

Recovering Credible Trade Elasticities from Incredible Trade Reforms

Alessandria, Khan, Khederlarian, Ruhl, and Steinberg

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Intro

- ▶ Unifying question: How much does trade change when policy changes?
- ▶ Trade elasticity: most important concept in int'l econ?
- ▶ Reduced form estimates: vary widely across time horizons & contexts
- ▶ Standard interpretation: response to unanticipated, once-and-for-all (“**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

Non-canonical reforms

Anticipation (PTA phaseouts)

Uncertainty (Brexit, Lib-Day)

+

Dynamic trade theory

Forward-looking export participation decisions due to front-loaded costs, back-loaded returns

Δ trade depends on observed policy + **expectations**

- ⇒ Same policy change leads to different trade responses under different expectations
- ⇒ Trade responds to changes in expectations even when policy doesn't change
- ⇒ **Trade responds more to large expected future tariff changes than small ones**

Main questions

1. How canonical is the typical trade reform? Which reforms are most/least canonical?
2. Do trade elasticity estimates differ across reform types?
 - ▶ How big are the differences?
 - ▶ Are the differences related to “canonicalness”?
3. **Can we recover canonical elasticities from non-canonical policy changes?**

Related Literature

► Strands:

- Trade elasticity (data): Head-Ries (07), Romalis (07), Baier-Bergstrand (07,14), Hummels-Schaur (10,2013), Hilberry-Hummels (13), Simonovoska-Waugh (14), Caliendo-Paro (15), Soderberry (15, 18), Yilmazkuday (19), Anderson-Yotov (20), Khan-Khederlarian (21), Boehm et al. (23)
- Trade dynamics (models): Baldwin-Krugman (89), Das et al. (07), Alessandria-Choi (07, 14ab), Ruhl-Willis (17), Alessandria et al. (21), Steinberg (23), Fitzgerald et al., (24)
- 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 & policy dynamics
- Some reforms “more canonical” than others. Estimates from “less canonical” reforms lack external validity.
- Need model to disentangle effects of past reforms vs. policy dynamics.
- 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

- ▶ Partial equilibrium version of Alessandria, Choi & 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, iceberg trade cost
 - ▶ Pay sunk cost to export next period, smaller fixed cost to continue
 - ▶ New exporters start with high iceberg trade cost
 - ▶ Longer tenure as exporter \Rightarrow greater chance of low iceberg cost
- ▶ Trade policy shocks
 - ▶ Current tariffs (τ)
 - ▶ Expectations about future tariffs ($\mathbb{E}\tau'$)

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):

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

- ▶ Given (z, ξ, τ) , choose p, ℓ to max flow profits

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

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 $f_0 := f(\infty)$, start with ξ_H
 - ▶ Continuing exporters: pay $f_1 := f(\xi_H) = f(\xi_L)$, switch iceberg cost 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:

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

- ▶ Per-firm sales (pd) depend on current tariffs
- ▶ Distribution (φ) depends on τ process: past realizations & expectations
- ▶ Mapping to structural trade elasticities:
 - ▶ SR response to *unanticipated* reform: demand elasticity = θ
 - ▶ LR response to *permanent* reform: $> \theta$, increasing in ξ_H/ξ_L and ρ_ξ

Roadmap

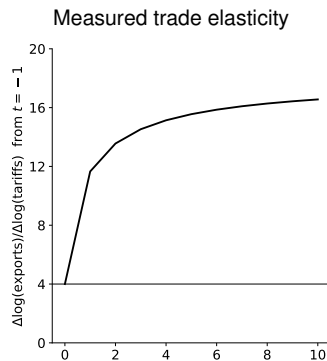
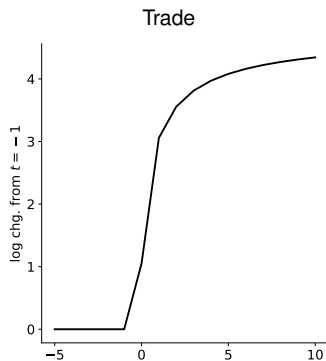
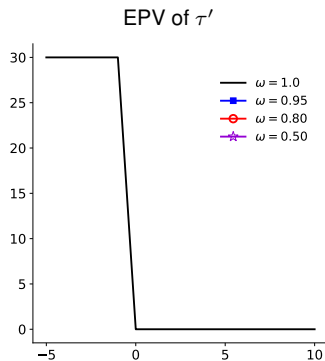
1. Model
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Experiment #1: persistent vs. transitory shocks

- ▶ Two-state Markov process: high vs. low tariffs, switching probability $1 - \omega$
- ▶ Start with τ_H for $t = -\infty, \dots, -1$, then switch to τ_L for $t = 0, \dots, \infty$

