

# TRADE POLICY

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Master Economics

International Trade

Matthieu Crozet

# TRADE PROTECTIONS ARE MANYFOLD

There are varieties of trade protection instruments

## Tariffs

- Ad valorem
- Per unit

## Non-Tariff barriers

- Quotas
- Tariff quotas
- VER
- TBT, subsidies, etc.

# TRADE PROTECTIONS

Have fun with U.S. tariffs

<https://hts.usitc.gov>

Level 1: **Rookie** - Ad valorem

Ex: Bulbs for electric lighting- [7011.10.50](#)

Level 2: **Pro** - Specific tariffs

Ex1: Chicken eggs - [0407.11.00](#)

Level 3: **Expert** - Compound tariffs

Wristwatches [9101.11.40](#)

Level 4: **Master** - Tariff rate quotas

Brooms: [9603.10.05](#)

# TRADE PROTECTIONS

## Trade agreements

### Multilateral

- GATT / WTO

### Regional agreements

- Free trade zones: Flexible but rules of origin
- Custom unions: Simple but binding

### Asymmetric agreements

- General system of preferences (e.g. EU's « everything but arms »)

# UNDERSTANDING WTO TARIFFS

*Bound tariff*

Countries negotiate **bound tariffs**

= commitments made by individual WTO members

that are the maximum tariff that can be applied (to another member)  
for a given product line

# UNDERSTANDING WTO TARIFFS

 Bound tariff

 MFN tariff

... **BUT** countries may want to set a tariff lower than the bound  
In the case, the **Most Favored Nation** principle implies that  
this tariff should be applied to all WTO members (non-discrimination)

# UNDERSTANDING WTO TARIFFS

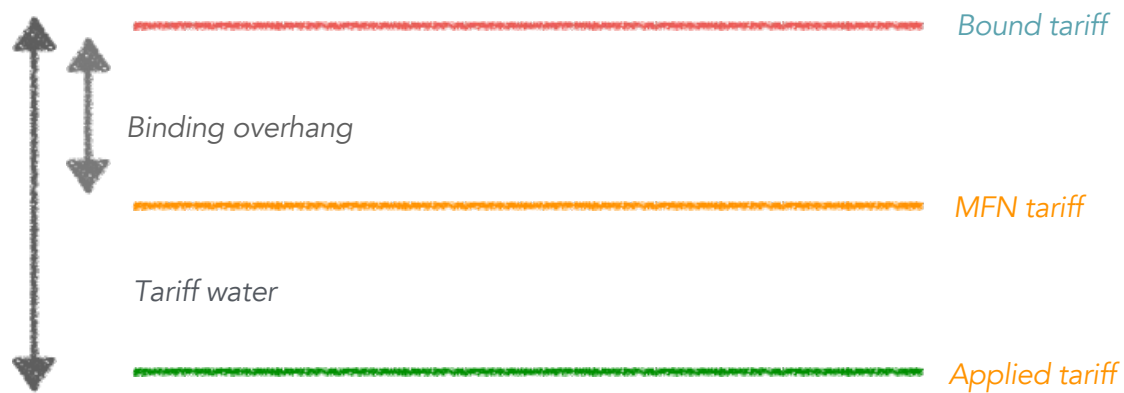
 Bound tariff

 MFN tariff

 Applied tariff

... **BUT** countries may have preferential trade agreements  
These agreements must be reciprocal... or not (General system of preferences)  
Some WTO members receive a tariffs which lower than the MFN

# UNDERSTANDING WTO TARIFFS





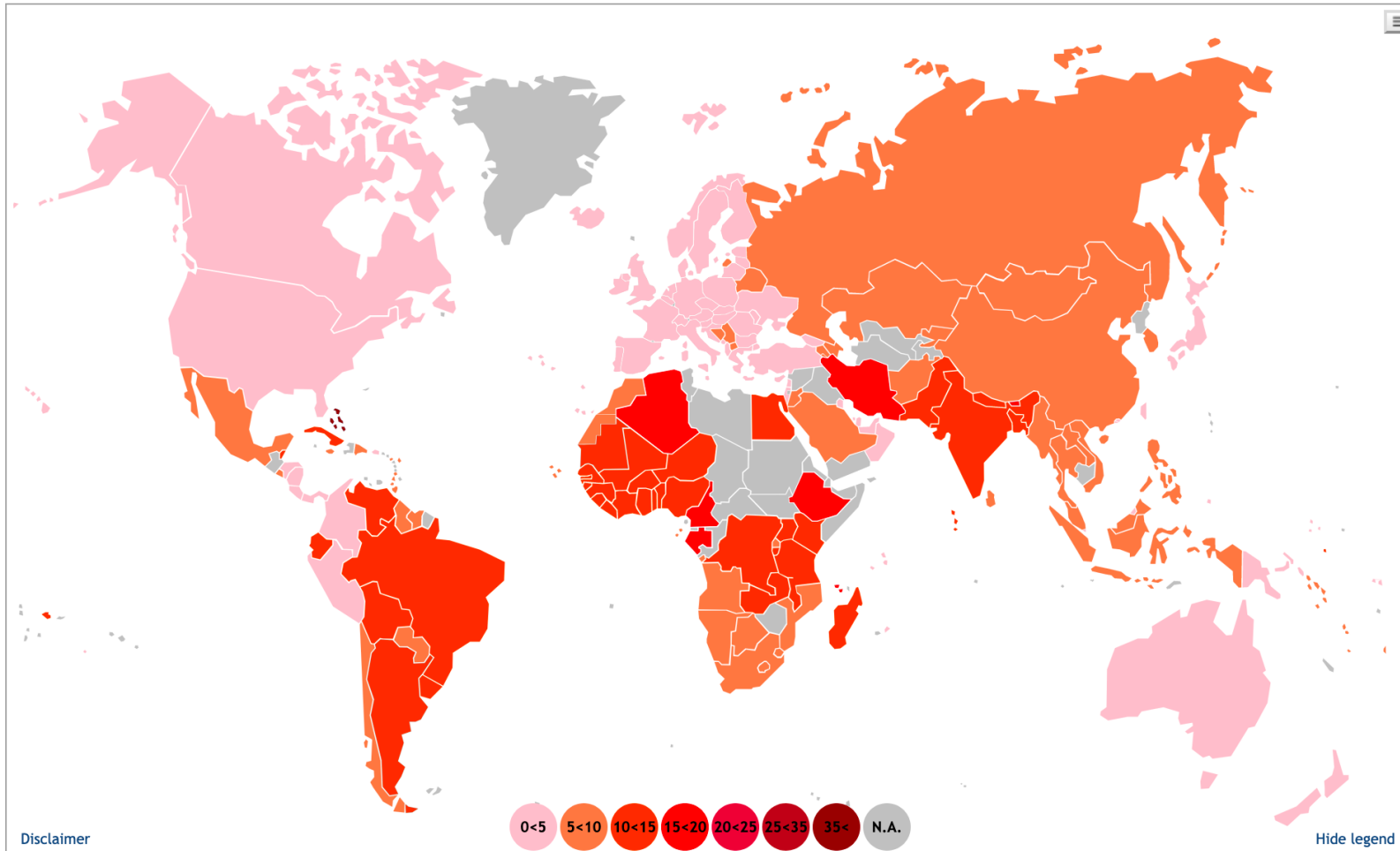
# International Trade and Market Access Data

About this page

TRADE TRENDS **TARIFFS** MiWi

More Data

Country group	Indicator	Product / Sector
All Countries	Simple Average Applied MFN tariff	Non-agricultural products (NAMA)



