

CAN TRADE POLICY SPUR INNOVATION?

Harun Alp

Federal Reserve Board

Sina T. Ates

Federal Reserve Board

China Workshop 2026, Banca d'Italia

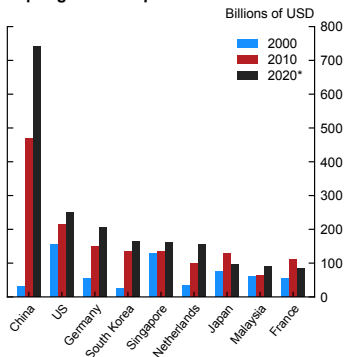
28/09/2026

[†]The views expressed here are those of the authors and do not necessarily reflect those of the Board of Governors or the Federal Reserve System.

Global Technological Competition Intensified...

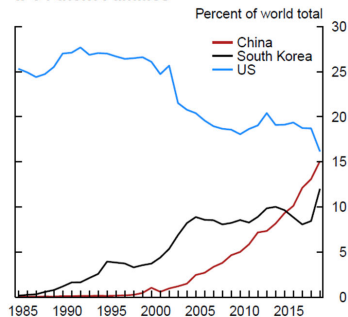
- ▶ China's rise in high-tech manufacturing
 - ▶ From marginal to >30% of global export share in two decades
 - ▶ Global dominance in solar (80%), EV (50%), telecom (30%) electronics
- ▶ China's patent share surged, closing the gap with the US

Top High-Tech Exporters



Source: Trade Data Monitor LLC.

IP5 Patent Families



Source: OECD.

... Alerting Major Economies

- ▶ Concerns in advanced economies about tech leadership and competitiveness...
 - ▶ **G7 Communiqué (2023):** “We remain committed to ensuring a level playing field ... and to protect **critical technologies**.”
 - ▶ **Draghi report (2024):** “Europe must profoundly refocus its collective efforts on closing the **innovation gap** with the US and China, especially in **advanced technologies**.”
- ▶ ...triggered historic policy actions.
 - ▶ Trade policy: Tariff hikes, Liberation Day
 - ▶ Industrial policy: US CHIPS Act, EU Chips Act

QUESTION Can trade policy spur innovation amid intense global competition?

- ▶ If so, under what conditions?
- ▶ Contrast with industrial policy?

To Answer These Questions...

1. Model: Trade, Competition, Innovation

- ▶ **Dynamic effects** of trade policy vs. standard frameworks
- ▶ **Two large open economies** subject to trade frictions
- ▶ **Dynamic general equilibrium** with endogenous incumbent innovation
- ▶ Step-by-step innovation with **strategic interaction between firms**
- ▶ **Transitional dynamics**: policy duration and time-varying effects

2. Quantitative Policy Analysis

- ▶ Higher import tariffs in a laggard (US) sector and retaliation
- ▶ Variation in initial technology, policy horizon, magnitude, and impact horizon

3. Empirical Analysis

- ▶ Testing the mechanism with 2018–19 US-China trade war combining trade and patent flows

Main Takeaways

- ▶ **Tariffs** spur innovation *only* in *substantially laggard* sectors and when applied *temporarily*
 - ▶ Competition vs. protection effects
 - ▶ Highly laggard: firms become relatively more competitive vis-à-vis foreign rival
 - ▶ Modestly laggard: firms become over-protected, shielded from competition, and complacent
- ▶ **Foreign retaliation:** rival may retaliate or not, depending on objective and policy lever
 - ▶ Technology leadership vs. rate of innovation
- ▶ **Empirical evidence:** response to 2018–19 US–China tariffs corroborates the mechanism

MODEL

Part 1. Static Environment

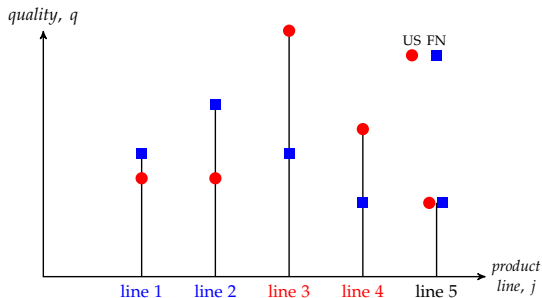
Final Good Production

- ▶ Final good in country $c \in \{US, FN\}$ produced combining intermediates with technology

$$Y_{ct} = \frac{1}{1-\beta} \int_0^1 \left(q_{USjt}^{\frac{\beta}{1-\beta}} k_{USjt} + q_{FNjt}^{\frac{\beta}{1-\beta}} k_{FNjt} \right)^{1-\beta} dj$$

- ▶ q_{cj}, k_{cj} : quality and amount of variety j produced in country c
- ▶ Implies: highest quality intermediate good k_{cj} (adjusted for other costs) is purchased.
- ▶ Final good producer's maximization gives the inverse demand $p_{cj} = q_{cj}^{\beta} k_{cj}^{-\beta}$.

Intermediate Goods



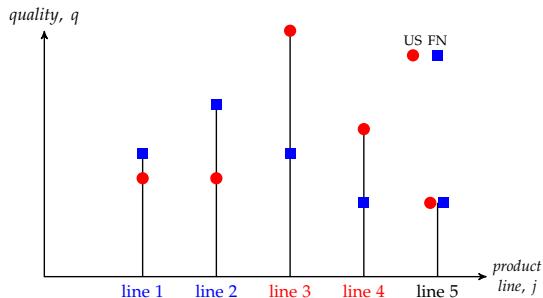
MODEL ECONOMY

In each j , one firm per country competing for leadership à la Bertrand.

$$\text{Tech. Leadership in } j = \begin{cases} \text{US is leader,} & \text{if } q_{US,j} > q_{FN,j} \\ \text{FN is leader,} & \text{if } q_{US,j} < q_{FN,j} \\ \text{Neck\&Neck,} & \text{if } q_{US,j} = q_{FN,j} \end{cases}$$

Qualities evolve through **innovation** and **spillovers**.