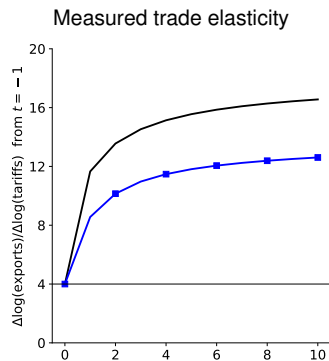
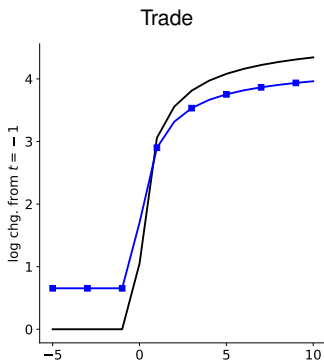
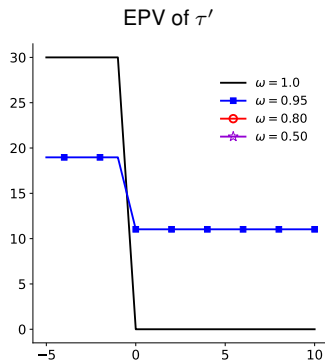
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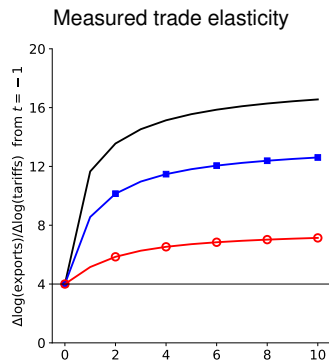
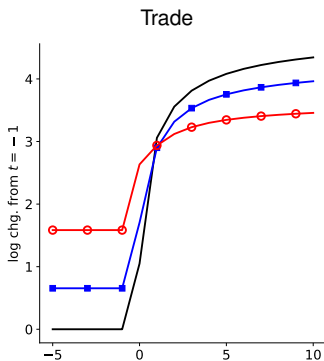
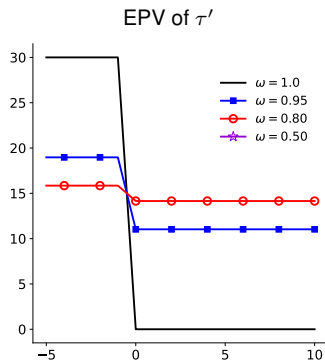
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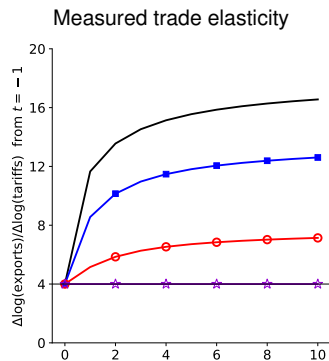
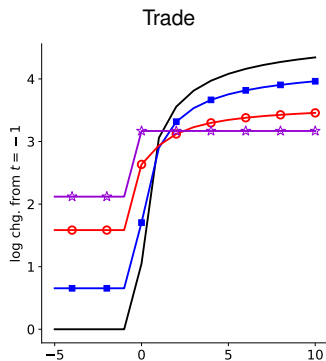
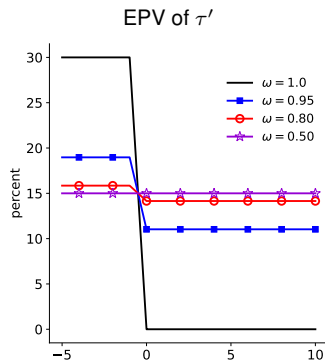
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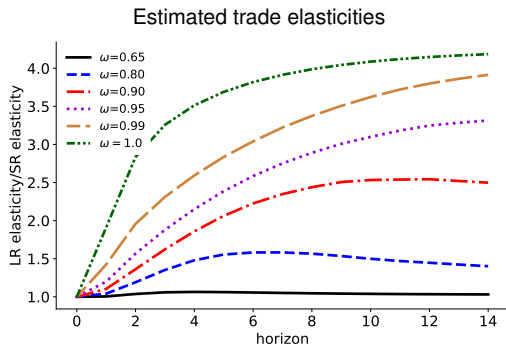
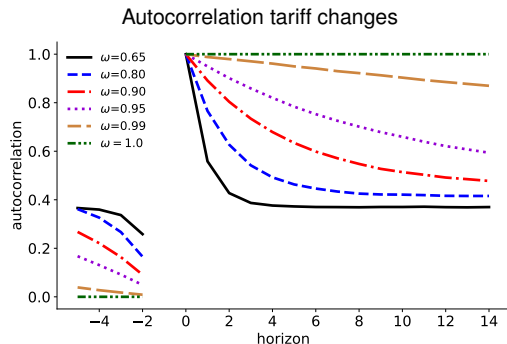
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Experiment #1: persistent vs. transitory shocks, continued

- ▶ 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)

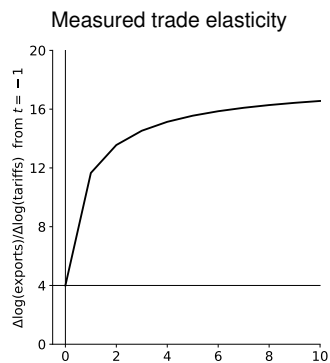
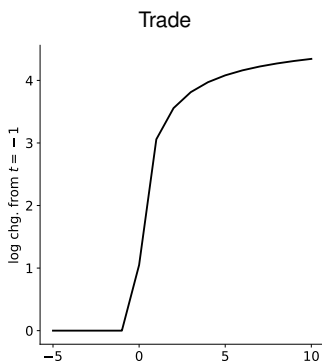
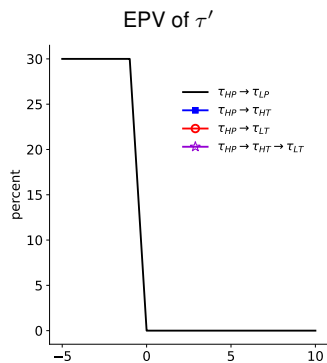


Experiment #2: shocks to expectations

- ▶ Four-state Markov process: $[\tau_H, \tau_L] \times [\omega_P, \omega_T]$

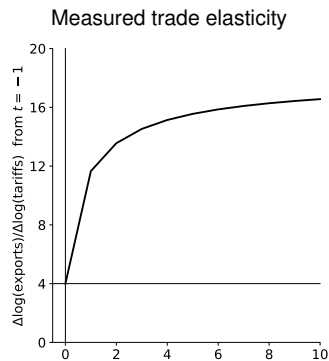
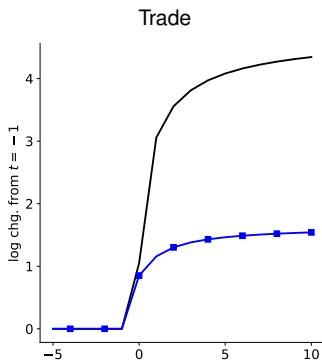
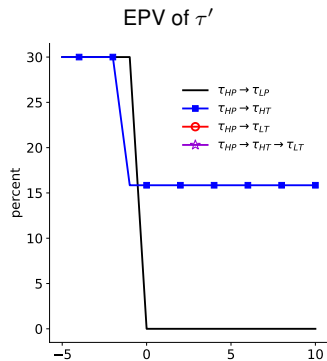
Experiment #2: shocks to expectations

