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

George Alessandria[1,2] Shafaat Y. Khan[3] Armen Khederlarian[1]

[1]University of Rochester, [2]NBER, [3]The World Bank

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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.

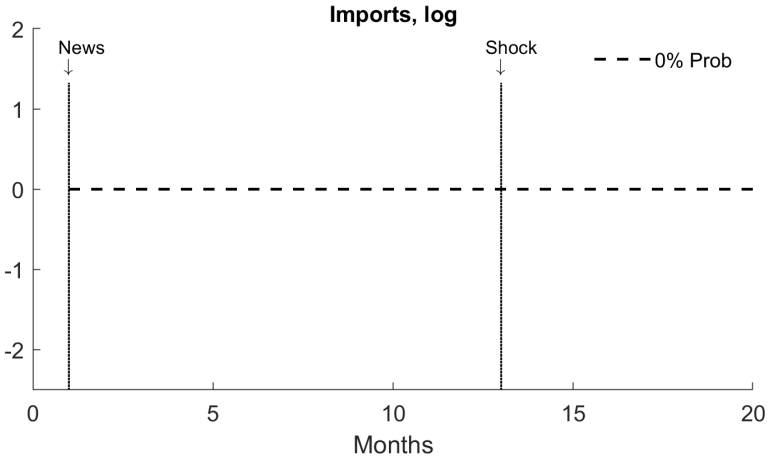
Preview

1. Show imports rise with TPU in monthly trade flows (anticipatory stockpiling).
2. Estimate annual non-renewal probability ($\approx$ 5 percent).
3. Quantify role of expected tariffs vs uncertainty in sS inventory model.
4. Show stockpiling behaviour accounts for 35 percent of TPU effects in annual data.

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



Literature

- **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**
  Coglianese 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*

Outline

Empirical Evidence

Model

Model Implied Probability of MFN Status Reversal

Uncertainty vs Expected Tariff Change

Effect on Annual Trade Flows

Background US Tariff Treatment of China

- Non Normal Trade Relation (NNTR) rates to communist countries.
- 1974 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

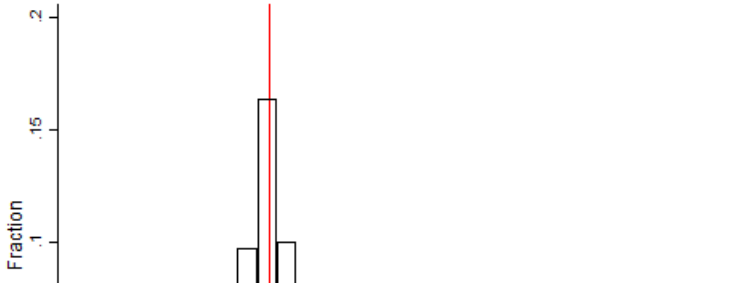
- Consider trade dynamics around MFN renewal decisions
- Exploit differences in tariff risk across products/industries.
- Use standard differences approach to estimate monthly response to tariff risk.

Empirical Approach

- Within-year trade growth rates $\ln\left(v^{i,j,z,t}_{m-2:m}/v^{i,j,z,t}_{m-7:m-5}\right)$
  - $v^{i,j,z,t}$ 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

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

Cross-sectional Distribution



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.

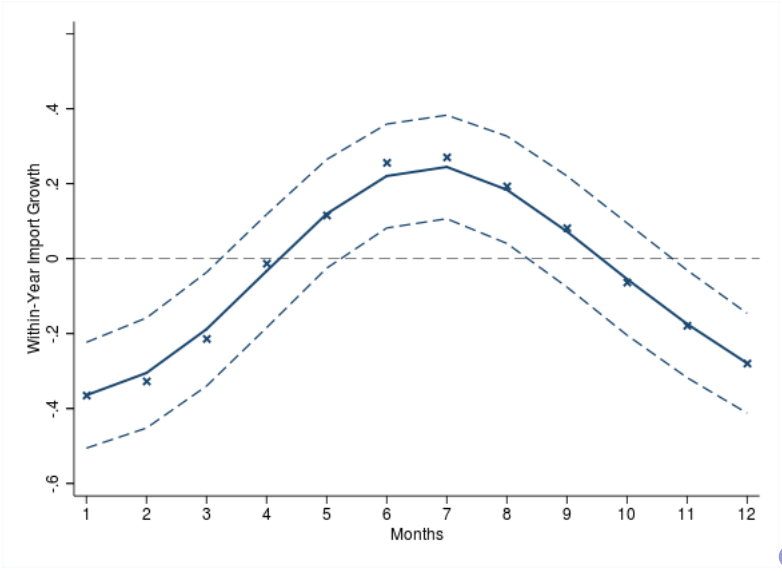
     RoW is EU-15, Japan, South Korea, Hong Kong, Norway and Switzerland.
   - All controls trade flows with access to unconditional MFN rates.

Estimation Equation

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

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

Baseline Result



β_m^{Post} β_m^{Others}

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 15% (anticipatory elasticity = 5)
  - After resolution imports rise 22.5% (resolution elasticity = - 7.5)
- Back of the envelope: $\pi \approx 0.27/5 \approx 5\%$

Robustness

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

Seasonality | Variables | Sample | 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.

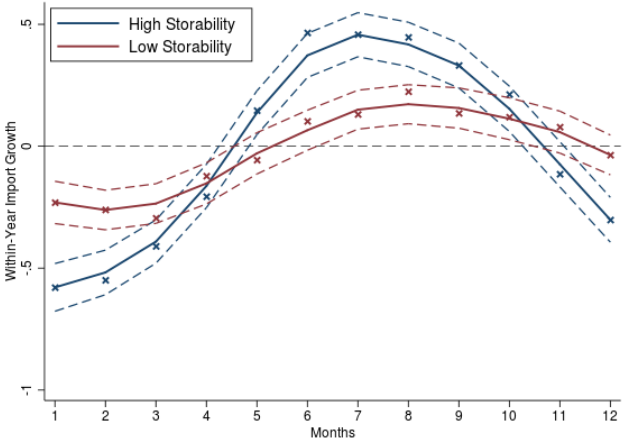
- Consider $1/HH_z$ - the effective number of months w/ shipments.

