Global Sourcing and Domestic Production Networks

Taiji Furusawa (Hitotsubashi)
Tomohiko Inui (RIETI)
Keiko Ito (Senshu)
Heiwai Tang (Johns Hopkins)

CEPR-World Bank Conference

March 31, 2016

The state of firm-level analysis of GVC

- Most research on global value chains (GVC) focuses on their international segments (the decomposition of foreign value added).
- The literature has so far given relatively little attention to the domestic segment of a global value chain in a country.
- Who is trading with whom in the domestic economy? How are the buyer-supplier relationships affected by global sourcing?
- The large and growing literature (e.g., Antràs, Fort, and Tintelnot (2014)) has taken an important step to study the patterns of global sourcing, but the focus is still about the firm that offshores.

Contributions

- Study both theoretically and empirically how firms' global sourcing affects choices of domestic suppliers and thus reshapes domestic production networks.
  - Extend the models of Antràs, Fort, and Tintelnot (2014) and Bernard, Moxnes, and Saito (2015) to study the pattern of both domestic and foreign sourcing.
  - The model features two-sided heterogeneity in efficiency across both buyers and sellers; and domestic trade costs that increase in distance.
  - An important addition: Consider inter-firm transaction costs that vary across different types of inputs, in particular, the specificity of the inputs to the buyer's production.
- Use exhaustive production network data (4.5 million buyer-supplier relationships) for Japanese firms to examine the model predictions.
- Propose an instrument for offshoring at the firm level to say something about the causal effects of offshoring on domestic sourcing patterns.

Main Findings

- The Patterns of Domestic and Foreign Sourcing (Antras et al. (2014) and Bernard et al. (2015)):
  1. Ex ante more productive firms are more likely to offshore; ex post, offshoring makes firms more productive.
  2. More productive firms source inputs from more suppliers over wider and more distant regions.
- Relationship specificity matters:
  1. Firms are less likely to source to a distant supplier for relation-specific inputs.
  2. less likely to source relation-specific inputs to a foreign supplier.
- The impact of global sourcing on domestic production networks:
  1. Offshoring causes churning of domestic buyers and suppliers; the net effect on the number of domestic suppliers is negative.
  2. More likely to drop suppliers of generic inputs and add those of relation-specific (differentiated) inputs.
  3. This choices of suppliers reduces the distance of outsourcing and makes the domestic production network denser.

Literature Review (Incomplete)

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

Demand

- Extend Antràs, Fort and Tintelnot (2014) and Bernard, Moxnes and Saito (2015) by considering multiple input types that differ in relationship specificity to the buyer.
- Dixit-Stiglitz preferences for differentiated final good varieties with elasticity of substitution $\sigma > 1$; monopolistic competition in the goods market.
- Production of final goods requires intermediates (K 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 k in each region r, there a mass of n_{kr} differentiated input suppliers.

Final-good Producers (Buyers)

- Consider a final-good producer.
- First, aggregates input varieties to composites:

$$x_k = \left[\int_0^1 x_k(j_k)^{\frac{\rho_k - 1}{\rho_k}} dj_k \right]^{\frac{\rho_k}{\rho_k - 1}}.$$

  where ρ_k is the elasticity of substitution between different input varieties in the production of the composite.
- Then assemble the composite inputs into final goods:

$$y = \varphi \prod_{k=1}^{K} \left(\frac{x_{ik}}{\beta_k} \right)^{\beta_k},$$

- where φ is the final-good producer's core productivity.

Trade Costs

- The final-good producer pays a fixed cost, f_k, to search for a potentially least costly input supplier in each region.
- Thus, firms will only source inputs to some regions, if at all.
- Conditional on using the supplier, shipping intermediates entails iceberg transport cost $\tau_k(d) > 1$, $\tau_k'(d) > 0$

Sector-specific Communication Costs

- Firms need to invest in communication (q) with the supplier (face-to-face interactions).
- An input supplier j_k will produce high-quality input with probability q.
- With low quality with probability $1 - q$, the supplier produces low quality inputs, which are useless for the buyer (normalized the value to 0).
- Communication investment increases the unit cost of production, more so for inputs sourced from a more distant location.
- In addition to iceberg trade costs, the purchase price is multiplied by $exp(mdq)$, where $m > 0$.

Firms' Unit Cost of Production

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

$$\tilde{c}_k = \left\{ \int_{I_{k0}} c_k(j)^{1-\rho_k} dj + \sum_{r \in \Omega_k} \int_{I_{kr}} \left[q_k^{\frac{\rho_k}{1-\rho_k}} c_k(j) \right]^{1-\rho_k} dj \right\}^{\frac{1}{1-\rho_k}}.$$

- where $c_k(j)$ is the lowest price of input variety j.
- Each input supplier draws its own productivity z from the Fréchet distribution, with sector-specific cdf:

$$F_k(z) = e^{-T_k z^{-\theta_k}},$$

- $c_k(j) = w_{kr}/z$, where w_{kr} is a sector-region-specific cost parameter.

Firm's Problem

For each input type, a buyer chooses

- sourcing regions (Ω_k).
- For each variety $j_k \in [0, 1]$ of input type k, search for the lowest price in Ω_k.
- For the lowest-cost supplier, invest in communication and building relationship.
- Choose prices to sell the final goods.

Firm Equilibrium Sourcing Patterns

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

$$s_{kr} = \frac{\Phi_{kr}}{\Phi_k}$$

- where the sourcing capability is

$$\Phi_k \equiv \Phi_{k0} + \sum_{r \in \Omega_k} \Phi_{kr}.$$

-

$$\Phi_{k0} = T_{k0}(w_{k0})^{-\theta_k}$$

$$\Phi_{kr} = n_{kr} T_{kr}(w_{kr})^{-\theta_k} q_k^{\frac{\theta_k \rho_k}{\rho_k - 1}} e^{-\theta_k [m q_k + t_k] d_{ir}} \quad \text{if } r = 1, \cdots, M + M^*$$

Endogenous Communication Costs and the Pattern of Sourcing

- Choice of communication intensity:

$$\frac{\partial \Phi_{kr}}{\partial q_k} = 0 \Rightarrow q_k\left(d_r\right) = \frac{\rho_k}{\left(\rho_k - 1\right) m d_r}$$

  $q_k\left(d_r\right)$ is decreasing in ρ_k and d_r.