- ▶ Four-state Markov process: $[\tau_H, \tau_L] \times [\omega_P, \omega_T]$
- ▶ $\tau_{HP} \rightarrow \tau_{LP}$: \downarrow tariffs only



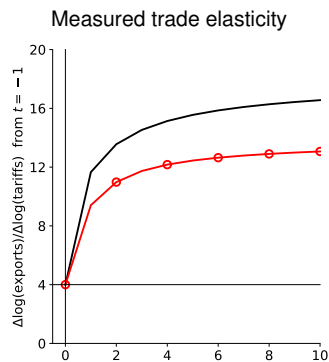
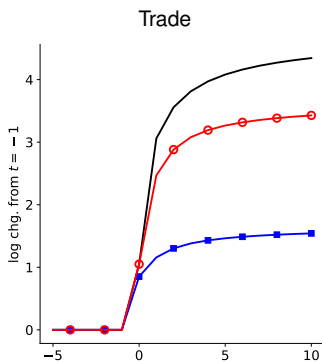
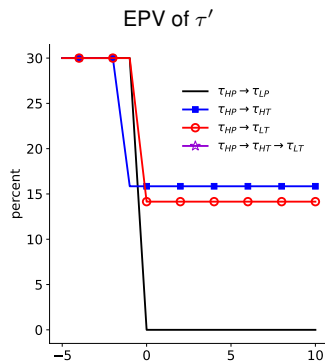
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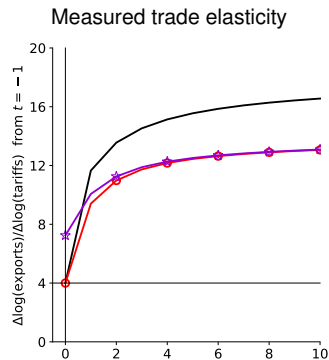
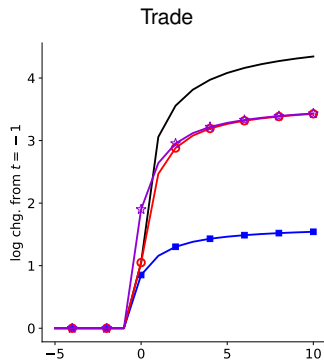
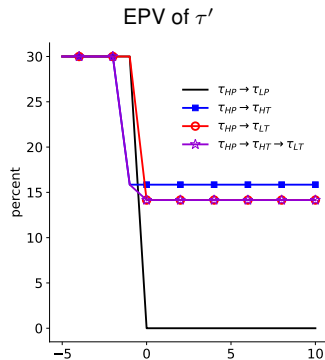
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- ▶ $\tau_{HP} \rightarrow \tau_{LT}$: simultaneous \downarrow in tariffs and persistence in $t = 0$



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- ▶ $\tau_{HP} \rightarrow \tau_{HT}$: \downarrow persistence only
- ▶ $\tau_{HP} \rightarrow \tau_{LT}$: simultaneous \downarrow in tariffs and persistence in $t = 0$
- ▶ $\tau_{HP} \rightarrow \tau_{HT} \rightarrow \tau_{LT}$: \downarrow persistence in $t = -1$, then \downarrow tariffs in $t = 0$



Roadmap

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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 MFN grant, NAFTA, GATT rounds, 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, etc.

Within vs. Statutory tariff regimes

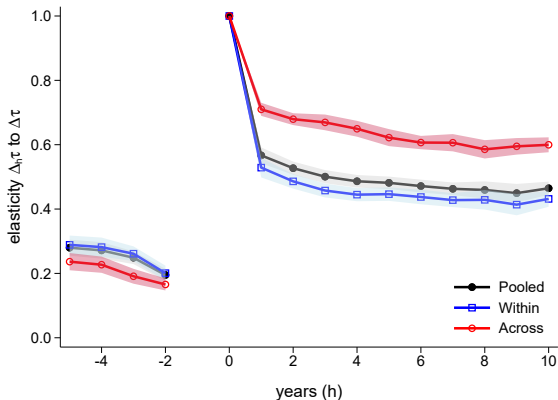
- ▶ **MFN:** Most Favored Nation a.k.a. Normal Trade Relations
- ▶ **NNTR:** Non-Normal Trade Relations
- ▶ **PTA:** Preferential Trade Agreement
- ▶ **UTPP:** Unilateral Trade Preference Program

From	To	N # <i>jgt</i>	Mean (p.p.)	Median (p.p.)	Std. dev. (p.p.)
<i>(a) Within</i>					
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
<i>(b) Across</i>					
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

Across-regime tariff changes are more persistent

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

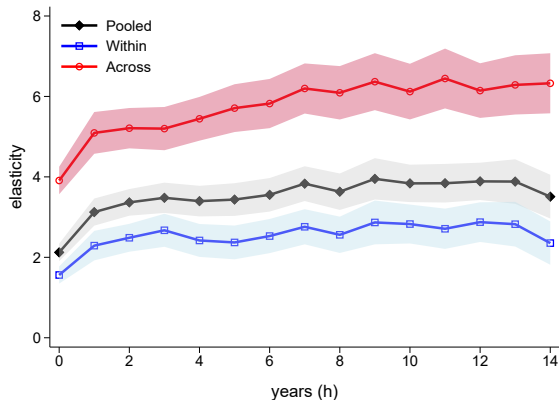
- ▶ Tariff-change autocorrelation, conditioning on regime switches
 - ▶ $\text{Within}_{jgt} = \mathbb{1}\{\text{regime}_{jgt} = \text{regime}_{jgt-1}\}$
 - ▶ $\text{Across}_{jgt} = \mathbb{1}\{\text{regime}_{jgt} \neq \text{regime}_{jgt-1}\}$
- ▶ δ_{gt} : common variation across countries, e.g. GATT rounds. Bigger differences when excluded.
- ▶ $\Delta_0 \tau_{jg,t-1}$ controls for pre-trends in tariff changes.
- ▶ $\beta_h^W \approx$ pooled β_h because sample mostly comprised of within-regime obs