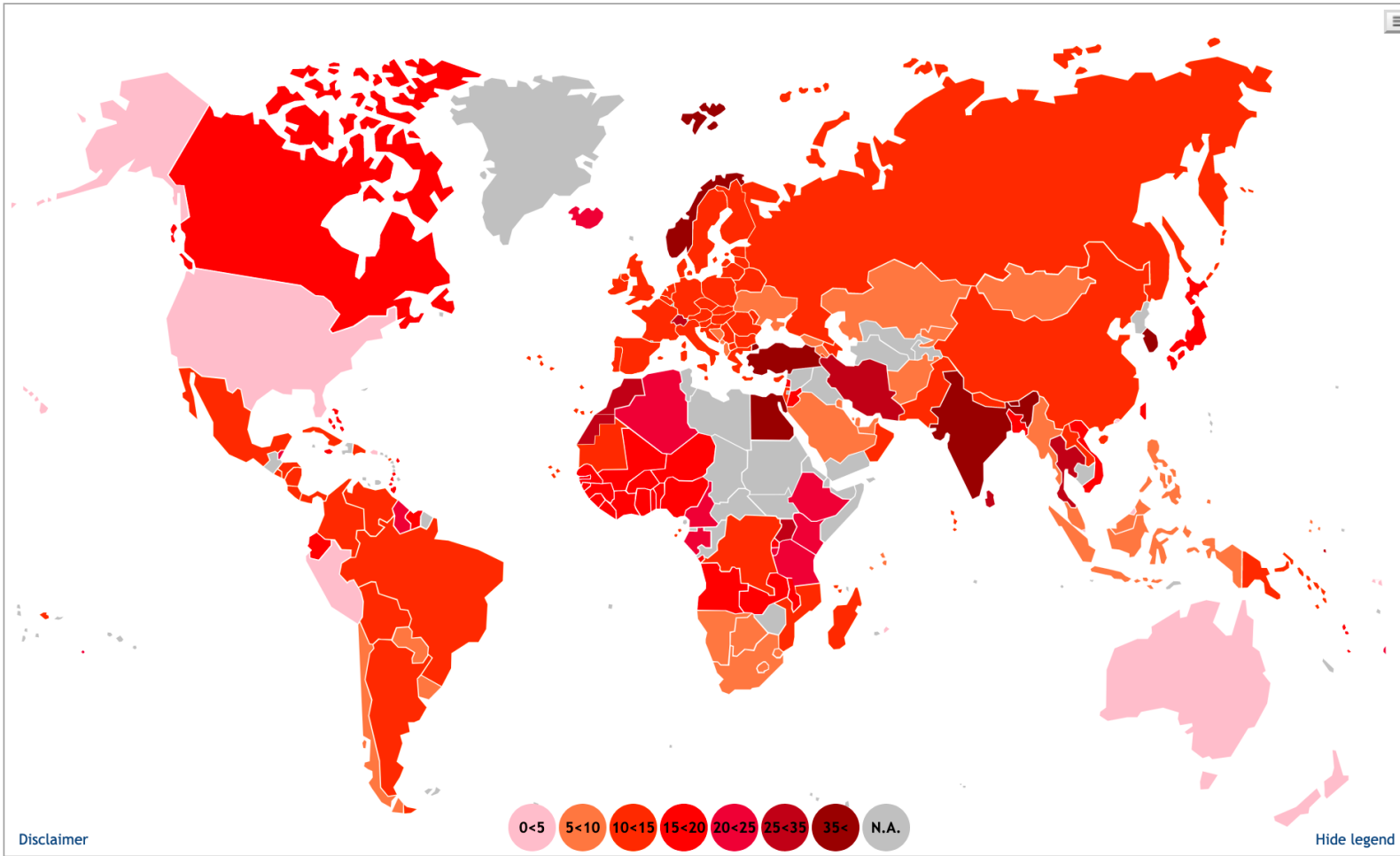
# International Trade and Market Access Data

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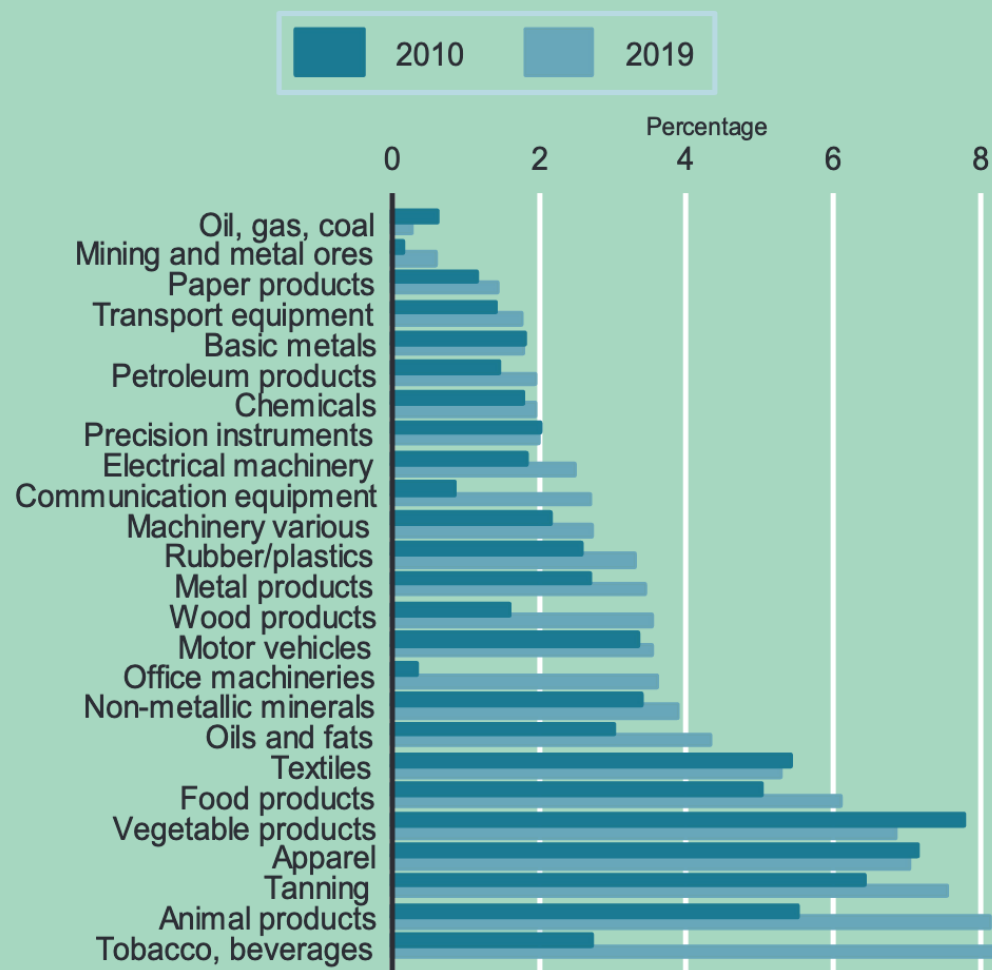
TRADE TRENDS **TARIFFS** MiWi

More Data

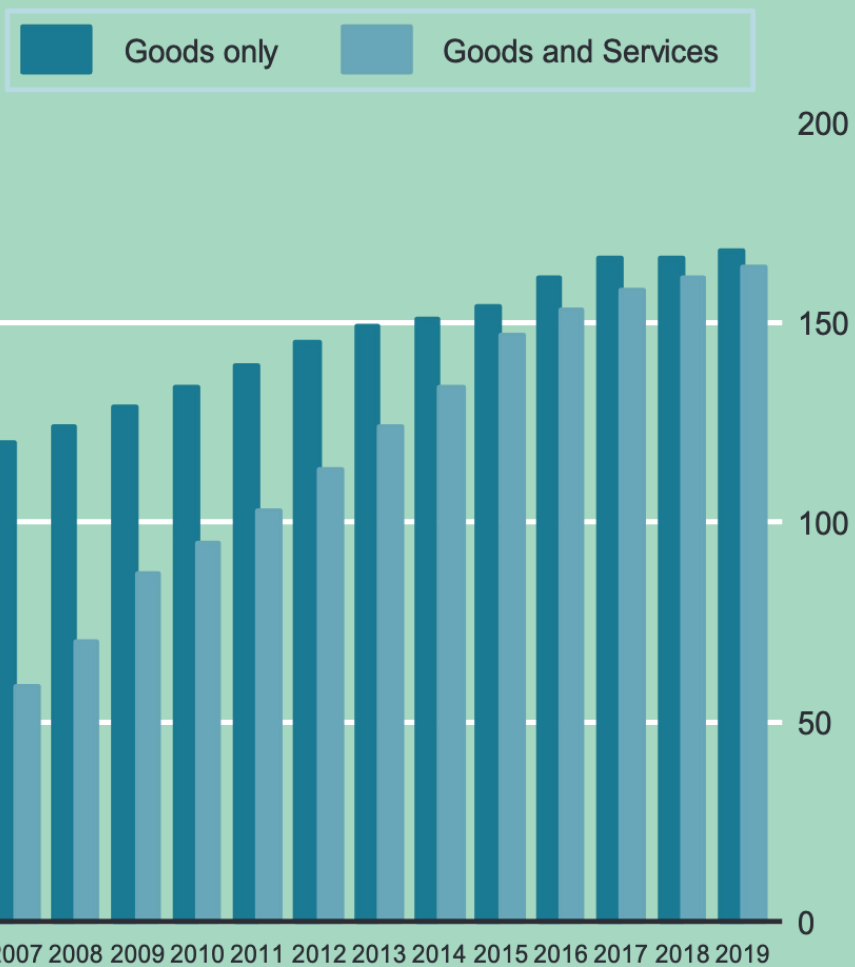
Country group	Indicator	Product / Sector
All Countries	Simple Average Applied MFN tariff	Agricultural products (Ag)



# Average Tariffs, by Sector



# Trade Agreements



## WHY NOT FREE TRADE?

Textbooks claim that free trade is good

Still, many trade barriers remain

What arguments can be made for protectionism?