- Lower $1/HH_z \implies$ more storability. Distribution

Specification with Storability

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

Anticipation & Storability



Note: The seasonal pattern is the result of $\beta_m^{TPU} + \beta_m^{HH}(1/HH_z)$ for a good at the 10th (high storable) and the 90th percentile (low storable) of the $1/HH_z$ distribution. Dashed lines are one standard deviations. Standard errors are clustered at HS-6 product level.

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
- Per unit price $\tau > 1$ possibly stochastic.
- Holding costs: Interest (β) and depreciation (δ)
- Demand faced by the importer is

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

Model: No Trade Policy Shocks

- Importer decides between importing or not importing

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

$$V^a(s,\nu;\tau) = \max_{p,i>0} q(p,s,\nu)p - \tau i - f + \beta EV(s',\nu';\tau)$$
$$V^n(s,\nu;\tau) = \max_{p>0} q(p,s,\nu)p + \beta EV(s',\nu';\tau)$$

subject to

$$q(p,s,\nu) = min(e^{\nu}p^{-\sigma}, s)$$
$$s' = \begin{cases} (1-\delta)[s - q(p,s,\nu) + i] & \text{if import} \\ (1-\delta)[s - q(p,s,\nu)] & \text{o/w} \end{cases}$$

Stationary Decisions Rules (constant tariff)



Pricing Calibration

Model: Trade Policy Shocks

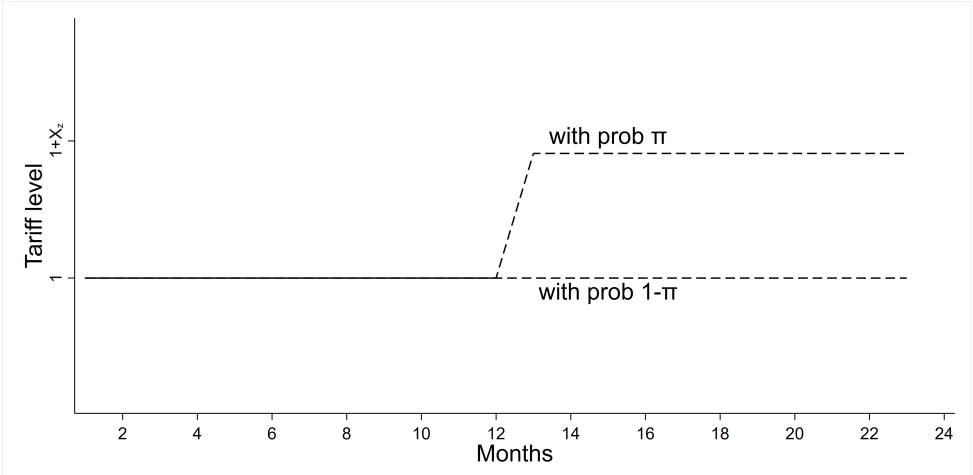
- Importer decides between Importing or not importing

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

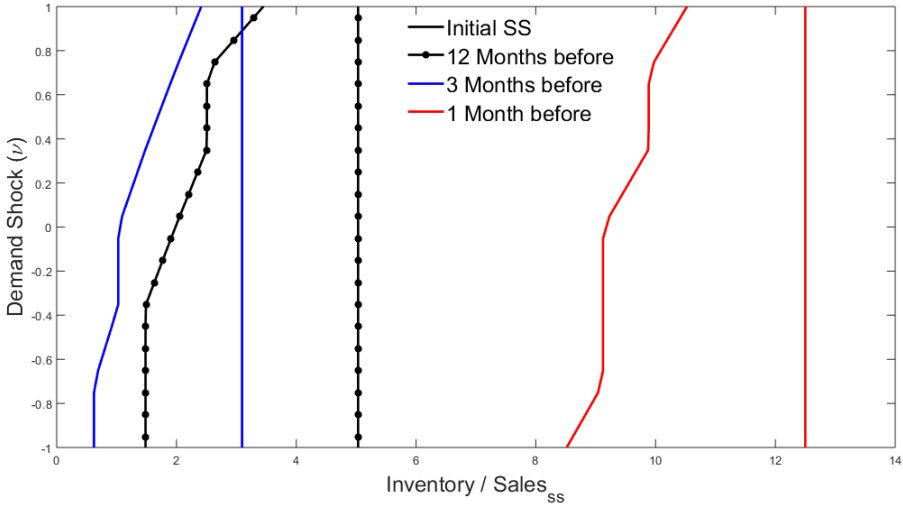
$$V_t^a(s,\nu,\tau) = \max_{p,i>0} q(p,s,\nu)p - \tau i - f + \beta E V_{t'}(s',\nu',\tau')$$
$$V_t^n(s,\nu,\tau) = \max_{p>0} q(p,s,\nu)p + \beta E V_{t'}(s',\nu',\tau')$$