Across-regime tariff changes have higher trade elasticities

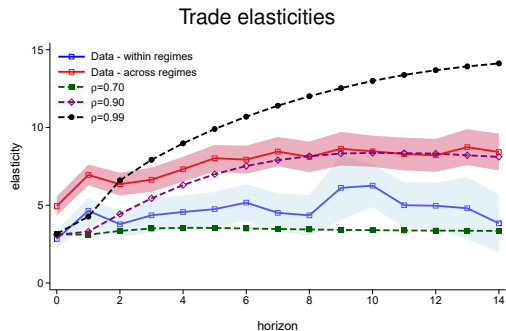
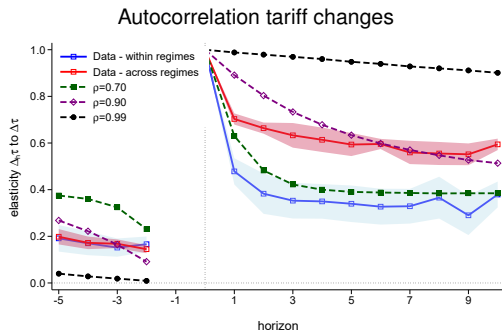
$$\Delta_h X_{jgt} = -\beta_h^W \Delta_h \tau_{jgt} \text{Within}_{jgt} - \beta_h^A \Delta_h \tau_{jgt} \text{Across}_{jgt} + Z_{jgt} + \delta_{jt} + \delta_{gt} + u_{jgt}.$$

- ▶ 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
- ▶ δ_{jt} : bilateral exchange-rate movements, exporter business cycles
- ▶ δ_{gt} : good-specific demand shocks, multilateral policy changes
- ▶ Z_{jgt} is vector of pre-trend controls
- ▶ Again, $\beta_h^W \approx$ pooled β_h



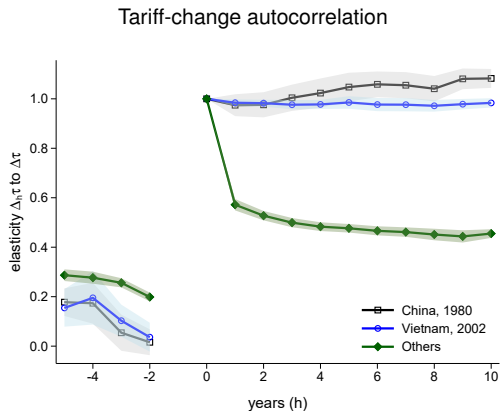
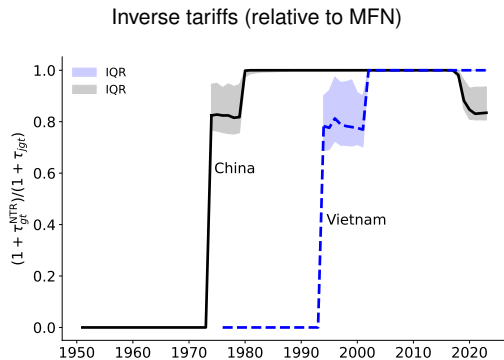
Recall Experiment # 1: persistent vs. transitory reforms

- ▶ 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 $\approx \rho = 0.90$.



Case studies: China & Vietnam NTR grants

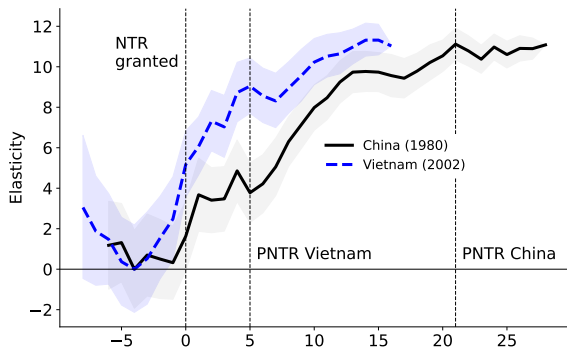
- ▶ Same observed policy trajectory: embargo → NNTR → MFN
- ▶ Ex post, “most canonical” reforms in US trade history. Ex ante, lots of uncertainty.
- ▶ Clearly-defined policy risk, no phase-in, embargo start allow for clean quantitative analysis



Case studies: larger trade elasticities than average regime change

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

- ▶ Elasticity of trade to gap between NNTR and MFN tariffs (“NNTR gap”):
 - ▶ $X_g = \log(1 + \tau_{g,1999}^{\text{NNTR}} - \tau_{g,1999}^{\text{MFN}})$
- ▶ Dual meaning: tariff reduction upon MFN access, but also exposure to risk of losing that access
- ▶ Similar LR elasticities, substantially larger than country averages and for average regime change
- ▶ Similar pre-MFN elasticities, but VNM’s starts rising several years before MFN access



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Overview of quantitative approach