## WHY NOT FREE TRADE?

Two main arguments:

Terms of trade manipulation

Strategic trade policy

# ROADMAP

1. ToT
  - a. Theory
  - b. Quantification
2. Strategic trade policy: Basics
3. Tariff pass-through

TRADE POLICY

**Terms of trade  
manipulation**

Theory

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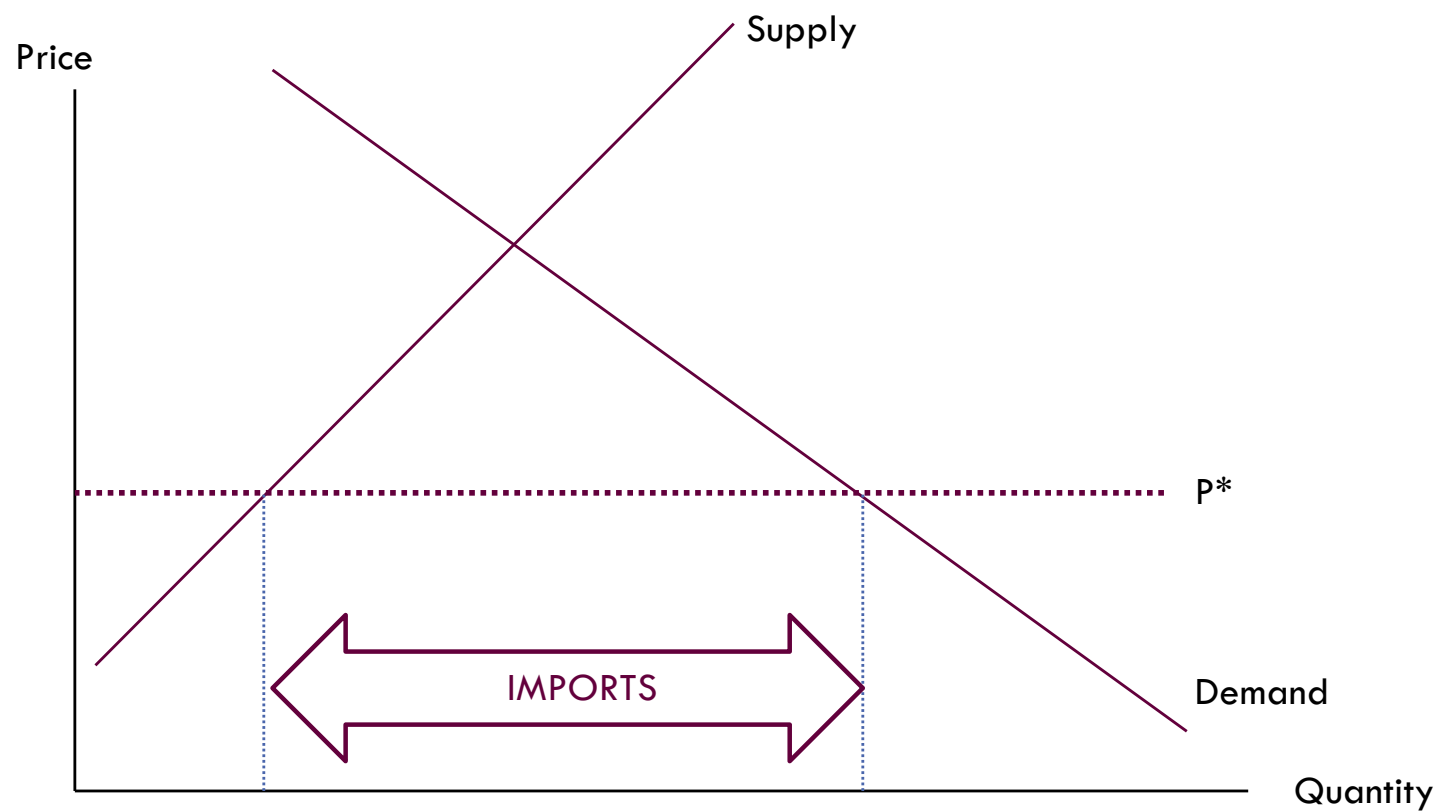
Matthieu Crozet



