Recovering Credible Trade Elasticities from Incredible Trade Reforms

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- Reduced form estimates: vary widely, across time horizons & across contexts
- Standard interpretation: response to unanticipated & once-and-for-all policy change —- **canonical reform**
- This paper: canonical reforms don't exist in the data!
  - Empirical: compare "more-canonical" vs. "less-canonical" reforms
  - Quantitative: recover canonical elasticity by feeding data through structural model

Main idea

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Canonical reforms – unanticipated, once-and-for-all – yield much larger responses

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- Compare tariff & trade dynamics within regimes vs. across regimes
  - Within: Common & transitory, low trade elasticities ($\sim$3 in LR)
  - Across: Rare & persistent, high trade elasticities ($\sim$6 in LR)
  - $N_{\text{Within}} \gg N_{\text{Across}} \Rightarrow$ full-sample estimates get responses to major reforms wrong

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- Case studies: China & Vietnam
  - Same policy path: Embargo $\rightarrow$ **NNTR** $\rightarrow$ **MFN** (conditional then “permanent”)
  - More persistent tariffs, higher trade elasticities than typical regime switch ($\sim$11 in LR)
  - expectations of obtaining MFN + uncertainty about reversal still present

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- Heterogeneous firms, sunk entry costs, fixed costs probabilistically improve market access
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- Illustrate measurement effects from non-canonical policy dynamics
  - Anticipation to policy change $\Rightarrow \uparrow$ SR elasticity
  - Likelihood of reversal after tariff change $\Rightarrow \downarrow$ LR elasticity

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- Illustrate measurement effects from non-canonical policy dynamics
  - Anticipation to policy change $\Rightarrow \uparrow$ SR elasticity
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- Recover canonical trade elasticity using China & Vietnam case studies
  - Estimate model parameters $+$ regime-switching probability
  - Match reduced-form elasticity path as in Alessandria et al. (2025a)
  - Conduct counterfactual canonical reform. LR elasticity ≈ 15.

Related Literature

- Trade elasticity (data): Head and Ries (2007), Romalis (2007), Baier-Bergstrand (2007), Hummels and Schaur (2010,2013), Hilberry and Hummels (2013), Simonovoska and Waugh (2014), Caliendo and Paro (2015), Soderberry (2015, 2018), Yilmazkuday (2019), Anderson and Yotov (2020), Khan-Khederlarian (2021), Boehm et al. (2023)
- Trade dynamics (models): Baldwin-Krugman (1989), Das et al. (2007), Alessandria-Choi (2007), Ruhl-Willis (2017), Alessandria et al. (2021), Steinberg (2023), Fitzgerald et al., (2024)
- Trade-policy uncertainty: Ruhl (2011), Pierce-Schott (2016), Handley-Limão (2015 & 2017), Steinberg (2019), Caldara et al. (2020), Bianconi et al. (2021), Alessandria et al. (2025ab)

- Lessons:
  - → Reduced-form estimates contaminated by interaction b/w forward-looking decisions and policy dynamics
  - → Some reforms "more canonical" than others. Estimates from "less canonical" reforms lack external validity.
  - → Disentangling effects of past reforms vs. policy dynamics requires model
  - → Ideal setting: well-specified policy process and few realized policy changes

Roadmap

1. Model
2. Numerical Experiments
3. Empirical evidence
4. Calibration + recover structural elasticity

Overview of the model

- Partial equilibrium version of Alessandria, Choi and Ruhl 2021 (ACR 2021)
  - Slow adjustment due to exporter life-cycle, large gap between SR and LR response
  - Expectations about future trade policy, not current policy, drive export participation
- Firms
  - Heterogeneous in productivity (z), variable trade cost (ξ)
  - Die with probability $1-\delta$, replaced by new firm (fixed mass)
  - Pay sunk cost to export next period, smaller fixed cost to continue
  - New exporters start with low export capacity (ξ_H)
  - Longer tenure as exporter $\Rightarrow$ greater chance of low iceberg cost (ξ_L w.p. $1-\rho_\xi$)
- Trade policy
  - Allow for innovations to current tariffs (τ) and expectations about future tariffs ($\mathbb{E}\tau'$)
  - Exporting threshold depends on expected z, ξ and $\mathbb{E}\tau'$

Production, demand, static optimization

- Production technology (z = productivity; ℓ = labor):

$$y = z\ell$$

- Export demand curve (p = price; τ = tariff):

$$d(p, \tau) = (p\tau)^{-\theta}$$

- Resource constraint (ξ = variable trade cost):

$$y \geqslant \xi d(p, \tau)$$

- Given z, ξ, choose p, ℓ to max flow profits

$$\pi(z, \xi, \tau) = \max_{p,\, \ell} pd(p\tau) - w\ell \quad \textbf{s.t.} \quad z\ell \geqslant d(p, \tau)\xi$$

Exporter life cycle, dynamic optimization

- Variable trade cost (ξ) captures current export status
  - ∞: non-exporter
  - ξ_H: High iceberg (low-capacity) exporter
  - ξ_L: low iceberg (high-capacity) exporter
- Costs of exporting in $t+1$ depend on current export status in t
  - New exporters: pay f_0, start with low export capacity (ξ_H)
  - Continuing exporters: pay f_1, switch to higher/lower export capacity with prob. $1-\rho_\xi$
- Given z, ξ, τ, choose whether to export at $t+1$ to max PV of profits:

$$V(z,\xi,\tau) = \pi_{gt}(z,\xi,\tau) + \max\left\{ \underbrace{-f(\xi) + \frac{\delta(z)}{1+r}\mathbb{E}_{z',\xi',\tau'} V(z',\xi',\tau')}_{\text{export}}, \underbrace{\frac{\delta(z)}{1+r}\mathbb{E}_{z',\xi',\tau'} V(z',\infty,\tau')}_{\text{don't export}} \right\}$$

- Solution characterized by entry + exit thresholds that depend on z, ξ and $\mathbb{E}\tau'$

Aggregation, trade elasticities

- Aggregate exports:

$$Y_t = \sum_{\xi \in \{\xi_L, \xi_H\}} \int_z p\left(z, \xi, \tau_t\right) d_t\left(z, \tau_t\right) \varphi_t\left(z, \xi\right) dz.$$

  - Per-firm sales (pd) depend on current tariffs
  - Distribution (φ) depends on τ process: past realizations and expectations about future

- Mapping to structural trade elasticities:
  - SR response to *unanticipated* reform: demand elasticity $= \theta$
  - LR response to *permanent* reform: $> \theta$, increasing in ξ_H/ξ_L and ρ_ξ

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Experiment #1: persistent vs. transitory shocks

- Two-state Markov process: high vs. low tariffs, switching probability $1 - \omega$
- Start with τ_H for $= -\infty, \ldots, -1$, then switch to τ_L for $t = 0, \ldots, \infty$
- Compare canonical reform ($\omega = 1.0$) to less persistent reforms ($\omega \in \{0.95, 0.8, 0.5\}$)

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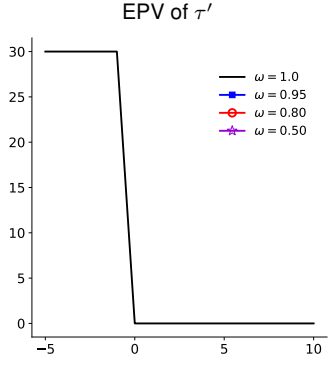