- For $r = 1, \cdots, M + M^*$,

$$\frac{\partial^2 \log \Phi_{kr}}{\partial \rho_k \partial d_r} > 0.$$

  Thus, Φ_{kr} is decreasing in d_r, but this negative effect is smaller for generic input (larger ρ_k).

Offshoring in the same input sector

- Buyer's profits

$$\max_{I_{kr}\in\{0,1\}} \pi(\varphi) = B\varphi^{\sigma-1}\Pi_{k=1}^{K}\gamma_k^{\beta_k(1-\sigma)}\Phi_k^{\frac{\beta_k(\sigma-1)}{\theta_k}} - \sum_{k=1}^{K}\sum_{r\in\Omega_k} f_k$$

- For the same input type that has been offshored (due to lower offshoring costs or higher foreign productivity), offshoring induces the buyer to weakly add a new domestic region for sourcing if the following is positive.

$$\begin{aligned}&(\pi(\varphi)|_{\Omega_{ik_1}\cup\{r^*,r_1\}} - \pi(\varphi)|_{\Omega_{ik_1}\cup\{r^*\}}) - (\pi(\varphi)|_{\Omega_{k_1}\cup\{r_1\}} - \pi(\varphi)|_{\Omega_{k_1}})\\ \approx\ & \frac{\beta_{k_1}(\sigma-1)}{\theta_{k_1}}\left[\frac{\beta_{k_1}(\sigma-1)}{\theta_{k_1}} - 1\right]\tilde{\pi}(\varphi)\frac{\Phi_{k_1r_1}}{\Phi_{k_1}(\Omega_{k_1})}\frac{\Phi_{k_1r^*}}{\Phi_{k_1}(\Omega_{k_1})}.\end{aligned}$$

- For input type that is not been offshore, offshoring induces the buyer to weakly add a new domestic region for sourcing.

Prediction - Spatial Distribution of Domestic Sourcing

Antràs, Fort, and Tintelnot (2014):

- A firm with a higher core productivity outsources more input varieties and to more regions. The optimal set of sourcing regions ($\Omega_k(\varphi) \subseteq \Omega_k(\varphi')$ for $\varphi < \varphi'$)

Bernard, Moxnes, and Saito (2015):

- Firms source inputs to a larger mass of firms to closer locations. The more distant suppliers are on average more productive.

- The greater fraction of inputs are insourced and outsourced to closer regions for the more relationship specific inputs.

Predictions - Offshoring and Firms' Domestic Production Network

Offshoring is more likely for

- more productive buyers;
- and generic (less relationship-specificity) inputs

The offshoring firm will

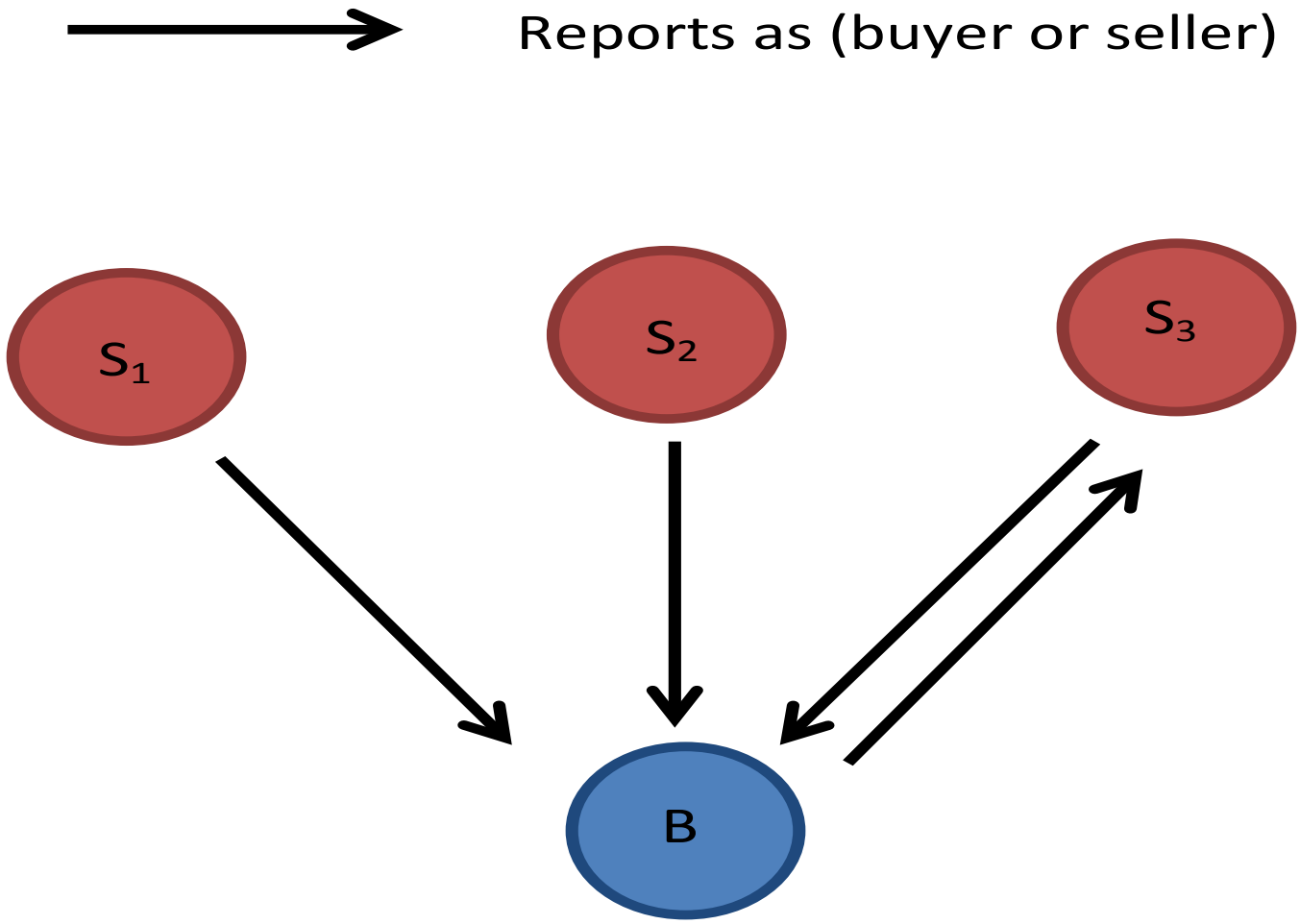
- source to more distant domestic regions and suppliers.
- drop the least efficient firms in all other domestic regions.
- reduces insourcing.

