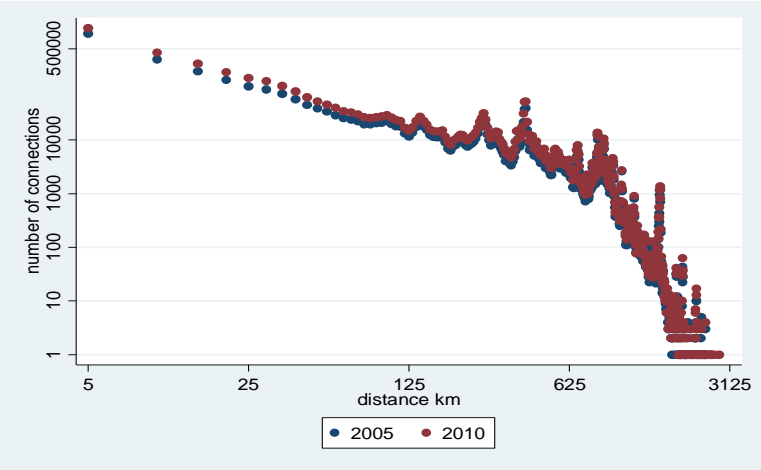
Number of Suppliers by Buyer Type



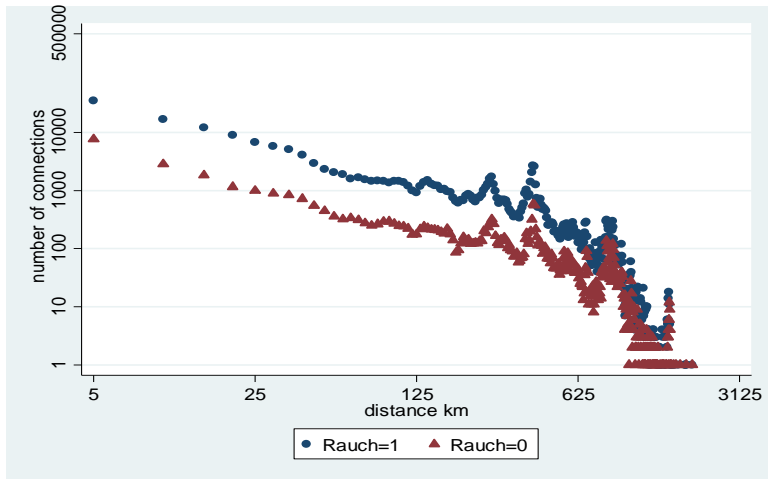
Productivity and the Scope of Outsourcing



Distance and the Number of Sellers



Distance and the Number of Sellers (Differentiated Input Industries)



Offshoring and the Firm's Scope of Domestic Sourcing

$$\Delta y_i = \alpha + \beta \Delta imp_i + \left[FE_s^i + FE_r^i \right] + \varepsilon_i,$$

Buyer's Offshoring and Changes in the Pattern of Domestic Outsourcing

Dep Var: $\Delta \ln$ of Buyer's	Sales	Nb. Sellers	Nb. Source Sectors	Nb. Source Regions	Avg Dist
	(1)	(2)	(3)	(4)	(5)
Imp Starter Dummy _{buyer}	0.0509** (0.022)	0.0536*** (0.019)	0.0404** (0.019)	0.0286* (0.017)	-0.0434* (0.026)
$\ln(\text{sales})_{\text{buyer},2005}$	-0.00253 (0.006)	0.0190*** (0.006)	0.00654 (0.005)	0.00278 (0.005)	-0.0114 (0.008)
Fixed Effects	Buyer 4-digit Industry; Buyer Prefecture Fixed Effects				
R-sq	4198	4198	4198	4198	4198
Nb Obs	.015	.0536	.042	.0157	.0145

Note: The regression sample includes manufacturing buyers only and domestic suppliers that are either manufacturing or non-manufacturing. The unit of observation is at the buyer level. Robust standard errors are used. In Panel A, all existing importers in 2005 are excluded in the sample, so only import starters and non-importers are considered. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Model

Demand

- ▶ Antràs, Fort and Tintelnot (2016; AFT henceforth) + Bernard, Moxnes and Saito (2016; BMS henceforth) + multiple input industries.
- ▶ Dixit-Stiglitz preferences with $\sigma > 1$; monopolistic competition in the final goods market.
- ▶ Production of final goods requires intermediates (S different types), which can be in-sourced and outsourced (to domestic or foreign suppliers).
- ▶ There are M domestic regions + M^* foreign regions. Each region has an exogenous number of input suppliers.
- ▶ For each input type s in each region r , there a mass of n_{sr} differentiated input suppliers.