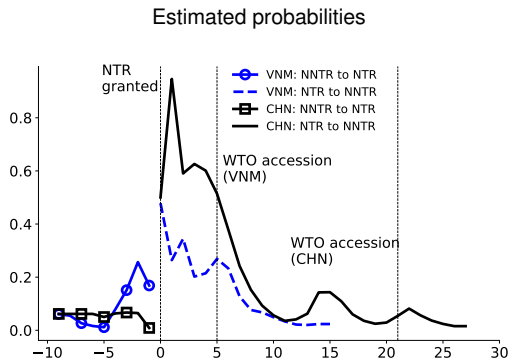
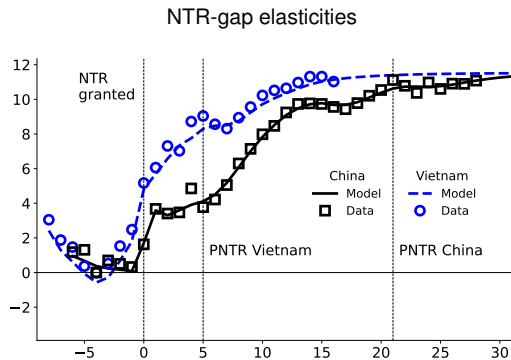
- ▶ Leverage China & Vietnam case studies using our AKKRS (24,25) methodology
 - ▶ Estimate tariff expectations from trade dynamics by leveraging common transition probability with product-specific tariff gaps.
- ▶ Model overview
 - ▶ Many goods $g = 1, \dots, G$ with tariffs $\tau_{gt}(s)$ that depend on trade-policy state s
 - ▶ Two states: NNTR ($s = 0$) and MFN ($s = 1$)
 - ▶ Time-varying stochastic process $\{\omega_t(s, s')\}_{t=0}^{\infty}$
- ▶ Calibrate trade technology to firm-level data moments
- ▶ Calibrate $\{\omega_t\}_{t=0}^{\infty}$ to match trade elasticity dynamics from event study
- ▶ Use calibrated model to conduct canonical reform, measure long-run trade elasticity

Inner step: calibrate trade technology to firm-level data

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

- ▶ Challenge: Firm-level data reflect transition dynamics and policy uncertainty
 - ▶ Technological params and policy transition probs not separately identified
 - ▶ Redo this step every time we update $\{\omega_t\}_{t=0}^{\infty}$
- ▶ Note: Assign demand elasticity θ externally based on Soderberry (2018) estimates
 - ▶ Reminder: θ = 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

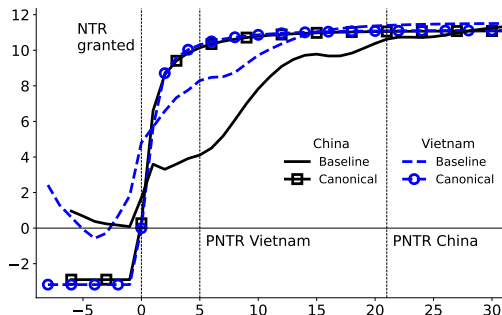
Outer step: Calibrate policy probs to event study



- ▶ Pre-MFN dynamics identify $\omega_t(NNTR, MFN)$
 - ▶ Chance of gaining MFN makes exporters of high-gap goods more likely to enter
- ▶ Post-MFN dynamics identify $\omega_t(MFN, NNTR)$
 - ▶ Chance of losing MFN access makes exporters of high-gap goods less likely to enter

Measuring canonical LR elasticities

- ▶ Canonical reform:
 - ▶ Start in NNTR steady state
 - ▶ Switch to MFN unantic, permanent
- ▶ Measure canonical LR elasticity as SS-to-SS change in NNTR-gap elasticity
 - ▶ China: -14.0
 - ▶ Vietnam: -14.3
 - ▶ ~25% larger than observed changes



- ▶ Why observed LR elast biased downward?
 - ▶ $\omega_t(NNTR, MFN) > 0$: Boosts trade in high-gap goods before reform occurs
 - ▶ $\omega_t(MFN, NNTR) > 0$ after (even post-WTO): High-gap goods respond less to reform
- ▶ Vietnam's observed SR elast biased \uparrow due to rising $\omega_t(NNTR, MFN)$

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 .
- ▶ Trump 2.0 = bittersweet vindication of our perspective
 - ▶ Now clear that trade policy (even PTAs) less credible than many people realized
 - ▶ Well-defined structure of US trade policy we exploited gone forever?
 - ▶ Steinberg (2025): Ambiguity about distribution of potential tariff changes

References

- 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: Estimating trade elasticities with AI

Can AI circumvent the Lucas Critique?

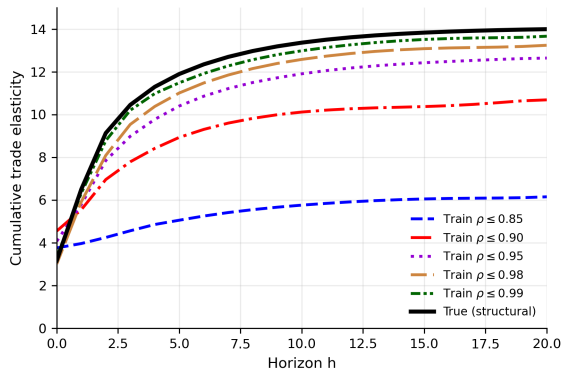
- ▶ Can AI models learn structural relationships from historical data and extrapolate correctly to novel policy changes?
- ▶ Simulated data from our model provide a controlled testbed
 - ▶ Know the true structural (canonical) trade elasticity path
 - ▶ Can simulate data from non-canonical reforms with known ρ
 - ▶ Ask: can an AI model trained *only* on non-canonical data ($\omega < 1$) recover the canonical ($\omega = 1$) elasticity?
- ▶ Experiment design:
 - ▶ Simulate model under two-state Markov tariff processes (τ_L, τ_H) with switching probability $1 - \omega$, for $\rho \in \{0.6, 0.7, 0.8, 0.85, 0.9, 0.95, 0.98, 0.99\}$
 - ▶ Train LSTM (Long Short-Term Memory) network to predict cumulative trade response from tariff and trade sequences around tariff-change “anchors”
 - ▶ Evaluate: predict outcome of canonical reform ($\omega = 1$, MIT shock)

