

Taking Stock of Trade Policy Uncertainty: Evidence from China's Pre-WTO Accession

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Two Main Questions about Trade & Trade Policy

1. How do agents respond in anticipation of **future, uncertain** changes in tariffs?
2. How do we measure the **future, uncertain** path of tariffs?
 - ▶ When?
 - ▶ How much?
 - ▶ How likely?

Explore these inter-related questions with US renewal of China's MFN Status

Innovation: use **within-year** variation in future tariff risk from political process.

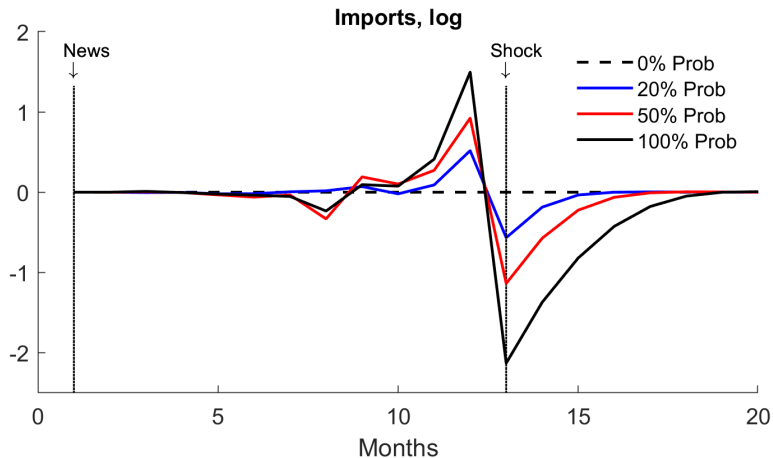
Preview

1. Show imports rise with TPU in **monthly** trade flows (anticipatory stockpiling).
 - ▶ Creates a particular **seasonal**
2. Estimate annual non-renewal probability (≈ 5 percent).
3. Quantify role of expected tariffs vs uncertainty in sS inventory model.
4. Show losses from stockpiling contribute to **negative annual** TPU effects.

Main idea: Anticipated Risk of a 10% Tariff Hike

- ▶ sS inventory model with many firms importing & reselling a foreign input.
- ▶ Assume tariffs expected to rise by 10 percent in 12 months with probability, π
 - ▶ But, tariff Δ not realized.
- ▶ Firms will shift timing of imports to avoid importing when tariffs are high.
- ▶ Strength of shifting rises in tariffs.
- ▶ Only affects imports in narrow window around possible tariff Δ .

Main idea: Anticipated Effect of Risky 10% Tariff Hike



- ▶ **Trade Policy Uncertainty**

Ruhl (2011), Pierce & Schott (2016), Handley & Limao (2017), Crowley et al. (2018), Feng et al. (2017), Steinberg (2019)

- ▶ *New mechanism: Incumbents ordering decisions.*

- ▶ **Anticipation to Policy Changes**

Coglianesse et al. (2017), Agarwal et al. (2017), Baker et al. (2018), Fajgelbaum et al. (2019), Khan & Khederlarian (2019)

- ▶ *Evidence of stockpiling in anticipation of TPU*

- ▶ **Inventories & Trade**

Alessandria et al. (2010, 2011), Kropf & Saure (2013), Bekes et al. (2017), Blum et al. (2017), Nadais (2017).

- ▶ *First moment drives majority of the uncertainty effect*

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Outline

Empirical Evidence

Model

Model Implied Probability of MFN Status Reversal

Uncertainty vs Expected Tariff Change

Background US Tariff Treatment of China

- ▶ Non Normal Trade Relation (NNTR) rates to communist countries (71-79)
- ▶ 1980 onward: MFN status conditional on annual renewal by President.
 - ▶ For China, temporary MFN status expired annually every 3rd of July.
- ▶ 1990 onward: Congress considers disapproving renewal within 60 days
- ▶ 1990-2000: Congress votes between July and September. Votes
 - ▶ Ex-post, MFN status was always renewed.
- ▶ 10/2000: Congress grants Permanent NTR upon joining WTO.
- ▶ 12/2001: China enters the WTO.

TPU before WTO Accession

Features of China MFN renewal helpful to fix 2/3 questions:

- ▶ **When?** Every year after Presidential renewal and Congress vote.
- ▶ **How much?** NNTR Rate - MFN Rate.
 - ▶ NNTR rates set in 1930, time-invariant
- ▶ **How likely?** Use anticipatory dynamics to study likelihood.

Empirical Approach

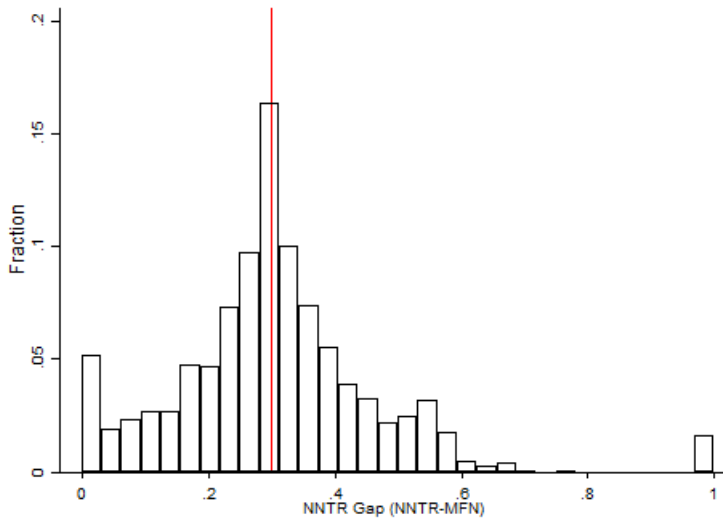
- ▶ Consider trade dynamics around MFN renewal decisions
- ▶ Exploit differences in tariff risk across products/industries.
- ▶ Use standard differences approach to estimate monthly response to tariff risk.

Empirical Approach

- ▶ Within-year trade growth rates $\ln \left(v_{m-2:m}^{i,j,z,t} / v_{m-7:m-5}^{i,j,z,t} \right)$
 - ▶ $v_{m-2:m}^{i,j,z,t}$ monthly averages of imports (CIF consumption value) from i to j of good z.
 - ▶ Cancels out year FE.
- ▶ Tariff risk, $X_{z,t} \equiv \ln \left((1 + \tau_z^{NNTR}) / (1 + \tau_{z,t}^{MFN}) \right)$.
- ▶ Sample period: 1991-2000, 2003-07.
- ▶ Product z at HS 6-digit level
- ▶ Balanced panel of 1,812 products Statistics

Make for 95% of US-China in 1990, 86% in 2000, 80% in 2007

Cross-sectional Distribution



Over Time

Interaction HH

Identification Challenges

1. Lumpiness

- ▶ Aggregate across time and products.

2. Sector specific seasonalities.

- ▶ Sector (HS-2) -Month FE.

3. Country specific seasonalities.

- ▶ China: Exports to EU-15, US.

- ▶ US: Imports from RoW, China.

RoW is EU-15, Japan, South Korea, Norway and Switzerland.

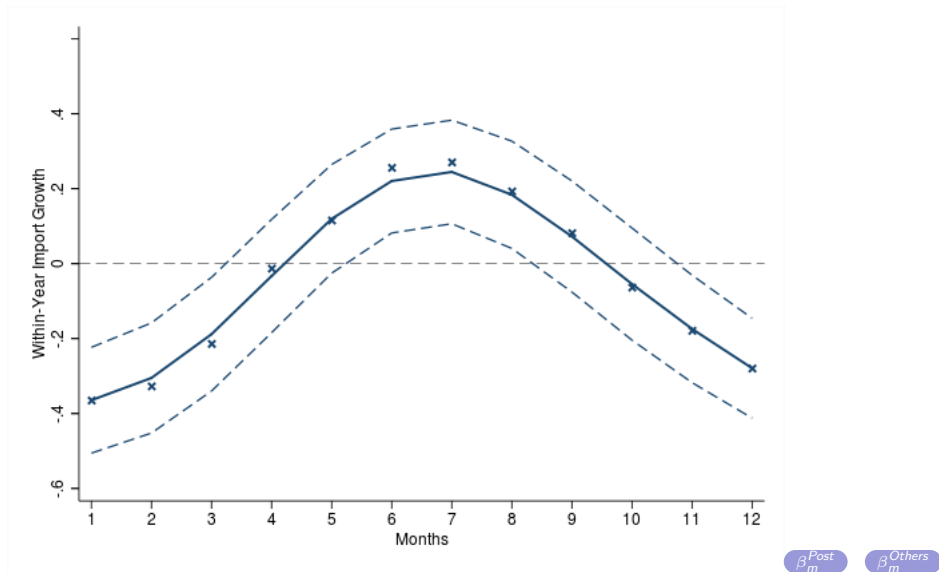
- ▶ All controls trade flows with access to unconditional MFN rates.

Estimation Equation

$$\begin{aligned}\ln(v_{m-2:m}^{i,j,z,t}/v_{m-7:m-5}^{i,j,z,t}) = & \sum_{m'} \beta_{m'}^{TPU} \mathbb{1}_{\{t < 2001\}} \mathbb{1}_{\{i=US, j=China\}} \mathbb{1}_{\{m=m'\}} X_{z,t} \\ & + \sum_{m'} \beta_{m'}^{Post} \mathbb{1}_{\{i=US, j=China\}} \mathbb{1}_{\{m=m'\}} X_{z,t} \\ & + \sum_{m'} \beta_{m'}^{Others} \mathbb{1}_{\{m=m'\}} X_{z,t} \\ & + \gamma_{i,t,m} + \gamma_{j,t,m} + \mathbb{1}_{\{t < 2001\}} \gamma_{s,m} + \varepsilon_{i,j,z,t,m}\end{aligned}$$

- Anticipation: $\beta_m^{TPU} > 0$ for months before uncertainty resolution

Baseline Result



Magnitude: Certain vs Uncertain Changes

- ▶ For median uncertain tariff increase, 31% relative to monthly average
 - ▶ Before uncertainty resolution, imports rise 8% (anticipatory elasticity = 0.27)
 - ▶ After resolution imports fall 11% (resolution elasticity = -0.36)
- ▶ For median certain NAFTA tariff cut of 3% (Khan & Khederlarian 19)
 - ▶ Before resolution, imports fall 18% (anticipatory elasticity = 6)
 - ▶ After resolution imports rise 22.5% (resolution elasticity = - 7.5)
- ▶ Back of the envelope: $\pi \approx 0.27/6 \approx 4.5\%$

Robustness

- ▶ Product Storability.
- ▶ Aggregation level of product/sector seasonality.
- ▶ Growth windows: base window, size of window.
- ▶ Prices vs Quantities.
- ▶ Alternative dependent variables.
- ▶ Sample Periods and Control Groups.