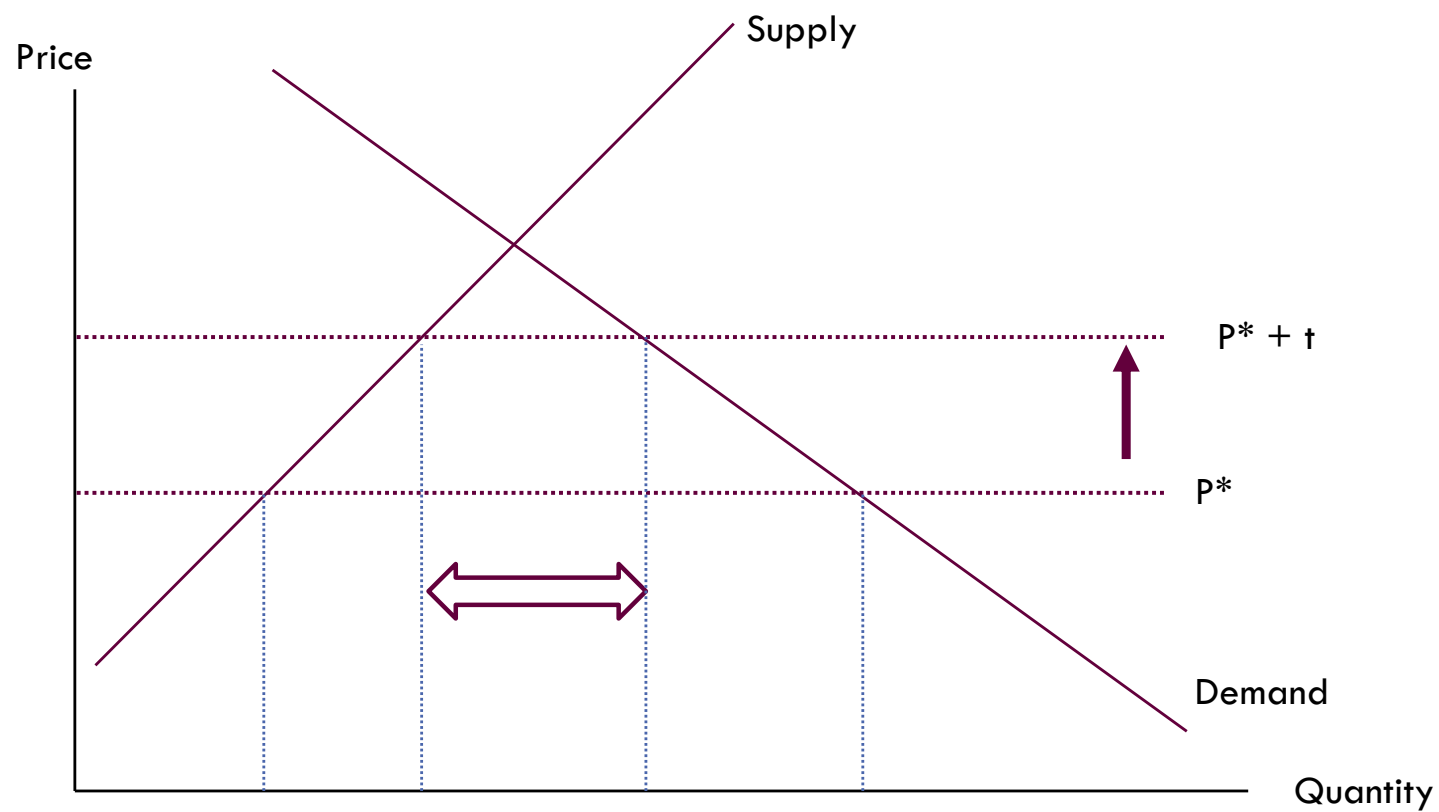
# TERMS OF TRADE MANIPULATIONS

Graphical intuition

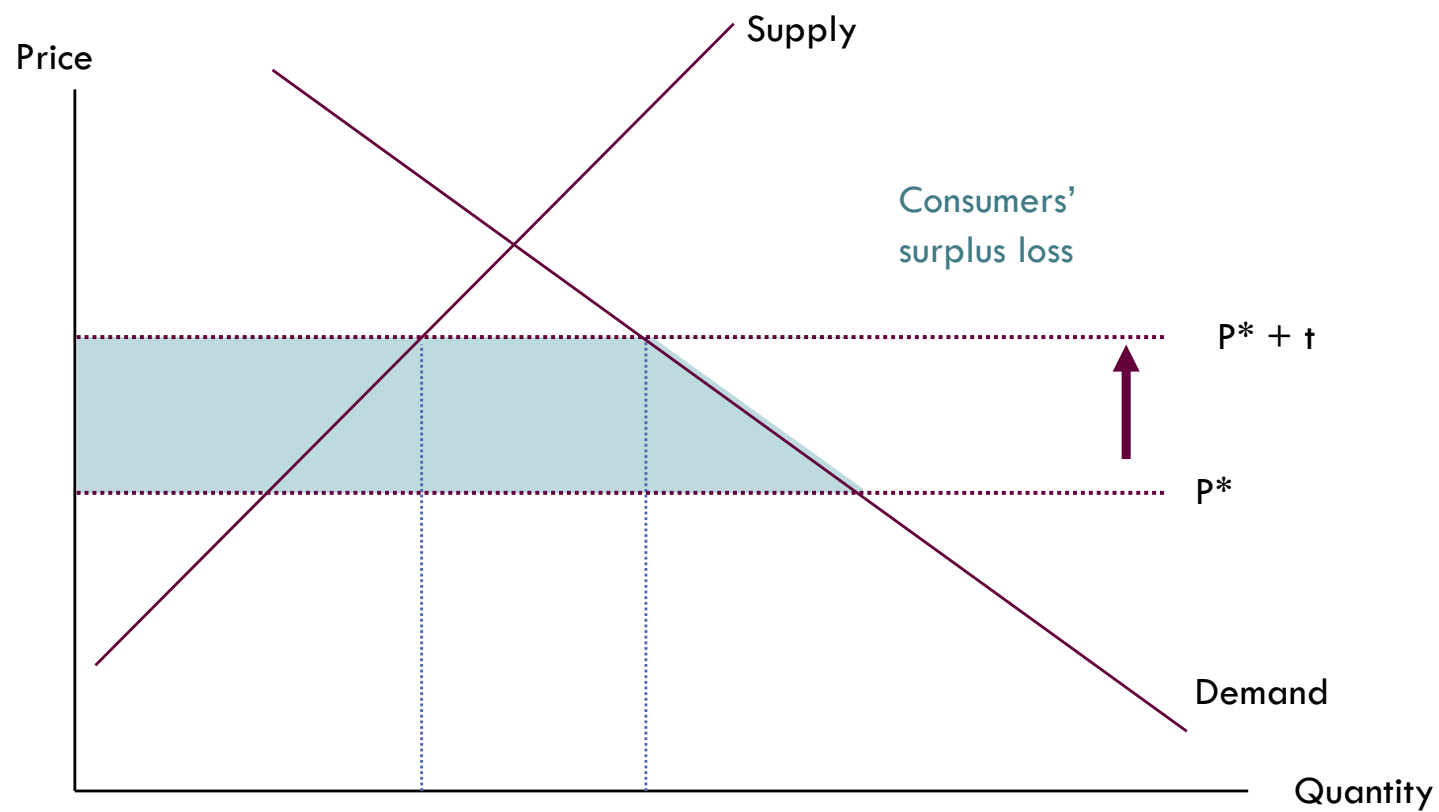
# THE CASE OF A SMALL COUNTRY



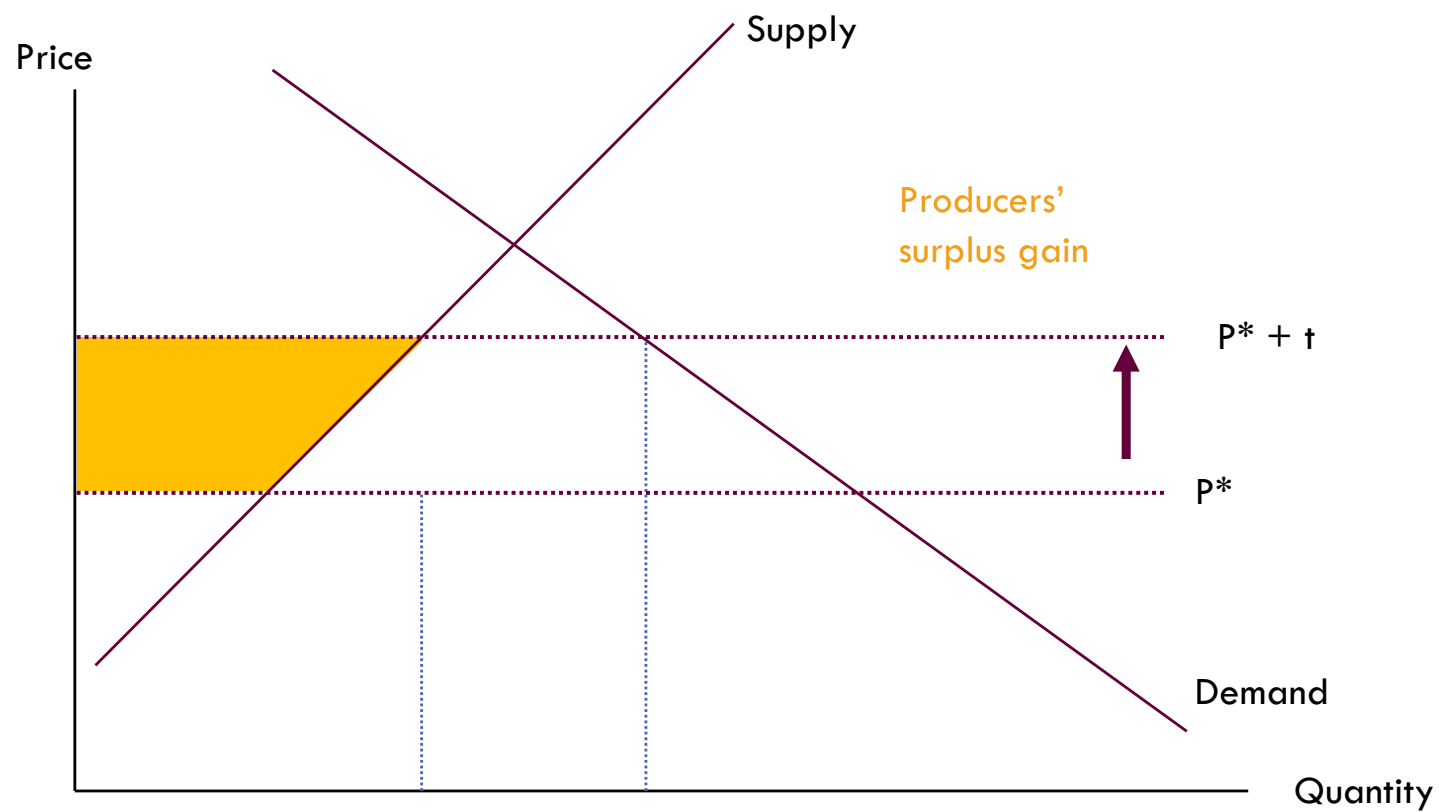
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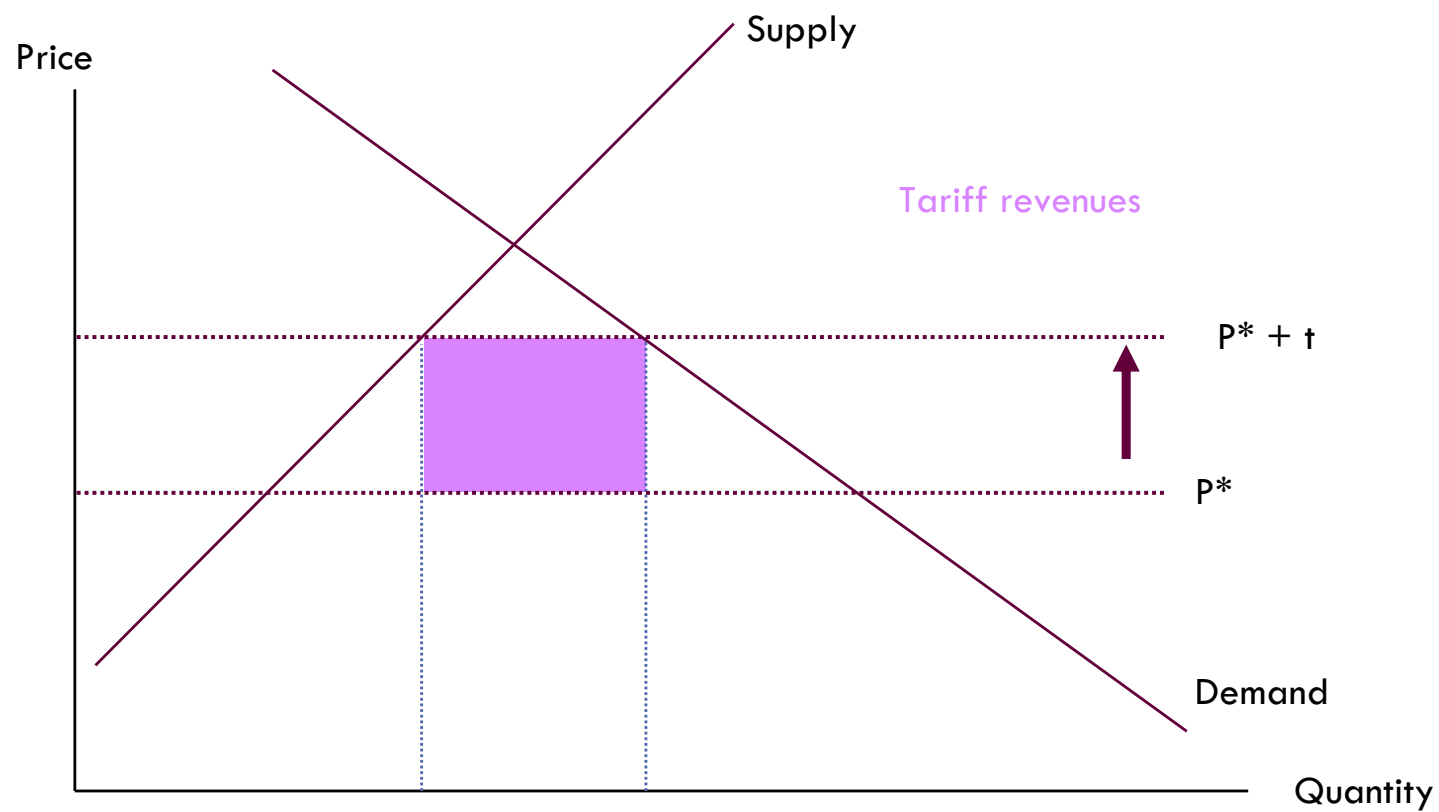
