De nition

Most trade models assume importers may switch across suppliers at no co

In practice, changing supplier might be costly

- Di cult: fewmight be costly

Motivation

Stickiness of trade relationships is key for many (trade) analysis:

- Levchenko (Restud, 2007) & Nunn (QJE, 2007): comparative advantage
- Acemoglu et al. (JF, 2009): vertical integration
- Antras & Staiger (AER, 2012): trade policy
- Antras & Chor (ECTA, 2013): global value chains
- Barrot & Sauvagnat (QJE, 2016): propagation of shocks in networks

A fresh look at relationship-stickiness

Length of a rm-to- rm relationship, conditional on the seller's competitiveness, is informative about the stickiness of the relationship

Dispersion across products is informative about product-level attributes tha tend to lengthen rm-to- rm relationships) Ex-post indicator of the relationship-stickiness of traded goods

Ex-post nature of the measure implies we are agnostic about the speci c source of stickiness:

- Product attributes, e.g. relation-speci c investments (Joskow, 1987, Nunn, 2007) or switching costs (Klemperer, 1995, MacKay, 2017)
- Contractual habits, e.g. relational contracts under imperfect contractual enforcement and uncertainty about rms' reliability (Macchiavello & Moriaria, 2015)

What we do (1/2): Measurement

Mean durations of buyer-seller relationships

- exploit rm-to- rm trade data (French exports to EU countries, 1995-2010)
- compute the duration of trade relationship, at the seller-buyer-product level

Estimate of product-level relationship stickiness

- conceptual framework where buyers receive o ers from sellers randomly
- stickiness a ects the likelihood that a buyer keeps on interacting with the same seller, conditional on an o er
- length of relationships is a function of RS and supplier's competitiveness

What we do (2/2): Applications

We use our RS measure to analyze 5 aspects of international trade:

1. Gravity and the stickiness of traded goods
2. Institutional comparative advantage in the production of high-RS goods
3. Relationship stickiness and intra rm trade
4. Trade-comovement correlation and the stickiness of relationships
5. Stickiness, uncertainty, and the formation of exporter-importer relationships

Literature

Measures of relationship speci city

- Rauch (1999), Nunn (2007)

Duration of trade relationships

- Besedes and Prusa (2006): higher hazard rate for homogeneous products
- Besedes (2008), Nitsch (2009), Békés and Muraközy (2012)

Firm-to- rm trade

- French data: Kramarz, Martin, Mejean (2016), Lenoir, Martin, Mejean (2016)
- Other: Bernard et al. (2014), Carballo et al. (2013), Magerman et al. (2016)
- Dynamics of trade: Eaton, Eslava, Jinkins, Krizan, Tybout (2016)

Literature speci c to each application

Data

French Customs data reporting the value of exports to EU countries per transaction from 1995 to 2010

For each transaction we know the (French) seller, the 8-digit (CN) product, the EU buyer, the month and year

Aggregate data by seller, buyer, product, month and year

Concorde the CN8 data across years to avoid nomenclature-driven censori

Need to follow the history of buyers: drop buyers importing only once over the entire sample (44% of buyer-product pairs but less than 2% of the value of trade)

Characteristics of trade relationships

Choice of a seller-buyer matching structure guided by the data

- at a given date, do we observe shipments from one seller-to-one buyer, one seller-to-many buyers, many sellers-to-many buyers etc ?

Most sellers(-product) interact with more than one buyer within a month

68% of sellers export each of their products to more that one buyer per month on average (conditional on exporting)

Buyers tend to import a product from a single French seller

About 95% of the buyers import a 8-digit product, at a given date, from a single French seller

many-to-one relationships : reminiscent to on-the-job search models

(unlike Bernard et al. 2017, we work i) at the product level, ii) at the monthly level)

Large transactions last longer

Table: Duration, switching probabilities, and the size of trade ows

	(1)	(2)	(3)	(4)	(5)	(6)
	duration	duration	duration	Log of 1/P(switch)	1/P(switch |Trade)	duration
Mean expra	x1.-7.97 596 Tg5 expra	x1.-7.97 596 Tg5 expra	*a 468(*r 468(*r 468(20r76l175r 468920r76l621(.0005			

