International Trade and Macro:
Time to ship, lumpy trade, and inventories

Trade costs are more than tariffs

1. Easy (and useful) to model tariffs and ad valorem trade costs
2. There are other important frictions out there

Friction: Delivery lags

- Lag between order and delivery is 6–8 weeks
- Shipping lags (Hummels, 1999)
  - 2–6 weeks by vessel, 1 day by air
  - Vessel accounts for most developing country trade (70%)
- Customs/paperwork (from WB *Doing business*
  - Adds 2–5 weeks
  - Some data at https://lpi.worldbank.org/international/global
- A related issue: Production lags, back orders,. . .

Friction: Fixed transactions costs

	Argentina	Russia	Mexico
Documents preparation	$750	$437	$206
Customs clearance & tech. control	$150	$500	$224
Port & terminal handling	$600		$165
U.S. export costs	$625	$625	$625
Fraction of mean shipment	0.04	0.02	0.01
Fraction of median shipment	0.17	0.07	0.11

- Freight has a fixed component, too

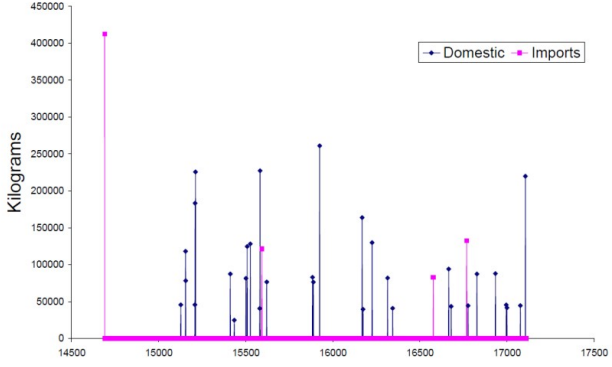
International transactions are lumpy

- Fixed transactions costs (in a model) imply infrequent shipments
- Larger fixed costs create lumpier trade flows
- Evidence:
  1. US steel wholesaler (George Hall and John Rust)
  2. US product-level exports

International transactions are lumpy

- Transaction-level data, identical goods from domestic and foreign suppliers
- 3,573 goods, 18,104 transactions, 9 years of daily data
- Import premia: Purchases 50 percent larger
- Import lumpiness: mean 205 vs 100 days (median: 140 vs 56 days)

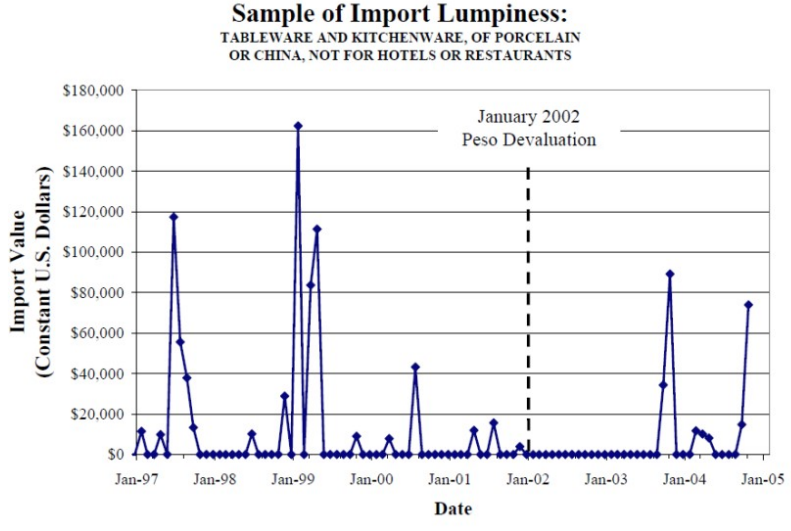
Purchases of hot-rolled steel coils (1/4” x 48”)



International transactions are lumpy

- All US export goods, monthly, 1990–2005
- Values, quantities, number of transactions
- A good is: HS-10 x port of exit

International transactions are lumpy



International transactions are lumpy

	Argentina	Russia	Mexico
Fraction of months exported	0.47	0.43	0.90
HH index	0.40	0.45	0.21
Fraction of annual trade in top mo.	0.50	0.53	0.27
Fraction of annual trade in top 3 mos.	0.83	0.85	0.53
Num. transactions in mo. with trade	2.2	2.7	32.3

- s_i = share of annual trade in month i

$$HH = \sum_{i=1}^{12} s_i^2$$

- Equal value in all months: $HH = 1/12 = 0.83$
- All value in one month: $HH = 1$
- $HH = 0.45 \rightarrow 2.2$ months with trade in a year

International transactions are lumpy

- Is it seasonality? No.

	Argentina	Russia	Mexico
Within year, across months			
HH index	0.40	0.45	0.21
Fraction of annual trade in top mo.	0.50	0.53	0.27
Fraction of annual trade in 3 top mos.	0.83	0.85	0.53
Across years, within month			
HH index	0.50	0.75	0.15
Fraction of annual trade in top mo.	0.60	0.80	0.25
Fraction of annual trade in top 3 mos.	0.96	1.00	0.54

International transactions are lumpy

- Lumpy in all types of goods

	Food	Int	Cap	Autos/parts	Cons
Months with exports (%)	0.33	0.45	0.36	0.68	0.45
HH index	0.53	0.40	0.52	0.35	0.41
Fraction annual trade in top mo.	0.59	0.49	0.61	0.42	0.51
Fraction annual trade in top 3 mos.	0.89	0.83	0.90	0.74	0.84
Share US exports	0.02	0.42	0.13	0.06	0.07

International traders need inventories

- Time to ship + fixed shipment costs $\rightarrow$ lumpy shipments
- How do firms have inputs to produce/sell?
- Firms hold inventories
- Larger costs, longer lags $\rightarrow$ inventory is more important

- Chilean plant-level data, unbalanced panel from 1990–2001

$$i_{jt} = c + \alpha_m s^m_{jt} + \alpha_x s^x_{jt} + \epsilon_{jt}$$

- i_{jt}: inventory-materials ratio
- s^M_{jt}: imports as share of material purchases
- s^x_{jt}: exports as share total sales

Inventory problems are bigger for exporters/importers

	c	α_m	α_x
Inventory	0.18	0.187	
(t-stat)	(18.4)	(15.6)	
Inventory	0.22	0.15	0.25
(t-stat)	(18.4)	(15.6)	(2.7)

- Includes controls for size (also works with industry FE)
- Non-importer $0.18 \times 12 = 2.16$ months
- 100% importer/exporter $(0.22 + 0.15 + 0.25 = 0.62)$ $0.62 \times 12 = 7.4$ months
- Holds if control for materials vs. finished goods
- Holds in US, India, Peru, Colombia data...

Richer trade costs, richer models

- Firms use inventories to
  - Save on fixed shipment costs
  - Deal with shipping times
  - Keep from stocking out
- Importer/exporters use inventories more intensively

- Let's put inventory-choice models into trade. . .

References I

Hummels, David (1999). “Towards a geography of trade costs.” Unpublished manuscript.