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 (24), buyers (24), and shareholders (3).
- 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.

Two-way Matching



Number of suppliers for B is 3, not 1.

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), employement, sales, purchases, exports, and imports (continents of imports and exports).

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 (Only buyers and sellers that exist in both 2005 and 2010; headquarter-subsidiary pairs excluded)

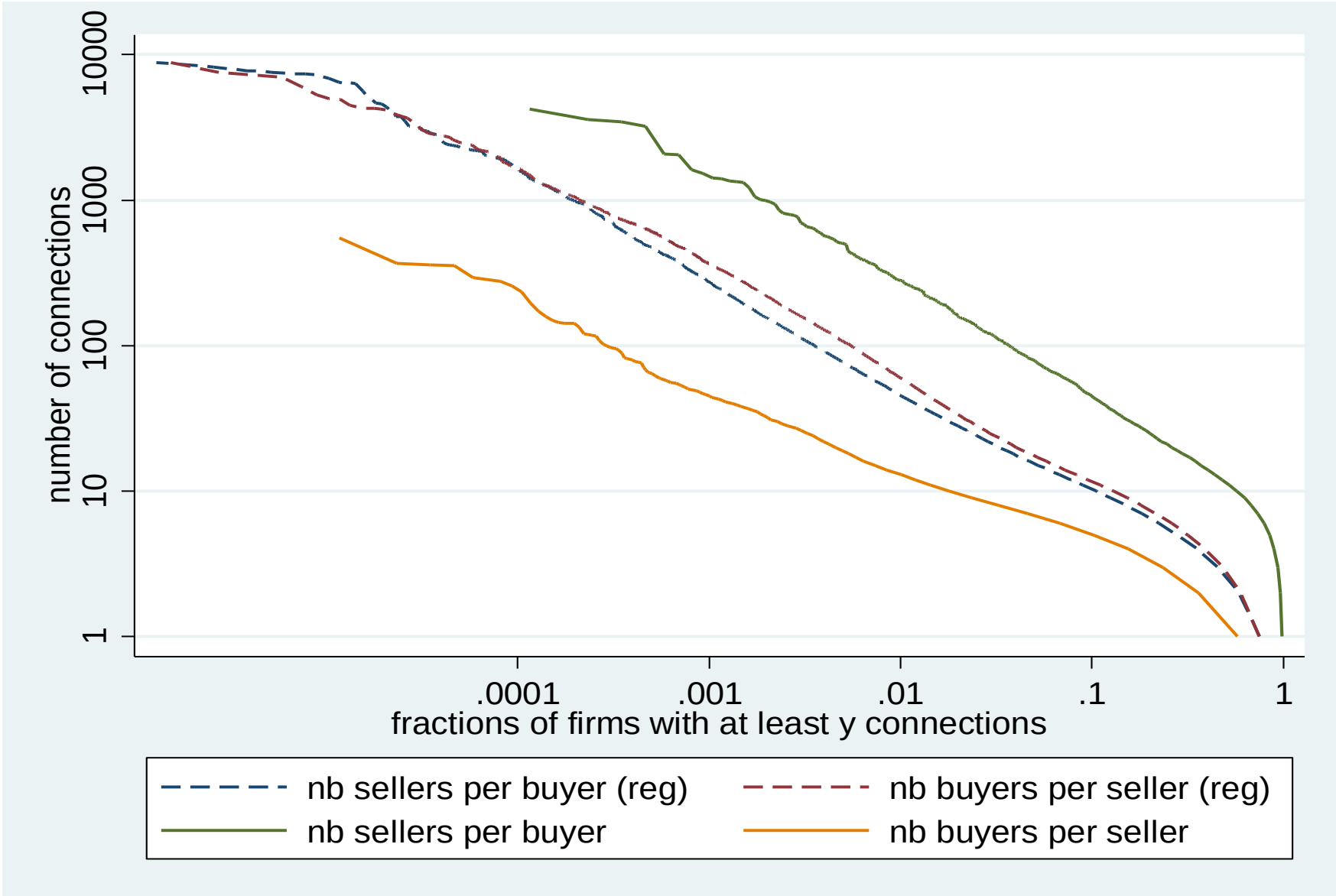
	Nb Obs	Mean nb of sellers	Median nb of sellers
2005	361,777	7.06	3
2010	458,984	8.07	4

C. Restricted Sample Merged with Basic Survey

	Nb Obs	% of pair in TSR merged	Mean nb of sellers	Median nb of sellers
2005	149,645	41.36	17.88	8
2010	187,676	40.89	21.86	10

Samples decribed in Panel B and C include buyers and sellers that have at least 10 employees, respectively.