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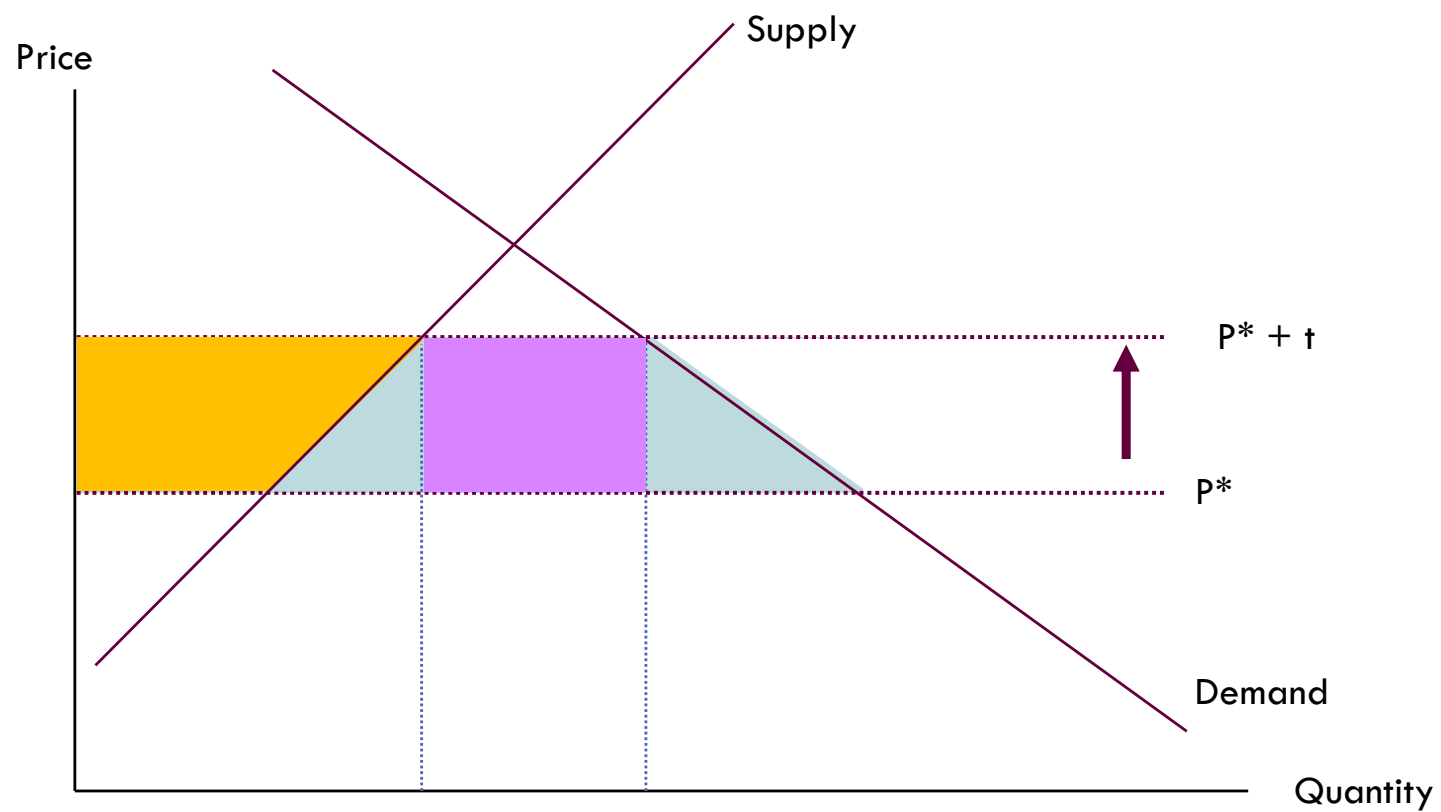
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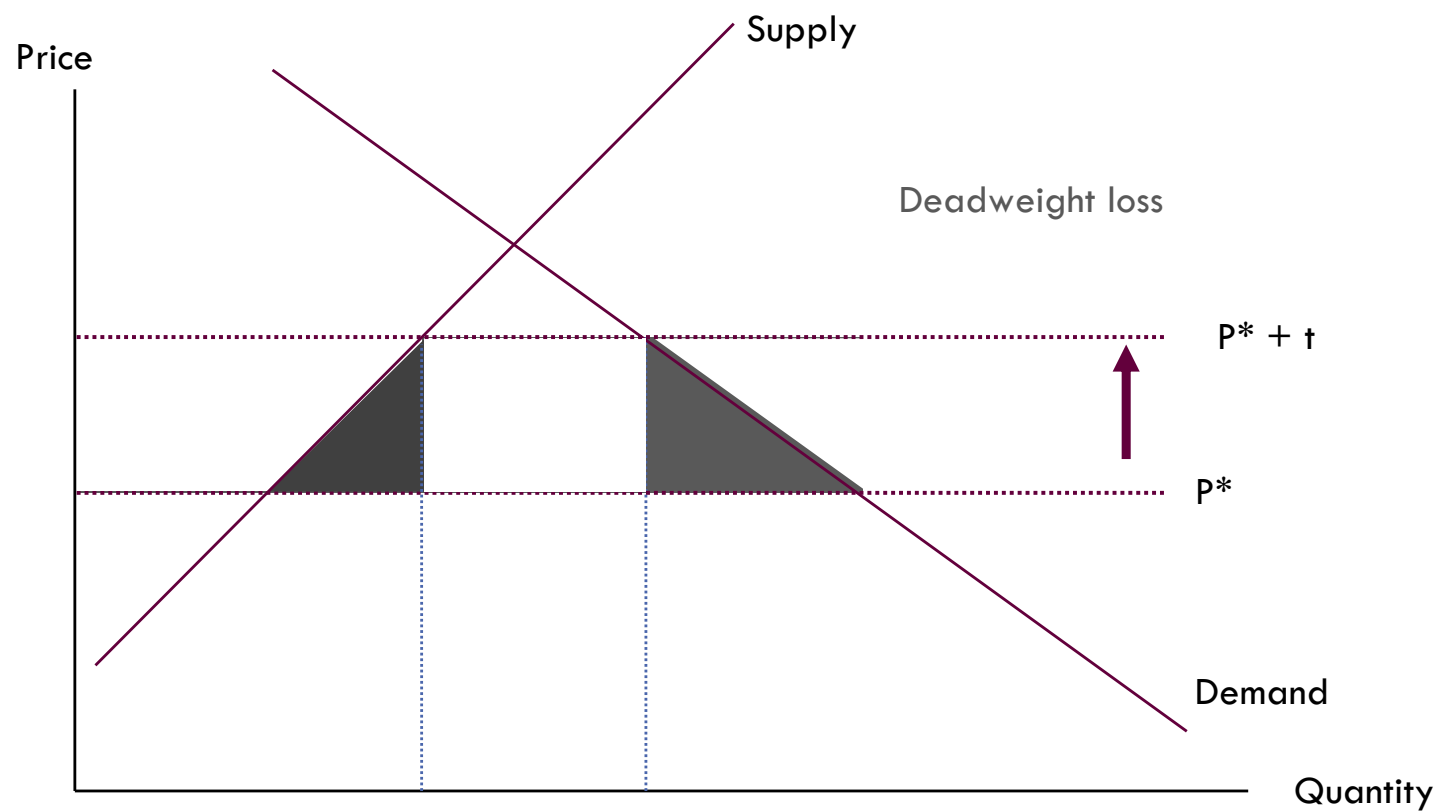
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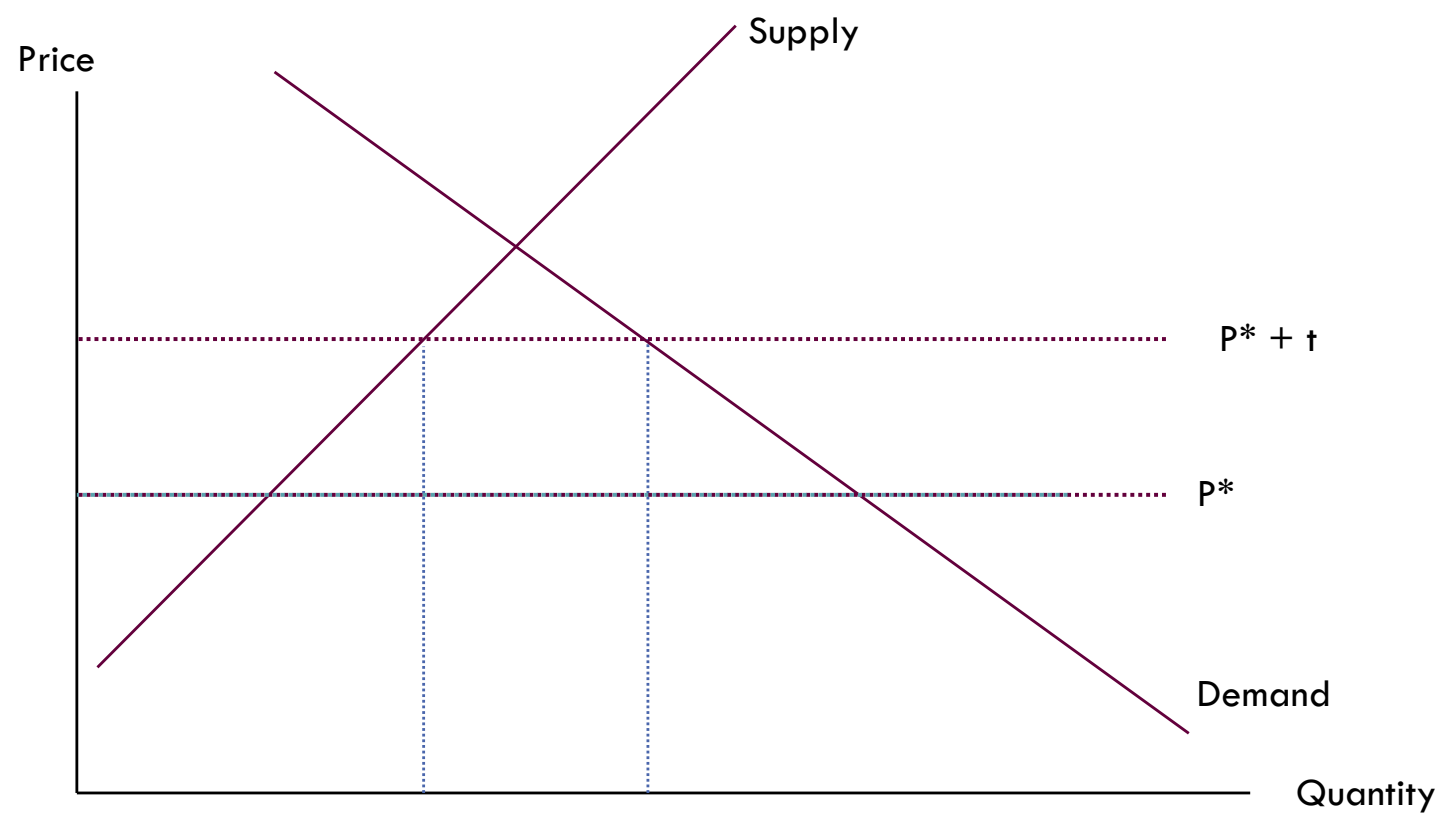