Final-good Producers (Buyers)

- ▶ First, aggregates input varieties to composites:

$$\tilde{x}_{is} = \left[\int_0^1 x_{is}(j)^{\frac{\rho_s-1}{\rho_s}} dj \right]^{\frac{\rho_s}{\rho_s-1}},$$

where ρ_s is the elasticity of substitution between different intermediate varieties.

- ▶ Then assemble the composite inputs into final goods:

$$y_i = \varphi_i \prod_{s=1}^S \left(\frac{\tilde{x}_{is}}{\beta_s} \right)^{\beta_s},$$

- ▶ where φ is the buyer's core productivity.

Input Quality and Endogenous Communication

- ▶ An input supplier j_s will produce high-quality input with probability q ($q = 1$ for insourcing).
- ▶ With low quality with probability $1 - q$, the supplier produces low quality inputs, which are useless for the buyer.
- ▶ Firms can invest in (face-to-face) communication with the supplier to increase (q).
- ▶ Communication is costly (assumption: more so for inputs sourced from a more distant location):
- ▶ The iceberg trade costs is multiplied by $e^{m_s(q)}$, where m is an industry-specific increasing function distance.

Buyer's Problem

1. Buyer i and each potential supplier draws productivities (z 's) for input production, from a sector-specific Fréchet distribution. Buyer i knows its own z 's before making sourcing decisions.
2. In each input industry s , buyer i chooses whether to outsource or not, and pays f for every industry that it has chosen to outsource. In addition, for each industry s chosen to outsource, it selects a set of regions in which it looks for input suppliers, paying f_s for every region that it searches. ▶ Trade Costs
3. For each input variety $j \in [0, 1]$ of industry s that it has chosen to outsource, buyer i chooses the lowest-price (inclusive of trade costs) supplier of all the input suppliers in regions in Ω_{is} and itself.
4. For each region $r \in \Omega_{is}$, buyer i chooses the optimal intensity of communication with the sellers.
5. Buyer i optimally sets its final-good price (= constant mark-up over marginal cost).

Buyer' Unit Cost of Production and Endogenous Communication Intensity

- ▶ For input composite s , conditional on the set of sourcing regions chosen, the marginal cost is

$$\tilde{c}_{is} = \left[\mu(I_{is0}) \int_0^\infty p^{1-\rho_s} dG_{is0}(p) + \sum_{r \in \Omega_{is}} \mu(I_{isr}) \int_0^\infty \left(q_{isr}^{\frac{\rho_s}{1-\rho_s}} p \right)^{1-\rho_s} dG_{isr}(p) \right]^{\frac{1}{1-\rho_s}}.$$

- ▶ where p denotes the lowest cost the buyer pays for each unit of input variety j .
- ▶ The optimal communication intensity:

$$q_{isr} = \frac{\rho_s}{(\rho_s - 1) m_s(d_{ir})}.$$

q_{isr} is decreasing in ρ_s and d_r .

Firm Equilibrium Sourcing Patterns

- ▶ Thanks to Fréchet and Eaton and Kortum (2002), the share of inputs k sourced from region r :

$$s_{isr} = \frac{\Phi_{isr}}{\Phi_{is}}$$

- ▶ where the sourcing capability is

$$\Phi_{isr} = \begin{cases} T_{s0}(w_0 c_s)^{-\theta_s} e^{-\theta_s t_s(d_{i0})} & \text{if } r = 0 \\ n_{sr} T_{sr}(w_r c_s)^{-\theta_s} \left[\frac{\rho_s}{(\rho_s - 1)m_s(d_{ir})} \right]^{\frac{\rho_s \theta_s}{\rho_s - 1}} e^{-\theta_s \left[\frac{\rho_s}{\rho_s - 1} + t_s d_{(ir)} \right]} & \text{if } r = 1 \end{cases}$$

- ▶ Sourcing capability by $\Phi_{is} \equiv \Phi_{is0} + \sum_{r \in \Omega_{is}} \Phi_{isr}$.