Intermediate Goods



MODEL ECONOMY

Produced with labor at unit cost $\eta \bar{q}_c^{-1}$; exporting subject to iceberg cost κ and foreign tariff τ^{FN} .

$$\text{Profit in the domestic market: } \Pi(q_j) = \left(\frac{1}{\bar{w}_c} \right)^{\frac{1-\beta}{\beta}} \pi q_j$$

$$\text{Profit in the foreign market: } \hat{\Pi}(q_j) = \left(\frac{1}{(1+\kappa)(1+\tau^{FN})\bar{w}_c} \right)^{\frac{1-\beta}{\beta}} \pi q_j$$

Export vs. Import Decisions

- ▶ Actual market ownership depends on **technology**, **trade costs**, and **relative wages**.
- ▶ A US firm exports if and only if

$$\frac{q_{USjt}}{q_{FNjt}} \geq \left[(1 + \kappa) \left(1 + \tau^{FN} \right) \omega_t \right]^{\frac{1-\beta}{\beta}}$$

⇒ Next: the dynamics of **technology**

MODEL

Part 2. Dynamic Environment

Intermediate Goods: innovation

- ▶ Qualities evolve through **innovation**.
- ▶ Successful **innovation** generates heterogeneous quality jumps btw. t and $t + \Delta t$:

$$q_{cj}(t + \Delta t) = \lambda^n q_{cj}(t), \quad \text{where } \lambda > 1, c \in \{US, FN\}.$$

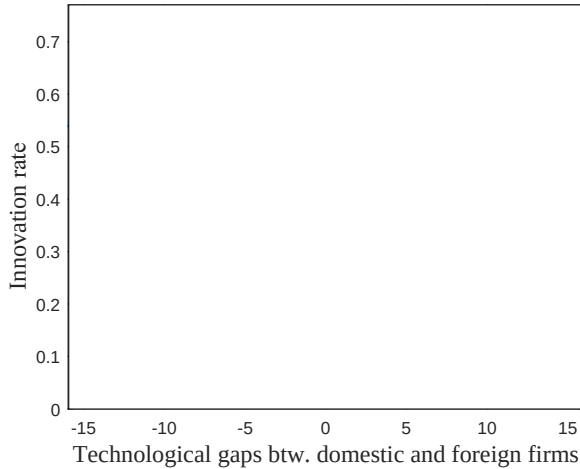
$n \in \mathbb{N}^+$ is a random variable reflecting spillovers and advantage of backwardness.

- ▶ Hence **technology gap** m_j between US and FN in j :

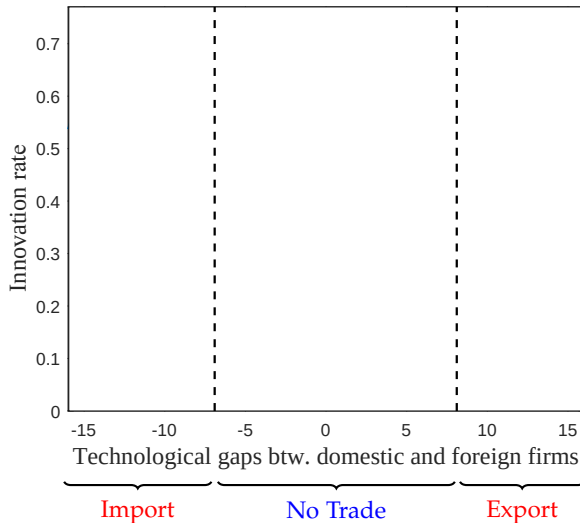
$$\frac{q_{USj}}{q_{FNj}} = \lambda^{N_{USj} - N_{FNj}} \equiv \lambda^{m_j}$$

$\Rightarrow m_j \in \mathbb{N}^+$ is the key state variable: tech. gap, payoff, degree of competition

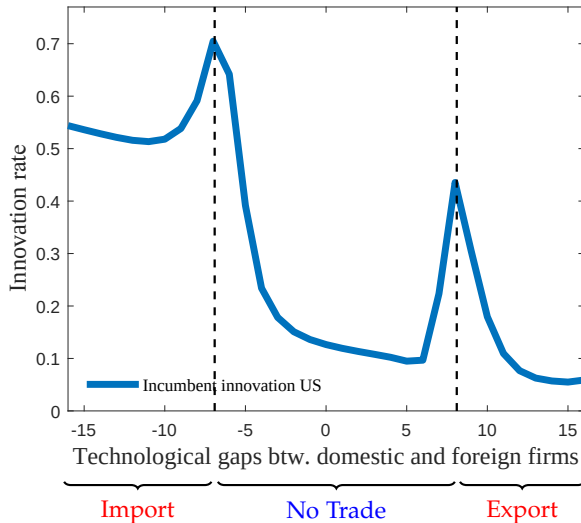
Innovation Outcome



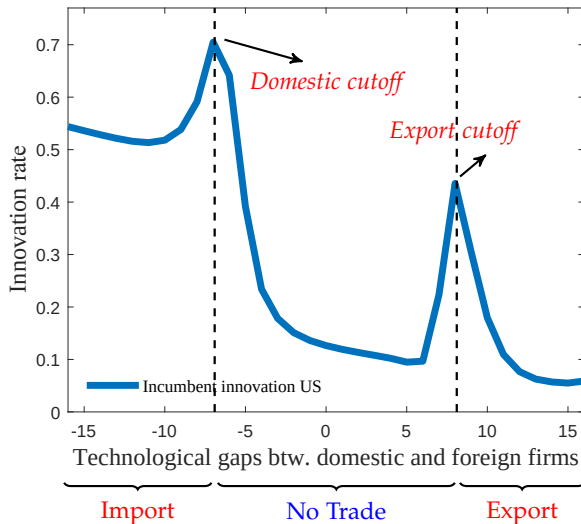
Innovation Outcome



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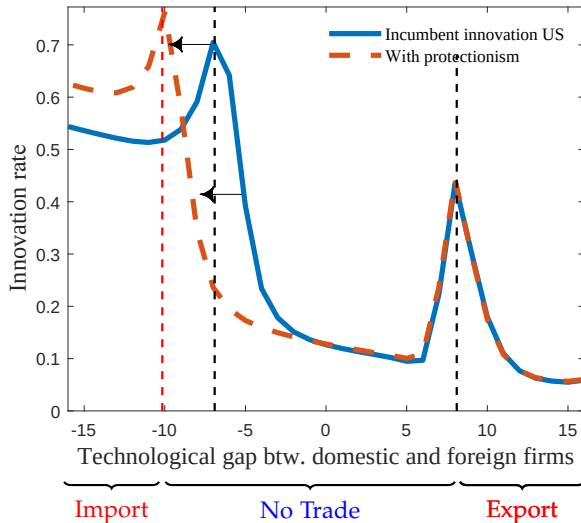


Innovation Outcome



Innovation Outcome

TARIFF HIKE - Partial Eq.