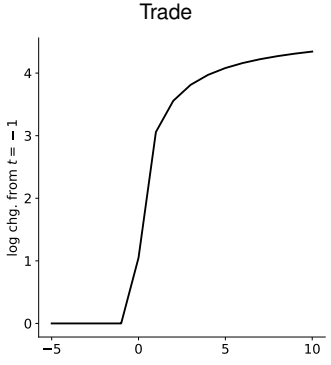

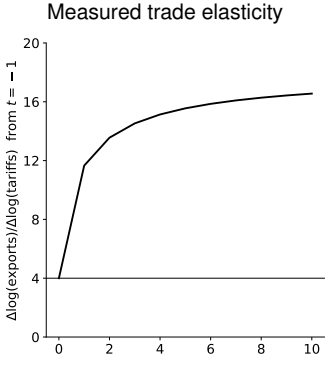

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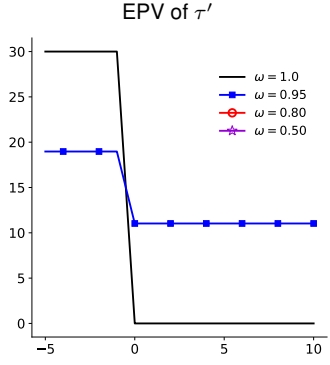

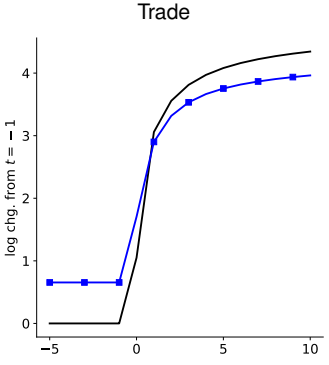

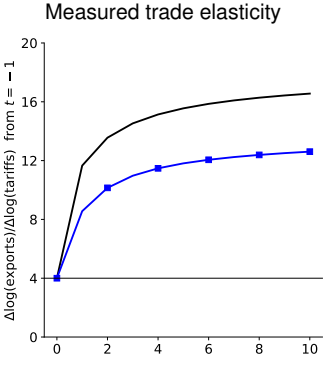

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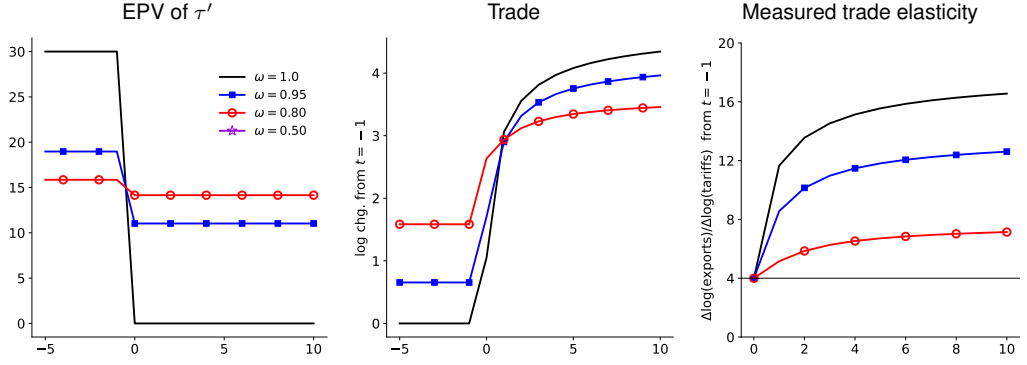

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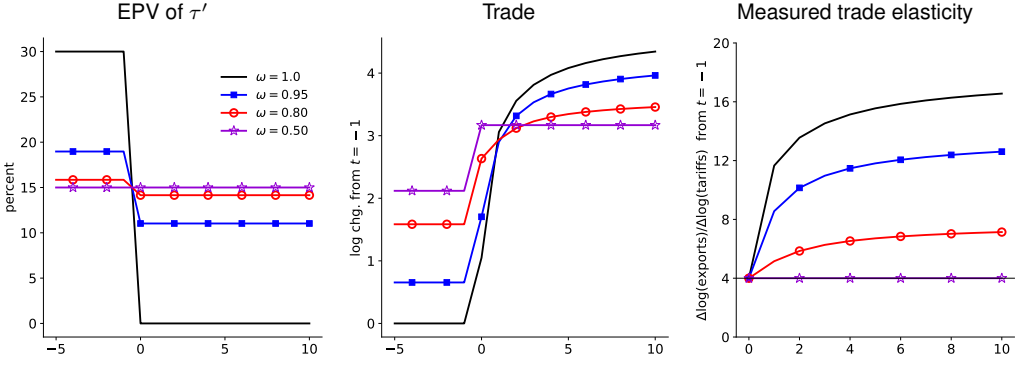
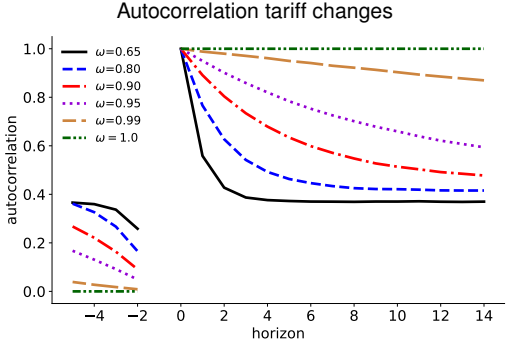
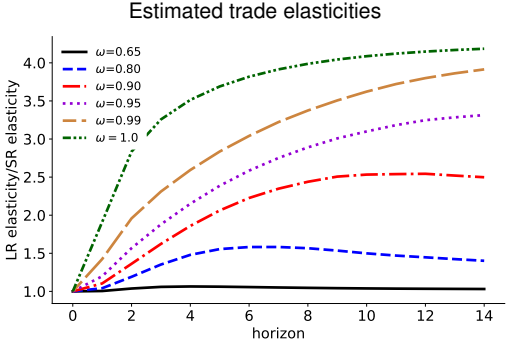


Local-projections estimates in model simulations with Markov tariffs

- Simulate 1,000 goods for 1,000 periods, each good receives idiosyncratic tariff changes
- Estimate trade elasticities w/local projections methods (Boehm et al., 2023)
- Consider how trade elasticities depend on tariff change transition probabilities





Experiment #2: shocks to expectations

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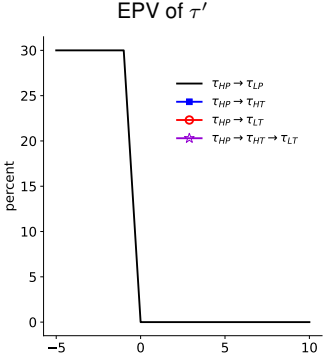

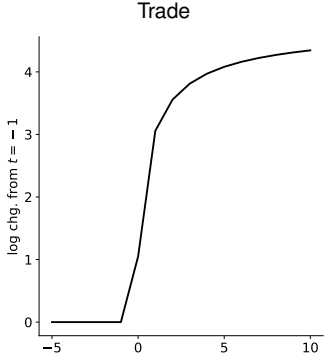

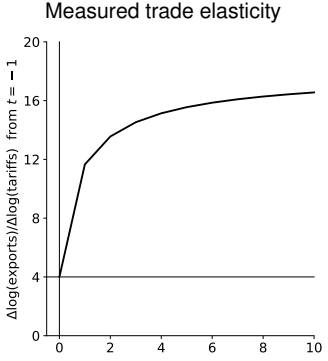

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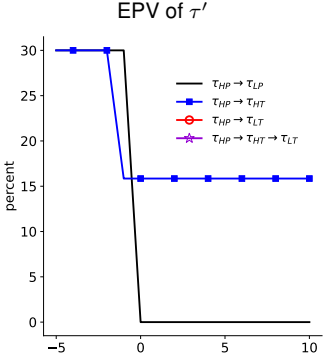

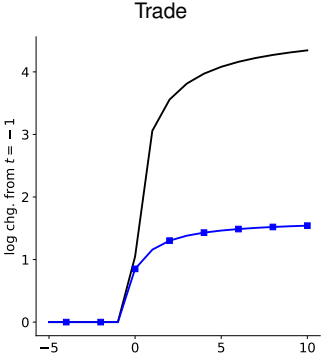

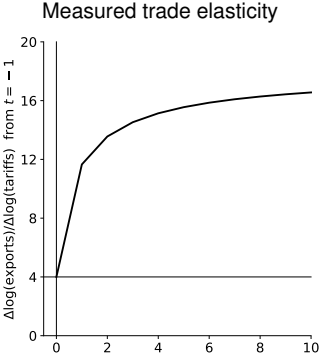

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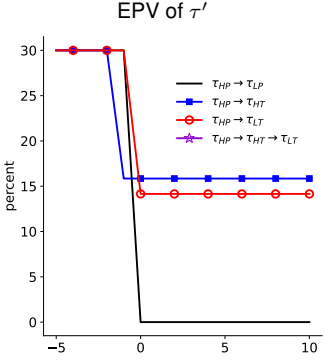

