

# Market-specific cost shocks and firm export behavior

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Preliminary

## The Big Picture

1. How do exporting firms choose prices and quantities for sale in foreign markets?
2. How do sales and prices change in response to cost shocks?
3. Are sales and pricing decisions linked across destination markets?
  - ▶ We examine how increases in time-varying bilateral temporary trade barriers (TTBs) affect firm-level trade flows.
  - ▶ Our analysis emphasizes the spillovers that a bilateral tariff increase between origin  $i$  and destination  $j$  has on the trade flows from origins NOT  $i$  and destinations NOT  $j$ .

## More concretely,

1. When an exporting firm faces a destination-market-specific increase in marginal cost, how does that impact sales and prices to:
  - ▶ the destination market with the cost increase and
  - ▶ all other markets?
2. When a Chinese exporting firm's competitors from other countries face a destination-market-specific increase in marginal cost, how does that impact the Chinese firm's sales and prices to that destination market?

## Preliminary findings

Export sales of Chinese firms to destination market  $j$ :

- ▶ decrease with an increase in  $\tau_{china,jht}$  (trade destruction),
- ▶ increase with an increase in  $\tau_{china,-jht}$  (trade deflection),
- ▶ are unchanged for most products with an increase in  $\tau_{NOTchina,j,ht}$  (no trade diversion).

## Preliminary findings (cont.)

Unit values (prices) of Chinese firms to destination market  $j$ :

- ▶ increase with an increase in  $\tau_{china,jht}$ ,
- ▶ decrease with an increase in  $\tau_{china,-jht}$  (trade deflection at fire sale prices? evidence of an increasing MC curve?)
- ▶ decrease with an increase in  $\tau_{NOTchina,jht}$  (capturing rivals' market share?)

## Preliminary findings (cont.)

Quantities of Chinese firms' exports to destination market  $j$ :

- ▶ decrease with an increase in  $\tau_{china,jht}$ ,
- ▶ increase with an increase in  $\tau_{china,-jht}$  (trade deflection)
- ▶ increase with an increase in  $\tau_{NOTchina,jht}$  (capturing rivals' market share?)

## Outline

1. Different models of firms in international trade.
2. Data
3. Empirical model
4. Results
5. Conclusion

## Theoretical Literature

A large set of static trade models assumes constant marginal costs of production.

1. Melitz (2003) and extension by Chaney (2008).
2. Eaton and Kortum (2002) and extension by Bernard, Eaton, Jensen and Kortum (2003)
3. Melitz and Ottaviano (2008) and extension by DiComite, Thisse and Vandebussche (2013)

In these models, a change in bilateral ( $ij$ ) trade costs (tariffs) have no impact on other bilateral trade flows ( $i, -j$ ).



## Models of firms engaged in international trade

Chaney (2008) extension of Melitz (2003)

- ▶ CES preferences, monopolistic competition among heterogeneous firms.
- ▶ Cost of selling  $q$  units:  $c_{ij}^h(q) = \frac{w_i \tau_{ij}^h}{\varphi} q + f_{ij}^h$ .
- ▶ Firms set prices at constant mark-up over marginal cost.
- ▶ Extensive margin: The productivity cutoff for firm in  $i$  to sell in  $j$  rises with variable trade costs,  $\tau_{ij}^h$ .
- ▶ Intensive margin: The value of trade,  $x_{ij}^h$ , declines as variable trade costs,  $\tau_{ij}^h$ , rise.

## Models of firms engaged in international trade

Bernard, Eaton, Jensen and Kortum (2003)

- ▶ Bertrand competition among firms that draw productivity in EK model.
- ▶ Lowest cost supplier of variety  $h$  to market  $j$  serves market.
- ▶ Limit-pricing with firms setting variable markups over marginal cost,  $C_{kji}(h) = \left(\frac{w_i}{Z_{ki}(h)}\right) d_{ji}$ .
- ▶  $P_j(h) = \min\{C_{2j}(h), \bar{m}C_{1j}(h)\}$
- ▶ An increase in competitors' marginal cost can lead to a price increase depending on the cost difference across potential suppliers.

## Models of firms engaged in international trade

DiComite, Thisse, and Vandenbussche (2013)

- ▶ Quadratic utility function with “verti-zontal” preferences
- ▶ Demand is a function of variety-specific quality,  $\alpha_s$  (vertical) and destination-specific taste for quality,  $\beta_{s,j}$  (horizontal).
- ▶ Heterogenous firms differ in cost,  $c_s$ , of producing a variety with quality  $\alpha_s$ .
- ▶ 
$$p_{s,j} = \frac{\alpha_s + c_s}{2} - \mathcal{T}_j \frac{\bar{\alpha}_j - \bar{c}_j}{2}$$
- ▶ 
$$q_{s,j} = \frac{1}{\beta_{s,j}} \left( \frac{\alpha_s + c_s}{2} - \mathcal{T}_j \frac{\bar{\alpha}_j - \bar{c}_j}{2} \right)$$

## Theoretical Literature

### Summary of constant marginal cost models

1. With CMC, bilateral sales fall and prices rise in response to a bilateral tariff increase.
2. With Bertrand competition and CES preferences or with verti-zontal preferences, an increase in a competitor's bilateral tariff leads a firm to raise prices.
3. With CMC, exports to destination  $j$  do not change when the marginal cost of exporting to destination NOT  $j$  increases. (No cross-market sales links.)

## Theoretical Literature

Few papers have explored cross-market linkages at the product or firm-level.

1. Bown and Crowley (2007) - intensive margin quantity decisions is which net marginal revenue is equated to marginal cost in all markets.
2. Albornoz, Calvo Pardo, Corcos and Ornelas (2012) - extensive margin entry with learning-about-exporting spillover.