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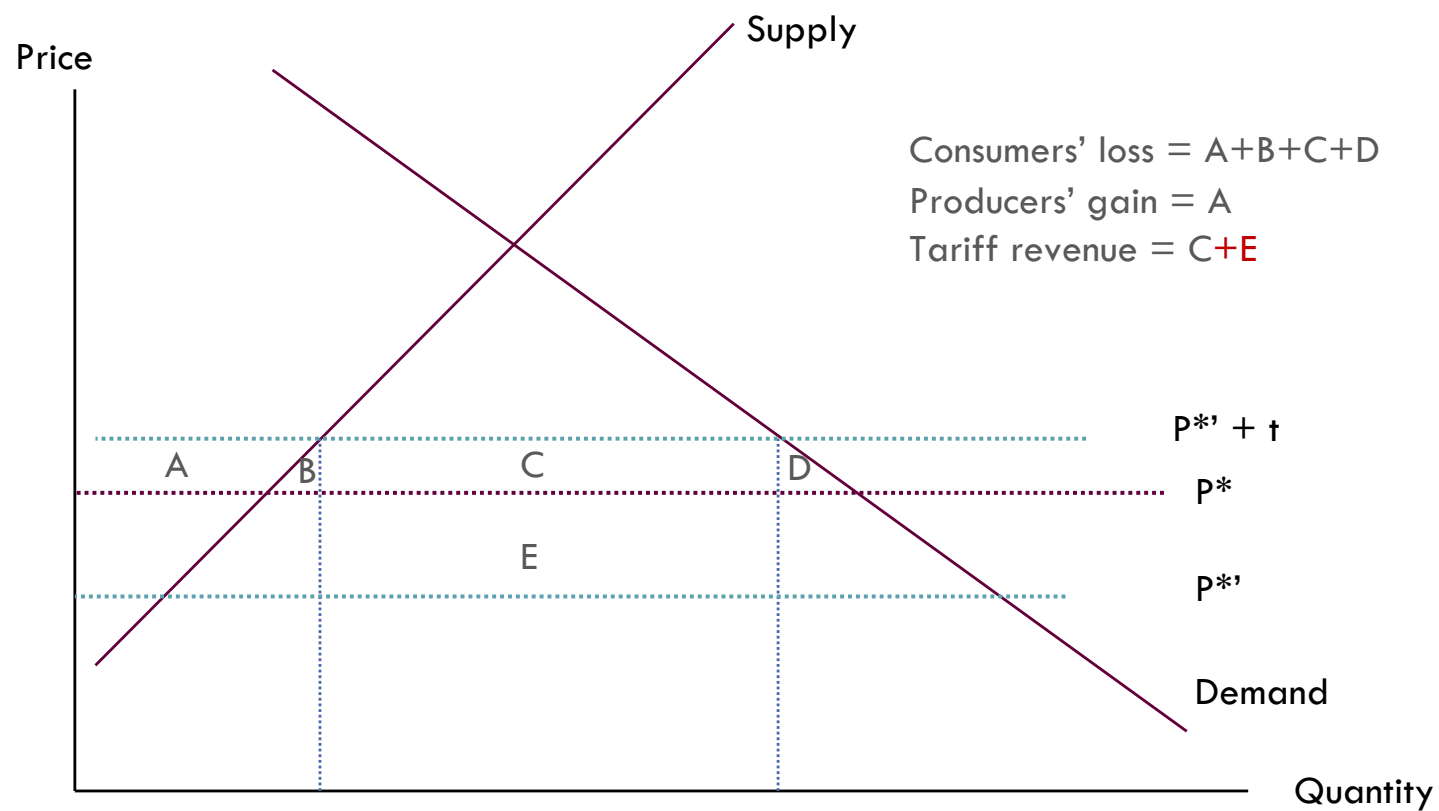