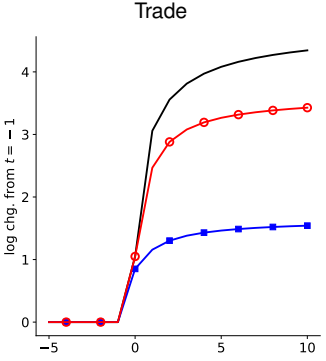

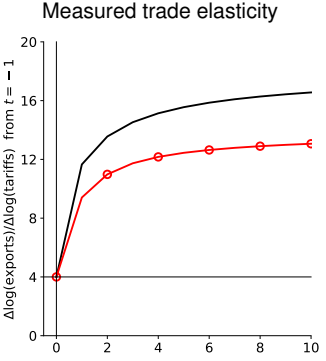

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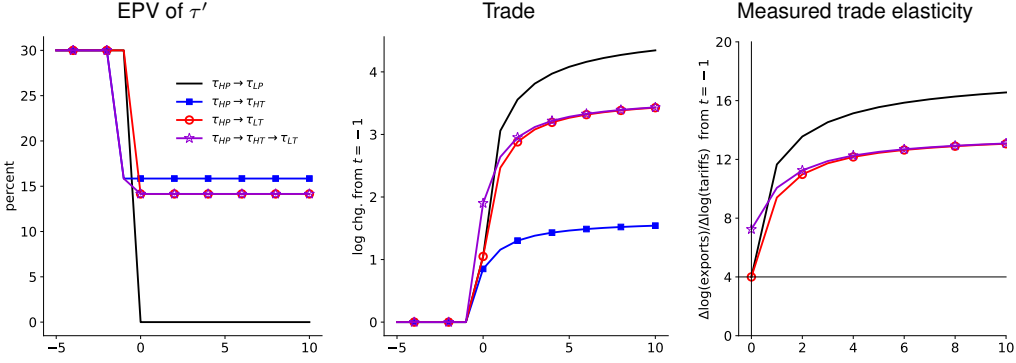

Experiment takeaways

- Transitory reforms have lower long-run trade elasticities
  - Post-reform trade suppressed by higher likelihood of reversal
  - Pre-reform trade boosted by expectation that reform more likely to happen
- Anticipated reforms have higher short-run trade elasticities
  - Trade begins to react when expectations change, not just when tariffs change

Roadmap

1. Model
2. Numerical Experiments
3. **Empirical evidence**
4. Calibration + recover structural elasticity

Data

- Sample: U.S. imports from 1974–2017
  - Captures transition from higher tariffs in 70s & 80s to low tariffs today
  - Covers major reforms: China's NTR grant, NAFTA, GATT rounds, GSP, etc.
- Aggregation: 5-digit SITC rev. 2
  - 1974–1988 U.S. imports at 8-digit TS-USA level: Concordance by Feenstra (1996)
  - 1989–2017 U.S. imports at 8-digit HTS level: Concordance using UNCTAD
- 44 years (t), 163 countries (j), 2,032 goods (g), 2,279,579 observations (jgt)
- Policy at jgt level: applied tariff (=duties/FOB imports)
  - Potentially different from scheduled tariffs due to aggregation, measurement error, etc.
  - Same jgt can have transactions under different schedules due to rules of origin, GSP requirements, etc.

Approach #1: statutory regime changes

- Assign *jgt*'s to statutory policy regimes: **MFN**, Non-Normal Trade Relations (**NNTR**), Preferential Trade Agreement (**PTA**), Unilateral Trade Preference Program (**UTPP**)
- Compare policy and trade dynamics within vs. across regimes

From	To	N # *jgt*	Mean (p.p.)	Median (p.p.)	Std. dev. (p.p.)
(a) Within					
MFN	MFN	1,352,360	-0.15	0.00	9.47
NNTR	NNTR	10,542	-0.25	0.00	9.25
PTA	PTA	75,910	-0.12	0.00	1.34
UTPP	UTPP	149,526	-0.03	0.00	1.04
(b) Across					
NNTR	MFN	1,523	-27.63	-26.17	24.04
MFN	PTA	10,291	-3.01	-1.80	4.57
MFN	UTPP	29,860	-4.02	-2.90	14.53
Total		1,671,098	-0.17	0.00	8.92

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PTA	PTA	75,910	-0.12	0.00	1.34
UTPP	UTPP	149,526	-0.03	0.00	1.04
(b) Across					
NNTR	MFN	1,523	-27.63	-26.17	24.04
MFN	PTA	10,291	-3.01	-1.80	4.57
MFN	UTPP	29,860	-4.02	-2.90	14.53
Total		1,671,098	-0.17	0.00	8.92

Vast majority of sample. Small mean-zero tariff changes.

Approach #1: statutory regime changes

- Assign *jgt*'s to statutory policy regimes: **MFN**, Non-Normal Trade Relations (**NNTR**), Preferential Trade Agreement (**PTA**), Unilateral Trade Preference Program (**UTPP**)
- Compare policy and trade dynamics within vs. across regimes

Small fraction of sample. Large tariff cuts/hikes.

From	To	N # *jgt*	Mean (p.p.)	Median (p.p.)	Std. dev. (p.p.)
(a) Within					
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Across-regime tariff changes are more persistent

$$\Delta_h \tau_{jgt} = \beta_h^W \Delta_0 \tau_{jgt} \text{Within}_{jgt} + \beta_h^A \Delta_0 \tau_{jgt} \text{Across}_{jgt} + \Delta_0 \tau_{jg,t-1} + \delta_{jt} + \delta_{gt} + u_{jgt}$$

- Tariff-change autocorrelation, conditioning on regime switches
  - $\text{Within}_{jgt} = \mathbb{1}_{\{\text{regime}_{jgt} = \text{regime}_{jgt-1}\}}$
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- $\Delta_0 \tau_{jg,t-1}$ controls for pre-trends in tariff changes.

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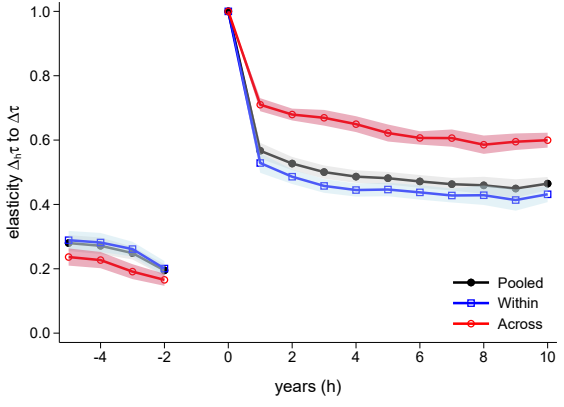

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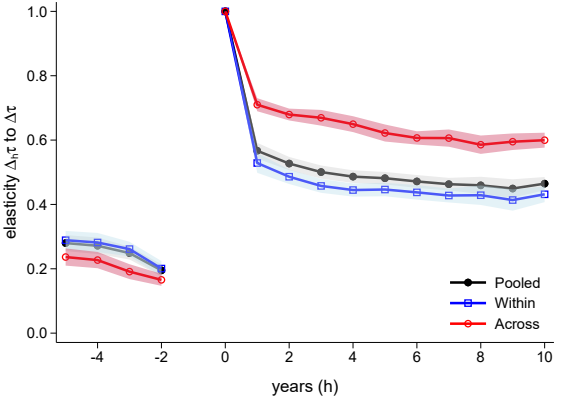
- $\beta_h^W \approx$ pooled β_h because sample mostly comprised of within-regime obs