Anticipation & Storability

- ▶ Anticipatory effects will be larger for goods that are more storable.
Of course, all traded goods are storable to some extent.
- ▶ Lumpiness of US imports from RoW countries over 1991-2000 at HS-10 level.

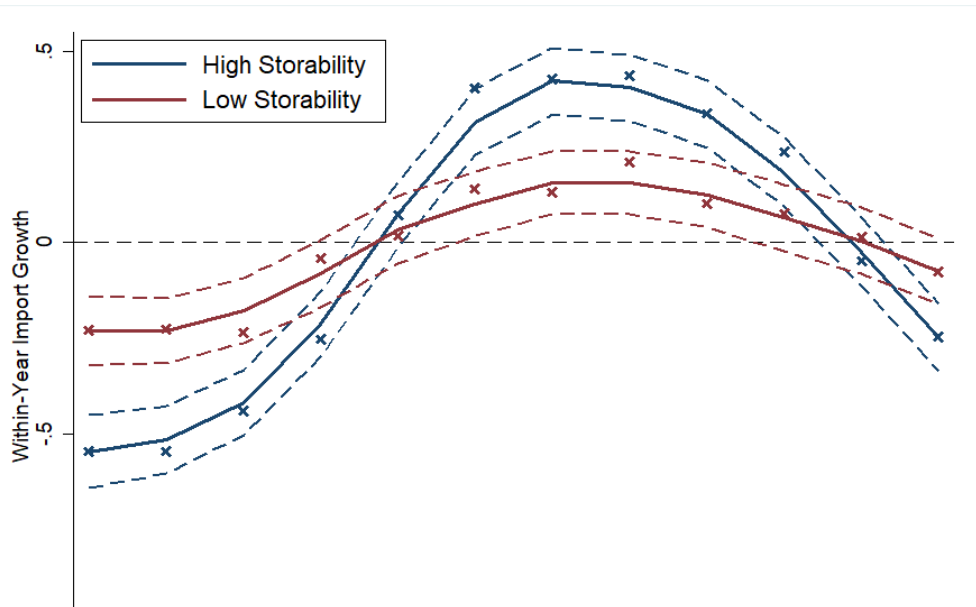
$$HH_{hs10,i,t} = \sum_{m=1}^{12} (v_{i,hs10,t,m} / \sum v_{i,hs10,t,m})^2 \in [1/12, 1]$$

- ▶ Wash out country-year fixed effects of HH_{hs10} and take average at HS-6 level.
- ▶ Consider $1/HH_z$ - the effective number of months w/ shipments.
- ▶ Lower $1/HH_z \implies$ more storability. Distribution

Specification with Storability

$$\begin{aligned}\ln(v_{m-2:m}^{i,j,z,t}/v_{m-7:m-5}^{i,j,z,t}) &= \sum_{m'} \beta_{m'}^{TPU} \mathbb{1}_{\{t < 2001\}} \mathbb{1}_{\{i=US, j=China\}} \mathbb{1}_{\{m=m'\}} X_{z,t} \\ &+ \sum_{m'} \beta_{m'}^{HH} \mathbb{1}_{\{t < 2001\}} \mathbb{1}_{\{i=US, j=China\}} \mathbb{1}_{\{m=m'\}} X_{z,t} \times (1/HH_z) \\ &+ \sum_{m'} \beta_{m'}^{Others} \mathbb{1}_{\{m=m'\}} X_{z,t} \\ &+ \sum_{m'} \beta_{m'}^{Others} \mathbb{1}_{\{m=m'\}} X_{z,t} \times (1/HH_z) \\ &+ \gamma_{i,t,m} + \gamma_{j,t,m} + \mathbb{1}_{\{t < 2001\}} \gamma_{s,m} + \varepsilon_{i,j,z,t,m}\end{aligned}$$

Anticipation & Storability



Model

- ▶ Consider (s,S) inventory model (Alessandria, Kaboski & Midrigan, 2010)
- ▶ Continuum of monopolist importers differentiating/reselling foreign intermediate with stock (s)
 - ▶ Also can interpret as exporters decision.
- ▶ Fixed import cost (f) , demand uncertainty (σ_ν) & one-month delivery lag
- ▶ Holding costs: Interest (β) and depreciation (δ)
- ▶ Per unit price $\tau > 1$ possibly stochastic.
- ▶ Demand faced by the importer is

$$q_j = e^{\nu_j} p_j^{-\sigma}, \text{ where } \nu_j \sim N(0, \sigma_\nu)$$

Model: Trade Policy Shocks

- ▶ Importer decides between Importing or not importing

$$V_t(s, \nu, \tau) = \max[V_t^a(s, \nu, \tau), V_t^n(s, \nu; \tau)]$$

$$V_t^a(s, \nu, \tau) = \max_{p, i > 0} q(p, s, \nu)p - \tau i - f + \beta EV_{t'}(s', \nu', \tau')$$

$$V_t^n(s, \nu, \tau) = \max_{p > 0} q(p, s, \nu)p + \beta EV_{t'}(s', \nu', \tau')$$

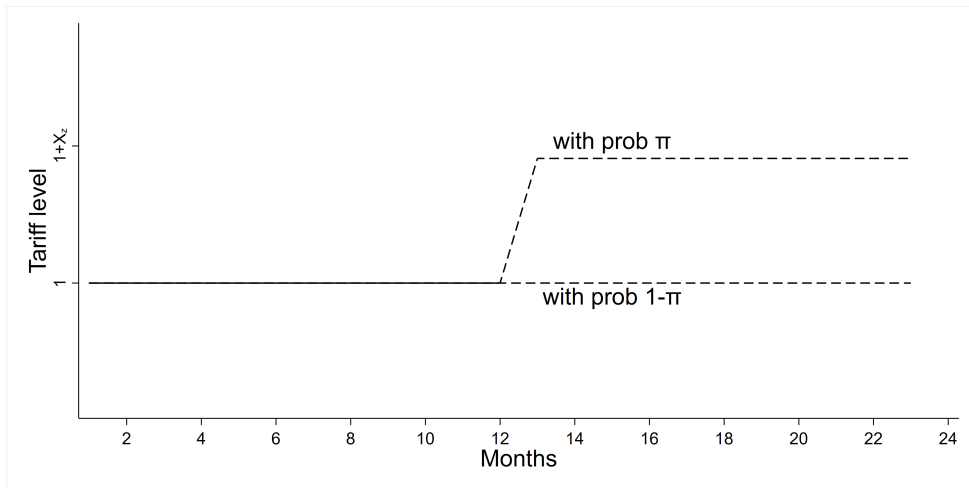
- ▶ Where $\tau \in \{1, 1 + X_z\}$
- ▶ Let Π^τ be the transition matrix for τ

Model: Trade Policy Uncertainty Shock

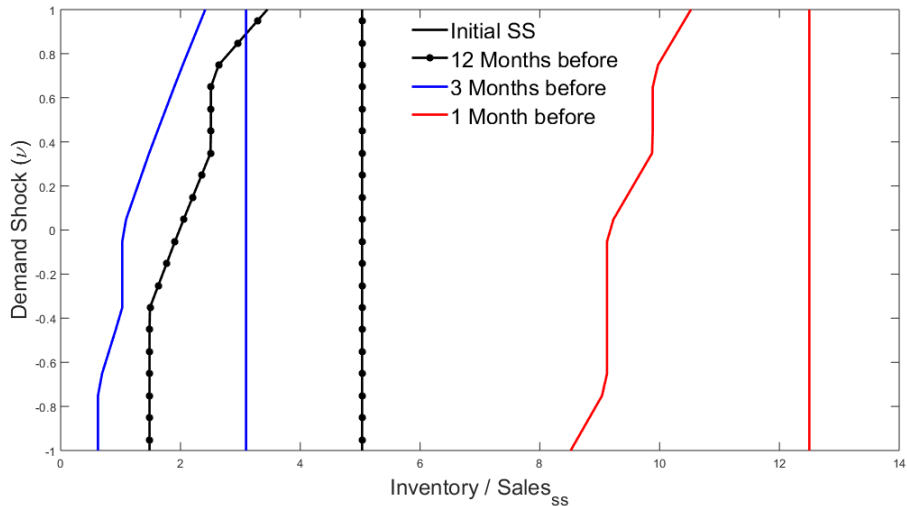
- ▶ All firms start with $\tau = 1$
- ▶ Make transition matrix time specific, Π_t^τ
- ▶ Firms anticipate a change in τ in period $m_{res} + 1$ when the uncertainty resolves

$$\Pi_t^\tau = \begin{cases} I_{|T|} & \text{if } t \neq m_{res} \\ \tilde{\Pi}^\tau & \text{if } t = m_{res} \end{cases}, \quad \tilde{\Pi}^\tau = \begin{bmatrix} (1 - \pi) & \pi \\ 0 & 1 \end{bmatrix}$$

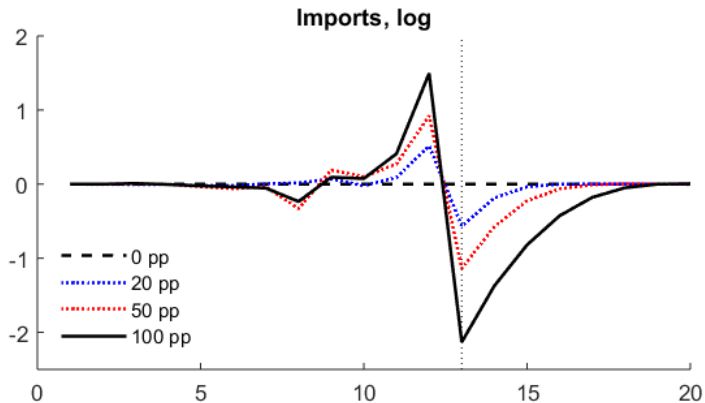
Model: Trade Policy Uncertainty Shock



Decisions Rule - Ordering Cutoffs

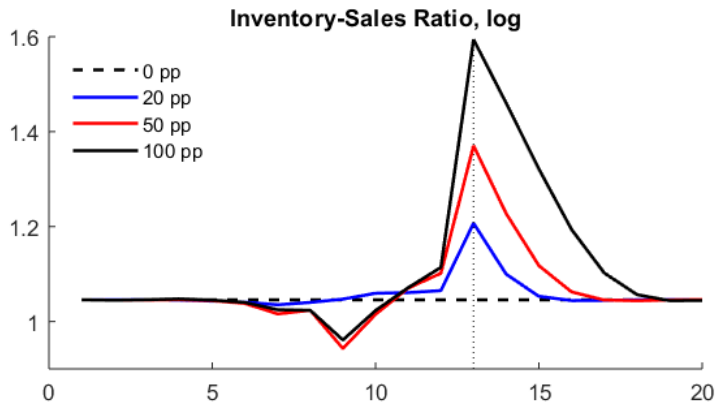


Path of Imports by NTR gap - 10% probability



Note: Imports depend on state (inventory distribution) & ordering rules.