Firm-size Rank Distribution

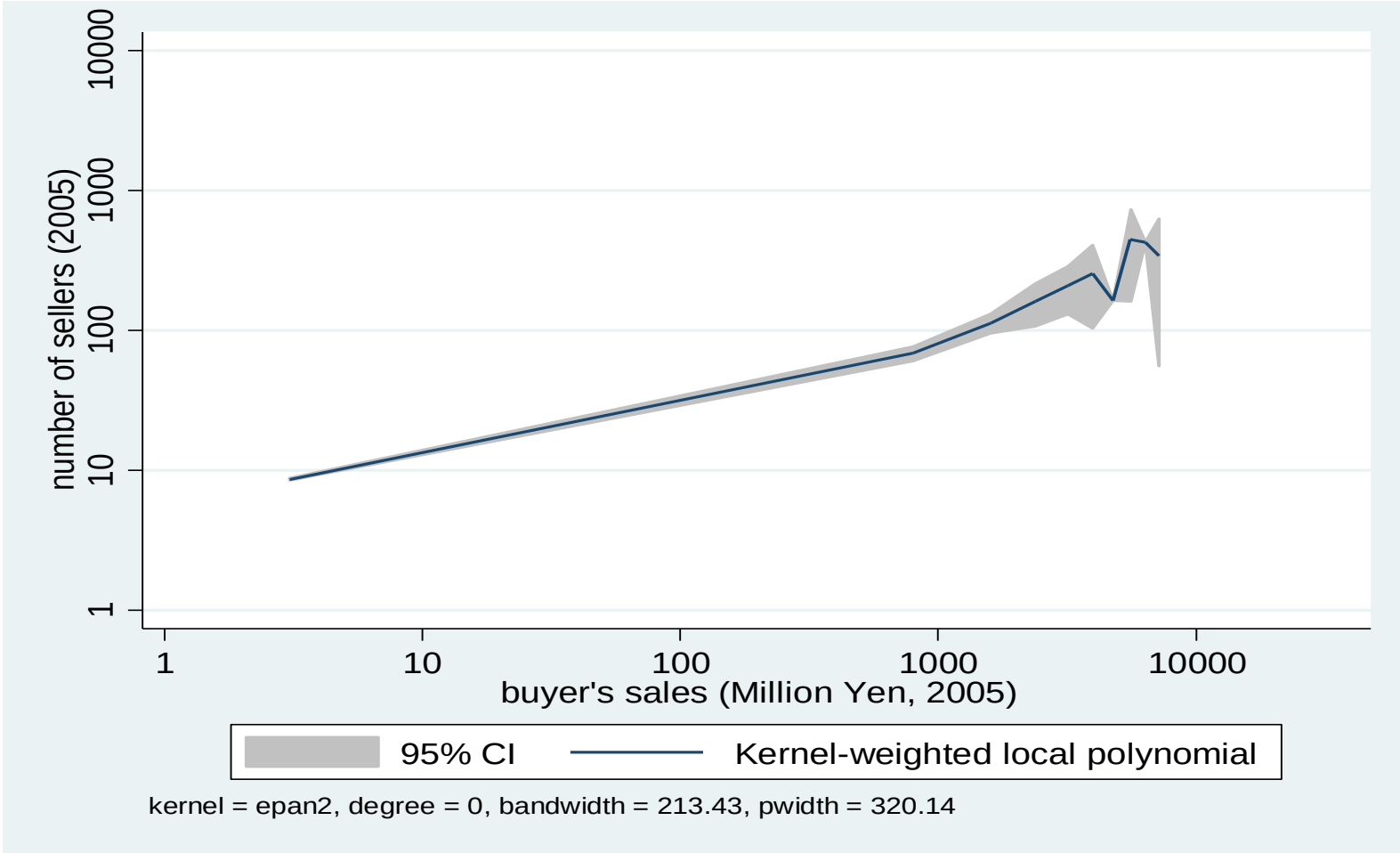


Number of Sellers

Table 3: Summary Statistics (Number of Buyers and Sellers)

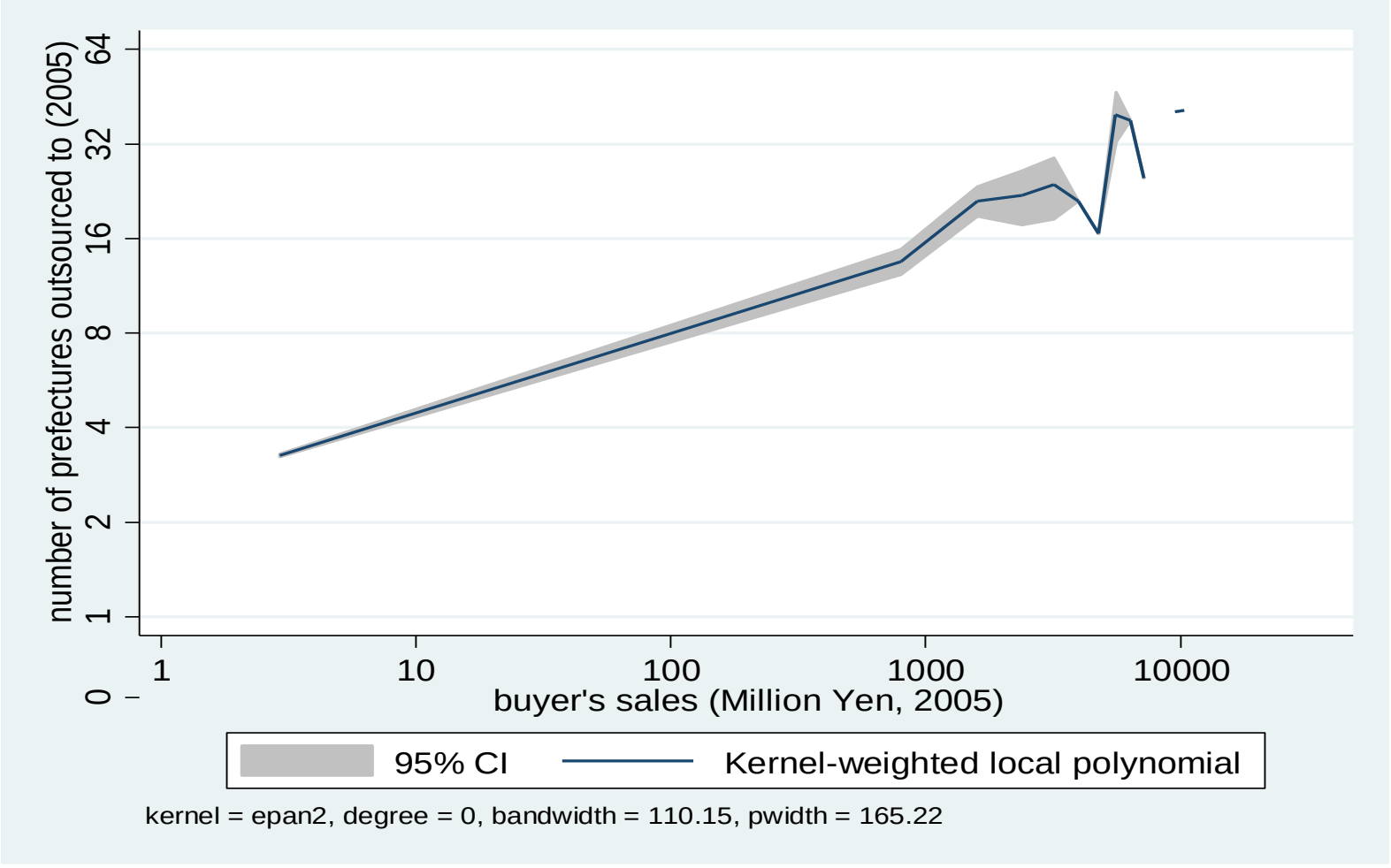
Sample:	All mfg. buyers in 2005	Existing Importers in 2005	Non-importers in 2003-2005	Import starters between 2005-2010	Non-importers 2005-2010	Continuous importers 2005-2010
Panel A: Number of buyers (2005)						
	8,404	2,117	5,611	341	4,179	1,436
Panel B: Number of sellers per buyer (2005)						
Mean	19.33	34.78	13.40	20.67	13.53	38.34
Median	8	11	7	9	7	12
Min.	1	1	1	1	1	1
Max.	3,552	3,004	3,552	1,056	3,552	3,004
Panel C: Number of sellers' prefectures per buyer (2005)						
Mean	4.84	6.79	4.01	5.25	3.99	7.00
Median	4	5	3	4	3	5
Min.	1	1	1	1	1	1
Max.	47	47	46	38	46	47