Across-regime tariff changes have higher trade elasticities

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- Follow approach in Boehm et al. (2023)
- Use $\Delta_0 \tau$ as IV for $\Delta_h \tau$
  - IRF to tariff shock at $h = 0$
  - Incorporate across vs. within differences in tariff autocorrelation
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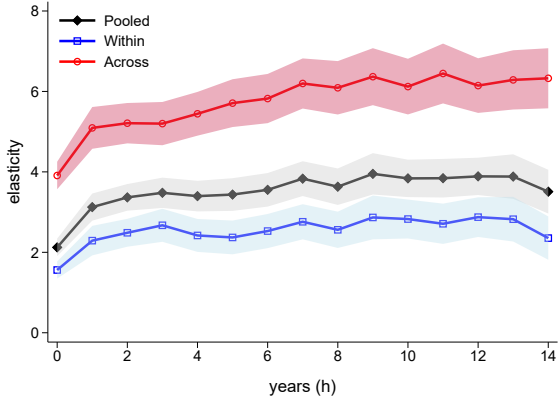

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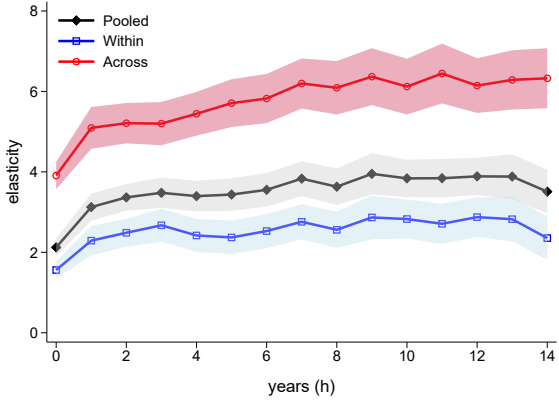
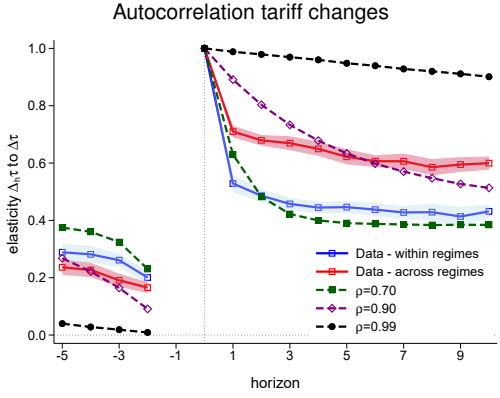
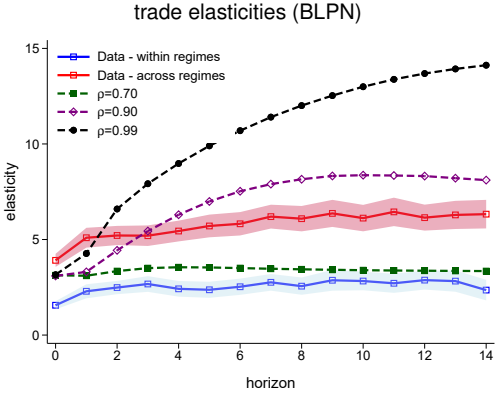


[Tariff] [Specification] [Sample] [Pre-Trends]

Recall Experiment # 1: trade elasticity dynamics w/Markov transitions.

- Simulate 1,000 goods for 1,000 periods, each good receives idiosyncratic tariff changes
- Consider how trade elasticities depend on tariff change transition probabilities
- Eye-ball: within-regime transition $\approx \rho = 0.70$, across $\approx \rho = 0.90$.





Approach #2: Case studies of China & Vietnam

- Same observed policy trajectory: embargo → **NNTR** → **MFN**
- Ex post, “most canonical” reforms in US trade history. Ex ante, lots of uncertainty.
- Clearly-defined policy risk, no phase-in, embargo start allow for clean quantitative analysis

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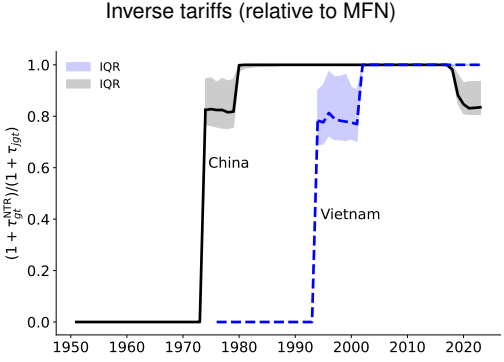

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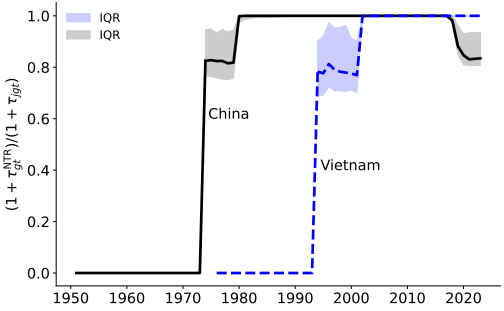
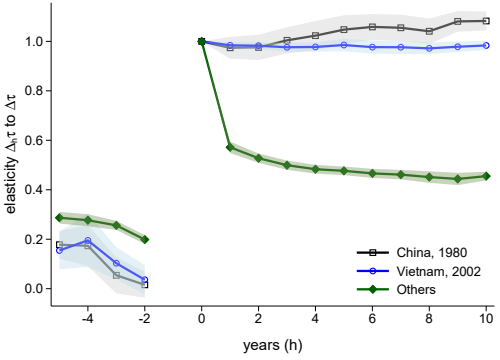
Inverse tariffs (relative to MFN)



Tariff-change autocorrelation



CHN & VNM have higher trade elasticities than other countries

$$\Delta_h x_{jgt} = -\beta_h^{\text{CHN}} \Delta_h \tau_{jgt} \mathbb{1}_{\{j=\text{CHN}\}} - \beta_h^{\text{VNM}} \Delta_h \tau_{jgt} \mathbb{1}_{\{j=\text{VNM}\}} - \beta_h^{\text{OTH}} \Delta_h \tau_{jgt} \mathbb{1}_{\{j=\text{Other}\}} + \delta_{jt} + \delta_{gt} + u_{jgt}$$

- Condition on countries instead of regime changes
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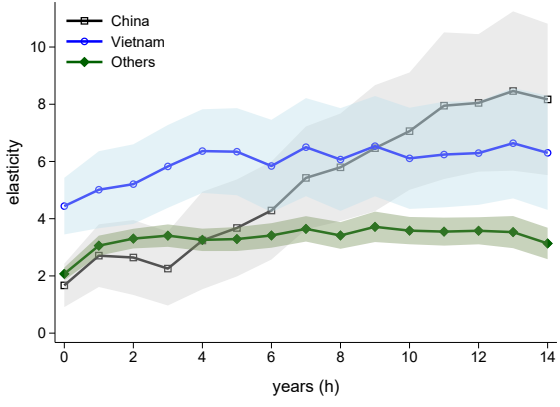

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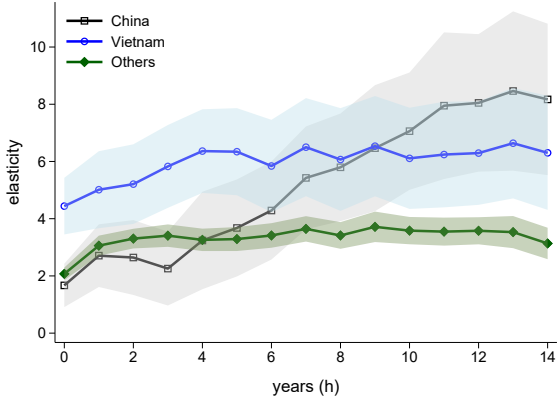
- Short run: CHN similar to other countries but VNM higher (and similar to typical regime change)