Path of Inventories by NTR gap - 10% probability



[Back](#)

Estimating Likelihood of MFN Reversal

- ▶ Estimate average and time-varying probability of non-renewal, π_t
- ▶ Need to match product-level variation in tariff gaps and trade flows
- ▶ But, the seasonal is related to industry structure, tariff gap and industry characteristics (storability)

Estimating Likelihood of MFN Reversal

1. Simulate tariff hikes for h industries with probability π .
 - ▶ Classify 1,812 HS-6 products into 453 bins (h) of 4 products by NNTR gap.
 - ▶ Each industry defined by (X_h, δ_h) .
 - ▶ Calibrate δ_h to match average $1/HH_z$ of bin h . Plot

2. Estimate:

$$\ln(v_{m-2:m}^h / v_{m-5:m-7}^h) = \sum_{m'} \beta_{m'}^{sim} \mathbb{1}_{\{m=m'\}} X_h + \epsilon_{h,m}$$

3. Iterate over π until peak-to trough $\Delta\beta = 0.63$

⇒ Average model-implied expected likelihood of reversal: $\hat{\pi} = 4.5\%$

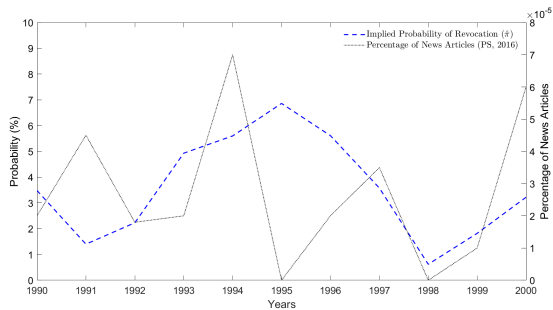
Estimating Likelihood of MFN Reversal: Annual Probabilities

- ▶ Redo previous exercise year-by-year to construct annual probability

⇒ Between 1990-2001: $\hat{\pi} \in [2\%, 10.2\%]$

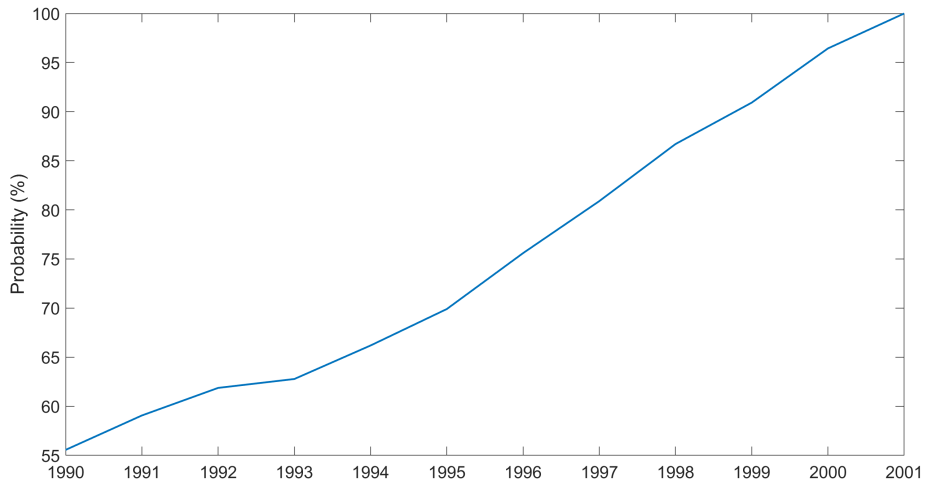
- ▶ Compare annual probability to news-based measures of non-renewal

Annual Probabilities of Revoked Access to MFN Rates



Table

Probability of Continued MFN Access until 2001



Role of Uncertainty vs. First Moment Shock

Reconsider uncertainty vs. expected tariff Δ : separate 1st & 2nd moment in model.

1. Generate h simulations facing tariff hike of $\hat{\pi} X_h$ with probability $\pi = 1$.

2. Estimate:

$$\ln(v_{m-2:m}^h / v_{m-5:-7}^h) = \sum_{m'} \mathbb{1}_{\{m=m'\}} \beta_{m'}^{sim} X_h + \varepsilon_{h,m}$$

$\Rightarrow$ Anticipatory response under certainty: $\max_m \{\hat{\beta}_m^{sim}\} - \min_m \{\hat{\beta}_m^{sim}\} = 0.82$

- Uncertainty dampens anticipation - “wait and see”.
- Expected trade costs explains around 3/4 of trade response (0.63/0.82).

First vs Second Moments: Model II

- ▶ Expected tariff hike depends on probability & tariff hike.
- ▶ To capture uncertainty effect compare same expected tariffs from various combinations of (π, τ)
- ▶ Uncertainty dampens anticipation only when expected tariff increase is quite large.
- ▶ For observed maximum expected tariff increase effects of uncertainty are modest

Interaction of Level w/ Spread

 Figures/Model/simul_scatter.png

Accounting for First and Second Moments: Model

Table: Decomposing Level Effect from Pure Uncertainty

$\tilde{v}_{m_{res}-2:m_{res}}^n / \tilde{v}_{m_{res}-7:m_{res}-5}^n$	Standardized (1)	Standardized (2)	Level (3)	Level (4)	Level (5)
Standardized $\mathbb{E}(\tilde{\pi}_n \tilde{X}_n)$	0.94***	1.1***			
Standardized $Var(X_n)$		-0.32***			
$\mathbb{E}(\tilde{\pi}_n \tilde{X}_n)$			8.85***	17.1***	17.1***
$[\mathbb{E}(\tilde{\pi}_n \tilde{X}_n)]^2$				-39.29***	-32.73***
$Var(X_n)$					-6.06***
Observations	80	80	80	80	80
R^2	0.89	0.96	0.89	0.93	1

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Costly Stockpiling - Annual data

- ▶ Reconsider source of trade dampening effects of TPU (Handley & Limao, 14)
- ▶ Annual stockpiling Transition $\implies$ higher holding costs $\implies$ lower annual trade
- ▶ Decompose the effect coming through lumpiness of trade
- ▶ 30% of trade-dampening effect explained by higher holding costs

Specification for Annual Imports

- ▶ Annual trade flows affected by stockpiling and destocking
- ▶ Effect on annual flows using diff-in-diff approach
- ▶ Novelty: additional information from reference importer

$$\ln(V_{i,j,z,t}) = \sum_{y=1990}^{2006} \beta_y \mathbb{1}_{\{y=t\}} \mathbb{1}_{\{i=US\}} \mathbb{1}_{\{j=Chn\}} X_{z,t} + \alpha \tau_{i,s,t}^{MFN} \\ + \gamma_{j,s,t} + \gamma_{i,z,t} + \gamma_{i,j,t} + \gamma_{i,j,z} + \varepsilon_{i,j,z,t}$$

Year-Specific Effect



Revisiting Trade Dampening Effects

- ▶ Reconsider source of trade dampening effects of TPU.
Pierce & Schott (2016), Handley & Limao (2017), Crowley et al. (2018))
- ▶ Tariff risk reduces **future profits** lower market entry.
- ▶ Novelty: Stockpiling $\implies$ higher **current** holding costs $\implies$ $\downarrow$ profits
Inventories Transition.
- ▶ Quantify the impact of stockpiling on the value of entry.

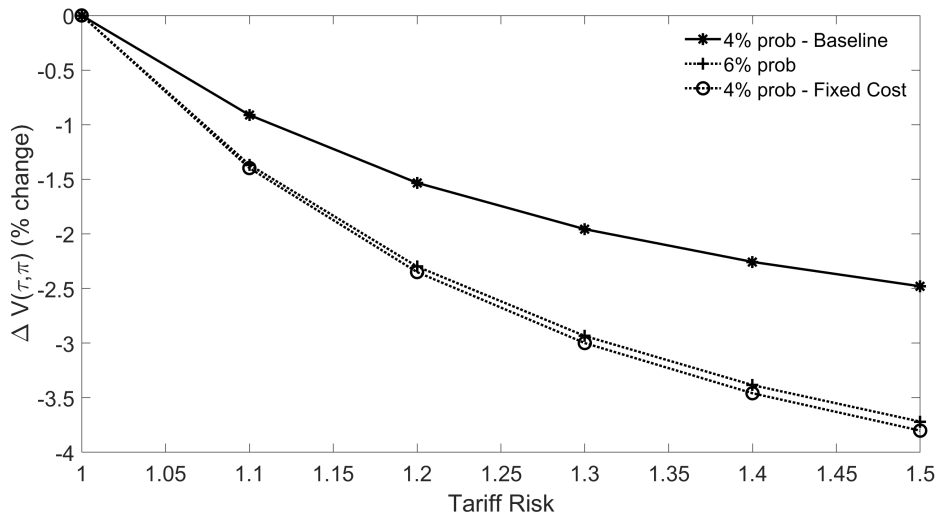
Role of Uncertainty on firm value

- ▶ Assume that there is just one year of risk (π, τ) and let $V_{-m}(0, \pi, \tau)$ denote the value of entering m months before the risk is resolved.
- ▶ Calculate loss in firm value for uncertainty as

$$\Delta V_m = \frac{V_{-m}(0; \pi, \tau) - V_{-m}(0; 0, 0)}{(1 - \beta_{annual}) V(0)}$$

- ▶ Focus on $m = 12$ to get lower bound of losses from a year of risk.