Buyer's Profit

- ▶ Buyer i's profits:

$$\pi_i(\varphi_i) = B\psi_i^{1-\sigma} - \sum_{s=1}^S \delta_{is} \left[f + \sum_{r \in \Omega_{is}} f_r \right]$$

where



$$\psi_i \equiv \varphi_i^{-1} \prod_{s=1}^S \gamma_s^{\beta_s} \Phi_{is}^{-\frac{\beta_s}{\theta_s}}.$$

- ▶ and δ_{is} is a dummy equal to 1 if sourcing in industry s .

Hypothesis

The share of inputs insourced and the share of inputs sourced to closer regions, respectively, are greater for the more relationship-specific inputs.

Testable Predictions

Restructuring of Production Networks

Hypothesis

1. *Relative to non-importers, import starters **drop** sellers that are less productive than others in the same industry-region. The replacement effect is more profound in the newly-offshored industries. Since such industries tend to be less relationship specific, the dropped sellers tend to be more productive and more distantly-located than sellers in other industries (not affected by offshoring).*
2. *Relative to non-importers, import starters **add** sellers that are more productive and more distantly-located than other firms in the same industries. In addition, they add sellers in the newly-outsourced input industries. These sellers tend to be more closely-located than sellers in other industries, since offshoring induces buyers to begin outsourcing inputs that tend to be more relationship specific than the industries that have been already outsourced.*

The Pattern of Domestic Sourcing



$$\begin{aligned} \log \frac{\Phi_{isr}}{\Phi_{isr(i)}} &= \underbrace{-\log n_{sr(i)} - \log T_{sr(i)} + \theta_s \log w_{r(i)} + \frac{\rho_s \theta_s}{\rho_s - 1} \log m_s(d_{ir(i)})}_{\text{input-industry-home-region-specific}} \\ &+ \underbrace{\log n_{sr} + \log T_{sr} - \theta_s \log w_r}_{\text{input-industry-source-region-specific}} \\ &- \theta_s \underbrace{\frac{\rho_s}{\rho_s - 1}}_{RS_s^j} \times \log m_s(d_{ir}) - \theta_s t_s(d_{ir}) \end{aligned}$$

- Empirical counterpart:

$$\log \frac{N_{irs}^{seller}}{N_{isr(i)}^{seller}} = \alpha + \log(dist)_{ir} \times (\beta + \gamma RS_s^j) + [FE_{sr}^i + FE_{sr}^j] + \varepsilon_{irs}$$

Distance, Relationship-specificity, and Domestic Sourcing

Distance, Scope of Domestic Outsourcing, and Relationship-Specificity of Inputs

	(1)	(2)	(3)	(4)	(5)
Dependent Variable:	$\ln(\text{sell}_{\text{source pref}}/\text{sell}_{\text{nearest pref}})_{\text{input ind}}$				
Mesasures of Relation-Spec of Input Industry	-	Rauch		Elast/(Elast-1)	
$\ln(\text{dist})_{\text{from seller's pref}}$	-0.0583*** -0.003	-0.0202*** -0.003	-0.0574*** -0.01	-0.0393*** -0.003	-0.0924*** -0.009
$\ln(\text{dist})_{\text{from seller's pref}} \times \text{RS}_{\text{input-ind}}$		-0.0322*** -0.002	-0.0295*** -0.002	-0.0484*** -0.007	-0.0425*** -0.007
$\ln(\text{dist})_{\text{from seller's pref}} \times \text{AIR}_{\text{input-ind}}$			-0.00631*** -0.001		-0.00968*** -0.001
Input Ind (4-digit) FE x Buyer Prefec FE	Y	Y	Y	Y	Y
Input Ind (4-digit) FE x Seller Prefec FE	Y	Y	Y	Y	Y
SE clustering			buyer		
R_sq	.294	.307	.308	.31	.307
Nb of Obs	530723	280105	240664	269631	245563

Note: The regression sample includes manufacturing buyers only and domestic suppliers that are either manufacturing or non-manufacturing. Data for 2005 are used while the results based on 2010 data are reported in the appendix. The unit of observation in all columns is at the buyer-(seller's)prefecture-sector level. All regressions include sellers' prefecture, seller's industry, and buyer fixed effects. Standard errors, clustered at the buyer level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Offshoring and Restructuring the Domestic Supplier Networks