## Models of firms engaged in international trade

### Bown and Crowley (2007)

- ▶ Segmented international markets, Cournot competition, and increasing MC.
- ▶ Firms allocate output to equate net marginal revenue and MC across markets.
- ▶ A change in bilateral tariffs changes net MR and, hence, all trade flows.
- ▶ Trade destruction: Exports<sub>*ij*</sub> fall when  $\tau_{ij}$  increases.
- ▶ Trade deflection: Exports<sub>*ij*</sub> rise when  $\tau_{i,-j}$  increases.
- ▶ Trade diversion: Exports<sub>*ij*</sub> rise when  $\tau_{-i,j}$  increases.

## Data: Temporary Trade Barriers under the WTO

	Percent of products with tariff commitment	Average promised tariff rate 1995- 2010	Percent of products with TTBs 1995	Percent of products with TTBs 2010	Average TTB tariff rate 1998- 2008
U.S.	100	3.6	3.3	5.7	58.5
EU	100	4.2	3.4	2.9	25.9
Turkey	50.4	28.5	0.7	6.9	49.7
India	73.8	49.4	0.2	6.6	-
Brazil	100	31.4	0.4	1.6	71.6

Sources: Bown and Crowley (2013a), Crowley and Yu (2013)

## Data: Temporary Trade Barriers Database of the World Bank

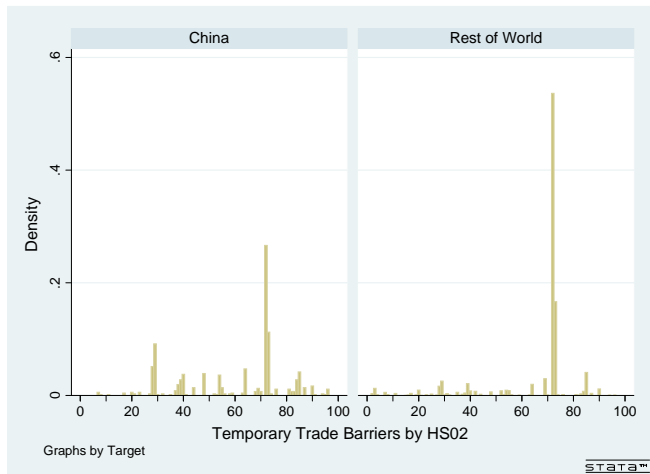
### Trade policy data, 1998-2008

- ▶ antidumping, global safeguard, and China safeguard tariffs
- ▶ bilateral for accused origin country ( $i$ ) and imposing destination country ( $j$ )
- ▶ at universally-defined HS06 product level ( $h$ )
- ▶ dummy for tariff/no tariff for ten countries ( $j$ ) - working on more
- ▶ tariff rates available for five countries ( $j$ ) - working on more

Summary Statistics



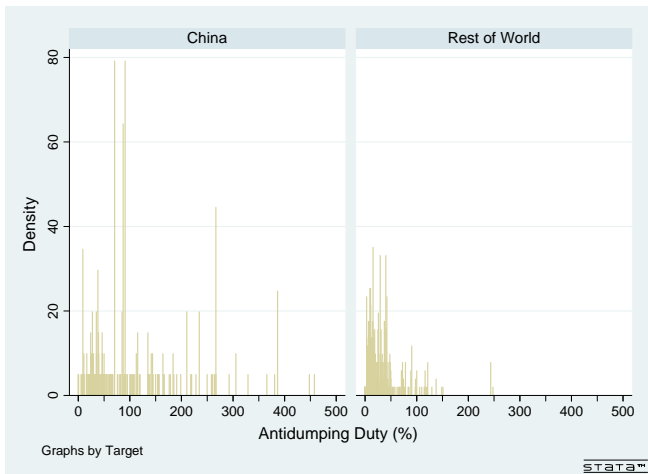
## TTBs by HS02 Products, 1998-2008



Graphs by Target

STATA™

## Antidumping Duties imposed by Brazil, EU, Korea, Turkey & USA, by Origin



## Data: China's General Administration of Customs

### Export value and quantity

- ▶ universe of exporting firms
- ▶ HS08 product level
- ▶ to top 50 destinations  $j$
- ▶ with type of product measurement units
- ▶ from 2000-2006

## Sample: Top 50 markets in Chinese Census of Exporting Firms

- ▶ Destination markets: Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Denmark, Ecuador, Egypt, El Salvador, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Trinidad, Turkey, United Kingdom, and Venezuela.
- ▶ TTB Policy Data for 10 trading partners: Australia, Brazil, Canada, European Union, Indonesia, India, Japan, South Korea, Turkey, the United Kingdom and the United States.

## Market-specific cost shocks and firm export behavior

↳ Data

↳ Table 1: Chinese Export Shares by Destination Country, 2000-2006

Export Share (%)	2000	2001	2002	2003	2004	2005	2006
USA	20.92	20.48	21.61	21.10	21.05	21.37	20.68
EU	16.29	16.53	16.08	17.81	18.02	18.77	18.55
Australia	1.38	1.35	1.42	1.43	1.49	1.45	1.38
Brazil	0.49	0.52	0.45	0.49	0.62	0.63	0.76
Canada	1.27	1.26	1.33	1.29	1.38	1.53	1.56
Indonesia	1.23	1.06	1.05	1.02	1.05	1.12	0.98
India	0.63	0.72	0.82	0.76	1.00	1.17	1.50
Japan	16.70	16.83	14.74	13.56	12.39	11.10	9.51
Korea	4.53	4.70	4.74	4.59	4.68	4.61	4.62
Turkey	0.43	0.25	0.34	0.47	0.48	0.55	0.76
Total	63.85	63.70	62.57	62.52	62.16	62.31	60.28

Notes: Destination countries reported above are those countries for which data on temporary trade barriers (antidumping, global safeguard, and China safeguard) are available.