Elasticity of Entry Value to Risk



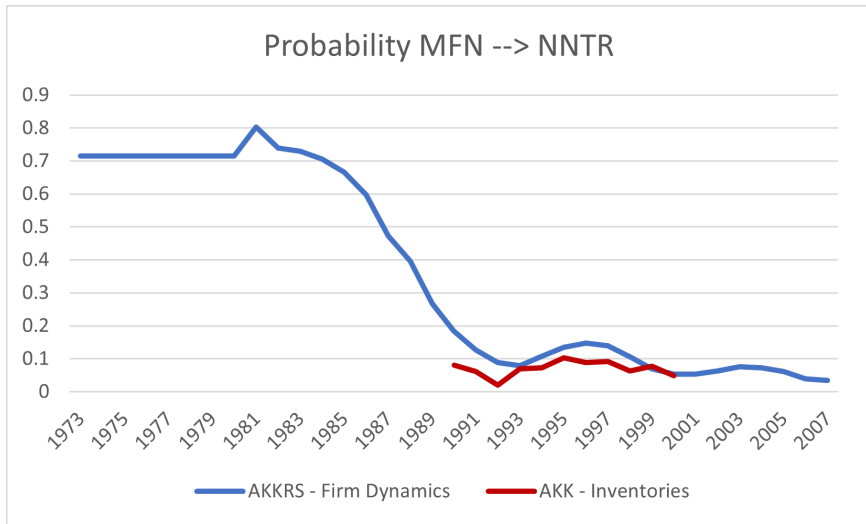
Conclusion

- ▶ New approach to quantifying TPU leveraging **near-term** TPU using **monthly** data.
 - ▶ Bundling with other decisions to get full path of expected tariffs.
- ▶ Robust evidence of anticipation to TPU for this episode.
- ▶ Model implies low and decreasing probability of revoking MFN status.
- ▶ Expected tariff more important than uncertainty in ordering decisions.
- ▶ Important for the recent world - aggregate effects?

Measure China Trade Policy Risk from 1975 to 2008

- ▶ With Khan, Khederlarian, Ruhl & Steinberg study dynamics of US imports from China after embargo (71+)
- ▶ Similarly, use industry variation in tariff risk & trade with a frontier **dynamic export investment model** to estimate a **two stage Markov-process for tariffs** with time varying probability of non-renewal π_t .
 - ▶ Long horizon has $\Delta\tau_{it}$ in 1972 & 1980; sorts out effects of lagged vs future policy.
- ▶ Find weak trade growth from 1980 - 85 consistent with high probability of nonrenewal 70 percent that fell sharply in mid 80s with GATT application.
 - ▶ Level and timing of non-renewal risk in 90s consistent with findings in this paper.

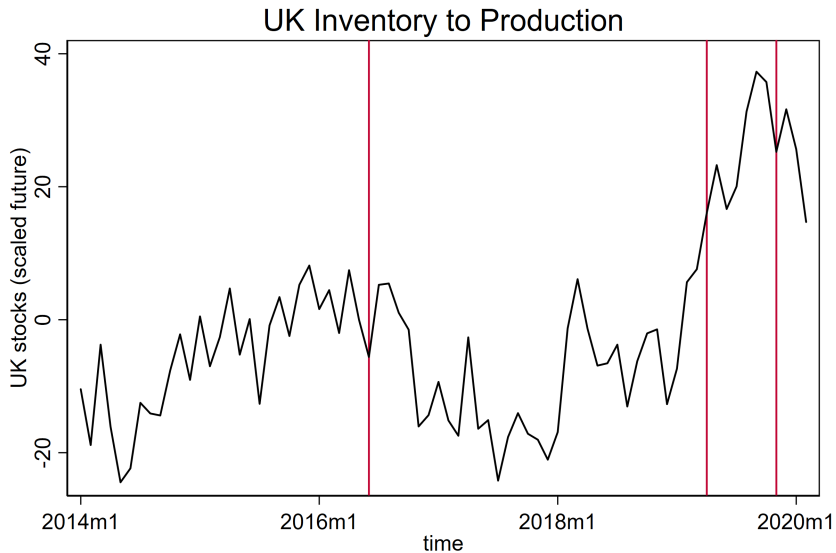
Alternative Measures of Renewal Probability



Mechanism at work: US and UK

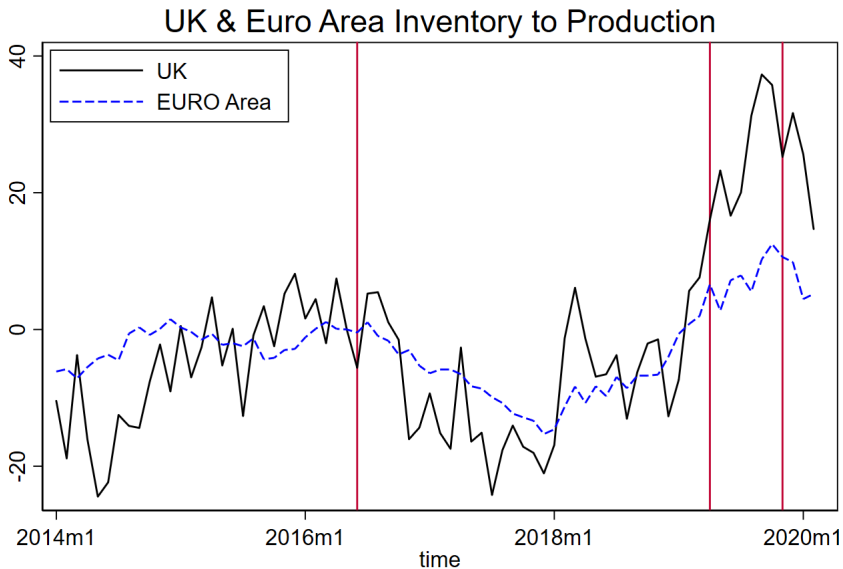
- ▶ Trade policy uncertain since Brexit & US election
- ▶ Tariffs have been rising in US and China but with more on the horizon
- ▶ Observed rising stocks and robust economic growth

Mechanism at work: Brexit

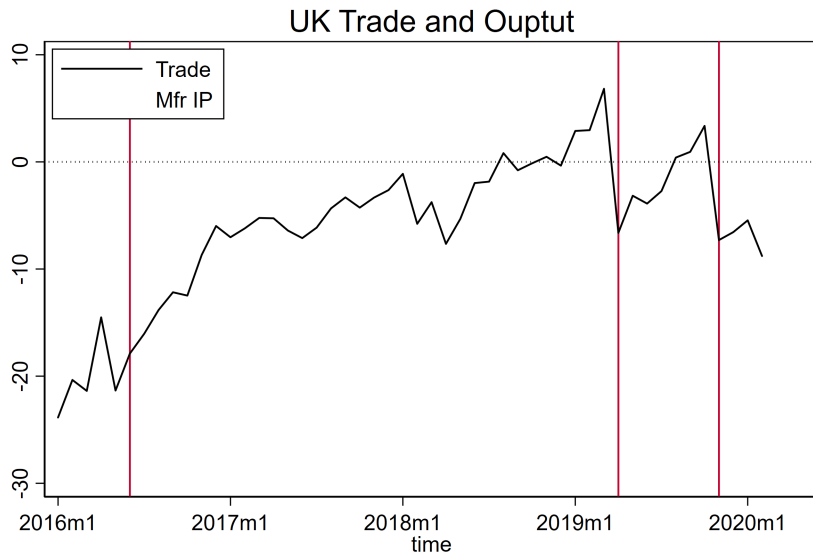


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Mechanism at work: UK & Euro Area

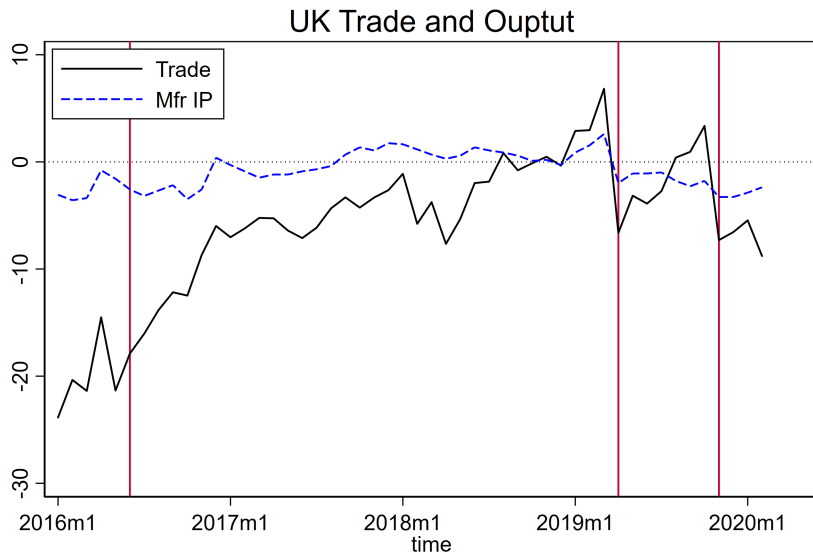


Mechanism at work: UK



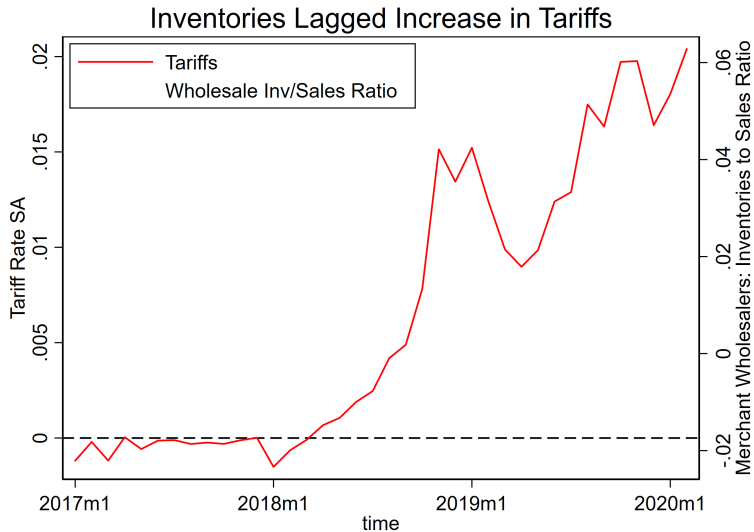
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Mechanism at work:UK