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

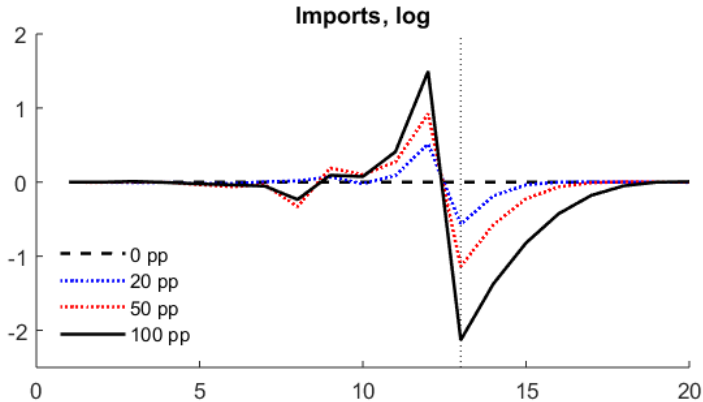
Model: Trade Policy Uncertainty Shock



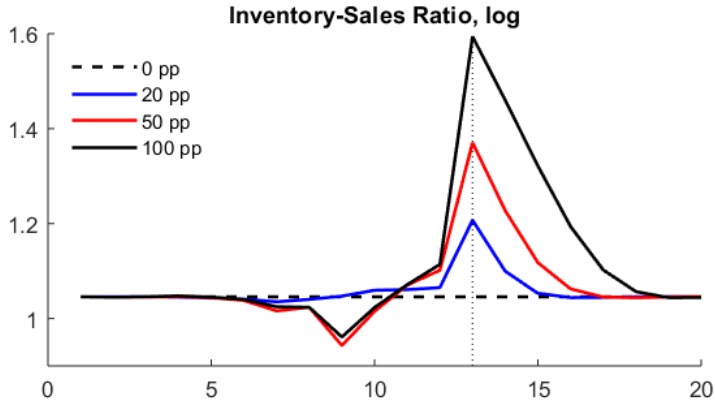
Decisions Rule - Ordering Cutoffs



Path of Imports by NTR gap - 10% probability



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:

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

3. Iterate over π until $\max_m\{\beta^{sim}_{m'}\} = \max_m\{\hat{\beta}^{TPU}_m\} = 0.27$

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

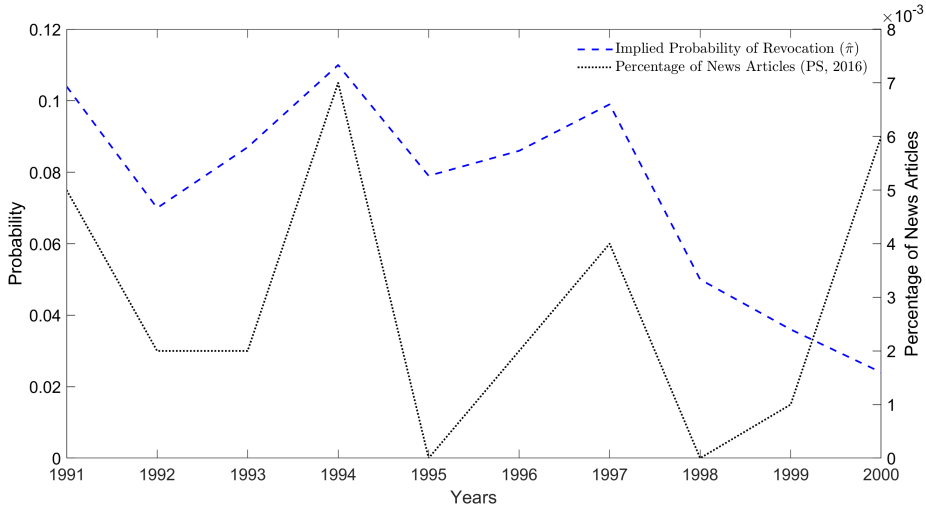
Estimating Likelihood of MFN Reversal: Annual Probabilities

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

  $\Rightarrow$ Between 1990-2001: $\hat{\pi} \in [1.8\%, 9\%]$

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

Annual Probabilities of Revoked Access to MFN Rates



Table

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:

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

$\Rightarrow$ Anticipatory response under certainty: $\max_m\{\hat{\beta}^{sim}_m\} = 0.36$

- Uncertainty dampens anticipation - "wait and see".
- Expected trade costs explains around 3/4 of trade response.

Revisiting Trade Dampening Effects

- Reconsider source of trade dampening effects of TPU (Pierce & Schott, 2016)

$$\ln(V_{i,j,z,t}) = \beta \mathbb{1}_{\{i=US\}} \mathbb{1}_{\{j=Chn\}} \mathbb{1}_{\{t>2000\}} X_{z,t} + \alpha \tau_{i,z,t}^{MFN} + \gamma_{j,t} + \gamma_{z,t} + \gamma_{j,z} + \varepsilon_{i,z,t}$$

- But, stockpiling Transition $\Longrightarrow$ higher holding costs $\Longrightarrow$ lower annual trade.

- Quantify the role of inventory holdings in the model.
  - Lower bound since effect on profits is larger $\Rightarrow$ induce short-run entry

Effect of Stockpiling on Annual Trade

Dep Var: Log Imports	PS(2016)	HS6 level		Model
Importer	US	US	US, EU	
Exporter	Chn,RoW	Chn,RoW	Chn, Row	
US×China×Post WTO×X_{zt}	0.48***	0.52***	0.40***	0.14***
	(0.10)	(0.11)	(0.09)	(0.06)
FEs	jt, zt, jz	jt, zt, jz	jt, zt, jz, ij, it, iz	
Observations	1,396,000	87,380	142,724	453

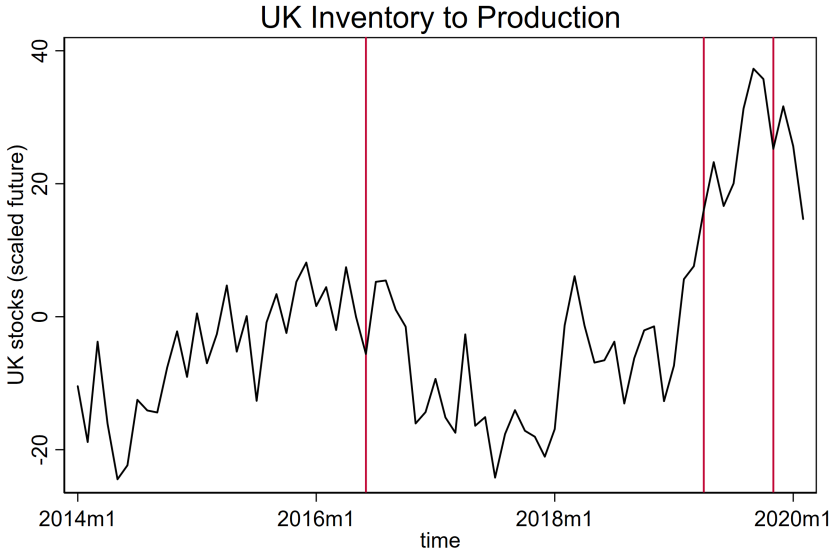
See HL 2017

Note: The dependent variable in all regressions is log import level for the years 1992 to 2007 exporter. First column is taken from Pierce and Schott (2016) which is estimated on HS8 level data.