Conceptual framework: duration

Under these conditions, the expected length of a buyer-seller relationship, conditional on its price is given by:

$$E[T \mid p] = \sum_{k=1}^{\infty} k(1 \quad H_P(p=))^{k \quad 1} \; H_P(p=) = \frac{1}{H_P(p=)}$$

) The duration of a relationship is just the inverse of the probability of switchin

(this holds true in continuous time)

Toward an econometric model: Assumption 1

We do not observed quality-adjusted prices - but we observe sales

Assumption 1: Demand for imports is iso-elastic (price-elasticity)

- duration in terms of sales ( ) rather than unobserved prices

$$E[T \mid r] = \frac{1}{(1 \quad H_R(r \quad 1}$$

Toward an econometric model: Assumption 2

We have to make assumptions regarding the distribution of prices

Assumption 2: the distribution of prices is inverse-Pareto

- transactions are distributed Pareto

$$H_R(r) = 1 - \left(\frac{r}{R_{min}}\right)^{-k}$$

with R_{min} the scale parameter and k the shape parameter

Toward an econometric model: Assumptions 1 and 2

Assumptions (1) and (2) deliver a log-linear relationship btw the expected (conditional) duration and relationship stickiness :

$$E[T \mid r] = \left(\frac{r}{R_{min}}\right)^{\frac{k}{1}}$$

- $\frac{k}{1}$ is our measure of relationship-stickiness
- duration of a buyer-seller relationship is increasing in
- duration increases with the size of the transaction

Discussion

Departure from the competitive framework: Bertrand-type competition

- same switching probability as in the competitive model
- but the distribution of transactions changes

Departure from the Pareto distribution of productivity

- focus on the log-normal case
- in-progress

Method of moments

Moments: average duration within transaction-size deciles

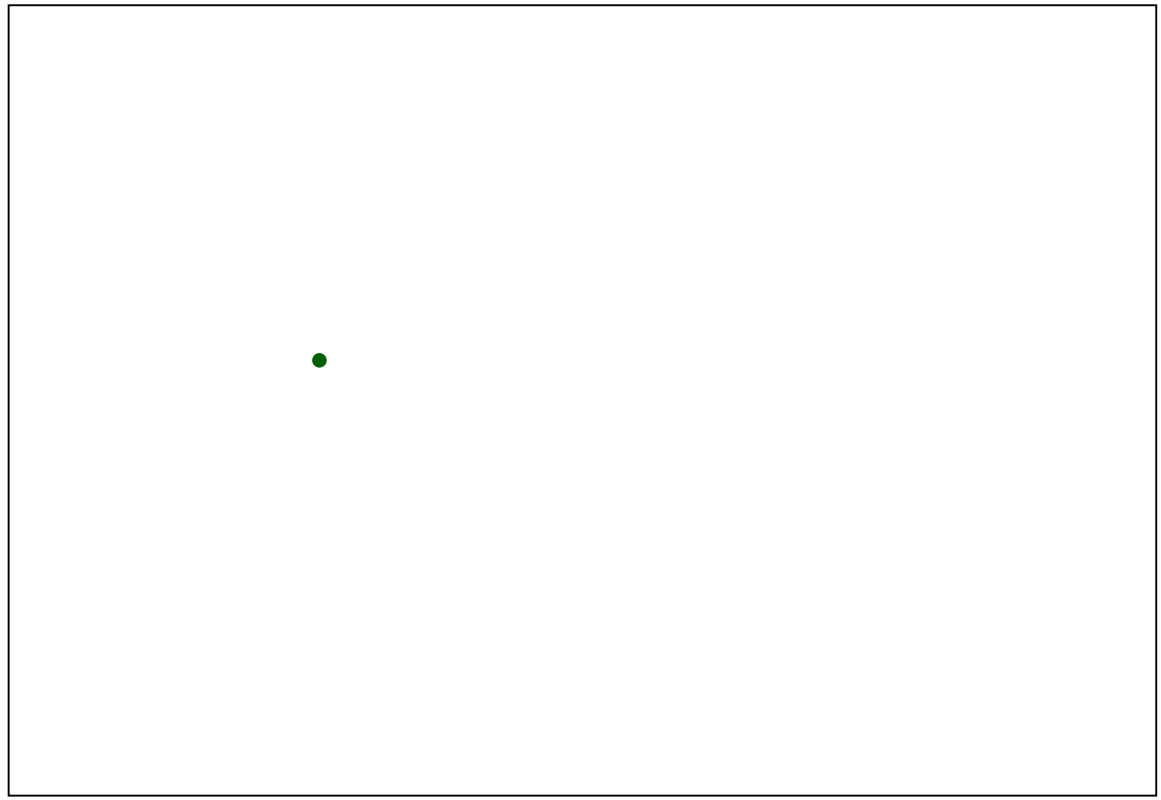
$$\int_{d}^{d+1} T(r)_{zpd} f(r) dr = \frac{p^{k_p}}{p} \log \frac{10 \quad d}{9 \quad d}$$