LSTM architecture & training

- ▶ Each example anchored at a tariff-change event for good g at time t
 - ▶ “Past” window: \log tariffs, $\Delta \log \tau$, \log exports, $\Delta \log X$, regime indicator, consecutive periods in current state
 - ▶ “Future”: path of tariff changes $\{\Delta \log \tau_{t+k}\}_{k=1}^h$
 - ▶ Target: cumulative log change in exports $\Delta_h \log X_t = \log X_{t+h} - \log X_{t-1}$
- ▶ Key: AI never observes ω directly; must infer from joint dynamics of tariffs and trade
- ▶ Five training runs, successively expanding range of ω :
 1. $\omega \leq 0.85$ (similar to within-regime MFN changes)
 2. Add $\omega = 0.90$ (similar to average across-regime switch)
 3. Add $\omega = 0.95$ (similar to most persistent observed reforms)
 4. Add $\omega = 0.98$
 5. Add $\omega = 0.99$ (essentially do not exist in historical data)
- ▶ “Empirical budget”: fixed fraction of anchors per ω file, so training set reflects dominance of transitory changes

Result: LSTM approaches but cannot reach canonical elasticity

- ▶ Black: true structural (canonical) elasticity ≈ 14 at $h = 20$
- ▶ $\omega \leq 0.85$: underpredicts LR elasticity by $> 50\%$ (6.1 vs. ~ 14)
- ▶ $\omega \leq 0.90$: $\sim 25\%$ too low
- ▶ $\omega \leq 0.95$: bias $< 10\%$
- ▶ $\omega \leq 0.99$: very close but still below truth
- ▶ **All** versions predict *larger* responses than anything in training data — meaningful extrapolation!



AI can partially, but not fully, circumvent the Lucas Critique

- ▶ LSTM *does* extrapolate meaningfully beyond its training support
 - ▶ E.g., $\omega \leq 0.85$ model never sees LR elasticities > 4.2 but predicts ~ 6.1
 - ▶ $\omega \leq 0.90$ model never sees LR elasticities > 5.8 but predicts > 10
- ▶ But accuracy depends critically on proximity of training data to the target policy
 - ▶ Within-regime tariff changes ($\omega \leq 0.85$) provide very poor basis for extrapolation to canonical reform
 - ▶ Need extremely persistent reforms ($\omega \geq 0.95$) in training data to get close—but these are rare/nonexistent empirically
- ▶ Parallel to our main empirical finding: reduced-form estimates from transitory reforms *also* dramatically understate canonical elasticity
 - ▶ Lucas Critique applies to AI in same way it applies to local projections
 - ▶ Structural model recovers canonical elasticity because it models the *decision problem*, not just the input-output mapping

Takeaways & next steps

- ▶ Trade elasticity estimation is a clean laboratory for the AI vs. Lucas Critique debate
 - ▶ True structural answer is known
 - ▶ Clear source of non-canonicalness (tariff persistence ω)
 - ▶ Can precisely control what the AI model sees during training
- ▶ Results suggest AI faces an **extrapolation barrier**
 - ▶ Performance improves monotonically as training support approaches the canonical regime
 - ▶ But closing the last gap—extrapolating to a qualitatively different policy environment—requires economic structure
- ▶ Next step: train LSTM on real-world tariff and trade data from AKKRS Section 3
 - ▶ Replace model-simulated panels with empirical panels
 - ▶ Test whether patterns from simulated exercise carry over

Appendix: Role of embargo lifting and jt fixed effects

Role of embargo lifting and jt fixed effects

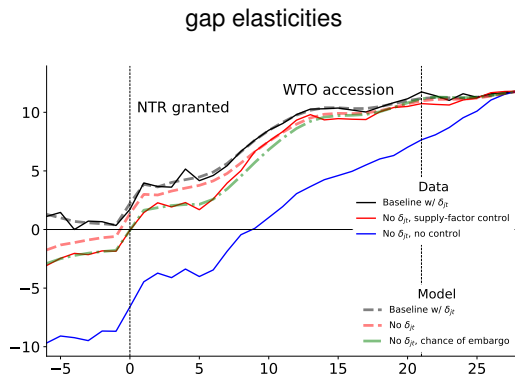
- ▶ So far we have abstracted from the earlier (much bigger) reform: the embargo lifting
 - ▶ China in 1971, Vietnam in 1994
- ▶ Empirically control for growth following the embargo using jt fixed effects
- ▶ But jt fixed effects contain valuable information!
 - ▶ Capture aggregate supply factors & the 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:

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

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

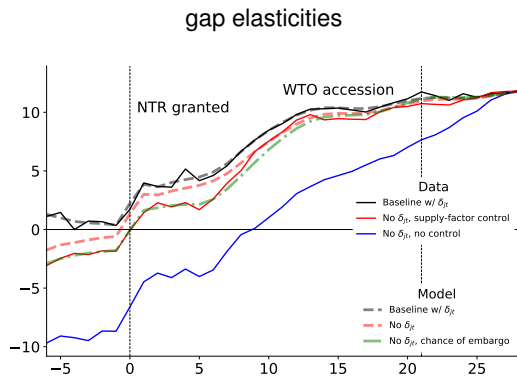
Gap-elasticities with (only) aggregate supply factor controls

- ▶ 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



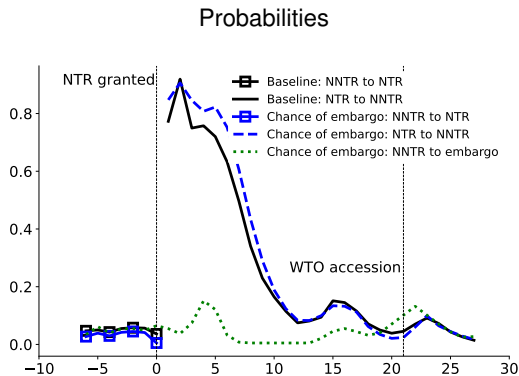
Gap-elasticities also infer likelihood of embargo return