Mechanism at work: US and UK

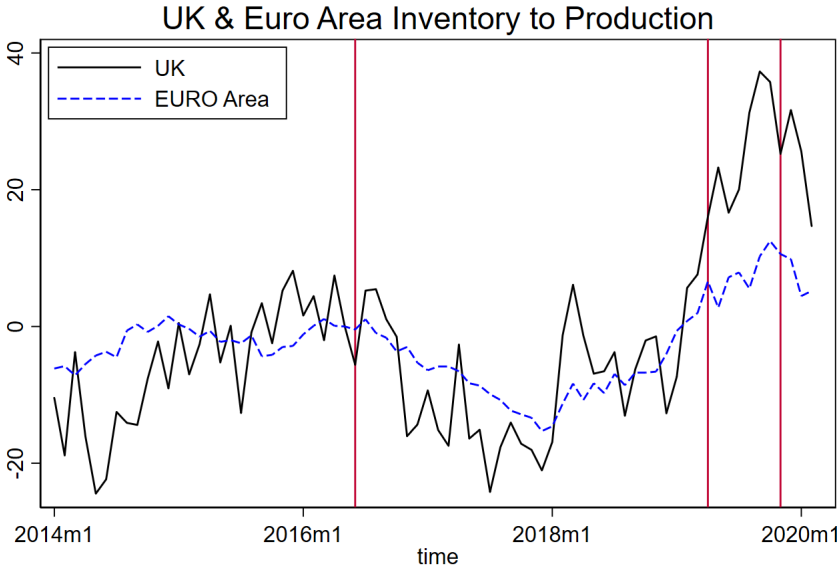
- Trade policy uncertain since Brexit & US election
- Tariffs have been rising in US and China but with more on the horizon
- Observed rising stocks and robust economic growth