$d = 0; 1; :::; 9; \frac{10 \quad d}{9 \quad d}$ increases with size

Regress the log of averaged duration within a decile on

- A function of the decile of the transaction
-

Share of non-homog. products vs RS measure



Application 1/5: Gravity for relationship-speci c goods

Gravity equations in trade: empirical regularity with theoretical underpinning (Head & Mayer 2014)

Some products defy gravity (eg. luxury goods cf. Martin & Mayneris 2015

What about high-RS products?

- Almost no guidance in the literature
- Atalay et al. (2017): rm boundaries are barriers to trade
- Head & Ries (2008): monitoring costs and distance

Unit values increase with distance (Hummels and Skiba 2004)

Application 1/5: Results

	(1) Value	(2) UV	(3) Value	(4) UV	(5) Value	(6) UV
Distance (log)	-0.571***	0.467***	-0.699***	0.101***	-0.990***	0.087***
	(0.020)	(0.006)	(0.021)	(0.006)	(0.023)	(0.007)
RS	1.008***	-0.166***				
	(0.093)	(0.041)				
- dist.	-0.151***	0.042***	-0.143***	0.020***	-0.113***	0.066***
	(0.012)	(0.005)	(0.012)	(0.004)	(0.010)	(0.005)
Upstreamness	1.008***	-0.166***				
	(0.041)	(0.043)				
- dist.	0.010**	-0.084***	0.021***	0.028***	-0.012*	0.047***
	(0.005)	(0.000)	(0.005)	(0.002)	(0.007)	(0.002)
Fixed e ects	country		country+ sect		country sect	
Observations	5,703,782				5,473,330	
R-squared	0.164	0.178	0.285	0.654	0.578	0.770

Clustered (country) standard errors in parentheses with , , denoting signi cance at the 10, 5 and 1% levels.

Application 2/5: Institutional comparative advantage

Nunn (2007): countries with good contract enforcement specialize in the production of goods for which relationship-speci c investments are most important.

Baseline speci cation:

$\log(export_{ic})$ (7 = ic) 9626 Tf98 m 126.135 163.745 -21Tf 6.435 19

Application 2/5: Results

	(1)	(2)	(3)	(4)	(5)
	log(exports)			Balassa Index	$1_{\text{Balassa}>1}$
Rule of law					
RS	0.349***		0.408***	0.286**	0.022***
	(0.053)		(0.053)	(0.120)	(0.006)
Nunn specif.		0.811***	0.978***	0.316*	0.027*
		(0.100)	(0.117)	(0.168)	(0.015)
Upstreamness			0.034	0.013	0.002
			(0.021)	(0.024)	(0.002)
Fixed e ects	country (122) and sector (4; 326)				
Observations	296,187	296,187	292,938	527,284	527,284
R-squared	0.605	0.606	0.610	0.012	0.139

Clustered (country) standard errors in parentheses with , , denoting signi cance at the 10, 5 and 1% levels.