- ▶ Does a buyer's offshoring decision affect its choices of domestic suppliers?
- ▶ What kind of domestic suppliers are most affected?

$$l_{ij} = \alpha + \beta \Delta imp_i \times x_{ij} + [FE_i + FE_s^j + FE_r^j] + \varepsilon_{ij}$$

- ▶ i and j are buyer, domestic seller.
- ▶ l_{ij} is a dummy variable that equals 1 if seller j was either added or dropped by buyer i between 2005 and 2010, 0 otherwise.
- ▶ x_{ij} is a measure of seller characteristics (size and distance).
- ▶ Δimp_i , is a dummy indicating buyer i 's change in import status (between 2005 and 2010).

Instrument

- ▶ Similar to Autor, Dorn, and Hanson (2013), estimate the export flow equation:

$$\ln(X_{sck}) - \ln(X_{sJk}) = \ln(A_{sc}) - \ln(A_{sJ}) - (\sigma_s - 1) [\ln(\tau_{sck}) - \ln(\tau_{sJk})]$$

- ▶ X_{sck} and X_{sJk} are dollar value of sector- s exports to country k from country c and Japan (J),
- ▶ A_{sc} and A_{sJ} are the export capabilities of country c and Japan in industry s .
- ▶ Empirical Counterpart:

$$\ln(X_{sckt}) - \ln(X_{sJkt}) = \alpha_s + \alpha_k + \varepsilon_{sckt},$$

Instrument (2)

- ▶ Take the residual

$$\varepsilon_{sckt} = \left[\ln \left(\frac{A_{sct}}{A_{sJt}} \right) - \alpha_s \right] + \left[-(\sigma_s - 1) \ln \left(\frac{\tau_{sckt}}{\tau_{sJkt}} \right) - \alpha_k \right].$$

- ▶ The first term captures the comparative advantage of **country c** in **industry s** relative to Japan.
- ▶ Compute the average exporter-sector supply shocks between 2005 and 2010:

$$\overline{\Delta \varepsilon_{sc}} = \frac{1}{5} \frac{1}{N_{sc}} \sum_{t=2006}^{2010} \sum_{k \in \Psi_{sc}} \Delta \varepsilon_{sckt},$$

▶ picture about the instrument

Instrument (3)

- ▶ Use the weighted average (based on Japan's import weights) to compute the sector-specific supply shock:

$$shock^s = \sum_c^{c=N_{05}} \omega_{sc} \overline{\Delta \varepsilon_{sc}},$$

- ▶ First stage (inspired by Bastos, Silva, and Verhoogen (2016))

$$shock_i = \sum_{s=1}^{s=N} \phi_{is} shock^s,$$

- ▶ ϕ_{is} is a dummy, which equals 1 if buyer i currently outsources sector- s inputs domestically

Supplier Dropping

Offshoring and Supplier Dropping (Seller Characteristics)

Dependent Variable	Drop Dummy					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	OLS	2SLS	OLS	2SLS	OLS	2SLS
Seller's Characteristics	-		Distance _{t-1}		Sales _{t-1}	
Import Starter	0.0167*** (0.005)	-0.00368 (0.032)				
Imp Starter x Seller Char			0.00334 (0.009)	0.0828** (0.042)	0.0440* (0.023)	0.462*** (0.076)
log(dist) _{buyer-seller}	Y	Y	Y	Y	Y	Y
Buyer (log) sales _{t-1}	Y	Y				
Input Industry FE	Y	Y	Y	Y	Y	Y
Seller Pref FE	Y	Y	Y	Y	Y	Y
Buyer FE		Y	Y	Y	Y	Y
Buyer Industry FE	Y	Y				
Buyer Pref FE	Y	Y				
N	93731	93731	93607	93607	93607	93607
R-sq	.0717	.0715	.15	.15	.148	.145

First Stage

Kleibergen-Paap F statistic

43.91

95.15

84.36

The sample includes only manufacturing buyers that did not import in 2003-2005. The unit of observation is a buyer-seller pair. The first stage of the 2SLS model (even-numbered columns) has a firm's import starting dummy as a dependent variable, with various firm-industry-specific export supply shocks. Robust standard errors are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Supplier Adding

Offshoring and Supplier Adding (Seller Characteristics)