Mechanism at work: Brexit

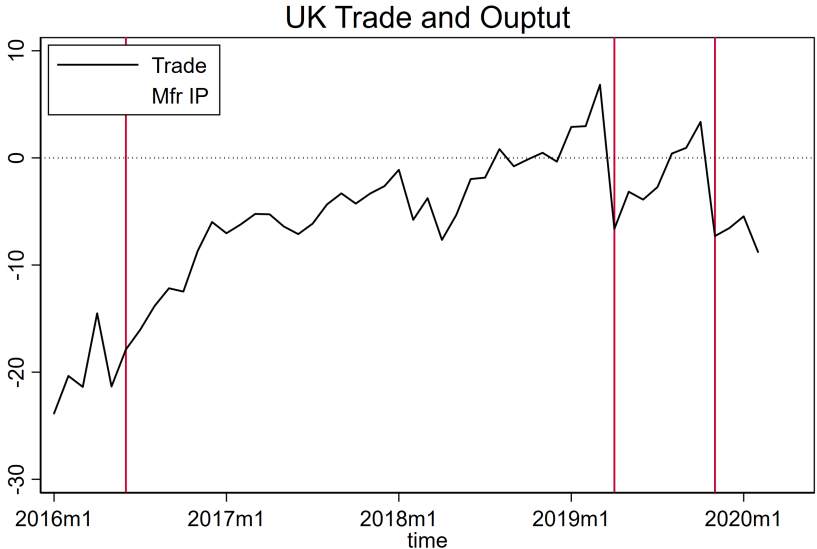


Last date: 02/20

Mechanism at work: UK & Euro Area

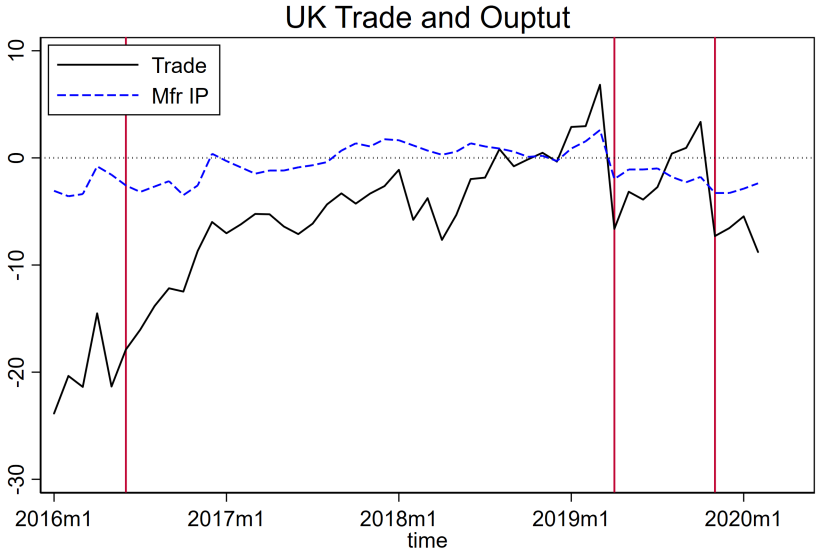


Mechanism at work: UK



Last date: 02/20; Relative to 18Q4; Source: OECD MEI

Mechanism at work:UK

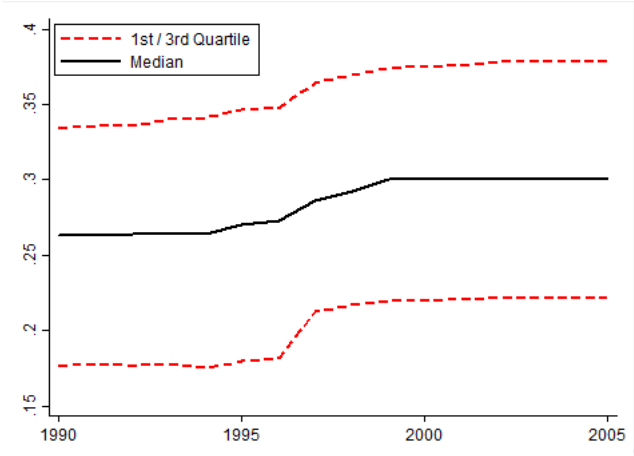


Last date: 02/20; Relative to 18Q4; Source: OECD MEI

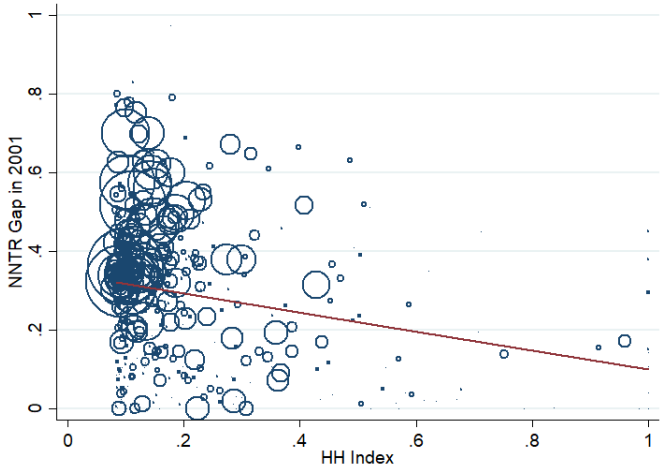
Conclusion

- New approach to quantifying TPU leveraging near-term TPU using monthly data.
  - Lumpiness is informative, not noise.
- New findings on TPU during China's MFN status renewal.
  - Evidence of anticipation to Congress votes and TPU induced seasonality.
  - Model implies low and decreasing probability of revoking MFN status.
  - Expected tariff more important than uncertainty in ordering decisions.
- Future research avenues.
  - Important for aggregate effects?
  - Relative stockpiling due to Covid and expected duration of demand shock.

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	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	House passed Senate version 9/22, voice vote	
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.J.Res. 31 S.Amdt. 890*	— Senate rejected 7/16 (22-77)		*(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.)	
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)	



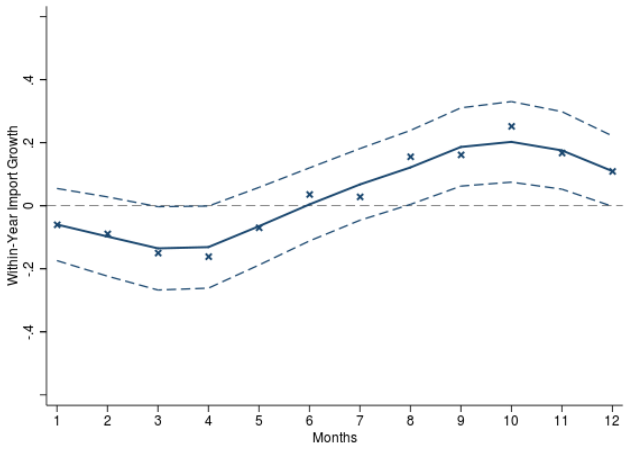
Note: Spread percentiles are calculated each year over NAICS Industries. Gaps are means over HS-8 Product lines from Pierce & Schott (2016).



Back

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 int the sample.

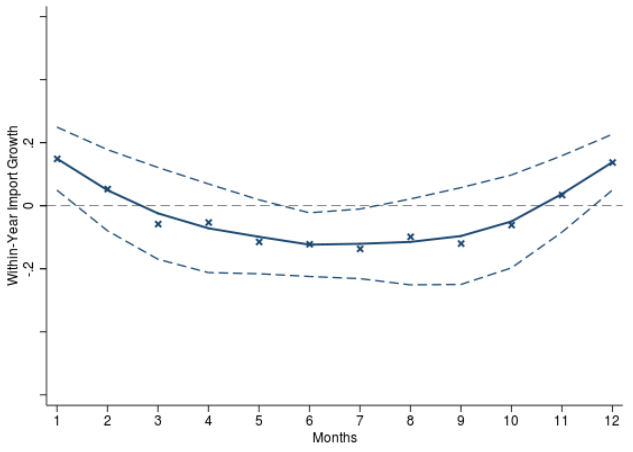
Baseline Result - β_m^{Post}



Back

Note: Crosses are the estimates of $\hat{\beta}_m^{Post}$ for $m = \{1, .., 12\}$ 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.

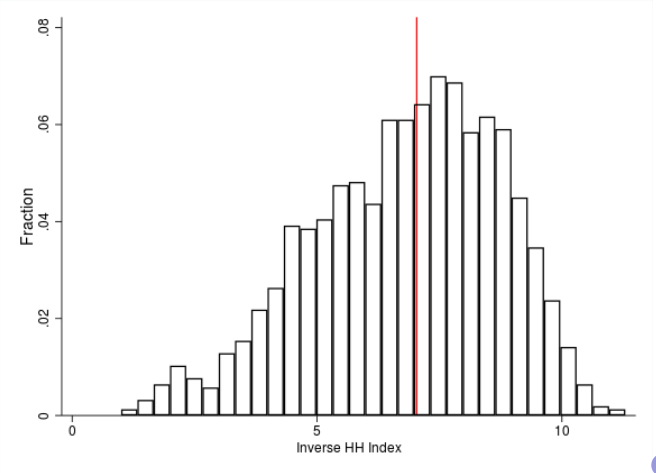
Baseline Result - β_m^{Others}



Back

Note: Crosses are the estimates of $\hat{\beta}_m^{Others}$ for $m = \{1, .., 12\}$ 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)



Back

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.