Productivity and the Scope of Outsourcing

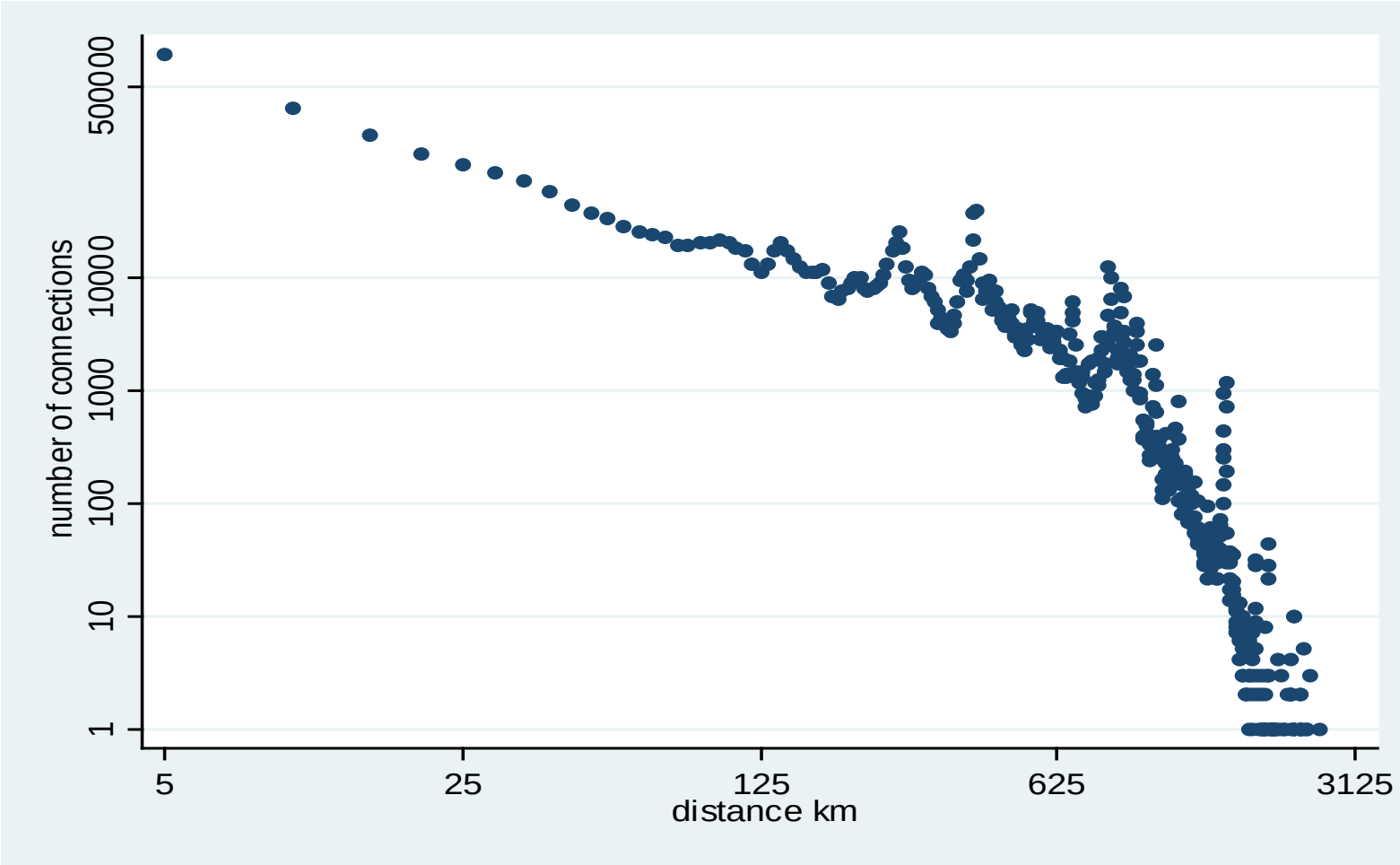


▸ regressions ▸ map

Productivity and the Scope of Outsourcing



Distance and the Number of Sellers



Distance, Domestic Sourcing, and Relationship-specificity

Table 5: Distance, Scope of Domestic Outsourcing, and Relationship-Specificity of Inputs

	Dependent Variable: ln(# sellers)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mesaures of Relationship Specificity (RS)	$Rauch_{seller\ ind}$	$(1\text{-}BJRS)_{seller\ ind}$	1/Input $Elast_{seller\ ind}$	1/Input $Elast_{buyer\ ind}$	$Rauch_{seller\ ind}$	$(1\text{-}BJRS)_{seller\ ind}$	1/Input $Elast_{seller\ ind}$
$ln(dist)_{buyer,seller's\ pref}$	-0.0197***	0.0144***	-0.0199***	-0.0200***			
	(0.001)	(0.005)	(0.001)	(0.002)			
$ln(dist)_{buyer,seller's\ pref}$ x $RS_{seller's\ ind}$	-0.00490***	-0.0441***	-0.0141***	-0.0271**			
	(0.001)	(0.006)	(0.003)	(0.013)			
$Productivity_{buyer}$ x $RS_{seller's\ ind}$					0.0370***	1.427***	0.0459***
					(0.013)	(0.123)	(0.014)
Fixed Effects	Seller industry and prefecture; Buyer						
R_sq	.271	.271	.254	.249	.4	.366	.349
Nb of Obs	108394	108127	141759	258906	21135	35163	47013