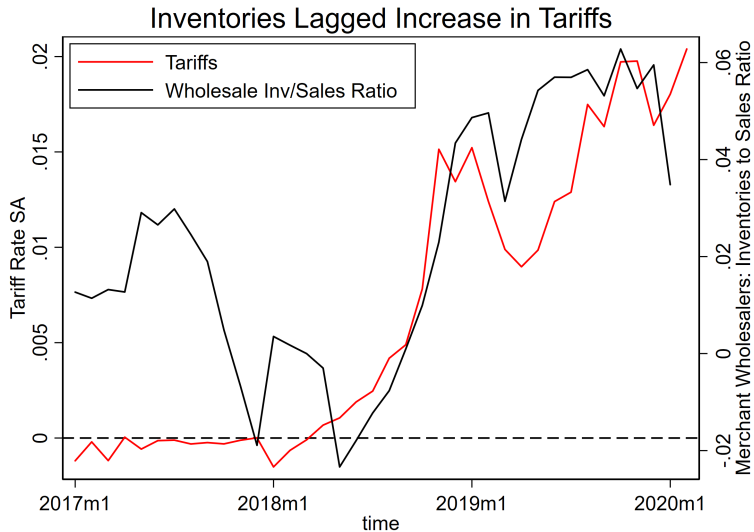


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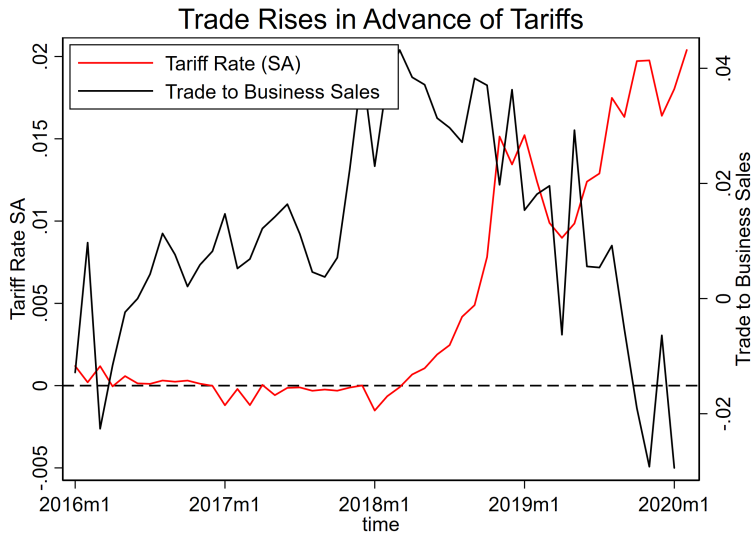
Mechanism at work: US



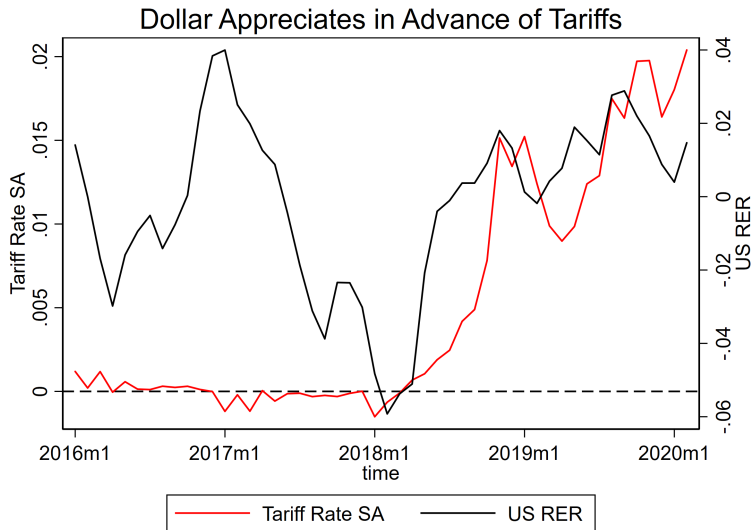
Mechanism at work: US



Mechanism at work: US



Mechanism at work: US



Mechanism at work: Covid-19

- ▶ An uncertain future demand shock will generate similar stockpiling.

$$q_t = p_t^{-\sigma} e^{\nu_t}$$

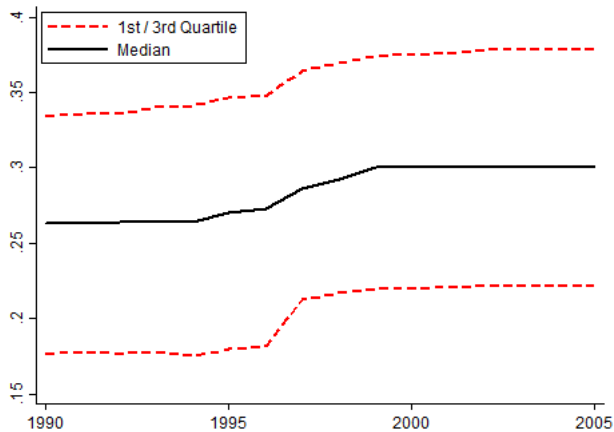
$$\nu_t = \rho \nu_{t-1} + \alpha_0 \varepsilon_t + \alpha_1 \varepsilon_{t-1}$$

- ▶ Use storability of goods used for infectious diseases (Ventilators, PPE, etc) to estimate country-specific expectations of Covid-spread $(\rho, \alpha_0, \alpha_1)$
- ▶ Find larger rise in imports for more storable goods.
- ▶ Rise in China was not unusual given reported deaths compared to other countries.

Mechanism at Work: Covid-19

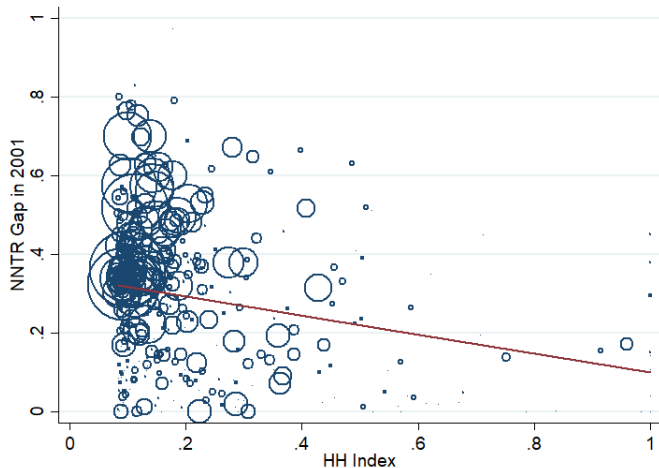
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Year	Disapproval Res.	Final Status	Alternate bills	Final Status	
1989	None	—	None	—	
1990	H.J.Res. 647	Passed House 10/18 (247-174)	H.R. 4939	Passed House 10/28 (384-30)	
1991	H.J.Res. 263	Passed House 7/10 (223-204) Senate Postponed 7/18, Unanimous Consent	H.R. 2212	Passed House 7/10 (313-112)	Conference Report H.Rept. 102-392 passed House 11/27 (409-21)
	S.J.Res. 153	Senate Postponed 7/18, Unanimous Consent	S. 1367	Passed H.R. 2212 in lieu 7/18 (55-44)	
1992	H.J.Res. 502	Passed House 7/21 (258-135)	H.R. 2212	Conference Report H.Rept. 102-392 passed Senate 2/25 (59-39) Vetoed by President 3/2 House override vote 3/11 (357-61) Senate override vote 3/18 (60-38) - veto sustained	
			H.R. 5318	Passed House 7/21 (339-62) Senate amended with text of S. 2808, passed by voice vote, 9/14 House passed Senate version 9/22, voice vote	H.R. 5318 vetoed by President, 9/28 House override vote 9/30 (345-74) Senate override vote 10/1 (59-40) - veto sustained
			S. 2808		
1993	H.J.Res. 208	House rejected 6/8 (105-318)	H.R. 1835 S. 806	No action	
1994	H.J.Res. 373	House rejected 8/9 (75-356)	H.R. 4590	Amended to impose no conditions, then passed House 6/8 (280-152)	
1995	H.J.Res. 96	House tabled 7/20 (321-107)	H.R. 2058	Passed House 7/20 (416-10)	
	S.J.Res. 37	—			
1996	H.J.Res. 182	House rejected 6/27 (141-286)	H.Res. 461	Passed House 6/27 (411-7)	
	S.J.Res. 56	—			
1997	H.J.Res. 79	House rejected 6/24 (173-259)	—	— *(S.Amdt. 890 expressed the sense of the Senate that China's MFN status should be revoked. It was offered as non-binding language to S. 955, the FY1998 Foreign Operations Appropriations bill.)	
	S.J.Res. 31 S.Amdt. 890*	— Senate rejected 7/16 (22-77)			
1998	H.J.Res. 121	House rejected 7/22 (166-264)	—	—	
1999	H.J.Res. 57	House rejected 7/27 (170-260)	—	—	
	S.J.Res. 27	Senate rejected motion to discharge committee 7/20 (12-87)	—	—	
2000	H.J.Res. 103	House rejected 7/18 (147-281)	H.R. 4444	House passed 5/24 (237-197)	Signed by President on October 10, 2000, as P.L. 106-286, giving China Permanent NTR upon accession to WTO
	—	—	S. 2277	Senate passed H.R. 4444 on 9/19 (85-13)	



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Note: Spread percentiles are calculated each year over NAICS Industries. Gaps are means over HS-8 Product lines from Pierce & Schott (2016).