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



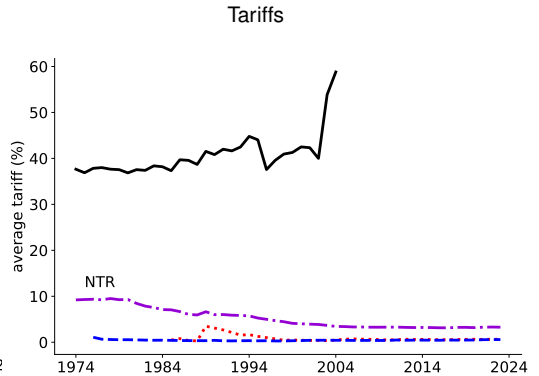
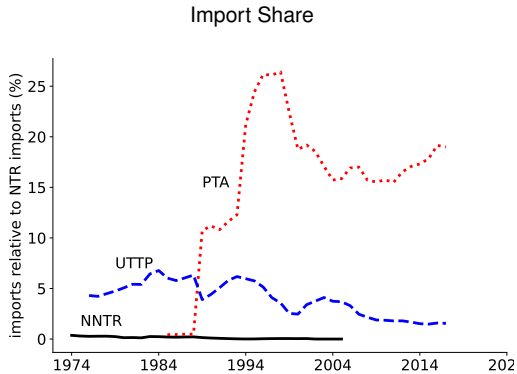
Gap-elasticities also infer likelihood of embargo return

- ▶ 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



Appendix: Additional figures & tables

Imports and Tariffs by Regime (each year)

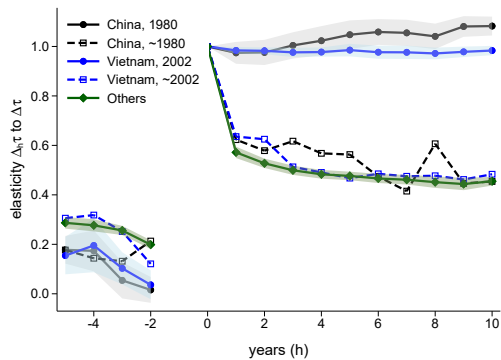


Top five country-year transitions across regimes

From	To	<i>ig (# g)</i>
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)

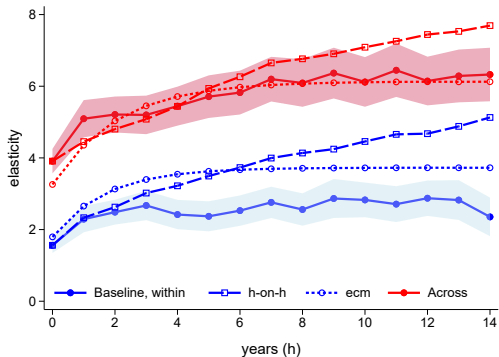
Empirical trade elasticity - Reconciling specifications