Dep. Var. $\ln(v^{i,j,t,z}_{m-2:m}/v^{i,j,t,z}_{m-7:m-5})$												
Period	1991-2000				1991-2000,2003-07							
Sample	US Imports China		Pooled		US Imports China		China Exports		US Imports		Pooled	
$\mathbb{1}_{\{m=1\}} \times X_{z,max}$	-0.56***	$\mathbb{1}_{\{US,China\}}$	-0.42***	$\mathbb{1}_{\{t<2001\}}$	-0.19*	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	-0.43***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	-0.24***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.36***	
	(0.09)		(0.08)		(0.11)		(0.09)		(0.09)		(0.09)	
$\mathbb{1}_{\{m=2\}} \times X_{z,max}$	-0.70***	$\mathbb{1}_{\{US,China\}}$	-0.41***	$\mathbb{1}_{\{t<2001\}}$	-0.21*	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	-0.42***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	-0.21**	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.33***	
	(0.10)		(0.07)		(0.12)		(0.09)		(0.10)		(0.09)	
$\mathbb{1}_{\{m=3\}} \times X_{z,max}$	-0.63***	$\mathbb{1}_{\{US,China\}}$	-0.35***	$\mathbb{1}_{\{t<2001\}}$	-0.18	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	-0.30***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	-0.12	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.21**	
	(0.10)		(0.08)		(0.12)		(0.10)		(0.10)		(0.09)	
$\mathbb{1}_{\{m=4\}} \times X_{z,max}$	-0.42***	$\mathbb{1}_{\{US,China\}}$	-0.17**	$\mathbb{1}_{\{t<2001\}}$	-0.030	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	-0.059	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	0.013	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.012	
	(0.09)		(0.08)		(0.13)		(0.10)		(0.10)		(0.10)	
$\mathbb{1}_{\{m=5\}} \times X_{z,max}$	-0.16*	$\mathbb{1}_{\{US,China\}}$	0.040	$\mathbb{1}_{\{t<2001\}}$	-0.038	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	0.093	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	0.083	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	0.12	
	(0.08)		(0.08)		(0.11)		(0.09)		(0.09)		(0.09)	
$\mathbb{1}_{\{m=6\}} \times X_{z,max}$	0.16**	$\mathbb{1}_{\{US,China\}}$	0.28***	$\mathbb{1}_{\{t<2001\}}$	0.13	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	0.27***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	0.20**	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	0.26***	
	(0.07)		(0.08)		(0.10)		(0.08)		(0.08)		(0.08)	
$\mathbb{1}_{\{m=7\}} \times X_{z,max}$	0.28***	$\mathbb{1}_{\{US,China\}}$	0.28***	$\mathbb{1}_{\{t<2001\}}$	0.22**	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	0.36***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	0.18**	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	0.27***	
	(0.08)		(0.08)		(0.11)		(0.09)		(0.09)		(0.08)	
$\mathbb{1}_{\{m=8\}} \times X_{z,max}$	0.42***	$\mathbb{1}_{\{US,China\}}$	0.33***	$\mathbb{1}_{\{t<2001\}}$	0.21*	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	0.29***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	0.11	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	0.19**	
	(0.09)		(0.07)		(0.11)		(0.09)		(0.09)		(0.08)	
$\mathbb{1}_{\{m=9\}} \times X_{z,max}$	0.46***	$\mathbb{1}_{\{US,China\}}$	0.23***	$\mathbb{1}_{\{t<2001\}}$	0.12	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	0.15	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	0.036	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	0.082	
	(0.10)		(0.08)		(0.12)		(0.10)		(0.10)		(0.09)	
$\mathbb{1}_{\{m=10\}} \times X_{z,max}$	0.50***	$\mathbb{1}_{\{US,China\}}$	0.19**	$\mathbb{1}_{\{t<2001\}}$	0.048	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	0.0078	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	-0.095	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.063	
	(0.10)		(0.08)		(0.11)		(0.09)		(0.10)		(0.09)	
$\mathbb{1}_{\{m=11\}} \times X_{z,max}$	0.22***	$\mathbb{1}_{\{US,China\}}$	-0.015	$\mathbb{1}_{\{t<2001\}}$	0.024	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	-0.11	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	-0.17*	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.18**	
	(0.09)		(0.09)		(0.10)		(0.09)		(0.09)		(0.09)	
$\mathbb{1}_{\{m=12\}} \times X_{z,max}$	-0.14*	$\mathbb{1}_{\{US,China\}}$	-0.17**	$\mathbb{1}_{\{t<2001\}}$	-0.076	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US\}}$	-0.27***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{China\}}$	-0.22***	$\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{US,China\}}$	-0.28***	
	(0.08)		(0.08)		(0.10)		(0.08)		(0.08)		(0.08)	
Observations	185372		586808		284808		579389		599145		892169	
Adjusted R^2	0.045		0.061		0.104		0.067		0.087		0.068	

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 $\delta_{i,t,m}$, $\delta_{j,t,m}$, $\mathbb{1}_{\{t<2001\}} \times \delta_{s,m}$, standard errors in parentheses are clustered at HS6, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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Dep. Var. $\ln(v^{i,j,t,z}_{m-2;m}/v^{i,j,t,z}_{m-7;m-5})$								
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=1\}} \times X_{z,max}$	-0.36***	-0.36***	-0.39***	-0.36***	-0.33***	-0.28***	-0.19*	-0.19*
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.11)	(0.11)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=2\}} \times X_{z,max}$	-0.33***	-0.31***	-0.34***	-0.35***	-0.31***	-0.25***	-0.21*	-0.23*
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.12)	(0.12)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=3\}} \times X_{z,max}$	-0.21**	-0.21**	-0.21**	-0.20**	-0.18**	-0.11	-0.18	-0.19
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.12)	(0.12)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=4\}} \times X_{z,max}$	-0.012	-0.025	-0.021	-0.0053	0.0089	0.090	-0.030	-0.024
	(0.10)	(0.10)	(0.10)	(0.10)	(0.09)	(0.09)	(0.13)	(0.13)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=5\}} \times X_{z,max}$	0.12	0.099	0.085	0.094	0.13	0.19**	-0.038	-0.015
	(0.09)	(0.09)	(0.09)	(0.10)	(0.09)	(0.08)	(0.11)	(0.11)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=6\}} \times X_{z,max}$	0.26***	0.25***	0.22**	0.23**	0.25***	0.26***	0.13	0.14
	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)	(0.10)	(0.10)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=7\}} \times X_{z,max}$	0.27***	0.27***	0.24***	0.24***	0.27***	0.23***	0.22**	0.23**
	(0.08)	(0.08)	(0.09)	(0.09)	(0.09)	(0.08)	(0.11)	(0.11)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=8\}} \times X_{z,max}$	0.19**	0.19**	0.16*	0.12	0.18**	0.11	0.21*	0.22**
	(0.08)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)	(0.11)	(0.11)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=9\}} \times X_{z,max}$	0.082	0.083	0.100	0.041	0.087	0.035	0.12	0.13
	(0.09)	(0.09)	(0.09)	(0.10)	(0.09)	(0.09)	(0.12)	(0.12)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=10\}} \times X_{z,max}$	-0.063	-0.057	-0.029	-0.055	-0.044	-0.055	0.048	0.037
	(0.09)	(0.09)	(0.10)	(0.10)	(0.09)	(0.09)	(0.11)	(0.11)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=11\}} \times X_{z,max}$	-0.18**	-0.17*	-0.19**	-0.20**	-0.15*	-0.13	0.024	0.024
	(0.09)	(0.09)	(0.09)	(0.10)	(0.09)	(0.09)	(0.10)	(0.10)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=12\}} \times X_{z,max}$	-0.28***	-0.28***	-0.28***	-0.25***	-0.25***	-0.21***	-0.076	-0.082
	(0.08)	(0.08)	(0.09)	(0.09)	(0.08)	(0.08)	(0.10)	(0.10)
Product/Sectoral Seasonality	HS2-$\mathbb{1}_{\{t<2001\}}$	HS2-Year	HS4-$\mathbb{1}_{\{t<2001\}}$	HS6-$\mathbb{1}_{\{t<2001\}}$	HS Sections-$\mathbb{1}_{\{t<2001\}}$	None	$\delta_{i,s,t,m}, \delta_{j,s,t,m}$	$\delta_{i,s,m} \times \mathbb{1}_{\{t<2001\}}$ $\delta_{j,s,m} \times \mathbb{1}_{\{t<2001\}}$
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