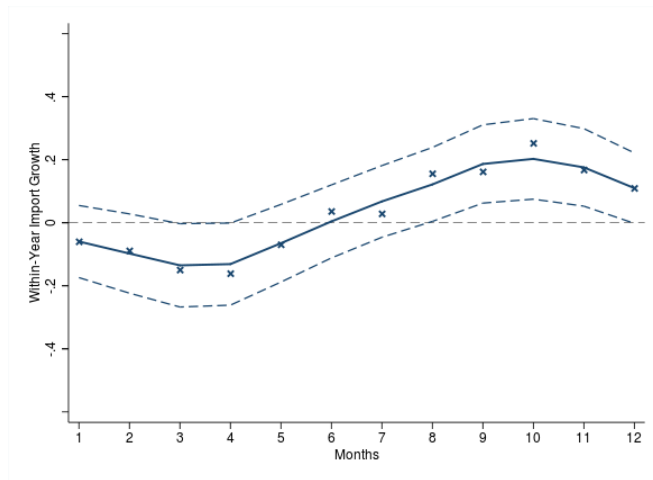
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Note: NNTR Gaps are means over HS-8 Product lines from Pierce & Schott (2016). The HH indexes are calculated as the mean HH index of the US imports from China in the second year a product line appears in the sample.

		US Imports China, Balanced Sample						NNTR Gap		Share Balanced Sample			
		HS6 Products		Import Share		Industry Share		Simple Mean	Weighted	US Imports China		US Imports ROW	
		1991	2001	1991	2001	1991	2001			1991	2001	1991	2001
1	ANIMAL PRODUCTS	39	39	47%	64%	2%	1%	4%	3%	100%	99%	33%	22%
2	VEGETABLE PRODUCTS	73	74	23%	34%	1%	0%	9%	7%	93%	93%	41%	37%
3	ANIMAL OR VEGETABLE FATS	3	3	9%	15%	0%	0%	5%	2%	93%	62%	4%	3%
4	PREPARED FOODSTUFFS, BEVERAGES & TOBACCO	51	51	4%	9%	1%	1%	16%	21%	98%	94%	63%	58%
5	MINERAL PRODUCTS	19	19	16%	5%	4%	1%	11%	2%	97%	66%	89%	78%
6	CHEMICAL PRODUCTS	186	191	5%	5%	2%	2%	27%	23%	93%	75%	48%	65%
7	PLASTICS & RUBBER	66	66	10%	36%	3%	4%	32%	41%	99%	98%	68%	64%
8	RAW HIDES AND SKINS, LEATHER, FURSKINS	26	27	36%	76%	7%	5%	28%	28%	100%	100%	88%	78%
9	WOOD	22	22	36%	77%	1%	1%	26%	30%	100%	96%	39%	20%
10	PULP OF WOOD, PAPER OR PAPERBOARD	45	46	6%	34%	0%	1%	22%	24%	100%	98%	54%	45%
11	TEXTILES AND TEXTILE ARTICLES	309	311	37%	51%	23%	9%	39%	40%	99%	98%	70%	68%
12	FOOTWEAR, HEADGEAR, UMBRELLAS, ETC.	52	52	39%	82%	17%	13%	29%	21%	100%	100%	98%	98%
13	ARTICLES OF STONE, PLASTER, CEMENT, ETC.	59	63	8%	38%	1%	2%	33%	36%	100%	96%	80%	71%
14	NATURAL OR CULTURED PEARLS	24	25	4%	15%	1%	1%	30%	40%	98%	99%	73%	65%
15	BASE METALS & ARTICLES OF BASE METAL	194	200	9%	32%	3%	5%	28%	27%	94%	85%	38%	43%
16	MACHINERY & MECHANICAL APPLIANCES	337	347	5%	22%	13%	25%	28%	30%	71%	67%	55%	57%
17	VEHICLES, AIRCRAFT, VESSELS	35	36	2%	11%	1%	2%	22%	20%	100%	95%	16%	14%
18	OPTICAL, PHOTOGRAPHIC, CINEMATOGRAPHIC, MEDICAL, ETC.	122	126	4%	18%	2%	3%	35%	33%	100%	93%	71%	64%
19	ARMS AND AMMUNITION	6	5	4%	10%	0%	0%	36%	35%	12%	91%	17%	18%
20	MISCELLANEOUS MANUFACTURED ARTICLES	110	110	29%	68%	18%	24%	37%	47%	100%	99%	96%	95%
21	WORKS OF ART	11	11	1%	3%	0%	1%	0%	0%	100%	98%	98%	99%

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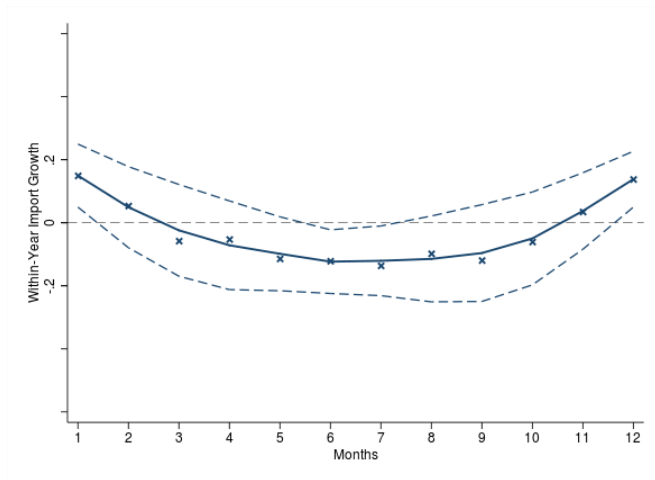
Baseline Result - β_m^{Post}



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Note: Crosses are the estimates of $\hat{\beta}_m^{Post}$ for $m = \{1, \dots, 12\}$ from the baseline estimating equation. The blue line is the applied locally weighted scatterplot smoother. Dashed lines are the 90% confidence interval. Standard errors are clustered at HS-6 product level.

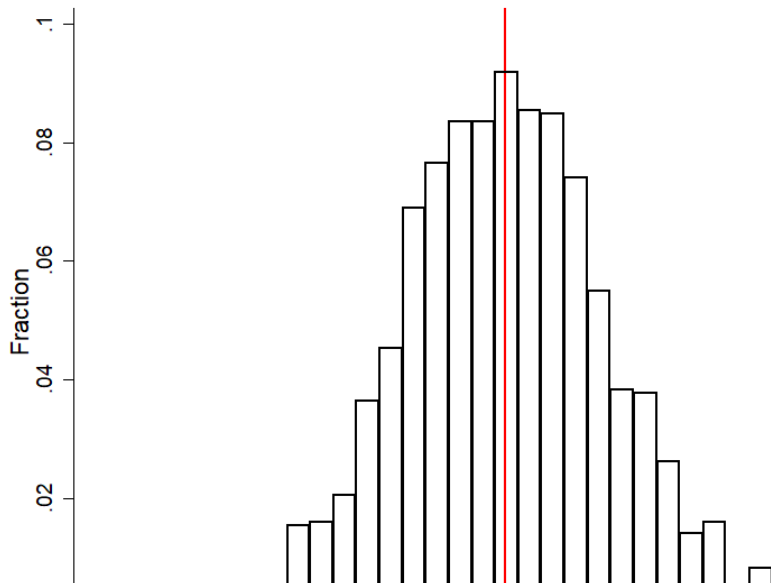
Baseline Result - β_m^{Others}



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Note: Crosses are the estimates of $\hat{\beta}_m^{Others}$ for $m = \{1, \dots, 12\}$ from the baseline estimating equation. The blue line is the applied locally weighted scatterplot smoother. Dashed lines are the 90% confidence interval. Standard errors are clustered at HS-6 product level.

Distribution of Inverse HH (Orders per year)



Dep. Var. $\ln(v_{m-2:m}^{ijt}/v_{m-7:m-5}^{ijt})$		1991-2000,2003-07										
Period		1991-2000										
(lr)2-5 (lr)6-14 Sample		China to U.S.	Pooled	China to U.S., EU	China, RoW to U.S.	Pooled	Separate	All	All except			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)			
		$\mathbb{1}_{m=m'}X_z$	$\mathbb{1}_{m=m'}\mathbb{1}_{i=U.S.}\mathbb{1}_{j=China}X_z$	$\mathbb{1}_{m=m'}\mathbb{1}_{i=U.S.}\mathbb{1}_{t<2001}X_z$	$\mathbb{1}_{m=m'}\mathbb{1}_{j=China}\mathbb{1}_{t<2001}X_z$	$\mathbb{1}_{m=m'}\mathbb{1}_{i=U.S.}\mathbb{1}_{j=China}\mathbb{1}_{t<2001}X_z$						
Jan	-0.56*** (0.09)	Jan	-0.42*** (0.08)	Jan	-0.43*** (0.09)	Jan	-0.24*** (0.09)	Jan	-0.36*** (0.09)	-0.35*** (0.09)	-0.38*** (0.08)	-0.42*** (0.08)
Feb	-0.70*** (0.10)	Feb	-0.41*** (0.07)	Feb	-0.42*** (0.09)	Feb	-0.21** (0.10)	Feb	-0.33*** (0.09)	-0.28*** (0.09)	-0.35*** (0.09)	-0.35*** (0.09)
Mar	-0.63*** (0.10)	Mar	-0.35*** (0.08)	Mar	-0.30*** (0.10)	Mar	-0.12 (0.10)	Mar	-0.21** (0.09)	-0.21** (0.09)	-0.22** (0.09)	-0.19** (0.09)
Apr	-0.42*** (0.09)	Apr	-0.17** (0.08)	Apr	-0.06 (0.10)	Apr	0.01 (0.10)	Apr	-0.01 (0.10)	-0.01 (0.10)	0.01 (0.09)	0.02 (0.09)
May	-0.16* (0.08)	May	0.04 (0.08)	May	0.09 (0.09)	May	0.08 (0.09)	May	0.12 (0.09)	0.14* (0.08)	0.13 (0.08)	0.14* (0.08)
Jun	0.16** (0.07)	Jun	0.28*** (0.08)	Jun	0.27*** (0.08)	Jun	0.20** (0.08)	Jun	0.26*** (0.08)	0.22*** (0.08)	0.26*** (0.08)	0.23*** (0.08)
Jul	0.28*** (0.08)	Jul	0.28*** (0.08)	Jul	0.36*** (0.09)	Jul	0.18** (0.09)	Jul	0.27*** (0.08)	0.24*** (0.09)	0.28*** (0.08)	0.27*** (0.08)
Aug	0.42*** (0.09)	Aug	0.33*** (0.07)	Aug	0.29*** (0.09)	Aug	0.11 (0.09)	Aug	0.19** (0.08)	0.12 (0.08)	0.20** (0.08)	0.17** (0.08)
Sep	0.46*** (0.10)	Sep	0.23*** (0.08)	Sep	0.15 (0.10)	Sep	0.04 (0.10)	Sep	0.08 (0.09)	0.07 (0.09)	0.08 (0.09)	0.06 (0.09)
Oct	0.50*** (0.10)	Oct	0.19** (0.08)	Oct	0.01 (0.09)	Oct	-0.10 (0.10)	Oct	-0.06 (0.09)	-0.06 (0.09)	-0.06 (0.09)	-0.07 (0.09)
Nov	0.22*** (0.09)	Nov	-0.02 (0.09)	Nov	-0.11 (0.09)	Nov	-0.17* (0.09)	Nov	-0.18** (0.09)	-0.19* (0.09)	-0.17** (0.09)	-0.19** (0.08)
Dec	-0.14* (0.08)	Dec	-0.17** (0.08)	Dec	-0.27*** (0.08)	Dec	-0.22*** (0.08)	Dec	-0.28*** (0.08)	-0.28*** (0.08)	-0.29*** (0.08)	-0.30*** (0.08)
Peak to trough		1.20*** (0.18)	0.74** (0.14)	0.79*** (0.16)	0.42*** (0.15)	0.64*** (0.15)	0.58*** (0.15)	0.66*** (0.15)	0.69*** (0.15)			
Observations		185372	586808	579389	599145	892169	1512037	900062	880794			
Adjusted R ²		0.045	0.061	0.104	0.067	0.087		0.075	0.070			