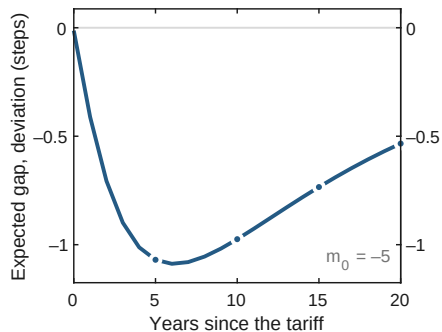
Quantitative Exercise

Exercise: Tariff Increase

- ▶ **Calibration:** BGP mapped to the period 2010–17
 - ▶ US vs. (an avg. of) major trade partners
 - ▶ Empirical technological gap distribution backed from patent data
- ▶ **Exercise:** increase tariffs in a single, hypothetical, laggard US industry
 - ▶ Aggregate wages and interest rates remain as in the baseline
- ▶ **Dimensions:** Comparing various cases
 - i. Initial condition: laggard vs. semi-laggard
 - ii. Policy horizon: permanent vs. temporary
 - iii. Impact horizon: short vs. long term
 - iv. Policy size: hike vs. initial gap

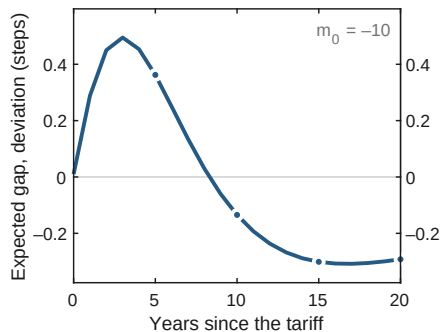
Exercise I.i: Permanent Tariff Increase

FIGURE: Avg. technology gap (deviation from baseline)



—•— Permanent tariff

A) Initial gap: -5 steps (no trade)



—•— Permanent tariff

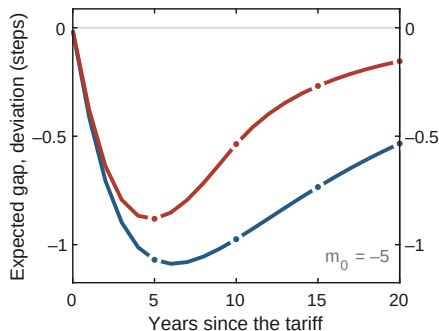
B) Initial gap: -10 steps (US importing)

Permanent hike mostly detrimental; short-term boost to catch-up if initial gap rel. large.

Exercise I.ii: Temporary Tariff Increase

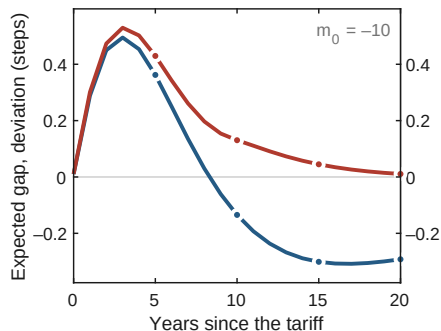
- Temporary tariff hike lasting for 10 years vs. permanent

FIGURE: Avg. technology gap (deviation from baseline)



● Permanent tariff ● 10-year tariff

A) Initial gap: -5 steps (no trade)



● Permanent tariff ● 10-year tariff

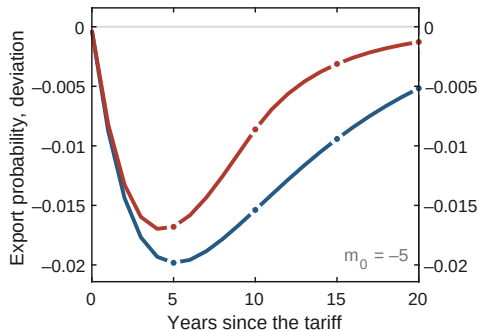
B) Initial gap: -10 steps (US importing)

Temporary hike can avoid long-term cost, preventing domestic firms from relaxing.

Exercise I: Tariff Increase and Export Probability

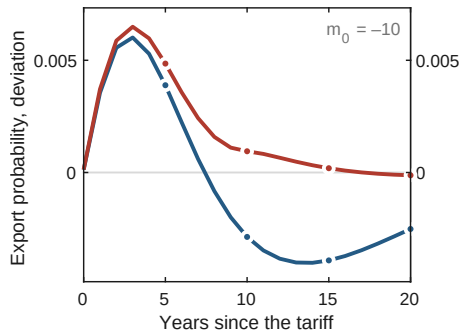
- Permanent vs. temporary (10 years) tariff hike

FIGURE: Probability of being an exporter (deviation from baseline)



—•— Permanent tariff —•— 10-year tariff

A) Initial gap: -5 steps (no trade)



—•— Permanent tariff —•— 10-year tariff

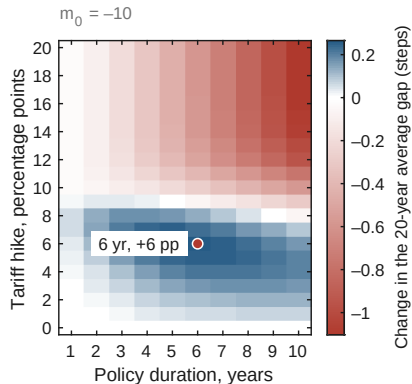
B) Initial gap: -10 steps (US importing)

Tariffs reduce exporting probability of domestic firms, unless temporary in laggard sector.