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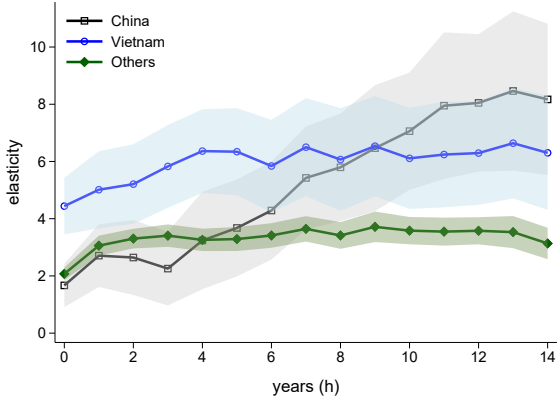

Event-study to MFN access shows even higher elasticities

$$v_{jgt} = \sum_{t'=1974}^{2008} \beta_{\mathbf{t}}^{\text{CHN}} \mathbb{1}_{\{t=t' \wedge j=\text{CHN}\}} X_g + \sum_{t'=1994}^{2017} \beta_t^{\text{VNM}} \mathbb{1}_{\{t=t' \wedge j=\text{VNM}\}} X_g + \delta_{jt} + \delta_{jg} + \delta_{gt} + u_{jgt}.$$

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  - $X_g = \log(1 + \tau_{g,1999}^{NNTR} - \tau_{g,1999}^{MFN})$

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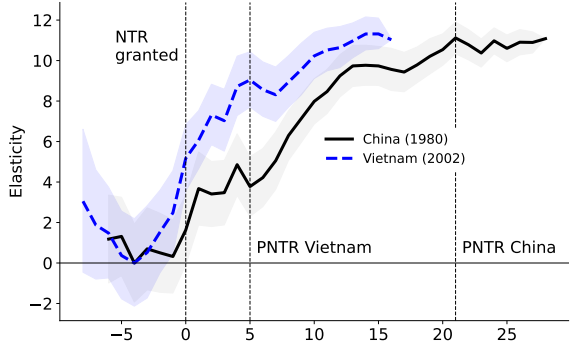

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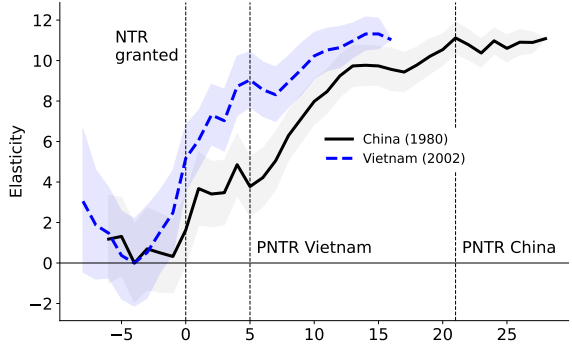

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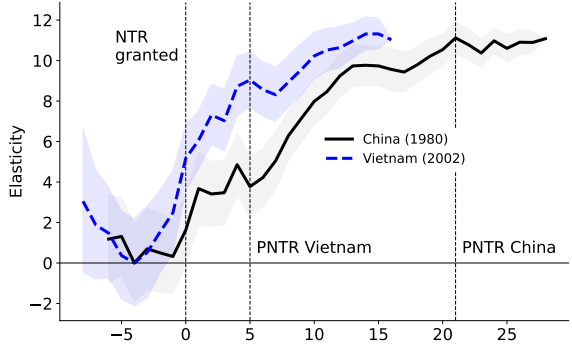
- Similar pre-MFN elasticities, but VNM's starts rising several years before MFN access



[Reconcile] [Gap measure] [Sample] [Anticipation]

Takeaways

- Rare, persistent tariff changes have very high LR trade elasticities
  - Often occur during statutory regime switches
  - Certain regime switches (e.g. PTAs and Vietnam's NTR access) have somewhat higher SR elasticities. Consistent with anticipation.
- Frequent, transitory tariff changes have small elasticities, especially in LR
  - Mostly within-NTR changes
  - Constitute vast majority of overall sample
  - Inappropriate for analyzing major reforms

Roadmap

1. Model
2. Numerical Experiments
3. Empirical Evidence
4. Calibration + recover structural elasticity

Overview of quantitative approach

- Leverage China & Vietnam case studies using Alessandria et al. (2024) methodology
- Model overview
  - Many goods $g = 1, \ldots, G$ with tariffs $\tau_{gt}(s)$ that depend on trade-policy state s
  - Two states: NNTR ($s = 0$) and MFN ($s = 1$)
  - Time-varying stochastic process $\{\omega_t(s, s')\}_{t=0}^{\infty}$

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- Estimate trade technology to match modern-day steady state
  - Key input: exporter-level panel data

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- Estimate trade technology to match modern-day steady state
  - Key input: exporter-level panel data
- Estimate ω_t to match transition from embargo
  - Key input: NNTR gap elasticity
- Use calibrated model to conduct canonical reform, measure long-run trade elasticity

Step #1: Calibrate steady state to firm-level trade dynamics

- For each country, use firm-level panel data to compute facts about cross-sectional distribution and life-cycle dynamics of export participation
- Calibrate production & trade technologies so that PNTR steady state matches these facts

Country	Targets				Parameters			
	Export part. (%)	Exit rate (%)	Incumbent prem.	Log CV exports	f_0	f_1	ξ_H	σ_z
China	28	11	2.9	2.27	0.73	0.342	3.92	1.50
Vietnam	11	15	4.41	2.91	1.57	0.657	5.89	1.69

- Note: Assign demand elasticity θ externally based on Soderberry (2018) estimates
  - Reminder: $\theta =$ canonical SR elasticity
  - Same as measured SR elasticity in experiments, except with anticipation shocks
  - Works for China & Vietnam, even though latter has higher measured SR elasticity

[Assigned Parameters]

Step #2: Calibrate transition to aggregate trade dynamics

- Calibrate policy process to match elasticity of trade to NNTR gap
  - Pre-MFN dynamics identify $\omega_t(\mathit{NNTR}, \mathit{MFN})$
  - Post-MFN dynamics identify $\omega_t(\mathit{MFN}, \mathit{NNTR})$

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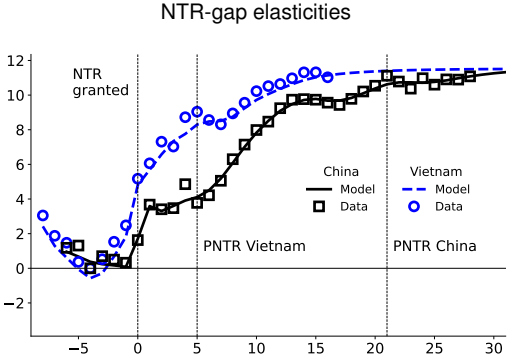

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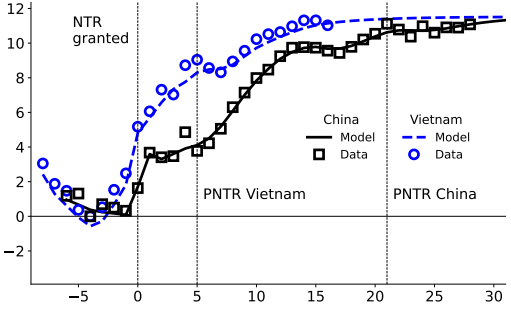
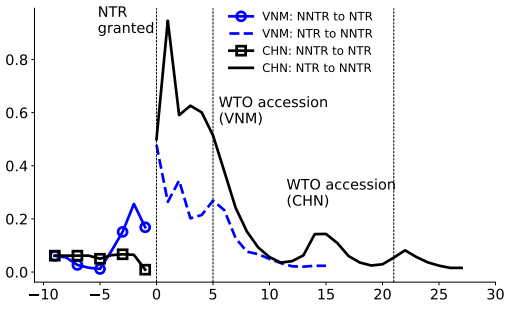
NTR-gap elasticities