## Market-specific cost shocks and firm export behavior

└ Data

└ Table 2b: Summary statistics on unit values by unit type

Unit of Quantity	Obs.(%)	Value (%)	Mean of Unit Value (\$)
Pair	76.02	71.64	300.8
Meter	9.74	6.76	196.9
Square Meter	13.96	17.17	398.4
Cubic Meter	0.23	2.03	2580
Kilogram	0.02	0.91	13,454
Non-specified	0.03	1.39	250.5
All	100	100	473.2

Exports of product  $h$  by firm  $f$  located in origin  $i$  to destination  $j$

$$\begin{aligned}
 x_{fijht} = & a_{ijh} + a_{it} + a_{jt} + a_{ft} + \sum_{k=t-2}^t \beta'_{1k} \tau_{ijhk} + \sum_{k=t-2}^t \beta'_{2k} \tau_{i-jhk} \\
 & + \sum_{k=t-2}^t \beta'_{3k} \sum_{NOTi} \tau_{-ijhk} + \beta'_4 x_{fijht-1} + \epsilon_{fijht}
 \end{aligned} \tag{1}$$

- ▶  $x_{fijht}$  is export value or unit value,
- ▶  $\tau_{ijhk}$  is a TTB on Chinese exports in destination  $j$ ,
- ▶  $\tau_{i-jhk}$  is a TTB on Chinese exports in destination NOT  $j$ ,
- ▶  $\tau_{-ijhk}$  is a TTB on China's competitors (NOT  $i$ ) in destination  $j$ .



## Take the first difference of (1)

$$\begin{aligned} \Delta x_{fijht} = & \Delta a_{it} + \Delta a_{jt} + \Delta a_{ft} + \sum_{k=t-2}^t \beta'_{1k} \Delta \tau_{ijhk} + \sum_{k=t-2}^t \beta'_{2k} \Delta \tau_{i-jhk} \\ & + \sum_{k=t-2}^t \beta'_{3k} \Delta \sum_{NOTi} \tau_{-ijhk} + \beta'_4 \Delta x_{fijht-1} + \Delta \epsilon_{fijht} \end{aligned} \quad (2)$$

- ▶  $\beta_{1k} < 0$  for exports predicted by all models,
- ▶  $\beta_{1k} < 0$  for unit values (Free On Board) predicted by all models,
- ▶  $\beta_{2k} > 0$  for exports predicted by increasing MC models,
- ▶  $\beta_{2k} = 0$  for exports and unit values predicted by CMC models,
- ▶  $\beta_{3k} > 0$  for exports (BEJK, DTV, BC) and prices (BEJK, DTV).

## Model of temporary trade barrier formation

$$\tau_{ijht} = \beta_0 + \beta_1 x_{ijht-1} + \beta_2 \left( \frac{1}{\eta_{xh} + \eta_{mh}} \right) + \beta_3 \left( x_{ijht-1} * \frac{1}{\eta_{xh} + \eta_{mh}} \right) + \beta_4 \sigma_{ijh}^x + \varepsilon_{ijht}, \quad (3)$$

- ▶  $\tau_{ijht}$  is a measure of a trade policy change,
- ▶  $x_{ijht-1}$  is a measure of the change in imports,
- ▶  $1/(\eta_{xh} + \eta_{mh})$  is the inverse of the sum of the export supply and import demand elasticities,
- ▶  $\sigma_{ijh}^x$  is a measure of the variance of imports.

where equation (3), the empirical model of TTBs in Bown and Crowley (2013), is derived from Bagwell and Staiger's (1990) "Theory of Managed Trade."

## Estimation Strategy

- ▶ For both export values, unit values and quantities, we estimate the gravity model with autocorrelated exports in first differences using Arellano-Bond GMM.
- ▶ The next step is to address endogeneity of the trade policy changes using the tariff formation equation of Bown and Crowley (2013).

# Market-specific cost shocks and firm export behavior

## Results

Table 3: System-GMM Estimates on Chinese Exports, all destinations, 2000-2006

Sampled Included $\Delta \text{Log Exports } (\Delta \ln \exp_{fijt})$	All Industries		No Textiles		Textiles Only	
	(1a)	(1b)	(2a)	(2b)	(2a)	(2b)
	1-Lag	2-Lag	1-Lag	2-Lag	1-Lag	2-Lag
Lag of $\Delta \text{Log Exports}$	0.381*** (359.51)		0.396*** (332.42)		0.335*** (104.56)	
Lag of $\Delta \text{TTB}$	-0.089** (-2.17)	-0.100** (-2.23)	-0.059 (-1.41)	-0.084* (-1.83)	-0.177 (-0.71)	0.207 (0.51)
Lag of $\Delta \text{TTB}$ imposed by USA	0.139*** (3.54)	0.161*** (3.48)	0.150*** (3.65)	0.155*** (3.32)	-0.344* (-1.88)	
Lag of $\Delta \text{TTB}$ imposed by Australia	0.243*** (3.69)	0.254** (2.32)	0.272*** (4.09)	0.267** (2.43)		
Lag of $\Delta \text{TTB}$ imposed by Brazil	0.889*** (10.65)	0.299*** (2.99)	0.896*** (10.67)	0.297*** (2.96)		
Lag of $\Delta \text{TTB}$ imposed by Canada	-0.222*** (-6.77)	-0.043 (-1.27)	-0.190*** (-5.75)	-0.032 (-0.94)		
Lag of $\Delta \text{TTB}$ imposed by Indonesia	0.194*** (2.66)	0.345*** (3.81)	0.222*** (3.02)	0.407*** (4.47)		
Lag of $\Delta \text{TTB}$ imposed by India	-0.136*** (-5.29)	-0.098*** (-3.49)	-0.124*** (-4.68)	-0.055* (-1.92)	0.559*** (4.34)	-0.234 (-0.82)
Lag of $\Delta \text{TTB}$ imposed by Korea	0.508*** (5.51)	0.189* (1.68)	0.673*** (6.83)	0.302*** (2.73)		
Lag of $\Delta \text{TTB}$ imposed by Turkey	0.036 (1.56)	0.069*** (2.75)	0.030 (1.22)	0.051* (1.91)	-0.156 (-1.44)	0.083 (0.81)
Lag of $\Delta \text{TTB}$ imposed by the EU	-0.078*** (-2.81)	0.093** (2.19)	-0.075*** (-2.71)	0.078* (1.83)	0.110 (0.19)	0.901* (1.95)
Lag of $\Delta \text{TTB}$ imposed by Importers on Non-China	-0.001 (-0.03)	0.062 (1.59)	0.004 (0.14)	0.060 (1.50)	1.150** (2.31)	-0.025 (-0.06)
Year-specific Fixed Effects		Yes		Yes		Yes
Importer-Year Fixed Effects		Yes		Yes		Yes
Number of Observations	1,096,241		866,146		230095	