Note: All regressions include $\delta_{i,t,m}$, $\delta_{j,t,m}$, standard errors in parentheses are clustered at HS6, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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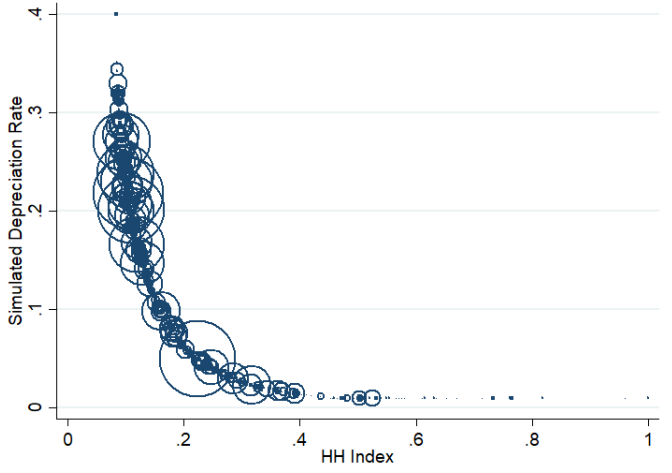
	Baseline	$\ln(v^{ij,t,z}_{m-3;m}) - \ln(v^{ij,t,z}_{m-7;m-4})$	$\ln(v^{ij,t,z}_{m-3;m}) - \ln(v^{ij,t,z}_{m-8;m-5})$	Mid Point Growth	$\ln(v^{ij,t,z}_{m}) - \ln(\sum_m v^{ij,t,z}_m)$	$\ln(v^{ij,t,z}_{m-2;m}) - \ln(\sum_m v^{ij,t}_m)$	Quantities	Unit Unit Values	Independent Var. $x_{z,t}$	Independent Var. $x_{z,2001}$
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=1\}} \times X_{z,max}$	-0.36***	-0.26***	-0.28***	-0.29***	-0.15*	-0.17***	-0.32**	-0.082	-0.37***	-0.38***
	(0.09)	(0.08)	(0.08)	(0.07)	(0.09)	(0.06)	(0.13)	(0.08)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=2\}} \times X_{z,max}$	-0.33***	-0.32***	-0.34***	-0.25***	-0.23***	-0.14**	-0.44***	0.060	-0.33***	-0.33***
	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)	(0.06)	(0.12)	(0.09)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=3\}} \times X_{z,max}$	-0.21**	-0.16**	-0.26***	-0.17**	-0.0069	-0.11*	-0.26**	0.066	-0.21**	-0.21**
	(0.09)	(0.08)	(0.08)	(0.07)	(0.08)	(0.06)	(0.12)	(0.08)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=4\}} \times X_{z,max}$	-0.012	0.011	-0.064	-0.028	-0.0013	0.015	-0.13	0.17*	-0.040	-0.00062
	(0.10)	(0.08)	(0.09)	(0.08)	(0.08)	(0.06)	(0.12)	(0.09)	(0.10)	(0.10)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=5\}} \times X_{z,max}$	0.12	0.059	0.0099	0.058	0.0084	0.070	0.069	0.050	0.12	0.13
	(0.09)	(0.07)	(0.08)	(0.07)	(0.07)	(0.05)	(0.12)	(0.08)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=6\}} \times X_{z,max}$	0.26***	0.25***	0.19**	0.20***	0.063	0.068	0.27**	0.069	0.22**	0.27***
	(0.08)	(0.07)	(0.08)	(0.07)	(0.07)	(0.05)	(0.12)	(0.08)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=7\}} \times X_{z,max}$	0.27***	0.26***	0.31***	0.22***	0.22***	0.15***	0.33***	0.025	0.20**	0.28***
	(0.08)	(0.07)	(0.08)	(0.07)	(0.07)	(0.05)	(0.12)	(0.08)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=8\}} \times X_{z,max}$	0.19**	0.12*	0.19**	0.13*	-0.0040	0.12***	0.18	0.098	0.15*	0.20**
	(0.08)	(0.07)	(0.08)	(0.07)	(0.08)	(0.05)	(0.12)	(0.07)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=9\}} \times X_{z,max}$	0.082	0.076	0.12	0.040	0.033	0.11**	0.16	-0.032	0.051	0.075
	(0.09)	(0.08)	(0.08)	(0.07)	(0.07)	(0.05)	(0.12)	(0.09)	(0.10)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=10\}} \times X_{z,max}$	-0.063	-0.064	0.043	-0.076	-0.053	0.024	0.00071	-0.10	-0.079	-0.079
	(0.09)	(0.08)	(0.08)	(0.07)	(0.08)	(0.05)	(0.12)	(0.07)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=11\}} \times X_{z,max}$	-0.18**	-0.19**	-0.14*	-0.19***	-0.29***	-0.072	-0.14	-0.14*	-0.19**	-0.20**
	(0.09)	(0.08)	(0.08)	(0.07)	(0.08)	(0.05)	(0.13)	(0.08)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=12\}} \times X_{z,max}$	-0.28***	-0.20***	-0.23***	-0.25***	-0.19**	-0.13***	-0.31***	-0.0076	-0.30***	-0.30***
	(0.08)	(0.07)	(0.08)	(0.07)	(0.08)	(0.05)	(0.12)	(0.07)	(0.08)	(0.08)
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 $\delta_{i,t,m}$, $\delta_{j,t,m}$, $\mathbb{1}_{\{t<2001\}} \times \delta_{s,m}$, standard errors in parentheses are clustered at HS6, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Back