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. Robust standard errors are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Distance, Offshoring, and Relationship-specificity

Table 6: Buyer's Productivity, Relationship Specificty of Inputs, and the Likelihood of Offshoring

	Dependent Variable: Dummy for Buyer's Offshoring in 2005				
	(1)	(2)	(3)	(4)	(5)
Measure of Buyer's Productivity	TFP (OP)	VA/Emp	-	-	-
Measure of Relationship Specificity	-	-	1/Input Elast$_{\text{seller ind}}$	(1-BJRS)$_{\text{seller ind}}$	Rauch$_{\text{seller ind}}$
Productivity$_{\text{buyer,2005}}$	0.00741	0.0255***			
	(0.021)	(0.009)			
Relationship Specificity$_{\text{seller's ind}}$			-0.449***	-0.264***	0.0144***
			(0.027)	(0.018)	(0.003)
Buyer's FE			Y	Y	Y
Buyer's Ind FE	Y	Y			
Buyer's Prefecture FE	Y	Y			
R_sq	.079	.0818	.431	0.430	.428
Nb of Obs	4530	4533	75786	75786	75786

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 in columns (1)-(2), and at the buyer-(seller's)sector level in columns (3)-(5). Standard errors, clustered at the buyer's industry level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Effects of Offshoring

- To exam the effects of offshoring, we estimate the following specifications:

$$\Delta Y_i = \alpha + \beta \Delta imp\_d_i + FE_s^i + FE_r^i + \varepsilon_i,$$

  where Y includes sales, labor productivity, number of sellers, number of sourcing regions, number of supplying industries, average distance from suppliers.

- Buyer's sector and region fixed effects are included (FE_s^i and FE_r^i).

Effects of Offshoring

Table 7: Buyer's Offshoring and Changes in the Pattern of Domestic Outsourcing

	(1)	(2)	(3)	(4)	(5)	(6)
Dep Var: Log Difference in Buyer's	Sales	Labor prod	Nb. Sellers	Nb. Supplying Sectors	Nb.Supplying Regions	Avg (Distance)
Imp Starter Dummy$_{buyer}$	0.249**	0.314***	-0.158*	-0.106*	-0.135*	-0.235**
	(0.122)	(0.106)	(0.091)	(0.061)	(0.081)	(0.108)
ln(sales)$_{buyer,2005}$	-0.00828**	-0.0260***	0.0107**	-0.0393***	-0.00172	-0.0175**
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.008)
Δln(sales)$_{buyer}$			0.184***	0.0415***	0.121***	-0.0106
			(0.018)	(0.013)	(0.015)	(0.028)
Fixed Effects	Buyer 4-digit Industry; Buyer Prefecture Fixed Effects					
R_sq	.0153	.0221	.0534	.0481	.0226	.00839
Nb of Obs	6479	6479	6467	6467	6467	6463

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. All regressions include buyer's industry and buyer's prefecture fixed effects. Standard errors, clustered at the buyer's industry level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Churning after Offshoring

- Is a buyer's decision of offshoring associated with the likelihood of dropping its existing domestic suppliers and adding new ones?

$$D_{ijt} = \alpha + \beta \triangle Imp_{it} + X_{i,t-1}\gamma + \{FE\} + \varepsilon_{ijt},$$

- where i, j, and t stand for domestic buyer, domestic seller, and year, respectively.
- D_{ijt} is a dummy variable that equals 1 if seller j was either added or dropped by buyer i between 2005 and 2010, 0 otherwise.
- The variable of interest, $\triangle Imp_{it}$, is a dummy indicating the firm's switch from no import (in 2003-2005) to import (in both 2010 and 2011).

Instrument

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

$$\ln\left(X_{jck}\right) - \ln\left(X_{jJk}\right) = \ln\left(A_{jc}\right) - \ln\left(A_{jJ}\right) - \left(\sigma_j - 1\right)\left[\ln\left(\tau_{jck}\right) - \ln\left(\tau_{jJk}\right)\right]$$

- where X_{jck} and X_{jJk} are dollar value of sector-j exports to country k from country c and Japan (J),
- A_{jc} and A_{jJ} are the export capabilities of country c and Japan in industry j.
- Empirical Counterpart:

$$\ln\left(X_{jckt}\right) - \ln\left(X_{jJkt}\right) = \alpha_j + \alpha_k + \varepsilon_{jckt},$$

Instrument (cont')

- Take the residual

$$\varepsilon_{jckt} = \left[\ln\left(\frac{A_{jct}}{A_{jJt}}\right) - \alpha_j\right] + \left[-(\sigma_j - 1)\ln\left(\frac{\tau_{jckt}}{\tau_{jJkt}}\right) - \alpha_k\right].$$

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

$$\overline{\triangle\varepsilon_{jc}} = \frac{1}{5}\frac{1}{N_{jc}}\sum_{t=2006}^{2010}\sum_{k\in\Gamma_{ic}}\triangle\varepsilon_{jckt},$$

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

$$XS_j = \sum_{c}^{c=M_{j,05}} \omega_{jc,2005}\overline{\triangle\varepsilon_{jc}},$$

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

$$\Delta imp\_d_i = \alpha + \sum_j \delta_j \mathbf{1}_{dom\_source j} XS_j + \xi_i$$

Supplier churning (differential effects across suppliers)

Table 8: Offshoring and Supplier Churning (Differential Effects)

2nd Stage Estimates						
Dep Var:	Drop Dummy			Add Dummy		
	(1)	(2)	(3)	(4)	(5)	(6)
Seller's Characteristics (Z)	-	ln(dist)	$\ln(\text{sales})_{t-1}$	-	ln(dist)	$\ln(\text{sales})_{t-1}$
$\text{Imp Starter Dummy}_{buyer}$	-0.0419	-0.0321	-0.0368	0.0610**	0.0603**	0.0220
	(0.033)	(0.032)	(0.033)	(0.028)	(0.027)	(0.028)
Imp Starter x Z		0.0200**	0.0596***		0.00705	0.0517***
		(0.010)	(0.015)		(0.008)	(0.012)
Controls	buyer lagged sales and sales growth, seller lagged sales and sales growth, $\ln(\text{dist})_{buyer\text{-}seller}$					
Fixed Effects	Buyer 4-digit Industry and Prefecture FE, Seller 3-digit Industry FE and Sellers' Prefecture FE					
R-square	.038	.038	.0307	.386	.386	.382
1st Stage Statistcs						
Dep Var:	$\text{Imp Starter Dummy}_{buyer}$					
Instruments	30 Export supply shocks to each upstream industry the buyer already outsourced					
Cragg-Donald Wald F stat	71.66	40.46	37.36	92.93	49.24	47.15
Kleibergen-Paap Wald F stat	67.78	38.23	35.64	79.88	44.01	30.46
Nb of Obs	54610	54610	54610	68159	68159	68159