Estimated probabilities



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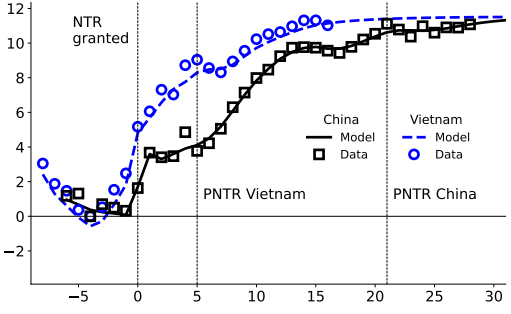

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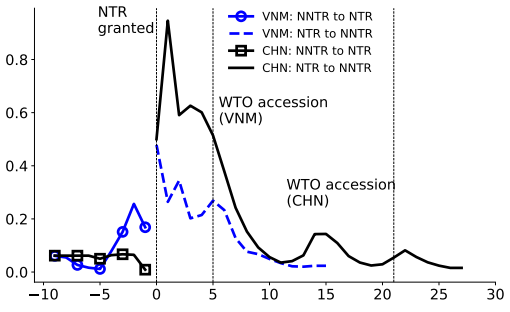
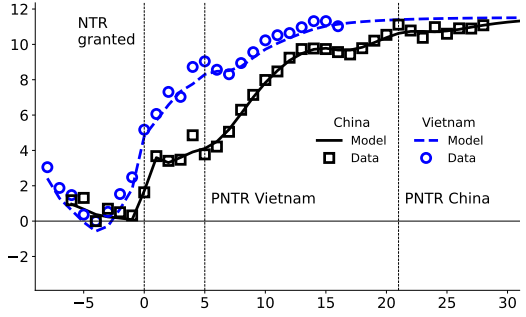


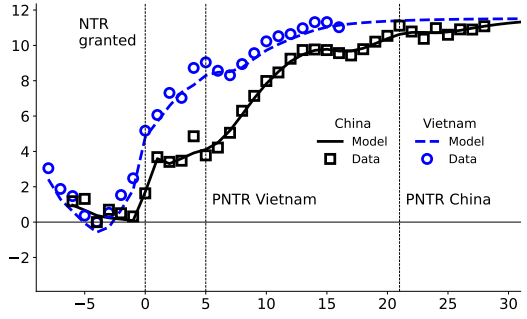
- Observed SR elast biased ↑ for Vietnam due to $P(NTR)$ ↑ during NNTR period

Step #3: Measure canonical LR elasticities



Step #3: Measure canonical LR elasticities

- Start in NNTR steady state. Switch to MFN unanticipated + permanent.



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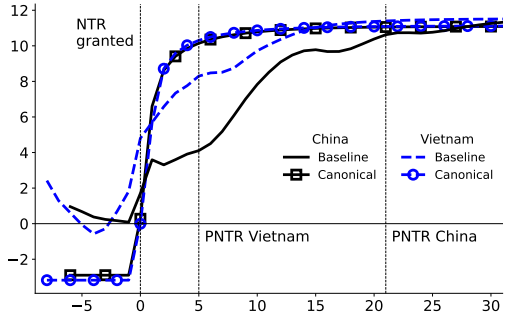
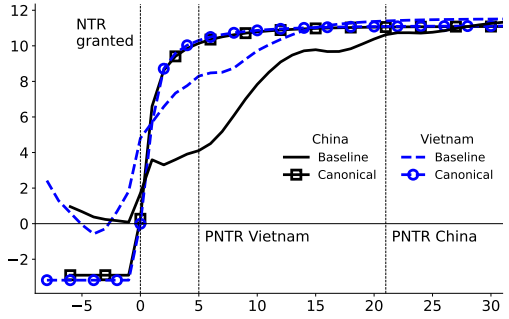


Step #3: Measure canonical LR elasticities

- Start in NNTR steady state. Switch to MFN unanticipated + permanent.
- Measure canonical LR elasticity as SS-to-SS change in NNTR-gap elasticity
  - China: -14.8
  - Vietnam: -15.3
  - $\sim$35% larger than observed (-11)



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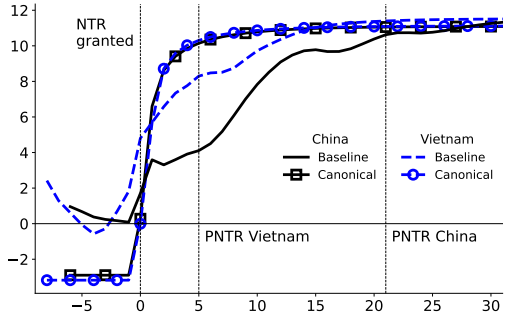
  - Vietnam: -15.3
  - $\sim$35% larger than observed (-11)
- Observed LR elast biased $\downarrow$
  - $P(NTR) > 0$ before NTR grant
  - $P(NNTR) > 0$ after (even post-WTO)



Robustness to embargo lifting and the role of *jt* fixed effects

- So far we have abstracted from the earlier (much bigger) reform: the embargo lifting
  - China in 1971, Vietnam in 1994
- Empirically control for growth following the embargo using *jt* fixed effects

Robustness to embargo lifting and the role of *jt* fixed effects

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- Empirically control for growth following the embargo using *jt* fixed effects
- But *jt* fixed effects contain valuable information!
  - They capture aggregate supply factors & the adjustment to the embargo lifting.
  - Low(zero)-gap goods are only exposed to the risk of returning to embargo.

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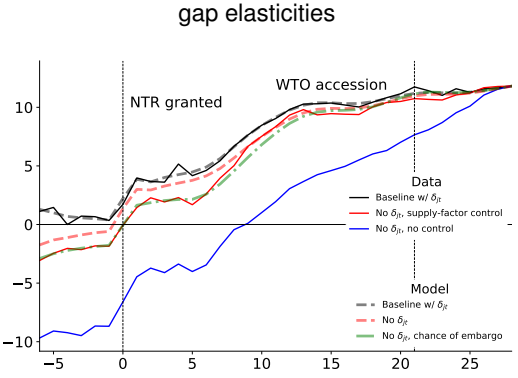
- But *jt* fixed effects contain valuable information!
  - They capture aggregate supply factors & the adjustment to the embargo lifting.
  - Low(zero)-gap goods are only exposed to the risk of returning to embargo.
- To allow for the embargo lifting effects while controlling for aggregate supply factors we estimate the gap-elasticities as follows:

$$v_{jgt}/AS_{jt} = \sum_{t'=1974}^{2008} \beta_{\mathbf{t}}^{\text{CHN}} \mathbb{1}_{\{t=t' \wedge j=\text{CHN}\}} X_g + \sum_{t'=1994}^{2017} \beta_t^{\text{VNM}} \mathbb{1}_{\{t=t' \wedge j=\text{VNM}\}} X_g + \delta_{jg} + \delta_{gt} + u_{jgt}.$$

where AS_{jt} measures aggregate supply factors as total exports excluding to the US.