Dependent Variable	Add Dummy					
	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method	OLS	2SLS	OLS	2SLS	OLS	2SLS
Seller's Characteristics	-		Distance _{t-1}		Sales _{t-1}	
Import Starter	0.0439*** (0.005)	0.0756** (0.034)				
Imp Starter x Seller Char			-0.00957 (0.009)	0.0148 (0.043)	-0.0677*** (0.023)	-0.296*** (0.071)
log(dist) _{buyer-seller}	Y	Y	Y	Y	Y	Y
Buyer (log) sales _{t-1}	Y	Y				
Input Industry FE	Y	Y	Y	Y	Y	Y
Seller Pref FE	Y	Y	Y	Y	Y	Y
Buyer FE		Y	Y	Y	Y	Y
Buyer Industry FE	Y	Y				
Buyer Pref FE	Y	Y				
N	116255	116255	116218	116218	111596	111596
R-sq	.0711	.0707	.144	.144	.147	.146

First Stage

Kleibergen-Paap F statistic 53.18 118.85 105.49

The sample includes only manufacturing buyers that did not import in 2003-2005. The unit of observation is a buyer-seller pair. The first stage of the 2SLS model (even-numbered columns) has a firm's import starting dummy as a dependent variable, with various firm-industry-specific export supply shocks. Robust standard errors are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Supplier Adding and Dropping (across Input Industries)

Offshoring and Supplier Adding and Dropping (Seller Industry Characteristics)

Dependent Variable	Drop Dummy				Add Dummy			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimation Method	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
Seller's Industry Dummy (q) based on	Rauch		Elast/(Elast-1)		Rauch		Elast/(Elast-1)	
Imp Starter _{buyer} x Seller char	0.0112 (0.017)	0.167* (0.089)	0.0224 (0.014)	-0.0388 (0.076)	-0.00548 (0.018)	-0.112 (0.104)	0.0232* (0.013)	0.144* (0.084)
log(dist) _{buyer-seller}	Y	Y	Y	Y	Y	Y	Y	Y
Input Industry Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Buyer Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
N	31736	31736	30658	30658	39402	39400	37458	37458
R-sq	.245	.243	.247	.246	.208	.207	.187	.185

First Stage

Kleibergen-Paap F statistic 10.61 9.98 12.15 7.98

The sample includes only manufacturing firms that did not import in 2003-2005. The unit of observation is at the buyer-input-industry level. The first stage of the 2SLS model (even-numbered columns) has a firm's import starting dummy as a dependent variable, with various firm-industry-specific export supply shocks. Robust standard errors are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Concluding Remarks

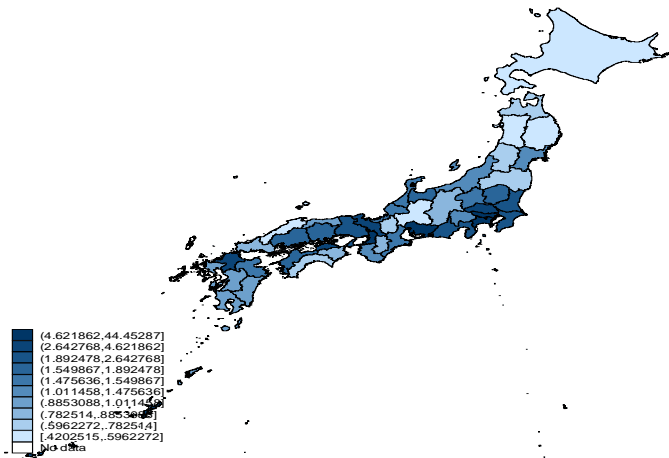
- ▶ How offshoring shapes firm's domestic production networks?
- ▶ We show that relation-specific inputs are less likely to be sourced from distant regions or abroad.
- ▶ Upon firms' offshoring, the resulting reduction in variable cost of production expands the geographic scope of domestic outsourcing within each industry, but the increased need to communicate with suppliers in the newly added relation-specific industries encourage the firms to source more locally from smaller suppliers.
- ▶ Global sourcing is a source of industry agglomeration and possibly regionalization of global value chains.