Note: Regressions of column 1 includes $\delta_{t,m}$, column includes $\delta_{s,t,m}$ $\delta_{i,t,m}$ $\delta_{j,t,m}$ $\mathbb{1}_{\{t<2001\}} \times \delta_{s,m}$, regressions of column 2,4 and 5 include

$\delta_{i,t,m}$ $\delta_{j,t,m}$ $\mathbb{1}_{\{t<2001\}} \times \delta_{s,m}$. We omit all estimates except the ones of our interest. Standard errors in parentheses are clustered at HS6, *

Dep. Var. $\ln(v_{m-2:m}^{jzt}/v_{m-7:m-5}^{jzt})$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\mathbb{1}_{m=m'} \mathbb{1}_{i=U.S.} \mathbb{1}_{j=China} \mathbb{1}_{t<2001} X_z$								
Jan	-0.36*** (0.09)	-0.36*** (0.09)	-0.39*** (0.09)	-0.36*** (0.09)	-0.33*** (0.09)	-0.28*** (0.08)	-0.19* (0.11)	-0.19* (0.11)
Feb	-0.33*** (0.09)	-0.31*** (0.09)	-0.34*** (0.09)	-0.35*** (0.09)	-0.31*** (0.09)	-0.25*** (0.09)	-0.21* (0.12)	-0.23* (0.12)
Mar	-0.21** (0.09)	-0.21** (0.09)	-0.21** (0.09)	-0.20** (0.09)	-0.18** (0.09)	-0.11 (0.09)	-0.18 (0.12)	-0.19 (0.12)
Apr	-0.01 (0.10)	-0.03 (0.10)	-0.02 (0.10)	-0.01 (0.10)	0.01 (0.09)	0.09 (0.09)	-0.03 (0.13)	-0.024 (0.13)
May	0.12 (0.09)	0.10 (0.09)	0.09 (0.09)	0.09 (0.10)	0.13 (0.09)	0.19** (0.08)	-0.04 (0.11)	-0.02 (0.11)
Jun	0.26*** (0.08)	0.25*** (0.08)	0.22** (0.09)	0.23** (0.09)	0.25*** (0.08)	0.26*** (0.08)	0.13 (0.10)	0.14 (0.10)
Jul	0.27*** (0.08)	0.27*** (0.08)	0.24*** (0.09)	0.24*** (0.09)	0.27*** (0.09)	0.23*** (0.08)	0.22** (0.11)	0.23** (0.11)
Aug	0.19** (0.08)	0.19** (0.09)	0.16* (0.09)	0.12 (0.09)	0.18** (0.09)	0.11 (0.08)	0.21* (0.11)	0.22** (0.11)
Sep	0.08 (0.09)	0.08 (0.09)	0.10 (0.09)	0.04 (0.10)	0.08 (0.09)	0.03 (0.09)	0.12 (0.12)	0.13 (0.12)
Oct	-0.06 (0.09)	-0.06 (0.09)	-0.03 (0.10)	-0.06 (0.10)	-0.044 (0.09)	-0.05 (0.09)	0.05 (0.11)	0.04 (0.11)
Nov	-0.18** (0.09)	-0.17* (0.09)	-0.19** (0.09)	-0.20** (0.10)	-0.15* (0.09)	-0.13 (0.09)	0.02 (0.10)	0.02 (0.10)
Dec	-0.28*** (0.08)	-0.28*** (0.08)	-0.28*** (0.09)	-0.25*** (0.09)	-0.25*** (0.08)	-0.21*** (0.08)	-0.076 (0.10)	-0.082 (0.10)
Peak to trough	0.64*** (0.15)	0.63*** (0.15)	0.63*** (0.16)	0.60*** (0.16)	0.60*** (0.15)	0.54*** (0.14)	0.43*** (0.21)	0.46*** (0.20)
Monthly FEs	HS2- $\mathbb{1}_{t<2000}$	HS2-Year	HS4- $\mathbb{1}_{t<2000}$	HS6- $\mathbb{1}_{t<2000}$	HS Sections- $\mathbb{1}_{t<2000}$	None	$\delta_{ism}, \delta_{jstm}$	$\delta_{ism} \times \mathbb{1}_{t<2000}$ $\delta_{jstm} \times \mathbb{1}_{t<2000}$
Observations	892169	891897	892168	892157	892169	892169	887784	892148
Adjusted R^2	0.068	0.073	0.141	0.242	0.049	0.037	0.086	0.080

	Baseline (1)	$\ln(v_{m-3:m}^{ijzt})$ $-\ln(v_{m-7:m-4}^{ijzt})$ (2)	$\ln(v_{m-3:m}^{ijzt})$ $-\ln(v_{m-8:m-5}^{ijzt})$ (3)	Mid Point Growth (4)	$\ln(v_{m}^{i,j,t,z})$ $-\ln(\sum_m v_m^{ijzt})$ (5)	$\ln(v_{m-2:m}^{ijzt})$ $-\ln(\sum_m v_m^{ijzt})$ (6)	Quantities (7)	Unit Values (8)	Independent Var. x_{zt} (9)	$x_{z,2001}$ (10)
$\mathbb{1}_{m=m'} \mathbb{1}_{i=U.S.} \mathbb{1}_{j=China} \mathbb{1}_{t < 2001} X_z$										
Jan	-0.36*** (0.09)	-0.26*** (0.08)	-0.28*** (0.08)	-0.29*** (0.07)	-0.15* (0.09)	-0.17*** (0.06)	-0.32** (0.13)	-0.08 (0.08)	-0.37*** (0.09)	-0.38*** (0.09)
Feb	-0.33*** (0.09)	-0.32*** (0.08)	-0.34*** (0.08)	-0.25*** (0.08)	-0.23*** (0.08)	-0.14** (0.06)	-0.44*** (0.12)	0.06 (0.09)	-0.33*** (0.09)	-0.33*** (0.09)
Mar	-0.21** (0.09)	-0.16** (0.08)	-0.26*** (0.08)	-0.17** (0.07)	-0.01 (0.08)	-0.11* (0.06)	-0.26** (0.12)	0.07 (0.08)	-0.21** (0.09)	-0.21** (0.09)
Apr	-0.01 (0.10)	0.01 (0.08)	-0.06 (0.09)	-0.03 (0.08)	-0.00 (0.08)	0.02 (0.06)	-0.13 (0.12)	0.17* (0.09)	-0.04 (0.10)	-0.00 (0.10)
May	0.12 (0.09)	0.06 (0.07)	0.01 (0.08)	0.06 (0.07)	0.01 (0.07)	0.07 (0.05)	0.07 (0.12)	0.05 (0.08)	0.12 (0.09)	0.13 (0.09)
Jun	0.26*** (0.08)	0.25*** (0.07)	0.19** (0.08)	0.20*** (0.07)	0.06 (0.07)	0.07 (0.05)	0.27** (0.12)	0.07 (0.08)	0.22** (0.09)	0.27*** (0.08)
Jul	0.27*** (0.08)	0.26*** (0.07)	0.31*** (0.08)	0.22*** (0.07)	0.22*** (0.07)	0.15*** (0.05)	0.33*** (0.12)	0.03 (0.08)	0.23** (0.09)	0.28*** (0.08)
Aug	0.19** (0.08)	0.12* (0.07)	0.19** (0.08)	0.13* (0.07)	-0.00 (0.08)	0.12*** (0.05)	0.18 (0.12)	0.10 (0.07)	0.15* (0.09)	0.20** (0.09)
Sep	0.08 (0.09)	0.08 (0.08)	0.12 (0.08)	0.04 (0.07)	0.03 (0.07)	0.11** (0.05)	0.16 (0.12)	-0.03 (0.09)	0.05 (0.10)	0.08 (0.09)
Oct	-0.06 (0.09)	-0.06 (0.08)	0.04 (0.08)	-0.08 (0.07)	-0.05 (0.08)	0.02 (0.05)	0.00 (0.12)	-0.10 (0.07)	-0.08 (0.09)	-0.08 (0.09)
Nov	-0.18** (0.09)	-0.19** (0.08)	-0.14* (0.08)	-0.19*** (0.07)	-0.29*** (0.08)	-0.07 (0.05)	-0.14 (0.13)	-0.14* (0.08)	-0.19** (0.09)	-0.20** (0.09)
Dec	-0.28*** (0.08)	-0.20*** (0.07)	-0.23*** (0.08)	-0.25*** (0.07)	-0.19** (0.08)	-0.13*** (0.05)	-0.31*** (0.12)	-0.00 (0.07)	-0.30*** (0.08)	-0.30*** (0.08)
Peak to trough	0.63*** (0.15)	0.58*** (0.13)	0.65*** (0.14)	0.50*** (0.12)	0.50** (0.12)	0.32*** (0.08)	0.77*** (0.21)	0.32 (0.14)	0.59*** (0.15)	0.66*** (0.15)
Observations	892169	895643	895395	899347	899317	899345	791635	791626	881309	892169
Adjusted R^2	0.068	0.064	0.067	0.080	0.052	0.081	0.045	0.007	0.069	0.068