## Findings: The impact of TTBs on the value of exports

- ▶ Trade destruction.  $\beta_{1,t-1} < 0$  and  $\beta_{1,t-2} < 0$ .
- ▶ Trade deflection.  $\beta_{2,t-1} > 0$  and  $\beta_{2,t-2} > 0$  for most destinations NOT  $j$ .
- ▶ No trade diversion.  $\beta_{3,t-1}$  and  $\beta_{3,t-2}$  are small and imprecisely estimated.

## Market-specific cost shocks and firm export behavior

## Results

Table 5: System-GMM Estimates on Chinese Unit Values, HS06 products, 2000-2006

Sampled Included Regressand: $\Delta\text{Log}$ of Unit Value	Whole Sample		Without Textiles		Textiles Only	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	1-Lag	2-Lag	1-Lag	2-Lag	1-Lag	2-Lag
Lag of $\Delta\text{Log}$ Unit Value	0.389*** (359.9)		0.397*** (221.6)		0.321*** (98.56)	
Lag of $\Delta\text{TTB}$	0.066*** (4.04)	0.095*** (5.15)	0.046* (1.85)	0.077*** (2.70)	-0.070 (-0.59)	0.310* (1.74)
Lag of $\Delta\text{TTB}$ imposed by USA	-0.117*** (-6.35)	-0.084*** (-4.59)	-0.117*** (-4.07)	-0.077*** (-2.71)		
Lag of $\Delta\text{TTB}$ imposed by Australia	0.960*** (22.55)	0.464*** (10.53)	0.927*** (13.91)	0.474*** (6.87)		
Lag of $\Delta\text{TTB}$ imposed by Brazil	-0.066** (-2.26)	-0.340*** (-8.17)	-0.015 (-0.33)	-0.293*** (-4.50)		
Lag of $\Delta\text{TTB}$ imposed by Canada	-0.315*** (-27.74)	-0.248*** (-19.22)	-0.231*** (-13.00)	-0.197*** (-9.77)		
Lag of $\Delta\text{TTB}$ imposed by Indonesia	0.125*** (4.83)	0.645*** (17.22)	0.145*** (3.59)	0.666*** (11.38)		
Lag of $\Delta\text{TTB}$ imposed by India	-0.313*** (-31.60)	-0.292*** (-25.35)	-0.300*** (-19.28)	-0.278*** (-15.39)	0.147** (2.10)	0.178 (1.27)
Lag of $\Delta\text{TTB}$ imposed by Korea	-0.531*** (-14.57)	-0.807*** (-17.15)	-0.531*** (-9.89)	-0.278*** (-10.80)		
Lag of $\Delta\text{TTB}$ imposed by Turkey	-0.526*** (-64.66)	-0.496*** (-45.04)	-0.570*** (-43.26)	-0.550*** (-30.24)	0.239*** (8.49)	-0.034 (-0.98)
Lag of $\Delta\text{TTB}$ imposed by the EU	-0.287*** (-19.74)	0.024 (0.91)	-0.325*** (-14.33)	0.022 (0.55)	-0.493*** (-2.85)	-0.639*** (-3.05)
Lag of $\Delta\text{TTB}$ imposed by Importers on Non-China	-0.304*** (-22.06)	-0.253*** (-16.19)	-0.273*** (-12.67)	-0.236*** (-9.59)	0.637** (2.36)	-0.213 (-1.53)
Year-specific Fixed Effects		Yes		Yes		Yes
Importer-Year Fixed Effects		Yes		Yes		Yes
Number of Observations		855,835		655,887		199,948

## Findings: The impact of TTBs on unit values

- ▶ Price increase in  $j$  with increase in marginal cost in  $j$ .  
 $\beta_{1,t-1} > 0$  and  $\beta_{1,t-2} > 0$ .
- ▶ Price reduction in  $j$  with increase in marginal cost in NOT  $j$ .  
 $\beta_{2,t-1} < 0$  and  $\beta_{2,t-2} < 0$  for most destinations NOT  $j$ .
- ▶ Price reduction in  $j$  when competitors face increase in marginal cost in  $j$ .  $\beta_{3,t-1} < 0$  and  $\beta_{3,t-2} < 0$ .