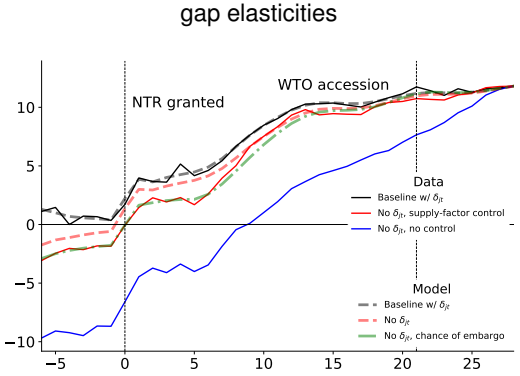
Gap-elasticities with (only) aggregate supply factor controls

- Without *jt* fixed effects, gap-elasticities drop sharply (blue)
- With aggregate supply factors (red), gap-elasticities move close to baseline (black)
- Remaining difference larger earlier on



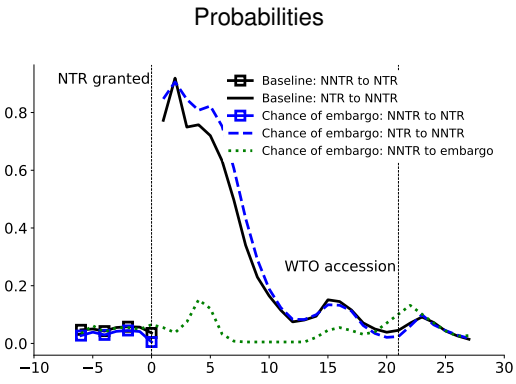
Gap-elasticities also infer likelihood of embargo return

- Extend model with embargo regime and include transition NNTR → Embargo
- Match gap-elasticities with and without *jt* fixed effects to estimate this probability



Gap-elasticities also infer likelihood of embargo return

- Extend model with embargo regime and include transition NNTR → Embargo
- Match gap-elasticities with and without *jt* fixed effects to estimate this probability
- Does not change our baseline probabilities!
- Embargo probability non-zero, higher early 1980s and at WTO accession



Summary & parting thoughts

- Empirical evidence on more-canonical vs. less-canonical reforms
  - Most reforms occur within tariff regimes. Transitory, with low LR trade elasticities.
  - Regime changes rare but persistent. Higher LR elasticities. Also higher SR elasticities, likely due to anticipation.
  - Most canonical: China & Vietnam MFN access. Very high LR elasticities. Differences in SR due to differences in anticipation.
- Recover canonical elasticity path using quantitative model
  - Estimate expectations for China & Vietnam by matching reduced-form evidence
  - Use calibrated model to conduct canonical reform. LR trade elasticity ≈ 14.
- Policy implications:
  - Trade adjustment takes time
  - Credibility matters to obtain full benefits of reforms

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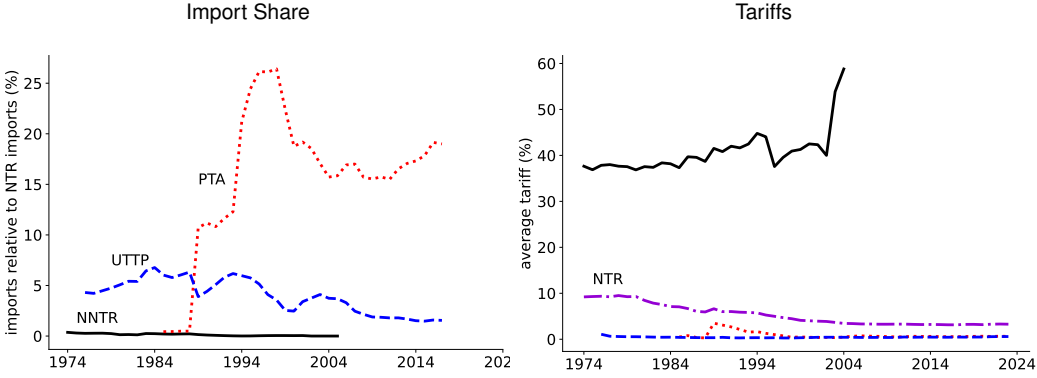
Alessandria, George, Horag Choi, and Kim J. Ruhl, "Trade Adjustment Dynamics and the Welfare Gains from Trade," *Journal of International Economics*, 2021, *131*, 1034–1058.

Boehm, Christoph, Andrei Levchenko, and Nitya Pandalai-Nayar, "The Long and Short (Run) of Trade Elasticities," *American Economic Review*, 2023, *113(4)*, 861–905.

Soderbery, Anson, "Trade Elasticities, Heterogeneity, and Optimal Tariffs," *Journal of International Economics*, 2018, *114*, 44–62.

Appendix

Imports and Tariffs by Regime (each year)



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Top five country-year transitions across regimes

From	To	*jg* (# *g*)
NTR	NNTR	PLD-1983 (232), PLD-1984 (78), PLD-1985 (43), AFG-1986 (46), ROU-1989 (119)
NTR	PTA	CAN-1989 (889), MEX-1994 (387), KOR-2012 (325), AUS-2005 (241), ISR-1986 (203)
NTR	UTPP	TWN-1976 (280), HKG-1976 (214), ISR-1976 (204), KOR-1976 (189), BRA-1976 (177)
NNTR	NTR	CHN-1980 (273), VNM-2002 (347), PLD-1989 (253), USSR-1992 (226), USSR-1993 (215)
NNTR	UTPP	ROU-1994 (32), CZE-1992 (31), CZE-1991 (28), BGR-1992 (26), PLD-1990 (23)
PTA	NTR	CAN-1999 (205), MEX-1999 (179), ISR-1999 (165), AUS-2009 (135)
UTPP	NTR	KOR-1989 (403), TWM-1989 (400), HKG-1989 (265), MYS-1997 (262), PRT-1986 (214)
UTPP	NNTR	ROU-1989 (7), ROU-1990 (6), ROU-1992 (5), ROU-1993 (5), YUG-1996 (5)
UTPP	PTA	ISR-1985 (354), MEX-1994 (342), PER-2007 (241), COL-2001 (229), DOM-2007 (176)

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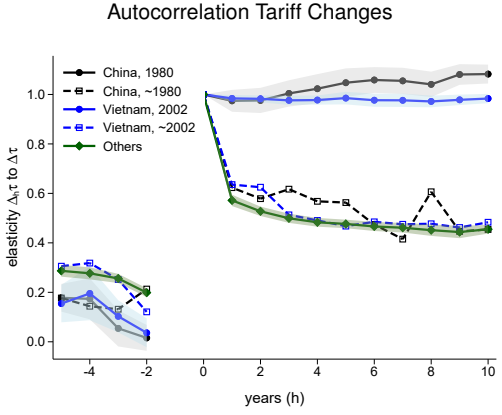
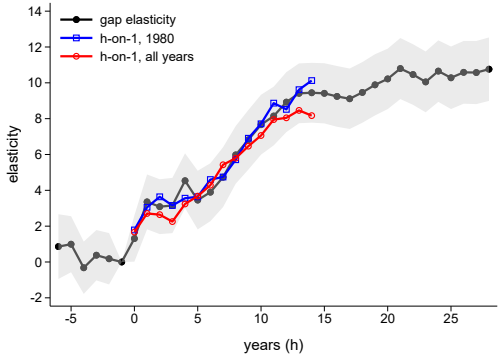
Empirical trade elasticity - Reconciling specifications

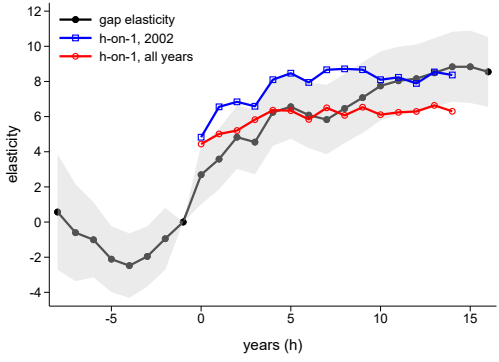


Empirical trade elasticity - Reconciling specifications

China



Vietnam



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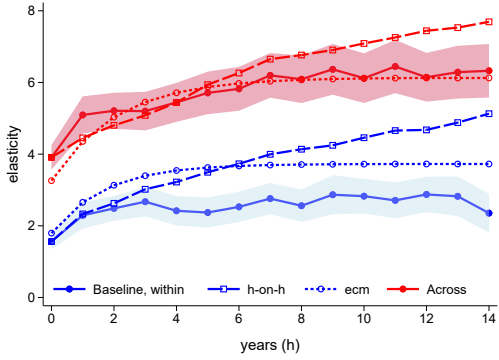
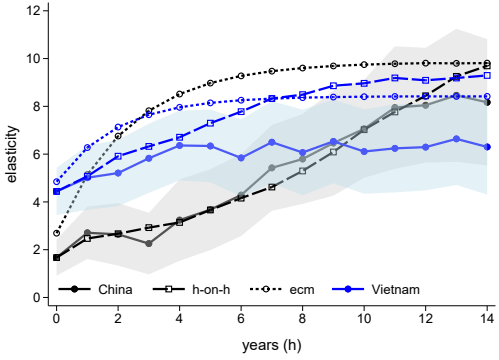
Robustness: specification