Exercise II: Optimal Tariff for Technology

- ▶ Optimal tariff rate & policy horizon pair for impact horizon of 20 years
- ▶ Maximizing average tech gap along impact horizon

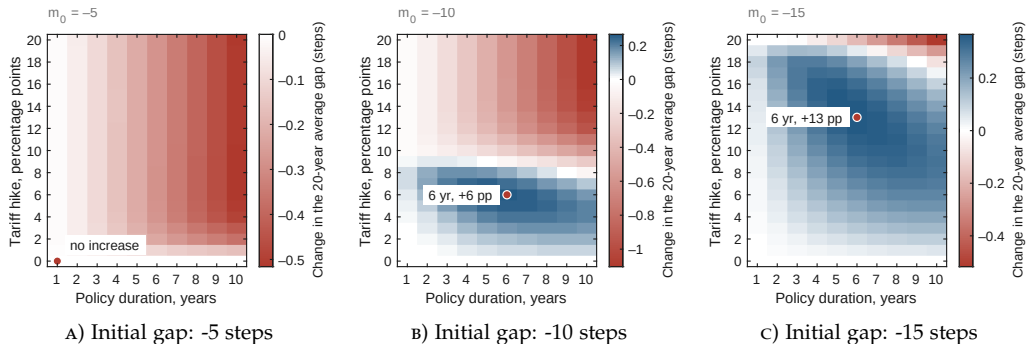
FIGURE: Technology gap response to (tariff hike, policy horizon) pairs
Initial gap: -10 steps



Exercise II: Optimal Tariff for Technology

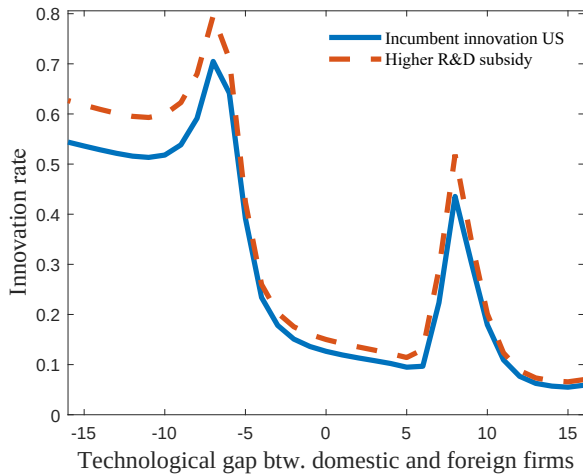
- Optimal tariff rate & policy horizon pair for impact horizon of 20 years, various initial gaps

FIGURE: Technology gap response to (tariff hike, policy horizon) pairs
Various initial gaps



Smaller initial gap $\Rightarrow$ smaller hike for shorter term

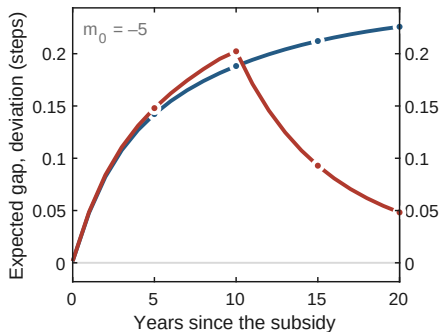
Exercise III: R&D Subsidy Increase



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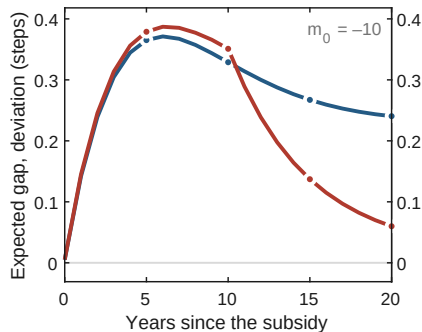
- Permanent vs. temporary (10 years) tariff hike

FIGURE: Avg. technology gap (deviation from baseline)



• Permanent subsidy • 10-year subsidy

A) Initial gap: -5 steps (no trade)



• Permanent subsidy • 10-year subsidy

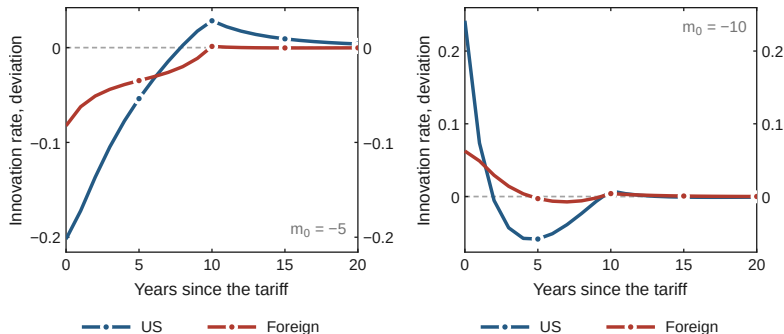
B) Initial gap: -10 steps (US importing)

R&D subsidies create gains over all horizons and initial gaps.

Exercise IV: Foreign Response and Retaliation

- **Objectives:** tech gap. advantage vs. innovativeness / **Instruments:** tariff vs. export subsidy

FIGURE: Innovation efforts (deviation from baseline)



A) Initial gap: -5 steps (no trade)

B) Initial gap: -10 steps (US importing)

Tech gap gains and innovativeness move in opposite direction.

Response and policy instrument decisions depend on objective and initial gap.

Key Takeaways

- ▶ To spur innovation, import tariffs must be both
 - ▶ targeted (i.e., laggard sectors) & temporary.
- ▶ Tariffs' dynamic effect on incentives matter.
 - ▶ Encourages R&D by some, discourages others.
 - ▶ R&D subsidies, by contrast, encourage innovation across the board.
- ▶ Next: empirical evidence corroborates the mechanism.

Empirical Analysis

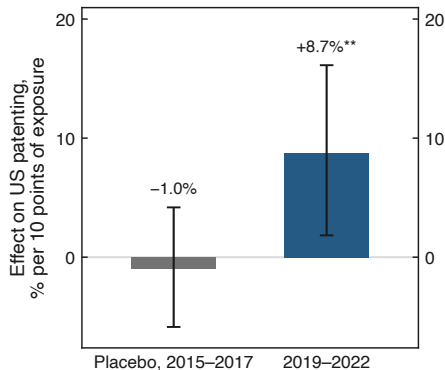
Empirical Test: The 2018–19 US–China Tariff War

- ▶ **Shock:** 2018–19 US Section 301 tariffs on imports from China
- ▶ **Data:** USPTO patents, Section 301 tariffs, Census imports, merged at HS6
- ▶ **Exposure:** $E_g = \tau_g^{301} \times s_g^C \rightarrow \text{tariff} \times \text{China's pre-war US-import share}$
- ▶ **Laggard** (D_g): US in the bottom quartile of pre-war patent share vs. the frontier
- ▶ **Question:** Do **exposed, initially laggard** products patent more after 2018?