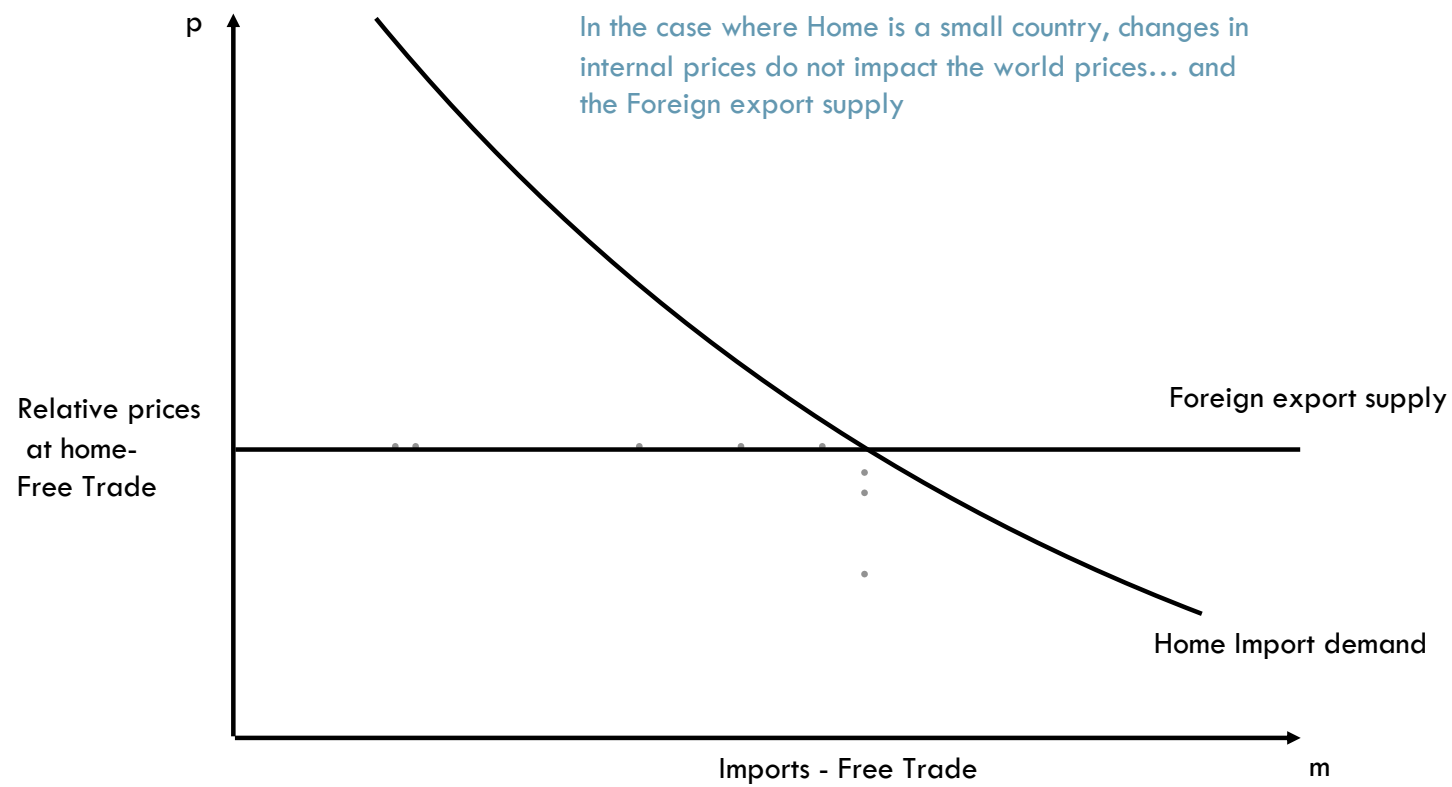
# THE CASE OF A LARGE COUNTRY



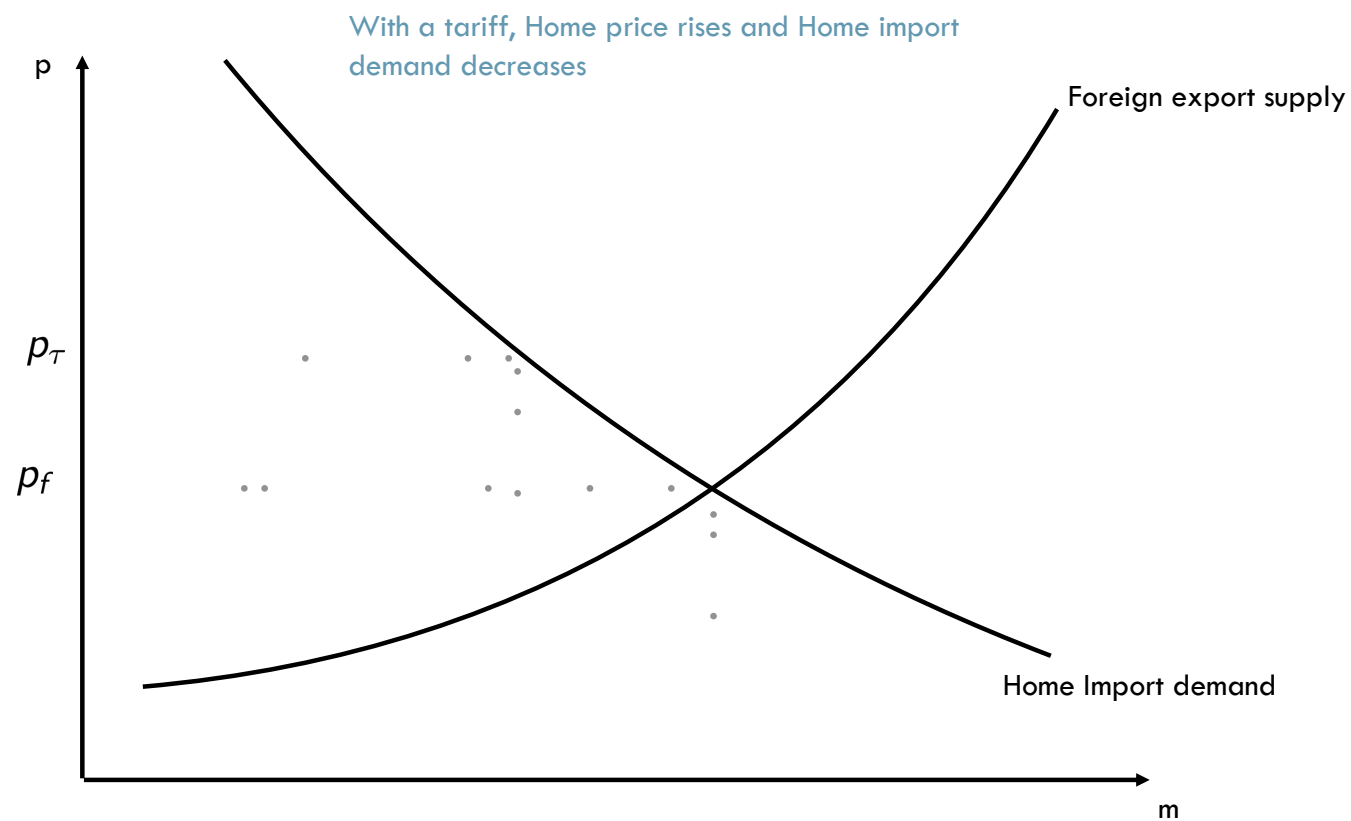
# THE CASE OF A LARGE COUNTRY



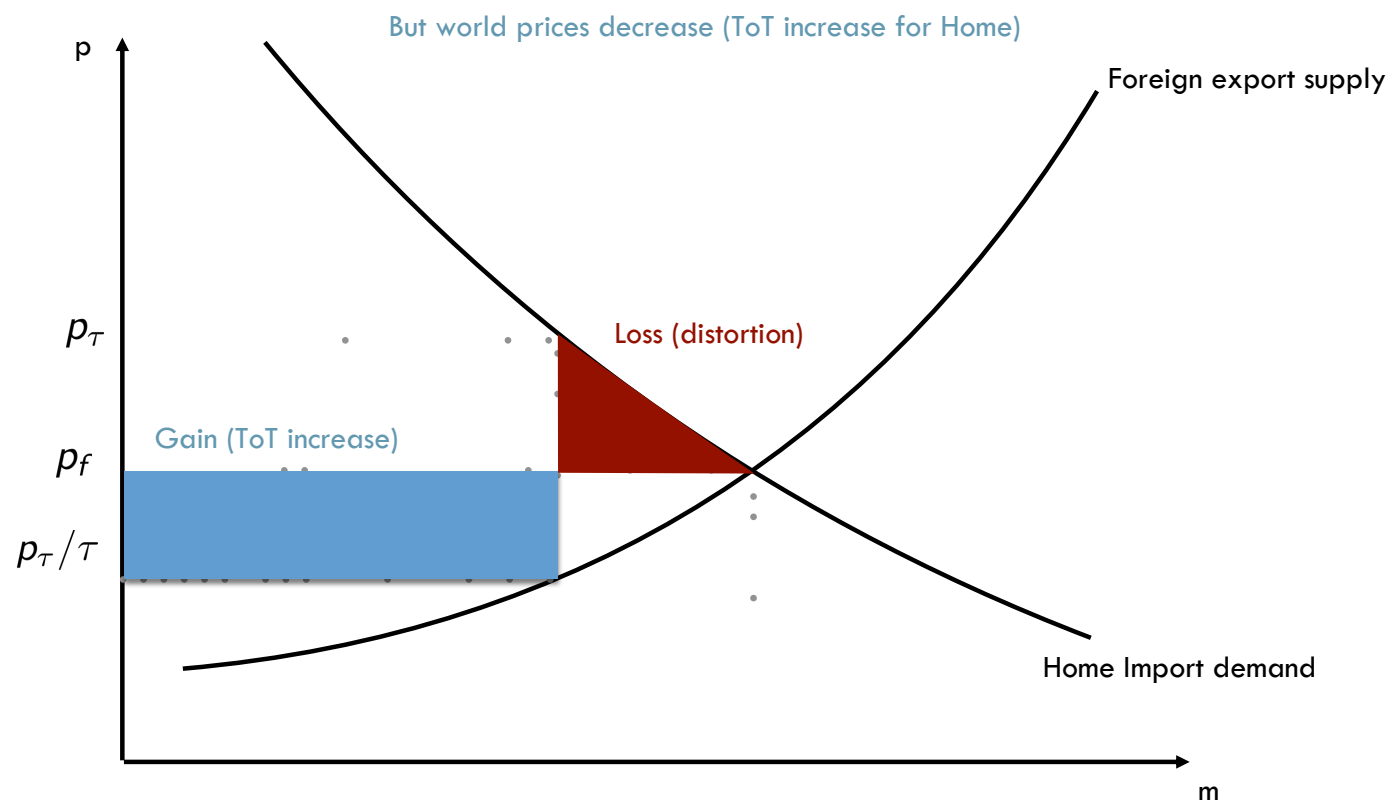
# OPTIMAL TARIFF



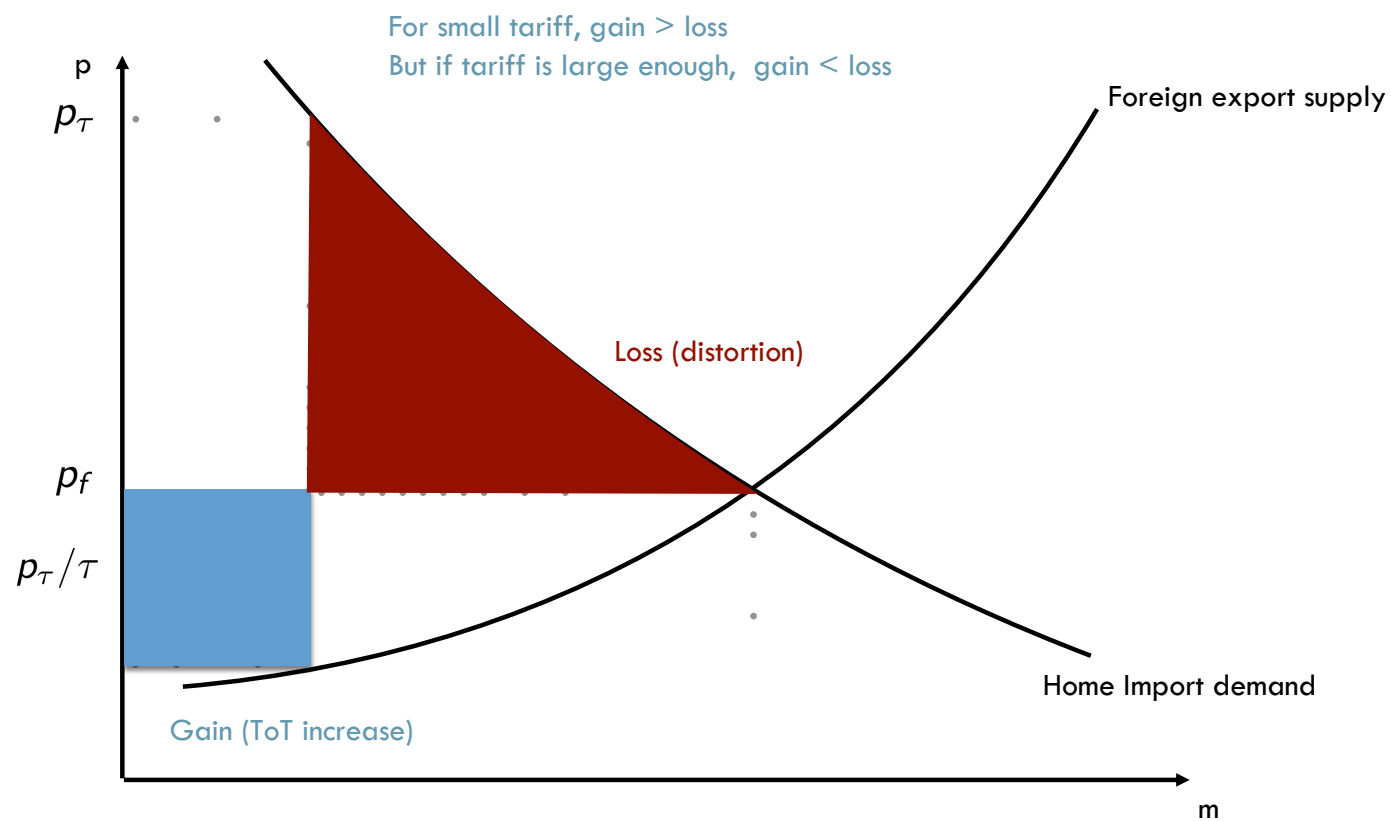
# OPTIMAL TARIFF



# OPTIMAL TARIFF



# OPTIMAL TARIFF



## OPTIMAL TARIFF – FORMAL APPROACH

Consider a case of perfect competition

Outside good as numeraire = wages are pinned down

Home population is  $L$

Foreign price =  $p^*$

Domestic price =  $p$ , with  $p = p^* + t$

$$\text{Utility: } U = c_0 + u[d(p)],$$

with  $c_0$  the consumption of the outside good and  $u[d(p)]$  the sub-utility generated by the consumption  $d(p)$  of the imported good

# OPTIMAL TARIFF – FORMAL APPROACH

Social welfare is the sum of:

Consumers' surplus = Utility  $U$

Tariff revenue =  $tm$ , where  $t$  is the tariff and  $m$  is the import value

Producers' surplus =  $py - C(y)$ , where  $y$  is the production and  $C(y)$  the production cost

$$W = U + tm + [py - C(y)]$$



## OPTIMAL TARIFF – FORMAL APPROACH

$$U = c_0 + u[d(p)]$$

Income:  $I = wL$  is exogenous

The consumption of the outside good can be written as the is the residual revenue after utility maximization

$$c_0 = I - p d(p) \Rightarrow \text{Consumer Surplus} = I - pd(p) + u[d(p)]$$

## OPTIMAL TARIFF – FORMAL APPROACH

$$\text{Consumer Surplus} = CS = I - pd(p) + u[d(p)]$$

This utility function is a convenient trick: After a change in price  $p$ , consumers maximize the subtility  $u[d(p)]$  and define their consumption of outside good

$\Rightarrow u[d(p)]$  is the result of a maximization  $\Rightarrow$  the envelop theorem applies

*= when one differentiates a function (like CS) that results from a maximization with respect to an exogenous variable (like  $p$ ), he can ignore the derivatives of all endogenous variables that have been maximized with respect to  $p$  (like  $d(p)$  and  $u$ ).*

# OPTIMAL TARIFF – FORMAL APPROACH

$$\text{Consumer Surplus} = CS = I - pd(p) + u[d(p)]$$

$$\Rightarrow \frac{\partial CS}{\partial p} = -d(p)$$

# OPTIMAL TARIFF – FORMAL APPROACH

Total welfare:

$$W = \text{Consumer Surplus} + \text{Tariff Revenue} + \text{Producer Surplus}$$

$$W = CS + tm + [py - C(y)]$$

Where  $m$  are the imports,  $y$  the production and  $C(y)$  the production cost

# OPTIMAL TARIFF – FORMAL APPROACH

We compute the derivative of welfare with respect to  $t$

$$W = CS + tm + [py - C(y)]$$