# Market-specific cost shocks and firm export behavior

## Results

Table 6: System-GMM Estimates on Chinese Quantities, HS06 products, 2000-2006

Sampled Included Regressand: $\Delta \text{Log of Quantity}$	Whole Sample		Without Textiles		Textiles Only	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	1-Lag	2-Lag	1-Lag	2-Lag	1-Lag	2-Lag
Lag of $\Delta \text{Log Quantity}$	0.452*** (206.24)		0.467*** (194.48)		0.370*** (67.87)	
Lag of $\Delta \text{TTB}$	-0.217*** (-3.14)	-0.275*** (-3.30)	-0.166** (-2.41)	-0.259*** (-3.11)	-0.083 (-0.17)	0.077 (0.10)
Lag of $\Delta \text{TTB}$ imposed by USA	0.372*** (4.82)	0.348*** (4.47)	0.350*** (4.61)	0.337*** (4.36)		
Lag of $\Delta \text{TTB}$ imposed by Australia	-0.748*** (-4.52)	0.120 (0.64)	-0.708*** (-4.31)	0.119 (0.64)		
Lag of $\Delta \text{TTB}$ imposed by Brazil	0.980*** (8.79)	0.772*** (4.81)	0.927*** (8.38)	0.720*** (4.52)		
Lag of $\Delta \text{TTB}$ imposed by Canada	-0.029 (-0.62)	0.013 (0.22)	-0.070 (-1.53)	-0.018 (-0.32)		
Lag of $\Delta \text{TTB}$ imposed by Indonesia	0.037 (0.36)	-0.183 (-1.17)	0.039 (0.38)	-0.171 (-1.11)		
Lag of $\Delta \text{TTB}$ imposed by India	0.058 (1.43)	0.039 (0.79)	0.099** (2.44)	0.045 (0.92)	-0.978*** (-3.16)	1.419** (1.99)
Lag of $\Delta \text{TTB}$ imposed by Korea	1.011*** (7.44)	0.949*** (5.37)	1.171*** (9.12)	0.944*** (5.39)		
Lag of $\Delta \text{TTB}$ imposed by Turkey	0.359*** (9.89)	0.159*** (2.93)	0.363*** (9.81)	0.180*** (3.21)	-0.069 (-0.51)	-0.164 (-0.91)
Lag of $\Delta \text{TTB}$ imposed by the EU	0.577*** (9.96)	-0.183 (-1.63)	0.589*** (10.27)	-0.178 (-1.59)	1.528** (2.10)	1.150 (1.21)
Lag of $\Delta \text{TTB}$ imposed by Importers on Non-China	0.533*** (9.15)	0.378*** (5.34)	0.494*** (8.52)	0.376*** (5.32)	1.094 (0.82)	-0.617 (-1.05)
Year-specific Fixed Effects		Yes		Yes		Yes
Importer-Year Fixed Effects		Yes		Yes		Yes
Number of Observations		508,559		425,821		82,738



## Findings: The impact of TTBs on quantities

- ▶ Quantity decreases in  $j$  with increase in marginal cost in  $j$ .  
 $\beta_{1,t-1} < 0$  and  $\beta_{1,t-2} < 0$ .
- ▶ Quantity increases in  $j$  with increase in marginal cost in NOT  $j$ .  $\beta_{2,t-1} > 0$  and  $\beta_{2,t-2} > 0$  for most destinations NOT  $j$ .
- ▶ Quantity increases in  $j$  when competitors face increase in marginal cost in  $j$ .  $\beta_{3,t-1} > 0$  and  $\beta_{3,t-2} > 0$ .

# Market-specific cost shocks and firm export behavior

## Results

Table 7: System-GMM Estimates on Sales, Unit Values and Quantities with TFP, HS06 products, 2000-2006

Regressand:	$\Delta \text{Log of Sales}$		$\Delta \text{Log of Unit Value}$		$\Delta \text{Log of Quantity}$	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	1-Lag	2-Lag	1-Lag	2-Lag	1-Lag	2-Lag
Lag of $\Delta$ Dependent Variable	0.416*** (160.91)		0.471*** (167.05)		0.548*** (137.04)	
Lag of $\Delta$ TTB	-0.296*** (-3.39)	-0.125 (-1.22)	0.027 (0.75)	0.062 (1.44)	-0.288*** (-2.86)	-0.010 (-0.08)
Lag of $\Delta$ TTB imposed by USA	0.438*** (5.29)	0.155 (1.39)	-0.154*** (-3.80)	-0.091** (-2.13)	0.595*** (5.21)	0.358*** (2.88)
Lag of $\Delta$ TTB imposed by Australia	0.260* (1.81)	0.287 (1.39)	0.226** (2.26)	0.093 (1.20)	-0.350 (-1.34)	0.261 (1.18)
Lag of $\Delta$ TTB imposed by Brazil	0.920*** (3.70)	0.273 (1.37)	-0.092 (-1.02)	-0.082 (-0.91)	0.837*** (3.53)	0.746*** (3.13)
Lag of $\Delta$ TTB imposed by Canada	-0.105 (-1.20)	0.261*** (3.24)	-0.259*** (-8.55)	-0.158*** (-5.15)	0.072 (0.80)	0.298*** (2.96)
Lag of $\Delta$ TTB imposed by Indonesia	0.441*** (2.90)	0.350* (1.74)	-0.216*** (-3.78)	0.146* (1.88)	0.500*** (3.00)	0.950*** (3.87)
Lag of $\Delta$ TTB imposed by India	0.087 (1.60)	0.024 (0.37)	-0.337*** (-13.59)	-0.208*** (-7.68)	0.290*** (3.81)	-0.013 (-0.15)
Lag of $\Delta$ TTB imposed by Korea	0.723*** (4.68)	0.262 (0.90)	-0.724*** (-8.41)	-0.908*** (-9.94)	1.267*** (5.73)	0.317 (1.33)
Lag of $\Delta$ TTB imposed by Turkey	-0.094* (-1.91)	0.123** (2.24)	-0.532*** (-30.63)	-0.465*** (-19.45)	0.217*** (4.02)	0.040 (0.47)
Lag of $\Delta$ TTB imposed by the EU	-0.001 (-0.01)	0.145 (1.53)	-0.525*** (-14.25)	0.018 (0.30)	0.661*** (6.86)	-0.240 (-1.34)
Lag of $\Delta$ TTB imposed by Importers on Non-China	0.172*** (2.59)	0.182** (2.06)	-0.214*** (-6.77)	-0.197*** (-5.24)	0.699*** (7.99)	0.390*** (3.31)
Lag of Firm TFP (Olley-Pakes)	-0.025*** (-4.56)	-0.030*** (-4.82)	0.001 (0.43)	-0.013*** (-4.84)	0.028*** (3.60)	-0.030*** (-2.93)
Year-specific Fixed Effects		Yes		Yes		Yes
Importer-Year Fixed Effects		Yes		Yes		Yes
Number of Observations		174,192		107,773		56,805

## Findings: The impact of TTBs after controlling for TFP

- ▶ Sample size decreases because TFP estimates only available for large firms.
- ▶ Effects of TTBs after controlling for TFP are quantitatively larger compared to those with no control for TFP.