The sample includes only manufacturing firms that did not import in 2003-2005. The unit of observation is at the buyer-seller level. All estimates are based on a 2SLS estimation, with the first stage having a firm's import starting dummy regressed on the firm-specific export supply shocks. Robust standard errors are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Supplier churning (differential effects across input sectors)

Table 10: Differential Effects across Supplier Industries

2nd Stage Estimates						
Dep Var	Drop Dummy			Add Dummy		
	(1)	(2)	(3)	(4)	(5)	(6)
Seller Industry Characteristics (Z):	1/Input Elast$_{\text{seller ind}}$	Rauch$_{\text{seller ind}}$	(1-BJRS)$_{\text{seller ind}}$	1/Input Elast$_{\text{seller ind}}$	(1-BJRS)$_{\text{seller ind}}$	Rauch$_{\text{seller ind}}$
Import Starting Dummy	-0.00994	-0.118*	0.259	-0.0479	-0.0882	-0.285***
	(0.053)	(0.064)	(0.326)	(0.037)	(0.245)	(0.058)
Import Starter x Z	0.0888	0.0628	-0.283	0.218**	0.136	0.638***
	(0.137)	(0.062)	(0.376)	(0.110)	(0.284)	(0.052)
Controls	buyer lagged sales and sales growth, seller lagged sales and sales growth, ln(dist)$_{\text{buyer-seller}}$					
Fixed Effects	Buyer Industry and Prefecture FE, Seller Industry FE and Sellers' Prefecture FE					
R-sq	.0249	.0204	.0234	.245	.201	.18
1st Stage Statistics						
Dep Var:	Imp Starter Dummybuyer					
Instruments	30 Export supply shocks to each upstream industry the buyer already outsourced					
Cragg-Donald Wald F stat	46.863	22.09	53.62	86.35	84.97	28.28
Kleibergen-Paap Wald F stat	*15.893*	*18.74*	*5.98*	*8.08*	31.02	28.22
Nb of Obs	30417	28452	28554	48396	35814	35626

Italic font indicates only 10% significance.

Concluding Remarks

- How firms' offshoring affects domestic production networks?
- In addition to the geographic and productivity sorting pattern of domestic sourcing, show that relation-specific inputs are less likely to be sourced to distant regions or abroad.
- Offshoring lower marginal costs of production, but reduces the scope of domestic outsourcing.
- Larger and distant suppliers are more likely to be added and dropped.
- The resulting reduction in cost of production expands the geographic scope of domestic outsourcing, but the increased need to communicate with suppliers may offset this effect.
- Future research:
  - Take the structural parameters of the model more seriously.
  - Aggregate productivity effects and localization of the domestic supply chains.

Regressions Results about the Spatial Pattern of Domestic Sourcing

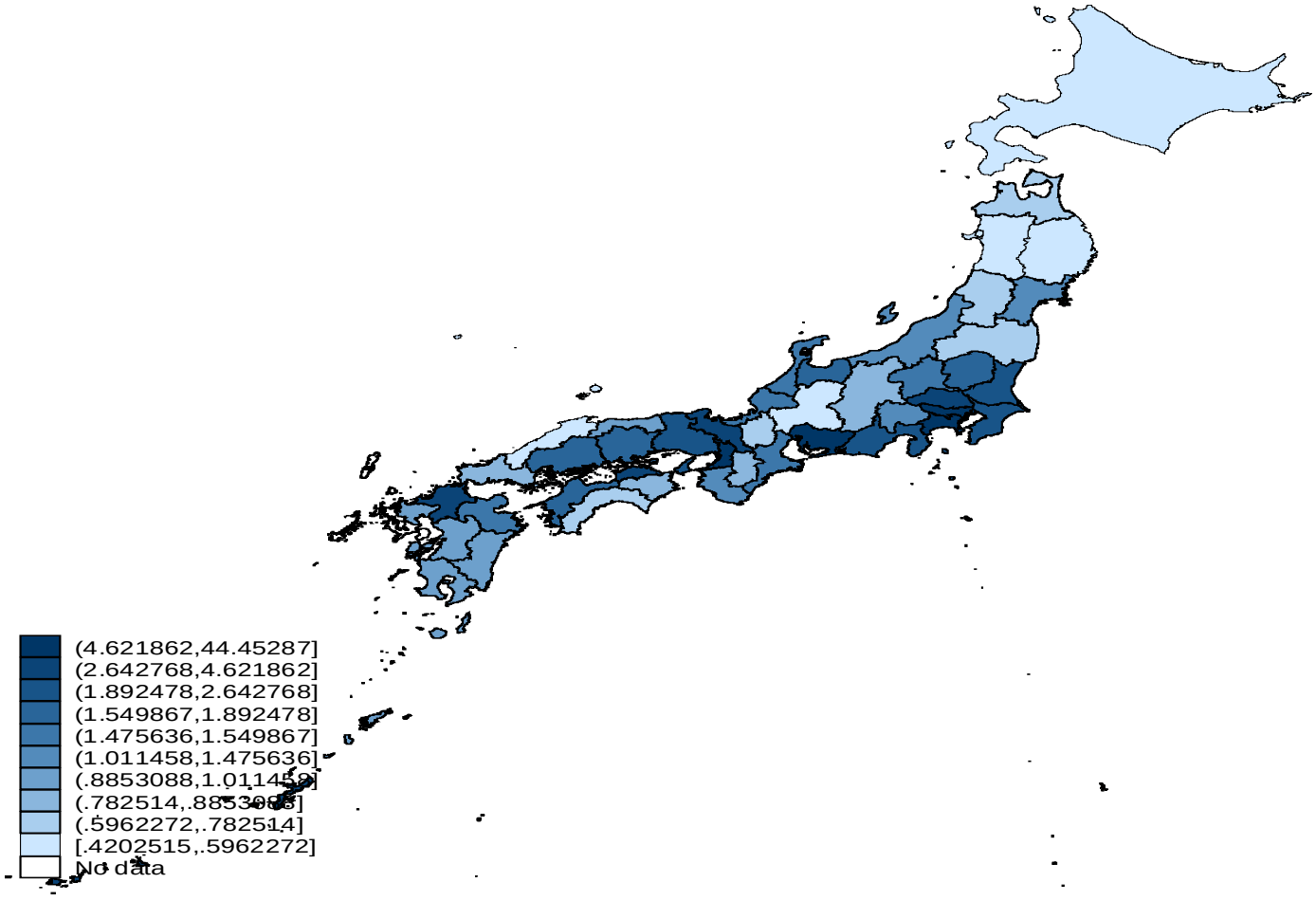
Table 4: Firm Productivity, Distance, and the Scope of Domestic Sourcing