Regressions Results about the Spatial Pattern of Domestic Sourcing

Table A3: Firm Productivity, Distance, and the Scope of Domestic Sourcing (2010)

Panel A. 2005 Cross-section Sample								
Dependent Variable	ln(# sellers' prefectures) _{buyer}		ln(# sellers) _{buyer}		ln(# jsic 4-digit outsourced) _{buyer}		ln(# sellers) _{pref}	ln(Sales/Emp) _{seller}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Measure of Buyer's Productivity	TFP (OP)	VA/Emp	TFP (OP)	VA/Emp	TFP (OP)	VA/Emp	-	-
Productivity _{buyer}	0.104*** (0.021)	0.344*** (0.016)	0.141*** (0.027)	0.553*** (0.025)	0.110*** (0.023)	0.485*** (0.021)		
ln(distance)							-0.168*** (0.001)	0.0543*** (0.001)
Buyers' (4-digit) Industry FE	Y	Y	Y	Y	Y	Y		
Buyer's Prefecture FE	Y	Y	Y	Y	Y	Y		
Buyer FE							Y	Y
Sellers' (4-digit) Industry FE								Y
Sellers' Prefecture FE							Y	Y
Parent-subsidiary dummy								Y
Distance							b/w prefecture Buyer	b/w buyer-seller Buyer
SE clustering			Buyers' (4-digit) Industry					
R_sq	.191	.247	.191	.261	.2	.271	.584	.646
Nb of Obs	8701	8742	8701	8742	8701	8742	205628	598946

nb of buyers per sq km by prefecture



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Idea of the export-supply shock instrument



Summary Stats

Table 1: Summary Statistics of the Network Data and the Merged Sample

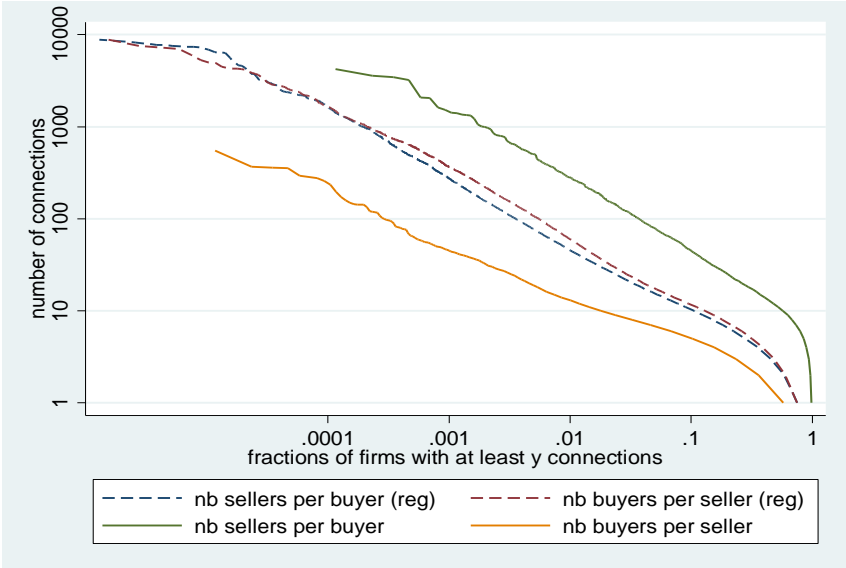
A. Full Sample of the Network Data from Tokyo Shoko Research (TSR)				
	Nb Obs		Mean nb of sellers	Median nb of sellers
2005	3,586,090		4.89	2
2010	4,463,168		5.47	3

B. Restricted TSR Sample (manufacturing buyers and all sellers that exist in both 2005 and 2010; headquarter-subsubsidiary pairs included)				
	Nb Obs		Mean nb of sellers	Median nb of sellers
2005	655,348		6.82	3
2010	836,205		7.92	4

C. Restricted Sample Merged with Basic Survey				
	Nb Obs	% of pair in TSR merged	Mean nb of sellers	Median nb of sellers
2005	345,352	52.70	25.05	10
2010	433,586	51.85	31.11	13

Samples described in Panel B and C include manufacturing buyers and both manufacturing and non-manufacturing sellers, respectively.