⇒ *Triple difference:* laggard vs. non-laggard exposed products within the same HS4×year cell

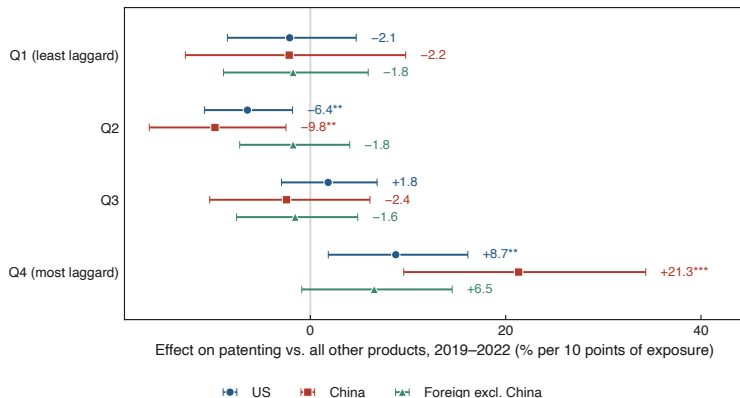
$$\log(1 + Y_{g,t}^{\text{US}}) = \mu_g + \delta_{\text{HS4},t} + \beta (E_g \times \text{Post}_t \times D_g) + \chi (E_g \times \text{Post}_t) + \rho (D_g \times \text{Post}_t) + e_{g,t}$$

Result: Exposed Laggards Patent More



- ▶ +10pp rise in tariff exposure $\Rightarrow$ +8.7% more US patenting in laggard products (2019-22)
- ▶ Placebo test: pre-period estimate ≈ 0 ; no differential pre-trend

Result: Response Concentrates in Laggard Sectors, Tariff-Rivals



- ▶ Most-laggard US quartile: **both** US and Chinese patenting up $\Rightarrow$ a tighter race; Q1–Q3 $\approx$ 0
- ▶ Untargeted foreign producers show no change $\Rightarrow$ tariffs operate via bilateral competition!

Conclusion

- ▶ How does trade policy affect innovation & technology trajectory?
- ▶ Quant analysis in a new model of int'l trade, tech competition, endog. innovation
- ▶ Heterogeneity in initial gap, policy and impact horizons
- ▶ Key finding: Tariffs may help, but only if temporary and targeted!
- ▶ How to manage global competition in advanced technologies?
- ▶ Various policies and settings can be addressed
 - ▶ Production subsidy, state-dependent policies, national security
 - ▶ Scale differences, learning by doing, trade diversion

APPENDIX

Literature Review

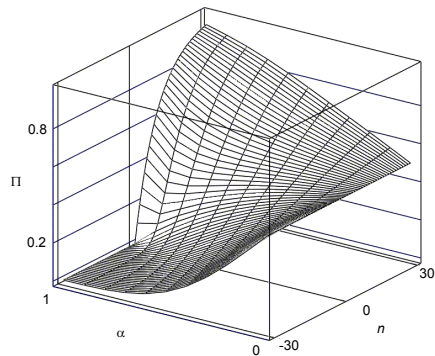
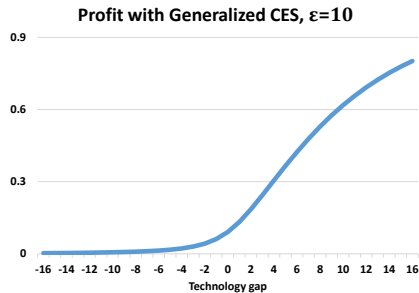
Step-by-step Growth Models: Aghion et al. (1997, 2001, 2005); Acemoglu and Akcigit (2012); Acemoglu et al. (2016), Akcigit and Ates (2019, 2021).

Empirics of Trade and Innovation: Fernandes (2007); Bustos (2011); Iacovone et al. (2011); Autor et al. (2016); Bloom et al. (2016); Aghion et al. (2017).

Trade, Technology and Firm Dynamics: Rivera-Batiz and Romer (1991); Grossman and Helpman (1993); Atkeson and Burstein (2010); Arkolakis et al. (2012); Burstein and Melitz (2013); Bloom et al. (2013); Alessandria and Choi (2014); Perla et al. (2015); Buera and Oberfield (2016); Impullitti and Licandro (2017); Sampson (2016, 2020); Somale (2021).

Trade and Industrial Policy: Rodrik (2004); Spencer and Brander (1983); Eaton and Grossman (1986); Grossman and Lai (2004); Broda et al. (2008); Demidova and Rodríguez-Clare (2009); Impullitti (2010); Ossa (2015); Costinot et al. (2015, 2016); Barattieri et al. (2017); Cesa-Bianchi et al. (2026); Ferrante et al. (2026).

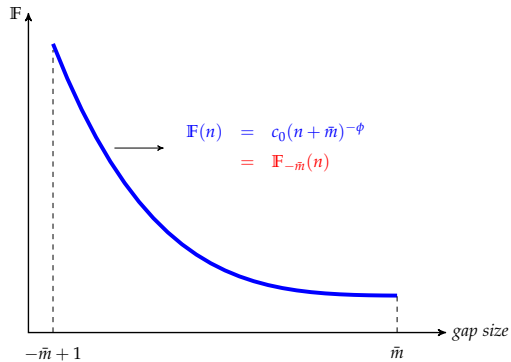
Generalized CES Production Function



Profit

Aghion et al. (2001, *Restud*)

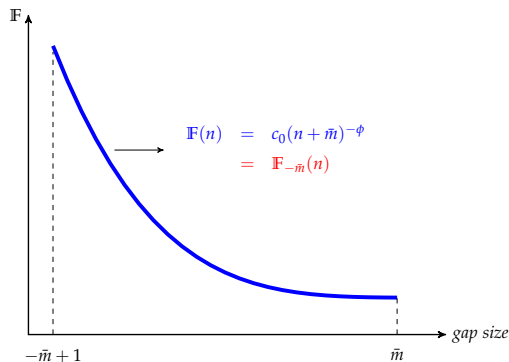
Step Jump Distribution $\mathbb{F}(n)$



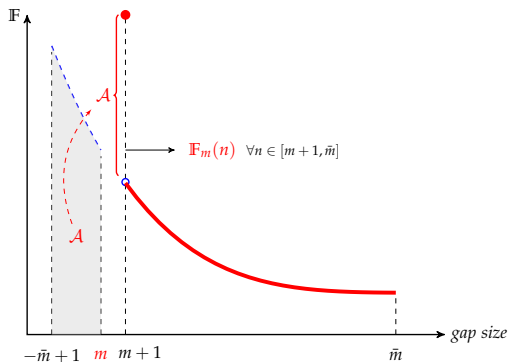
A) for $m = -\bar{m}$

- multiple step jumps are less likely: increasing difficulty

Step Jump Distribution $\mathbb{F}(n)$



A) for $m = -\tilde{m}$



B) for $m > -\tilde{m}$

- ▶ multiple step jumps are less likely: increasing difficulty
- ▶ backward firms more likely to multiple jumps:
advantage of backwardness (à la Gerschenkron, 1962)