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 Productivitiy	TFP (OP)	VA/Emp	TFP (OP)	VA/Emp	TFP (OP)	VA/Emp	-	-
Productivity$_{buyer}$	0.414***	0.323***	0.645***	0.518***	0.560***	0.467***		
	(0.057)	(0.017)	(0.107)	(0.026)	(0.088)	(0.023)		
ln(distance)							-0.153***	0.0489***
							(0.001)	(0.001)
Buyers' Industry FE	Y	Y	Y	Y	Y	Y		
Buyer's Prefecture FE	Y	Y	Y	Y	Y	Y		
Buyer's FE							Y	Y
Sellers' Industry FE								Y
Sellers' Prefecture FE							Y	Y
R_sq	.136	.182	.146	.205	.152	.214	.556	.68
Nb of Obs	8246	8255	8246	8255	8246	8255	124230	355730

Note: The regression sample includes manufacturing buyers only and domestic suppliers that are either manufacturing or non-manufacturing. Data for 2005 are used while robustness checks, as reported in the appendix, are conducted using data for 2010. The unit of observation is at the buyer level from columns (1) to (6), and at the buyer-seller level in columns (7)-(8). All regressions include the most exhaustive set of fixed effects possible. Standard errors, clustered at the buyer's industry level, are reported in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

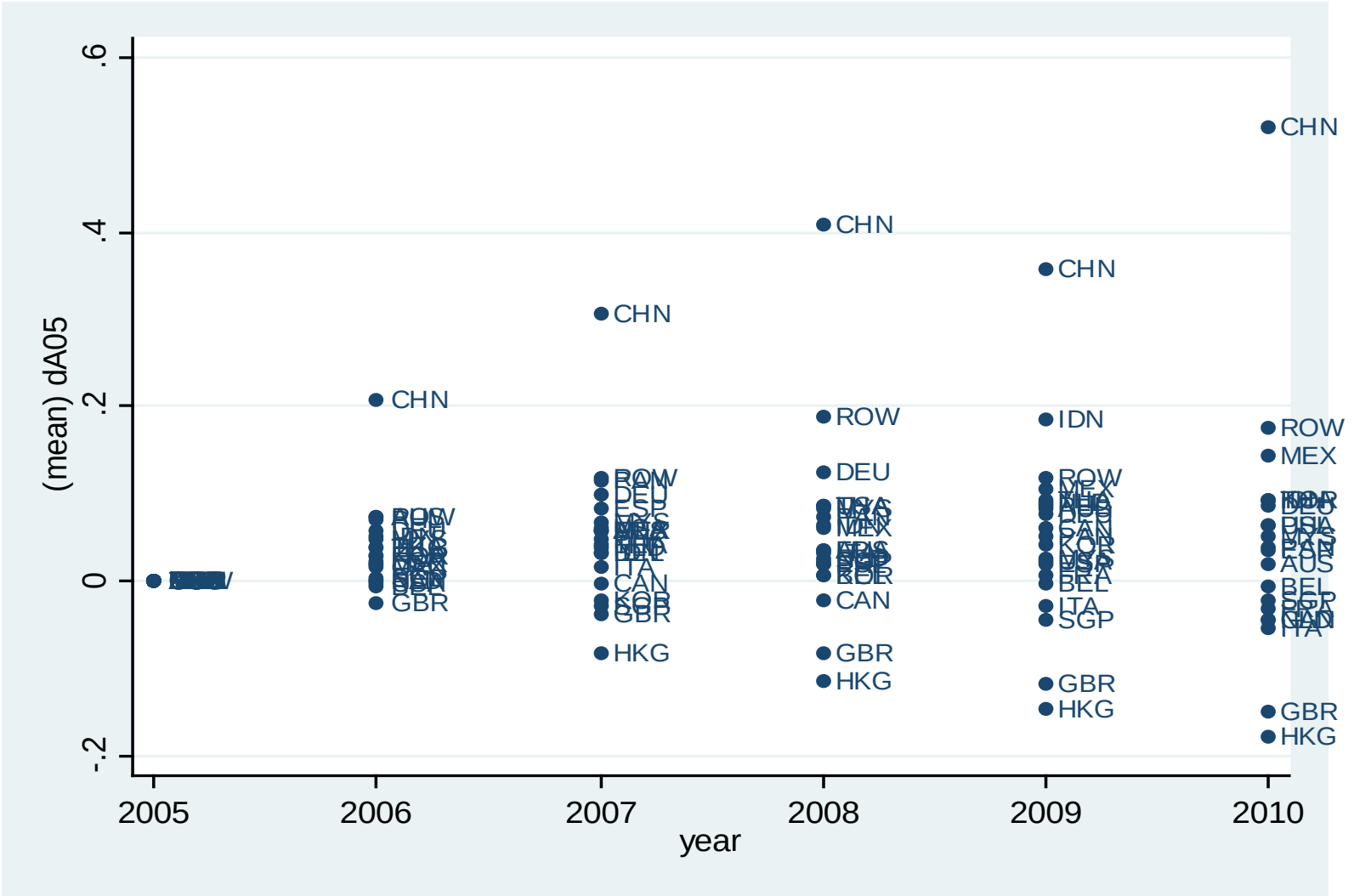
Back

nb of buyers per sq km by prefecture



Back

Idea of the export-supply shock instrument



Back