## Results

Table 4: Negative Binomial Estimates of TTBs on Firm's Export Scope, all destinations, 2000-2006

Sampled Included Regressand: Firm's Export Scope	Whole Sample		Without Textiles		Textiles Only	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	1-Lag	2-Lag	1-Lag	2-Lag	1-Lag	2-Lag
Lag of $\Delta$ TTB	1.142*** (3.75)	1.091*** (2.60)	1.086** (2.23)	1.057 (1.61)	0.910 (-0.55)	0.653* (-1.75)
Lag of $\Delta$ TTB imposed by USA	0.862*** (-4.30)	0.795*** (-6.92)	0.938* (-1.75)	0.871*** (-4.06)	0.759* (-1.65)	
Lag of $\Delta$ TTB imposed by Australia	0.696*** (-5.40)	0.645*** (-6.12)	0.750*** (-4.19)	0.708*** (-4.72)		
Lag of $\Delta$ TTB imposed by Brazil	0.508*** (-8.60)	0.923 (-1.39)	0.576*** (-6.85)	0.991 (-0.14)		
Lag of $\Delta$ TTB imposed by Canada	0.890*** (-3.48)	0.990 (-0.33)	1.007 (0.22)	1.093*** (2.87)		
Lag of $\Delta$ TTB imposed by Indonesia	0.572*** (-6.85)	0.613*** (-6.29)	0.625*** (-5.63)	0.637*** (-5.66)		
Lag of $\Delta$ TTB imposed by India	0.820*** (-8.72)	0.807*** (-9.38)	0.894*** (-4.64)	0.885*** (-5.14)	0.803** (-2.29)	0.697** (-2.29)
Lag of $\Delta$ TTB imposed by Korea	0.793*** (-3.07)	0.580*** (-6.22)	0.937 (-0.67)	0.662*** (-4.57)	0.704*** (-2.65)	
Lag of $\Delta$ TTB imposed by Turkey	0.817*** (-9.82)	0.730*** (-9.63)	0.894*** (-4.99)	0.864*** (-6.74)	0.711*** (-5.39)	0.877*** (-2.59)
Lag of $\Delta$ TTB imposed by the EU	0.806*** (-10.47)	0.730*** (-11.32)	0.880*** (-6.03)	0.785*** (-8.41)	0.188*** (-6.03)	0.297*** (-7.32)
Lag of $\Delta$ TTB imposed by Importers on Non-China	0.786*** (-7.78)	0.725*** (-10.55)	0.838*** (-5.51)	0.762*** (-8.64)	0.601*** (-2.69)	0.754 (-1.22)
Year-specific Fixed Effects		Yes		Yes		Yes
Importer-Year Fixed Effects		Yes		Yes		Yes
Number of Observations		689,533		487,825		201,708

## Findings: The impact of TTBs on the product scope of exports

- ▶ Product diversification in the market imposing a TTB.
- ▶ Reduction in product scope in third country markets. Focus on core competency?
- ▶ Reduction in product scope when rivals face a TTB.

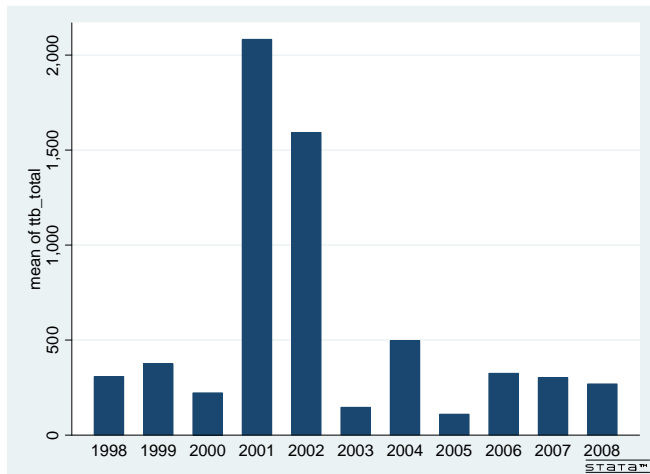
## Preliminary Findings

- ▶ Firm-level sales and quantities increase with  $\tau_{china,-jht}$
- ▶ Firm-level prices decrease in  $\tau_{china,-jht}$ 
  - ▶ suggests that firms have increasing MC or binding capacity constraints.
- ▶ Firm-level quantities increase with  $\tau_{NOTchina,jht}$
- ▶ Firm-level prices decrease with  $\tau_{NOTchina,jht}$
- ▶ The scope of products in a market rises with a direct tariff but declines with tariffs in third countries and against competitors.

## Next steps...

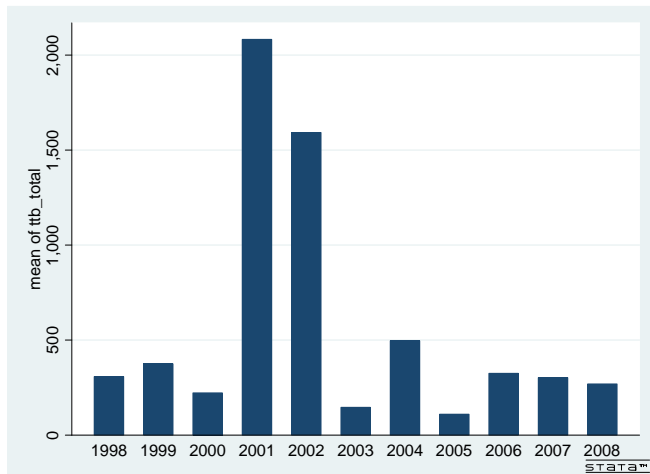
- ▶ Address endogeneity of trade policy.
- ▶ Use data on ad valorem tariff increases.
- ▶ Examine the extensive margin.