Value Functions

$$\begin{aligned} & r_{US,t} V_{US,mt} (q_t) - \dot{V}_{US,mt} (q_t) \\ &= \max_{x_{US,mt}} \left\{ \Pi \left(m; \tau^{US}, \tau^{FN} \right) q_t - \left(1 - s^{US} \right) \alpha_{US} \frac{(x_{US,mt})^{\gamma_{US}}}{\gamma_{US}} q_t \right. \\ &+ x_{US,mt} \sum_{n_t=m+1}^{\bar{m}} \mathbb{F}_m (n_t) \left[V_{US,nt} \left(\lambda^{(n_t-m)} q_t \right) - V_{US,mt} (q_t) \right] \\ &+ \tilde{x}_{US,mt} [0 - V_{US,mt} (q_t)] \\ &\left. + \left(x_{FN(-m)t} + \tilde{x}_{FN(-m)t} \right) \sum_{n_t=-m+1}^{\bar{m}} \mathbb{F}_{-m} (n_t) \left[V_{US(-nt)} (q_t) - V_{US,mt} (q_t) \right] \right\} \end{aligned}$$

$x_{US,mt}$: Domestic incumbent innovation

$\tilde{x}_{US,mt}$: Domestic entrant innovation

$x_{FN,mt}$: Foreign incumbent innovation

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Value Functions

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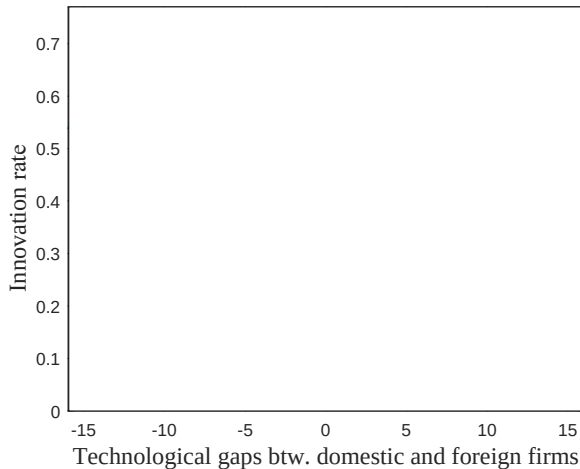
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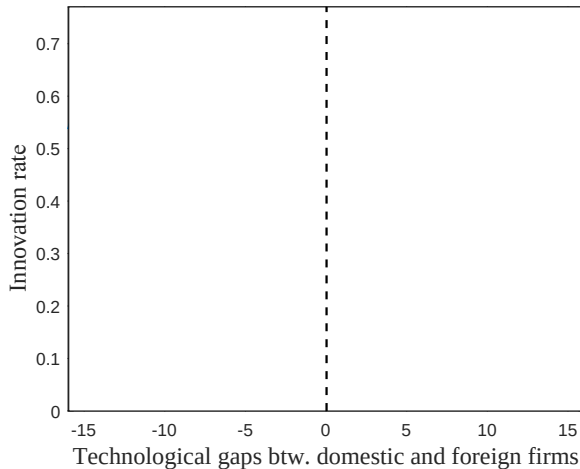
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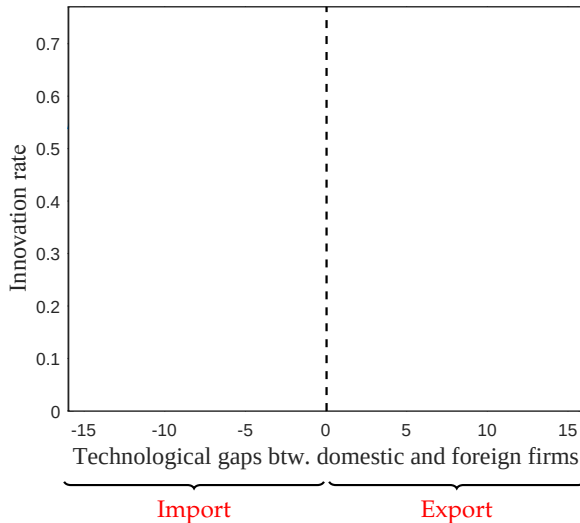
Innovation outcome: Zero trade cost



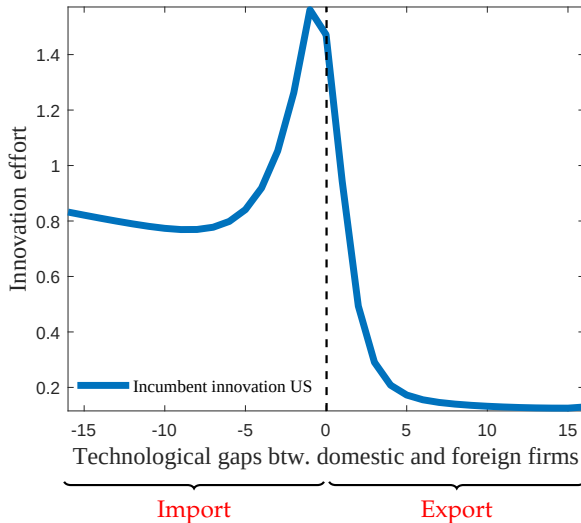
Innovation outcome: Zero trade cost



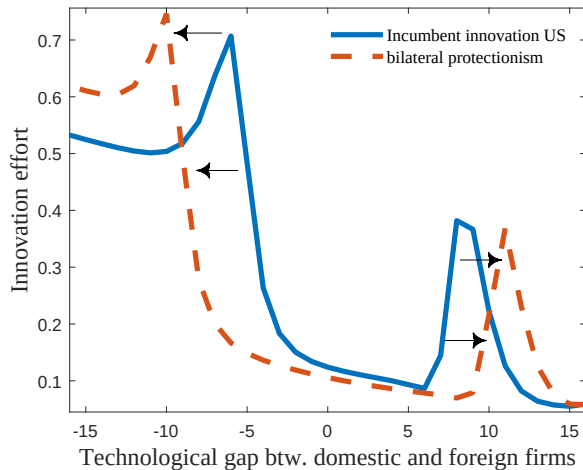
Innovation outcome: Zero trade cost



Innovation outcome: Zero trade cost



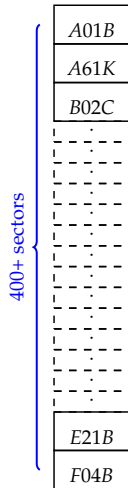
Innovation outcome: Retaliation



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Patent Classes to Technology Gaps