(a) Across vs. within-regime



(b) China & Vietnam



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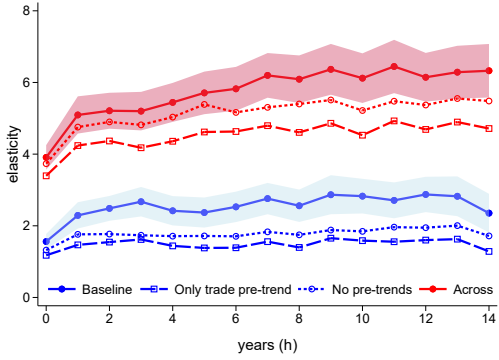
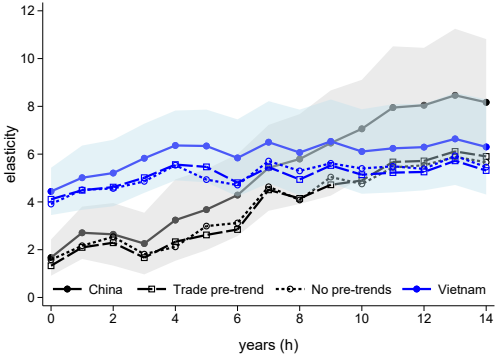
Robustness: pre-trends

(a) Across vs. within-regime



(b) China & Vietnam



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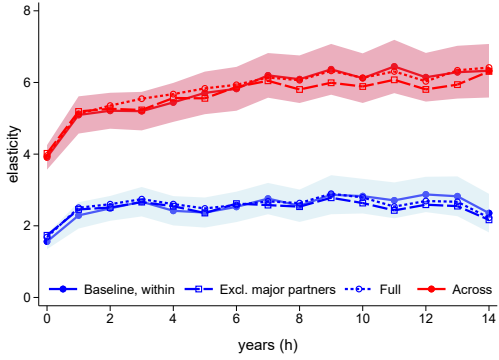
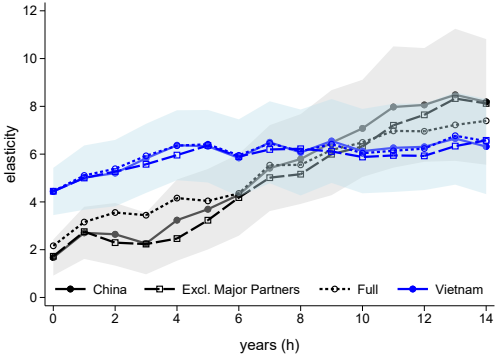
Robustness: sample design

(a) Across vs. within-regime



(b) China & Vietnam



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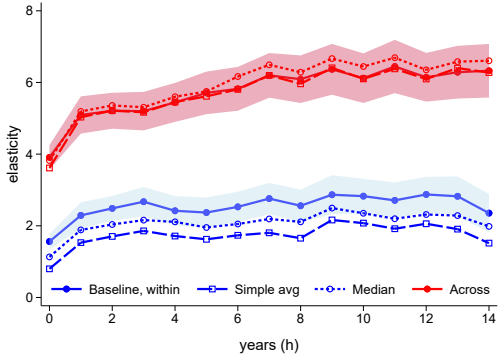
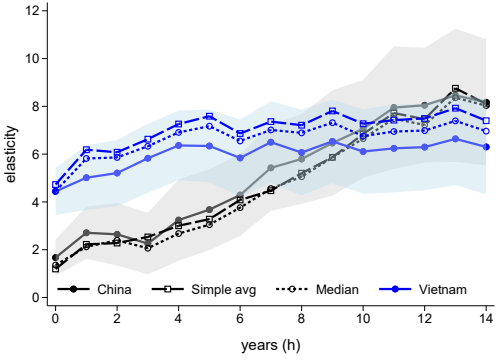
Robustness: tariff measure

(a) Across vs. within-regime



(b) China & Vietnam



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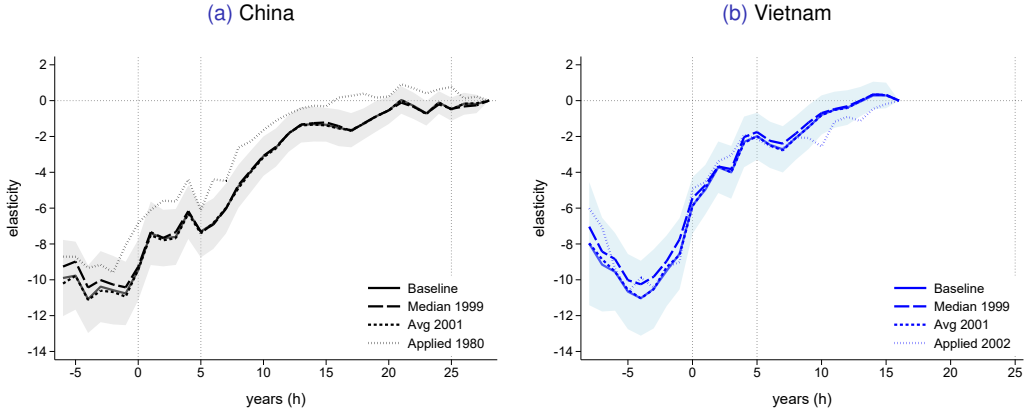
Robustness gap-elasticities: Gap measure



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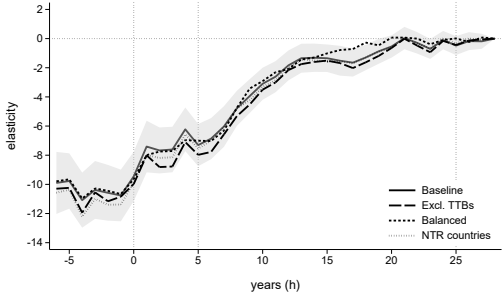
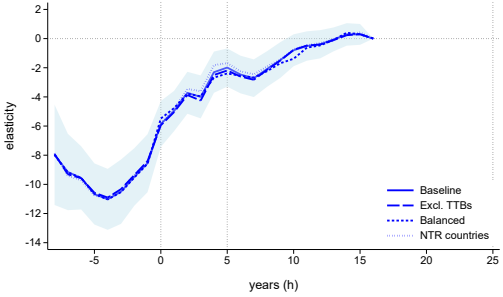
Robustness gap-elasticities: Sample

(a) China



(b) Vietnam



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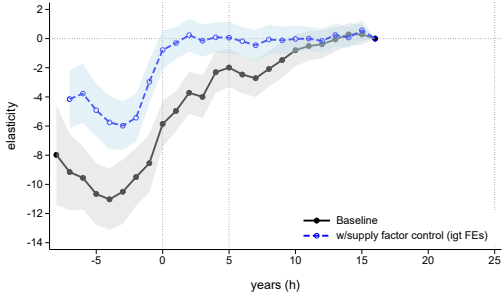
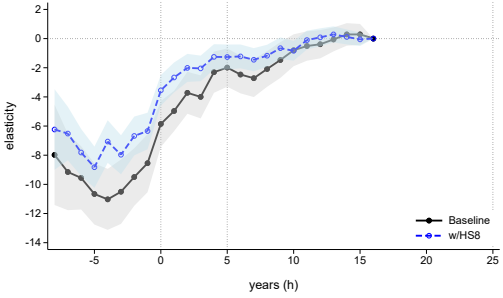
Robustness gap-elasticities Vietnam

(a) Supply factors



(b) Product aggregation



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Assigned Parameters

	Parameter	Value	Target/Source
θ	Demand elasticity	3.17	Soderbery (2018)
r	Interest rate	0.04	Common Value
δ_0	Constant exit rate	21	Alessandria et al. (2021)
δ_1	Elasticity of exit to productivity	0.02	Alessandria et al. (2021)
ρ_ξ	Trade cost transition persistence	0.92	Alessandria et al. (2021)

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