Autocorrelation Tariff Changes

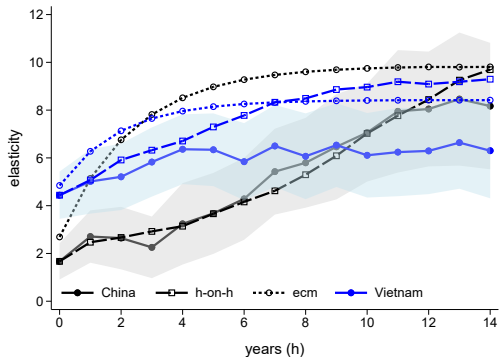


Robustness: specification

(a) Across vs. within-regime

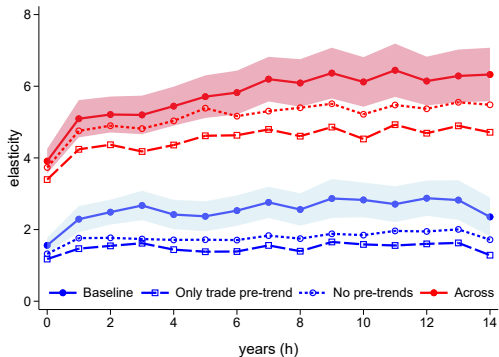


(b) China & Vietnam

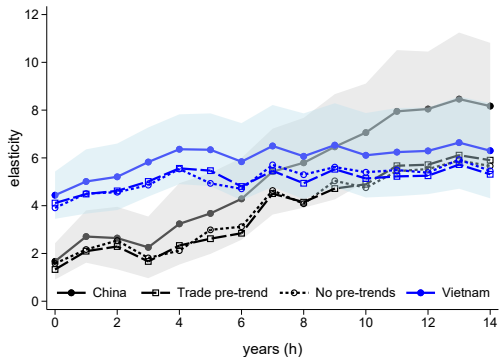


Robustness: pre-trends

(a) Across vs. within-regime

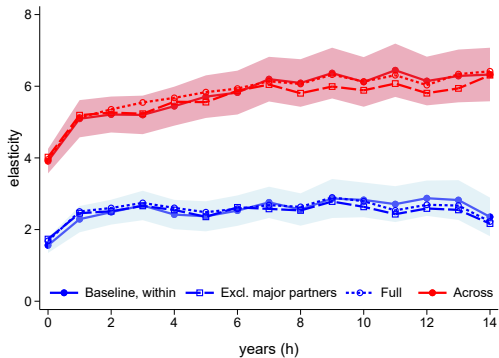


(b) China & Vietnam

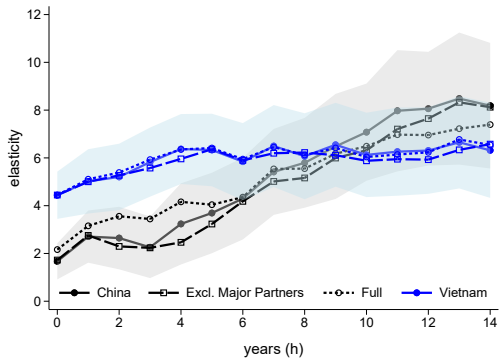


Robustness: sample design

(a) Across vs. within-regime

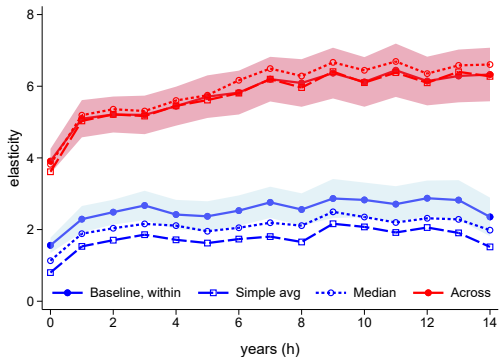


(b) China & Vietnam

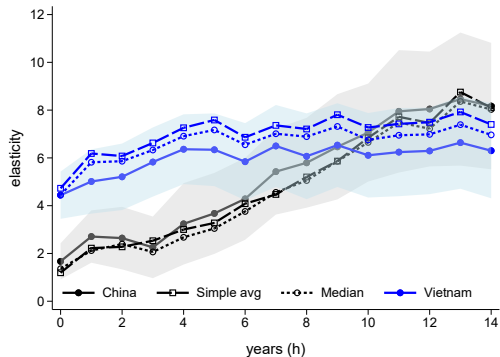


Robustness: tariff measure

(a) Across vs. within-regime

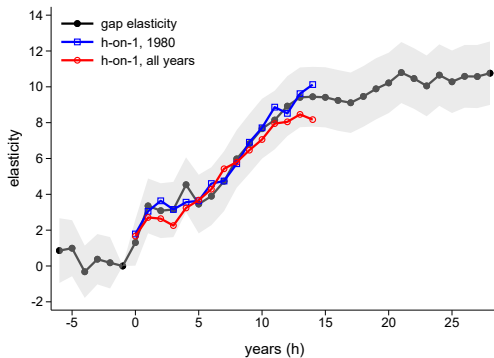


(b) China & Vietnam

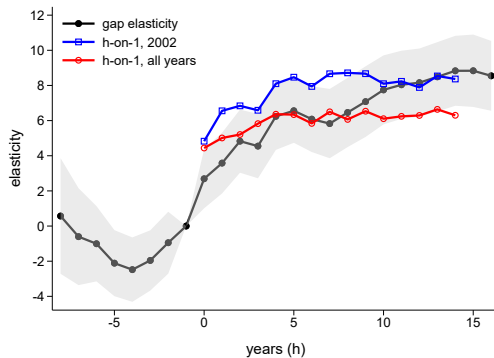


Empirical trade elasticity - Reconciling specifications

China

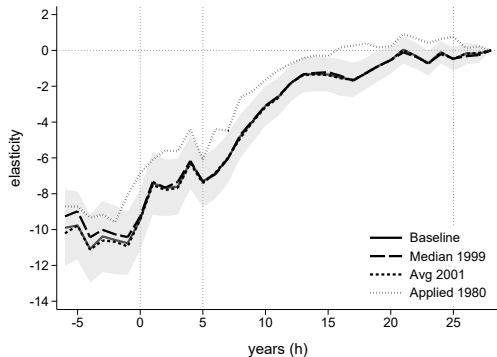


Vietnam

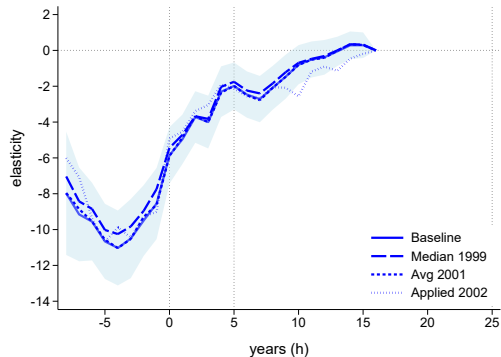


Robustness gap-elasticities: Gap measure

(a) China

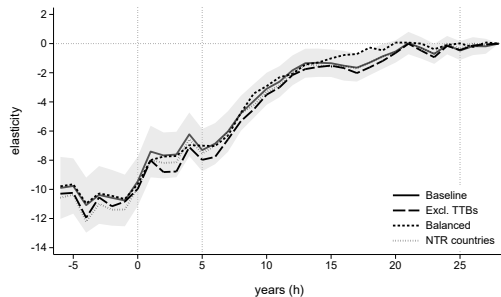


(b) Vietnam

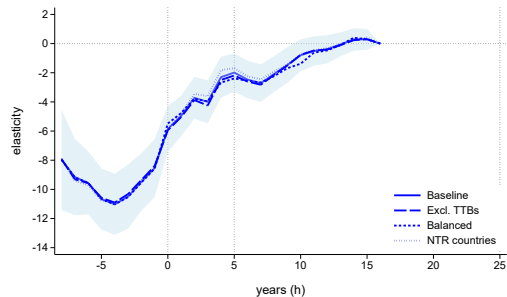


Robustness gap-elasticities: Sample

(a) China

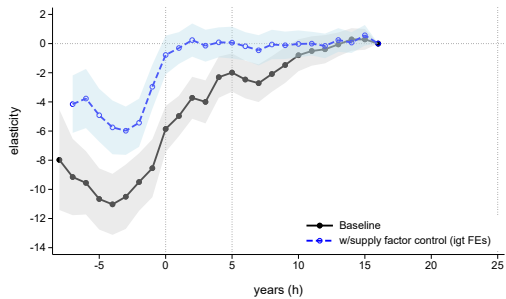


(b) Vietnam

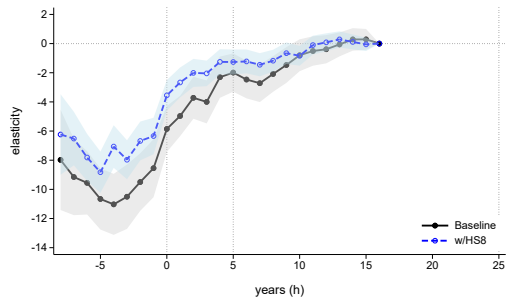


Robustness gap-elasticities Vietnam

(a) Supply factors



(b) Product aggregation



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)