Patent Classes



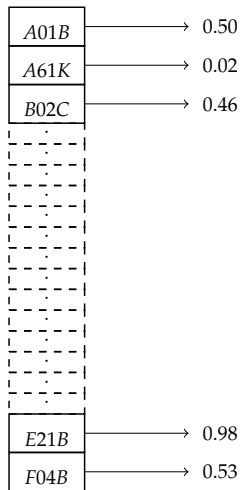
Patent Classes to Technology Gaps

<i>Patent Classes</i>	$\frac{\# \text{ US patents}}{\# \text{ total}}$
A01B	0.50
A61K	0.02
B02C	0.46
...	
E21B	0.98
F04B	0.53

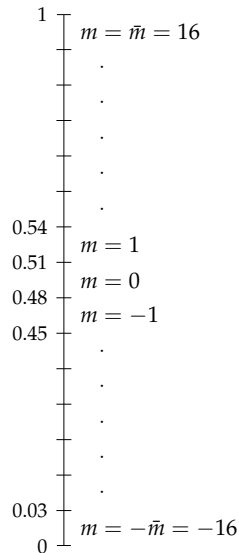
Patent Classes to Technology Gaps

Patent Classes

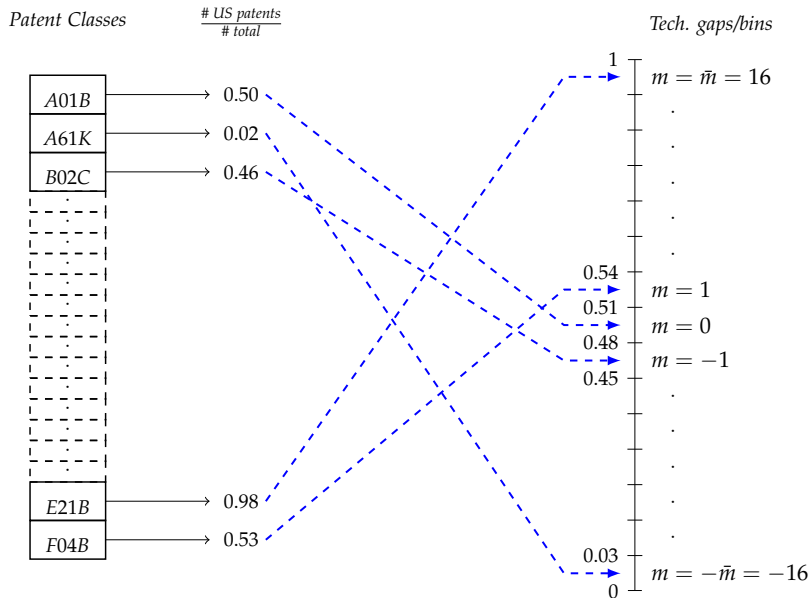
$\frac{\# \text{ US patents}}{\# \text{ total}}$



Tech. gaps/bins

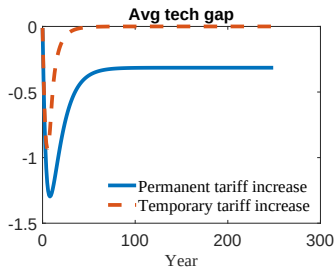


Patent Classes to Technology Gaps

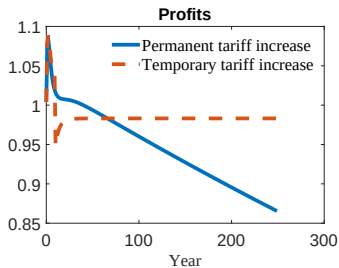


Exercise: Tariff increase

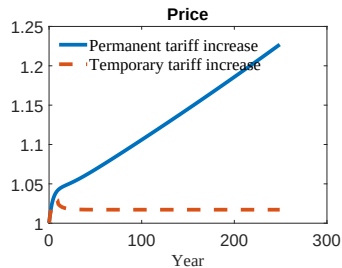
- Effects of tariff increase for initial gap -5 into BGP



A) Tech gap



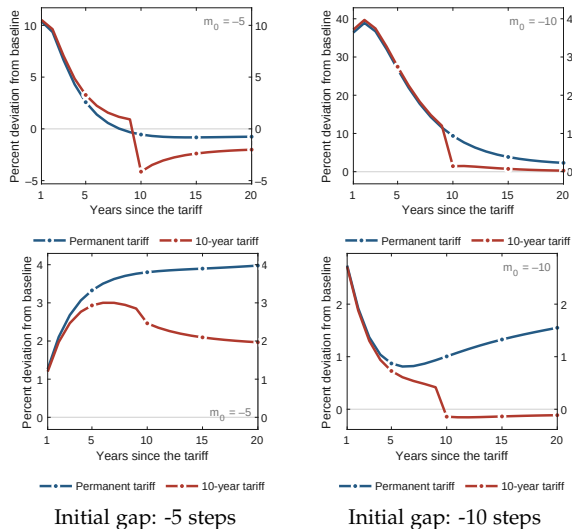
B) Profit income



C) Price

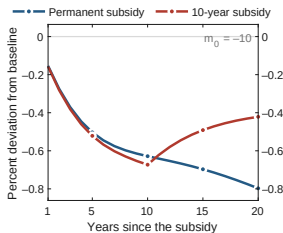
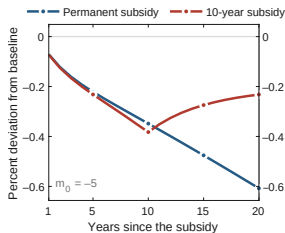
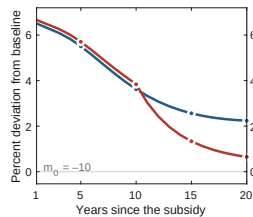
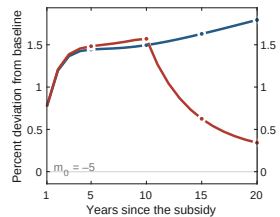
Exercise: Tariff Increase