Dep. Var. $\ln(v^{i,j,t,z}_{m-2;m}/v^{i,j,t,z}_{m-7;m-5})$	Baseline	Excl. MFA Phase 1-3	Balanced 1991-2007	Rotating Sample	Full Sample	Incl. 2001,02
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=1\}} \times X_{z,max}$	-0.36***	-0.32***	-0.38***	-0.30***	-0.22**	-0.29***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=2\}} \times X_{z,max}$	-0.33***	-0.31***	-0.32***	-0.27***	-0.19**	-0.28***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=3\}} \times X_{z,max}$	-0.21**	-0.21**	-0.22**	-0.28***	-0.17*	-0.22***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=4\}} \times X_{z,max}$	-0.012	-0.045	-0.027	-0.12	0.014	-0.015
	(0.10)	(0.10)	(0.09)	(0.09)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=5\}} \times X_{z,max}$	0.12	0.050	0.12	0.11	0.084	0.072
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=6\}} \times X_{z,max}$	0.26***	0.19**	0.26***	0.25***	0.17**	0.24***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=7\}} \times X_{z,max}$	0.27***	0.23***	0.27***	0.23***	0.18**	0.22***
	(0.08)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=8\}} \times X_{z,max}$	0.19**	0.14	0.18**	0.15*	0.085	0.15*
	(0.08)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=9\}} \times X_{z,max}$	0.082	0.042	0.062	0.16*	0.036	0.029
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=10\}} \times X_{z,max}$	-0.063	-0.065	-0.077	0.025	-0.065	-0.073
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=11\}} \times X_{z,max}$	-0.18**	-0.12	-0.18**	-0.049	-0.063	-0.15*
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
$\mathbb{1}_{\{US,China\}}\mathbb{1}_{\{t<2001\}}\mathbb{1}_{\{m=12\}} \times X_{z,max}$	-0.28***	-0.23***	-0.29***	-0.22***	-0.20**	-0.19**
	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)
Observations	892169	819278	874998	1204879	1634409	1016887
Adjusted R^2	0.068	0.065	0.069	0.053	0.042	0.069

Note: All regressions include $\delta_{i,t,m}$, $\delta_{j,t,m}$, $\mathbb{1}_{\{t<2001\}} \times \delta_{s,m}$, standard errors in parentheses are clustered at HS6, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

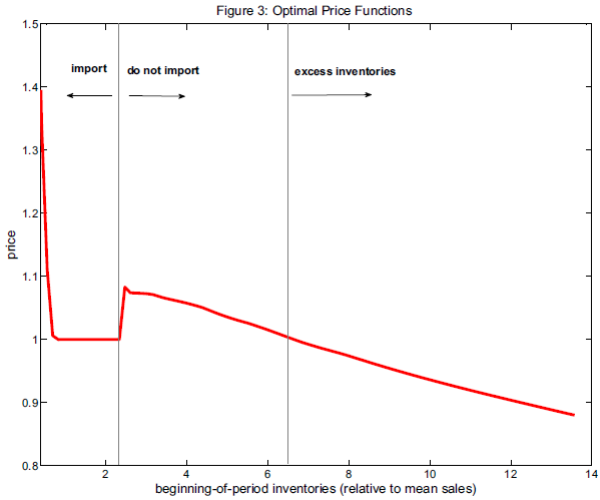
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Note: HH_z is calculated as the residual of regressing the HH index of annual imports of HS-10 products imported by the US from all countries included in the control group (separately) on source-year fixed effects.

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	$\max_m\{\hat{\beta}_m^{TPU}\}$	$\hat{\pi}$	$\hat{\beta}_{m=9}^{TPU}$	m_{max}	Peak-to-Trough
1991	0.61***	10.4%	0.52***	October	1.02***
1992	0.41***	7.0%	0.41***	September	0.57***
1993	0.51**	8.7%	0.47***	August	0.89***
1994	0.65***	11%	0.45***	October	0.88***
1995	0.46***	7.9%	0.46***	September	0.82***
1996	0.50***	8.6%	0.47***	August	0.99***
1997	0.58***	9.9%	0.43***	August	0.83***
1998	0.26**	5.0%	0.23**	June	0.64***
1999	0.21***	3.6%	0.12	August	0.33***
2000	0.14*	2.4%	0.12	October	0.44***
Average					
1991 - 2000	0.43***	7.45%	0.37***	8.6	0.74***
Pooled Sample (Baseline)					
1991 - 2000	0.35***	6%	0.35***	September	0.58***

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Controlling for Lumpiness: Model

	$\ln(\widetilde{HH}_b)$	$\ln(\tilde{v}_b)$	$\ln(\tilde{v}_b)$
$\widetilde{X}_b^{HL}$	-0.78***	3.03***	0.23***
	(0.04)	(0.05)	(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***	0.39***	0.43***	0.08***
	(0.21)	(0.14)	(0.13)	(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.