Note: All regressions include $\delta_{i,t,m}$, $\delta_{j,t,m}$, $\mathbb{1}_{\{t < 2001\}} \times \delta_{s,m}$. We omit all estimates except the ones of our interest. Standard errors in

Dep. Var. $\ln(v_{m-2:m}^{ijzt}/v_{m-7:m-5}^{ijzt})$

	Baseline (1)	Excl. MFA Phase 1-3 (2)	Balanced 1991-2007 (3)	Rotating Sample (4)	Full Sample (5)	Incl. 2001,02 (6)
$\mathbb{1}_{m=m'} \mathbb{1}_{i=U.S.} \mathbb{1}_{j=China} \mathbb{1}_{t < 2001} X_z$						
Jan	-0.36*** (0.09)	-0.32*** (0.09)	-0.38*** (0.09)	-0.30*** (0.09)	-0.22** (0.09)	-0.29*** (0.08)
Feb	-0.33*** (0.09)	-0.31*** (0.09)	-0.32*** (0.09)	-0.27*** (0.09)	-0.19** (0.09)	-0.28*** (0.08)
Mar	-0.21** (0.09)	-0.21** (0.09)	-0.22** (0.09)	-0.28*** (0.09)	-0.17* (0.09)	-0.22*** (0.08)
Apr	-0.01 (0.10)	-0.05 (0.10)	-0.03 (0.09)	-0.12 (0.09)	0.01 (0.09)	-0.02 (0.09)
May	0.12 (0.09)	0.05 (0.09)	0.12 (0.09)	0.11 (0.09)	0.08 (0.09)	0.07 (0.08)
Jun	0.26*** (0.08)	0.19** (0.08)	0.26*** (0.08)	0.25*** (0.08)	0.17** (0.08)	0.24*** (0.08)
Jul	0.27*** (0.08)	0.23*** (0.09)	0.27*** (0.08)	0.23*** (0.08)	0.18** (0.08)	0.22*** (0.08)
Aug	0.19** (0.08)	0.14 (0.09)	0.18** (0.08)	0.15* (0.08)	0.085 (0.08)	0.15* (0.08)
Sep	0.08 (0.09)	0.04 (0.09)	0.06 (0.09)	0.16* (0.09)	0.04 (0.09)	0.023 (0.09)
Oct	-0.06 (0.09)	-0.07 (0.09)	-0.08 (0.09)	0.03 (0.09)	-0.07 (0.09)	-0.07 (0.09)
Nov	-0.18** (0.09)	-0.12 (0.09)	-0.18** (0.09)	-0.05 (0.09)	-0.06 (0.09)	-0.15* (0.08)
Dec	-0.28*** (0.08)	-0.23*** (0.08)	-0.29*** (0.08)	-0.22*** (0.08)	-0.20** (0.09)	-0.19** (0.08)
Peak to trough	0.63*** (0.15)	0.55*** (0.15)	0.64*** (0.15)	0.53*** (0.15)	0.39** (0.15)	0.54** (0.14)
Observations	892169	819278	874998	1204879	1634409	1016887
Adjusted R^2	0.068	0.065	0.069	0.053	0.042	0.069

Dep. Var. $\ln(v_{m-2,m}^{jzt}/v_{m-7,m-5}^{jzt})$

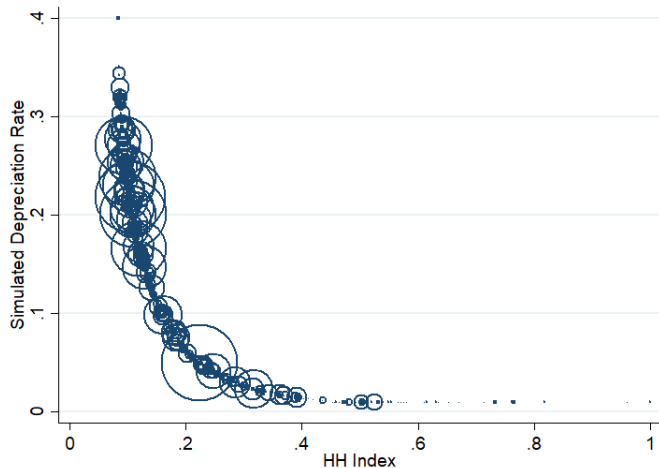
Indicator for High Storability
(lr)1-2(lr)3-4 (1) Continuous Storability Measure
(2)

$\mathbb{I}_{m=m'} \mathbb{I}_{i=U.S.} \mathbb{I}_{j=China} \mathbb{I}_{t < 2000} X_z$

Jan	-0.29*** (0.08)	-0.92*** (0.18)
Feb	-0.29*** (0.07)	-0.92*** (0.17)
Mar	-0.27*** (0.08)	-0.68*** (0.16)
Apr	-0.07 (0.08)	-0.50*** (0.16)
May	0.04 (0.08)	0.14 (0.16)
Jun	0.17** (0.08)	0.72*** (0.16)
Jul	0.17** (0.08)	0.77*** (0.16)
Aug	0.24*** (0.07)	0.70*** (0.17)
Sep	0.13* (0.08)	0.62*** (0.17)
Oct	0.08 (0.08)	0.43*** (0.17)
Nov	0.00 (0.08)	-0.12 (0.16)
Dec	-0.12 (0.08)	-0.45*** (0.15)

$\mathbb{I}_{m=m'} \mathbb{I}_{i=U.S.} \mathbb{I}_{j=China} \mathbb{I}_{t < 2000} X_z$

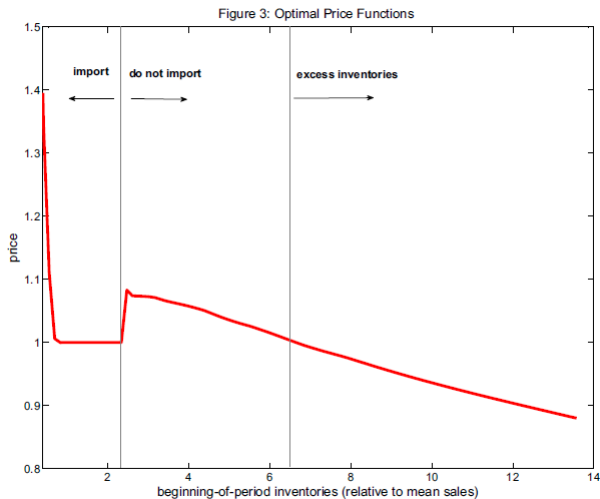
$\mathbb{I}_{1/HH_z < Median}$ Jan	-0.22*** (0.06)	(1/HH _z) Jan	0.16*** (0.05)
$\mathbb{I}_{1/HH_z < Median}$ Feb	-0.21*** (0.06)	(1/HH _z) Feb	0.16*** (0.05)
$\mathbb{I}_{1/HH_z < Median}$ Mar	-0.15** (0.06)	(1/HH _z) Mar	0.10** (0.04)
$\mathbb{I}_{1/HH_z < Median}$ Apr	-0.16*** (0.06)	(1/HH _z) Apr	0.11** (0.04)
$\mathbb{I}_{1/HH_z < Median}$ May	0.02 (0.06)	(1/HH _z) May	-0.03 (0.04)



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Note: HH_z is calculated as the residual of regressing the HH index of annual imports of HS-10 products imported by the US from all countries included in the control group (separately) on source-year fixed effects.

Stationary Pricing Decision



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Parameter		Value	Source
β	Annual Discounting factor	0.97	St. Louis Fed
σ	Elasticity of Substitution	4	Literature
f	Fixed Cost Ordering	0.095	Match HH index
μ	Delivery lag	1 pd	AKM
σ_ν	Std Dev of Taste Shocks	0.8	AKM
δ	Annual Depreciation Rate	30%	AKM
Moments			
	HH Index	0.32	75 th pctile in data
	Median Inventory-Sales	3.64 months	
	Mean(Fixed Cost/Revenue)	6.8%	

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Annual Probabilities

Year	$\max_m \{\hat{\beta}_m^{TPU}\}$	$\hat{\pi}$
1991	0.47***	8%
1992	0.32***	5.4%
1993	0.39**	6.7%
1994	0.50***	8.5%
1995	0.35***	6%
1996	0.39***	6.6%
1997	0.45***	7.6%
1998	0.20**	3.9%
1999	0.16***	2.8%
2000	0.11*	1.9%
Average		
1991 - 2000	0.33***	5.7%
Pooled Sample (Baseline)		
1991 - 2000	0.27***	4.5%

Controlling for Lumpiness: Model

	$\ln(\widetilde{HH}_b)$	$\ln(\tilde{v}_b)$	$\ln(\tilde{v}_b)$
$\tilde{X}_b^{HL}$	-0.78*** (0.04)	3.03*** (0.05)	0.23*** (0.05)
$\ln(\widetilde{HH}_b)$			-3.57*** (0.08)
Reduction in Effect			92%
Observations	453	453	453

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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Stockpiling and Annual Trade Dampening - HL2017 w/ time periods

Dep Var: 5-year Import Growth	HL(2017)	2002-2006		Model
Importer	US, EU	US, EU	US, EU	
Exporter	Chn	Chn	Chn, Row	
$1_{\{i=US\}} \times 1_{\{j=Chn\}} \times \Delta_5 X_{zt}^{HL}$	0.43*** (0.21)	0.39*** (0.14)	0.43*** (0.13)	0.08*** (0.04)
FEs	z, is	zt, ist	zt, ist, jst	
Observations	8,827	31,060	54,627	453

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Note: The dependent variable in all regressions is 5 years import growth for years t 2002 to 2006. s denotes sector defined using 2-digit HS codes. z is a HS6 product, i denotes importer and j denotes exporter.