## Temporary Trade Barriers (TTBs) Imposed, 1998-2008

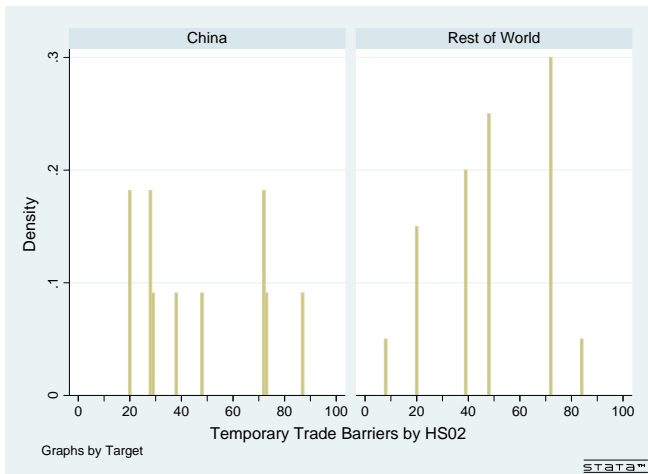




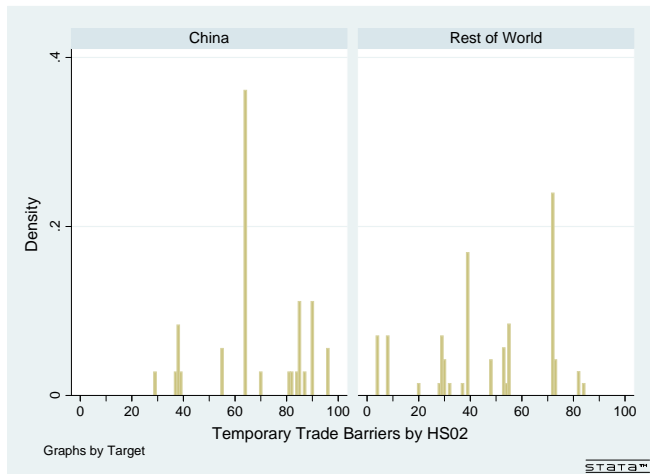
## Temporary Trade Barrier Cases Filed, 1998-2008



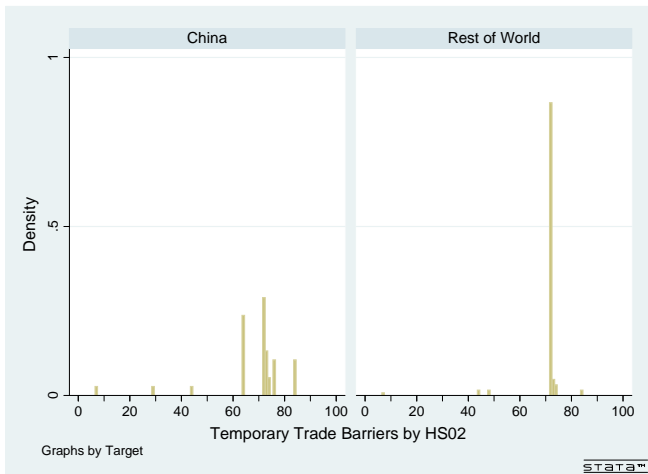
# Australia TTBs by HS02 Products, 1998-2008



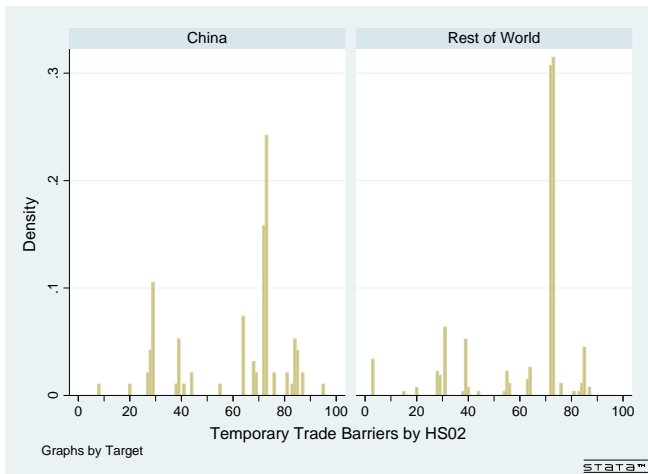
## Brazil TTBs by HS02 Products, 1998-2008



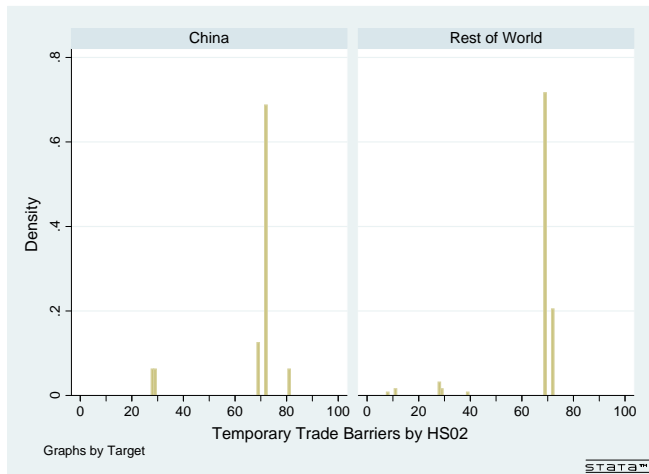
# Canada TTBs by HS02 Products, 1998-2008