Firm-size Rank Distribution

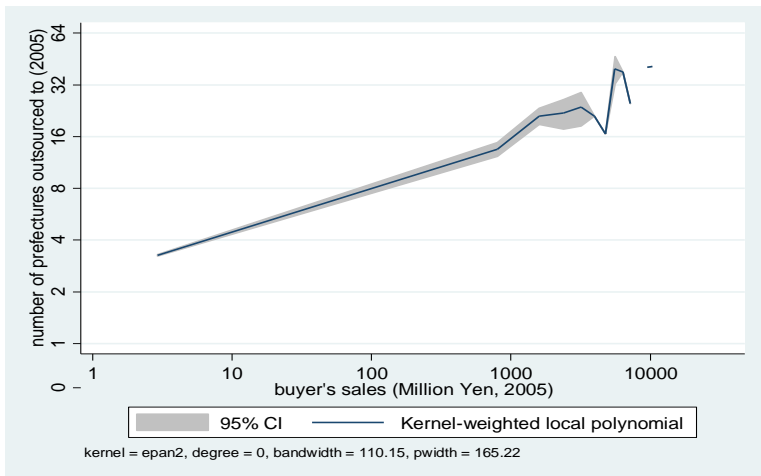


Number of Sellers

Summary Statistics (Number of Buyers and Sellers)

Sample:	All mfg. buyers	Continuing importers 2005-2010	Import starters between 2005-2010	Continuing Non- importers 2005-2010
<u>A. Number of buyers in 2005</u>				
Count	13,784	1,807	1,024	10,135
Share	(1.00)	(0.13)	(0.07)	(0.74)
<u>B. Number of sellers per buyer in 2005</u>				
Mean	25.05	48.50	22.47	20.58
Median	10	16	11	9
Max.	4,724	4,026	1,471	4,724
<u>C. Number of sellers' prefectures per buyer in 2005</u>				
Mean	5.17	7.49	5.34	4.62
Median	4	5	4	4
Max.	47	47	40	46

Productivity and the Scope of Outsourcing



▶ Back

Literature Review

- ▶ Domestic production networks
 - ▶ Oberfield (2013); Carvalho and Gabaix (2013); Carvalho, Nirei, and Saito (2014); Bernard, Moxnes and Saito (2016); Boehm, Flaaen, Pandalai-Nayar (2015).
- ▶ Firms' global sourcing and endogenous firms' performance
 - ▶ Antràs, Fort, and Tintelnot (2016); Ramanarayanan (2014); Blaum, Lelarge, and Peters (2015); Kee and Tang (2016).
- ▶ Network and trade
 - ▶ Rauch (1999); Rauch and Trindade (2002); Bernard, Moxnes and Ulltveit-Moe (2014); Chaney (2014).
- ▶ Non-efficiency aspect of firm performance
 - ▶ Jensen and Kletzer (2005); Holmes and Stevens (2015).
- ▶ Economic Geography
 - ▶ Davis and Weinstein (2002); Duranton and Overman (2005); Redding and Turner (2015); Davis and Dingel (2016), etc.

Trade Costs

- ▶ For each input type outsourced, the buyer pays a fixed cost, f , and an additional f_s for each source region.
- ▶ No fixed cost for in-house production of inputs.
- ▶ Shipping intermediates entails iceberg transport cost $\tau_s(d) = e^{t_s(d)} \geq 1$, where t_s is an industry-specific increasing function of the distance d between a pair of buyer and seller.

Expected outcomes:

- ▶ The combination of firm productivity and incremental fixed costs gives rise to the standard scope-productivity relationship.
- ▶ Firms will always insource part of the input production in each input type.

Relationship-specificity and Offshoring

Table 5: Buyer's Productivity, Relationship Specificity of Inputs, and the Likelihood of Offshoring

Dependent Variable: Dummy for Buyer's Offshoring in 2005 (import or not as of 2005)

	(1)	(2)	(3)	(4)
Measure of Buyer's Productivity (log)	TFP	VA/Emp	TFP	TFP
Measure of Relationship Specificity	-	-	Rauch _{seller ind}	1/Input Elast _{seller ind}
Productivity _{buyer,2005}	0.0382*** (0.008)	0.0827*** (0.009)		
Domestic sourcing (yes=1)			0.0671*** (0.001)	0.0684*** (0.001)
Relationship Specificity _{seller's ind}			0.0136*** (0.003)	-0.131*** (0.021)
RS x Productivity _{buyer,2005}			-0.000993 (0.001)	0.0206*** (0.004)
Buyer's FE			Y	Y
Buyer's (4-digit) Industry FE	Y	Y		
Buyer's Prefecture FE	Y	Y		
SE clustering	buyer ind	buyer ind	buyer	buyer
R_sq	.164	.172	.141	.141
Nb of Obs	8780	8820	257208	257208