Application 3/5: Intra rm trade

Theory: contracts and speci c inputs (Antras 2003, Antras & Helpman 2004

Empiric: Bernard et al. (2010), Nunn & Tre er (2013), Corcos et al. (2010)

- Product and country characteristics explain the share of intra rm trade
- What fraction of dispersion across products might be explained by our measure?

Application 3/5: Results

	(1)	(2)	(3)	(4)
	Share of intra- rm			
	exports		imports	
RS ( )	0.177***	0.180***	0.140***	0.138***
	(0.040)	(0.041)	(0.030)	(0.031)
Nunn		0.406***		0.199***
		(0.063)		(0.046)
Upstreamness		0.060***		0.015
		(0.016)		(0.011)
Elasticity ( )		0.002		-0.005
		(0.006)		(0.004)
Observations	378	378	378	378
R-squared	0.058	0.166	0.071	0.119

Application 4/5: Trade and BCC

Frankel & Rose (1998) di Giovanni & Levchenko (2010): Countries that trade more together comove more. Role of international IO linkages as a driver of comovements

Hypothesis: Propagation of shocks in production networks should be especially strong for high input-speci c goods (Barrot & Sauvagnat, 2016)

Baseline speci cation (di Giovanni & Levchenko, 2010):

$$^{ij}_{kl} = \quad + \quad \ln \text{Trade}^{ij}_{kl} + u + \text{"}^{ij}_{kl}$$

ij a pair of countries, kl a pair of sectors, u a set of xed e ects
$^{ij}_{kl}$ the correlation between value added in sector k of country i and sector l of country j
Trade^{ij}_{kl} a measure of the intensity of bilateral trade in both sectors:

$$\text{Trade}^{ij}_{kl} = \frac{1}{T} \sum_t \frac{X^{ij}_{kt} + X^{ji}_{lt}}{X^{i}_{kt} + X^{j}_{lt}}$$

Trade-BCC with relationship-speci c trade

Augmented speci cations:

1. $^{ij}_{kl} = \quad + \quad \ln \text{Trade}^{ij}_{kl} + \quad RS^{ij}_{kl} + \quad {}^{H}RS^{ij}_{kl} \quad \ln \text{Trade}^{ij}_{kl} + u + \text{"}^{ij}_{kl}$

   with RS^{ij}_{kl} a trade-weighted average of product-level RS indicators

2. $^{ij}_{kl} = \quad + \quad {}^{H}\text{TradeH}^{ij}_{kl} + \quad {}^{L}\text{TradeL}^{ij}_{kl} + u + \text{"}^{ij}_{kl}$

   with TradeH^{ij}_{kl} and TradeL^{ij}_{kl} the two sub-components ofTrade^{ij}_{kl}, respectively computed on above-the-median and below-the-median RS products

Data: UNIDO + ComTrade

Uncertainty and the formation of trade relationships

Conclusion

New method to reveal relationship speci city using transaction data

Easy to implement (and easy to improve)

Easy to use : applied to 5 key issues in international trade

RS dataset available to other researchers soon

Discussion: strengths and limits of the RS measure

Correlation across measures

Table: Correlation of estimated RS measures

	Mean duration	$1=P(\text{switch})$	$1=P(\text{switch}\mid\text{Trade})$
Mean duration	1.000		
$P(\text{switch})^{-1}$	.828	1.000	
$P(\text{switch}\mid\text{Trade})^{-1}$	.793	.602	1.000
	Measures accounting for censoring		
$\text{Duration}_{\text{cens}}$	.922		
$P(\text{switch})^{-1}_{\text{cens}}$		.883	
$P(\text{switch}\mid\text{Trade})^{-1}_{\text{cens}}$			.899

Policy uncertainty, 2000-2015

Table: Correlation - uncertainty

	DE	IT	UK	ES
Germany	1,00			
Italy	0,52	1,00		
UK	0,67	0,55	1,00	
Spain	0,54	0,49	0,45	1,00