FIGURE: Wage income (top panel) and Prices (bottom panel) deviations



Exercise: R&D Subsidy Increase

FIGURE: Wage income (top panel) and Prices (bottom panel) deviations



Permanent subsidy 10-year subsidy

Initial gap: -5 steps

Permanent subsidy 10-year subsidy

Initial gap: -10 steps

- Acemoglu, Daron and Ufuk Akcigit**, "Intellectual Property Rights Policy, Competition and Innovation," *Journal of the European Economic Association*, 2012, 10 (1), 1–42.
- , —, **Douglas Hanley**, and **William R. Kerr**, "Transition to Clean Technology," *Journal of Political Economy*, 2016, 124 (1), 52–104.
- Aghion, Philippe, Antonin Bergeaud, Mathieu Lequien, and Marc Melitz**, "The Impact of Exports on Innovation: Theory and Evidence," 2017. Manuscript.
- , **Christopher Harris**, and **John Vickers**, "Competition and Growth with Step-by-step Innovation: An Example," *European Economic Review*, 1997, 41 (3), 771–782.
- , —, **Peter Howitt**, and **John Vickers**, "Competition, Imitation and Growth with Step-by-step Innovation," *Review of Economic Studies*, 2001, 68 (3), 467–492.
- , **Nicholas Bloom**, **Richard Blundell**, **Rachel Griffith**, and **Peter Howitt**, "Competition and Innovation: An Inverted-U Relationship," *Quarterly Journal of Economics*, 2005, 120 (2), 701–728.
- Alessandria, George and Horag Choi**, "Do falling iceberg costs explain recent U.S. export growth?," *Journal of International Economics*, 2014, 94 (2), 311–325.
- Arkolakis, Costas, Arnaud Costinot, and Andrés Rodríguez-Clare**, "New Trade Models, Same Old Gains?," *American Economic Review*, February 2012, 102 (1), 94–130.
- Atkeson, Andrew and Ariel Tomas Burstein**, "Innovation, Firm Dynamics, and International Trade," *Journal of Political Economy*, 2010, 118 (3), 433–484.
- Autor, David, David Dorn, Gordon H. Hanson, Gary Pisano, and Pian Shu**, "Foreign Competition and Domestic Innovation: Evidence from U.S. Patents," 2016. National Bureau of Economic Research # 22879.
- Barattieri, Alessandro, Matteo Cacciatore, and Fabio Ghironi**, "Protectionism and the Business Cycle," 2017. Manuscript.
- Bloom, Nicholas, Mirko Draca, and John Van Reenen**, "Trade Induced Technical Change? The Impact of Chinese Imports on Innovation, IT and Productivity," *The Review of Economic Studies*, 2016, 83 (1), 87.

- , **Paul M Romer, Stephen J Terry, and John Van Reenen**, “A Trapped-factors Model of Innovation,” *American Economic Review, Papers and Proceedings*, 2013, 103 (3), 208–213.
- Broda, Christian, Nuno Limao, and David E. Weinstein**, “Optimal Tariffs and Market Power: The Evidence,” *American Economic Review*, 2008, 98 (5), 2032–65.
- Buera, Francisco J. and Ezra Oberfield**, “The Global Diffusion of Ideas,” 2016. National Bureau of Economic Research # 21844.
- Burstein, Ariel and Marc J. Melitz**, “Trade Liberalization and Firm Dynamics,” in “Advances in Economics and Econometrics Tenth World Congress. Applied Economics,” Vol. 2 2013, pp. 283–328.
- Bustos, Paula**, “Trade Liberalization, Exports, and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinian Firms,” *American Economic Review*, 2011, 101 (1), 304–340.
- Costinot, Arnaud, Andrés Rodríguez-Clare, and Iván Werning**, “Micro to Macro: Optimal Trade Policy with Firm Heterogeneity,” 2016. National Bureau of Economic Research # 21989.
- , **Dave Donaldson, Jonathan Vogel, and Iván Werning**, “Comparative Advantage and Optimal Trade Policy *,” *The Quarterly Journal of Economics*, 2015, 130 (2), 659.
- Demidova, Svetlana and Andrés Rodríguez-Clare**, “Trade Policy Under Firm-level Heterogeneity in a Small Economy,” *Journal of International Economics*, June 2009, 78 (1), 100–112.
- Eaton, Jonathan and Gene M. Grossman**, “Optimal Trade and Industrial Policy under Oligopoly,” *Quarterly Journal of Economics*, 1986, 101 (2), 383–406.
- Fernandes, Ana M**, “Trade policy, trade volumes and plant-level productivity in Colombian manufacturing industries,” *Journal of international economics*, 2007, 71 (1), 52–71.
- Grossman, Gene M. and Edwin L.-C. Lai**, “International Protection of Intellectual Property,” *American Economic Review*, 2004, 94 (5), 1635–1653.

- **and Elhanan Helpman**, *Innovation and growth in the global economy*, MIT press, 1993.
- Iacovone, Leonardo, Wolfgang Keller, and Ferdinand Rauch**, “Innovation Responses to Import Competition,” 2011. mimeo, Princeton University, March.
- Impullitti, Giammario**, “International Competition and US R&D Subsidies: A Quantitative Welfare Analysis,” *International Economic Review*, 2010, 51 (4), 1127–1158.
- **and Omar Licandro**, “Trade, Firm Selection, and Innovation: The Competition Channel,” *Economic Journal*, 2017.
- Ossa, Ralph**, “A Quantitative Analysis of Subsidy Competition in the US,” 2015. National Bureau of Economic Research Working Paper # 20975.
- Perla, Jesse, Christopher Tonetti, and Michael E. Waugh**, “Equilibrium Technology Diffusion, Trade, and Growth,” 2015. National Bureau of Economic Research Working Paper # 20881.
- Rivera-Batiz, Luis A. and Paul M. Romer**, “Economic Integration and Endogenous Growth,” *The Quarterly Journal of Economics*, 1991, 106 (2), 531–555.
- Rodrik, Dani**, “Industrial Policy for the Twenty-first Century,” 2004. CEPR Discussion Paper #4767.
- Spencer, Barbara J. and James A. Brander**, “International R&D Rivalry and Industrial Strategy,” *Review of Economic Studies*, 1983, 50 (4), 707–722.