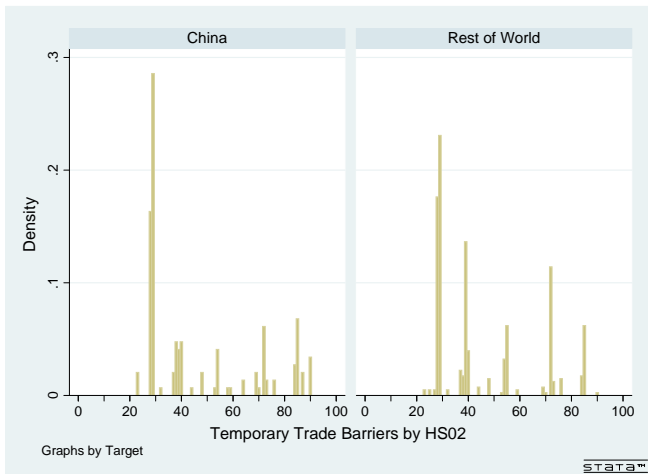
# European Union TTBs by HS02 Products, 1998-2008



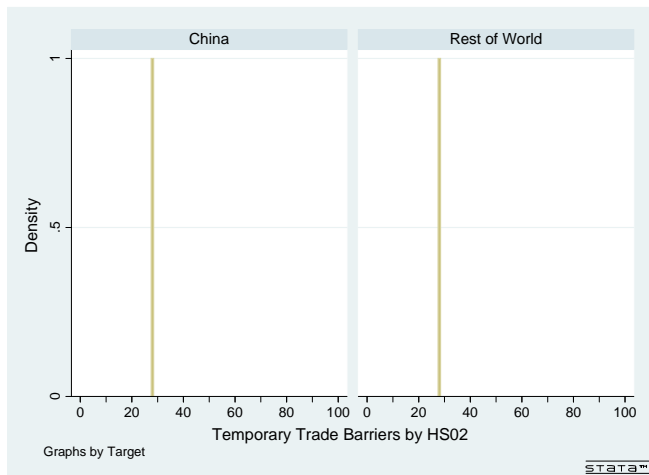
## Indonesia TTBs by HS02 Products, 1998-2008



# India TTBs by HS02 Products, 1998-2008

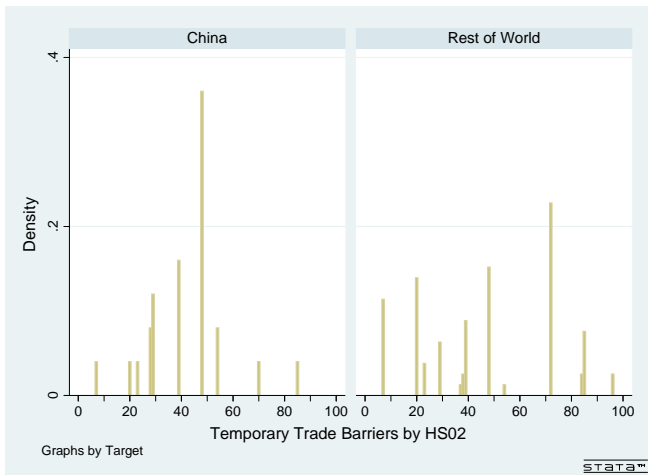


## Japan TTBs by HS02 Products, 1998-2008

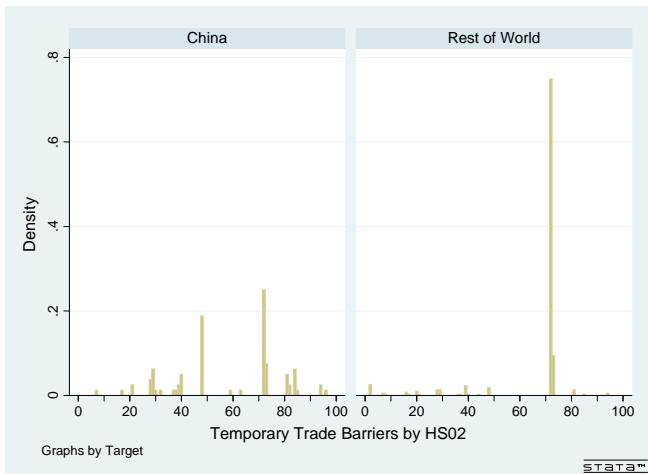




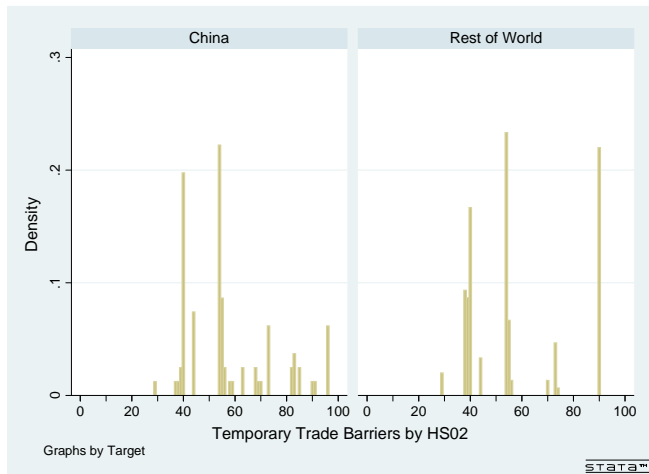
# Korea TTBs by HS02 Products, 1998-2008



# United States TTBs by HS02 Products, 1998-2008



# Turkey TTBs by HS02 Products, 1998-2008



## Antidumping Duties imposed by Brazil, EU, Korea, Turkey & USA, 1998-2008