$$\frac{\partial W}{\partial t} = \frac{\partial CS}{\partial p} \frac{\partial p}{\partial t} + m + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} + \frac{\partial p}{\partial t} y + p \frac{\partial y}{\partial p} \frac{\partial p}{\partial t} - \frac{\partial C(y)}{\partial y} \frac{\partial y}{\partial p} \frac{\partial p}{\partial t}$$

$$\frac{\partial W}{\partial t} = -d(p) \frac{\partial p}{\partial t} + \frac{\partial p}{\partial t} y + m + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} + \left[ p - \frac{\partial C(y)}{\partial y} \right] \frac{\partial y}{\partial p} \frac{\partial p}{\partial t}$$

## OPTIMAL TARIFF – FORMAL APPROACH

$$\frac{\partial W}{\partial t} = -d(p) \frac{\partial p}{\partial t} + \frac{\partial p}{\partial t} y + m + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} + \left[ p - \frac{\partial C(y)}{\partial y} \right] \frac{\partial y}{\partial p} \frac{\partial p}{\partial t}$$

$$\frac{\partial W}{\partial t} = [y - d(p)] \frac{\partial p}{\partial t} + m + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} + \left[ p - \frac{\partial C(y)}{\partial y} \right] \frac{\partial y}{\partial p} \frac{\partial p}{\partial t}$$

$$p - \frac{\partial C(y)}{\partial y} = \text{Price-Marginal cost} = 0$$

$$[y - d(p)] = -m$$

$$\frac{\partial W}{\partial t} = m \left[ 1 - \frac{\partial p}{\partial t} \right] + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t}$$

## OPTIMAL TARIFF — FORMAL APPROACH

$$\frac{\partial W}{\partial t} = m \left[ 1 - \frac{\partial p}{\partial t} \right] + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t}$$

$$p = p^* + t \Rightarrow \frac{\partial p}{\partial t} = \frac{\partial p^*}{\partial t} + 1 \Rightarrow 1 - \frac{\partial p}{\partial t} = - \frac{\partial p^*}{\partial t}$$

$$\frac{\partial W}{\partial t} = -m \frac{\partial p^*}{\partial t} + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t}$$

## OPTIMAL TARIFF – FORMAL APPROACH

$$\frac{\partial W}{\partial t} = -m \frac{\partial p^*}{\partial t} + t \frac{\partial m}{\partial p} \frac{\partial p}{\partial t}$$

For  $t$  close to 0:

$$\frac{\partial W}{\partial t} = -m \frac{\partial p^*}{\partial t}$$

Result #1: As far as the world price decreases with the tariff, a small tariff increases welfare



## OPTIMAL TARIFF – FORMAL APPROACH

Optimal tariff  $t^*$

$$\frac{\partial W}{\partial t} = -m \frac{\partial p^*}{\partial t} + t^* \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} = 0$$

$$t^* = \left( m \frac{\partial p^*}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} \right)$$

## OPTIMAL TARIFF – FORMAL APPROACH

$$t^* = \left( m \frac{\partial p^*}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} \right)$$

$$\frac{t^*}{p^*} = \left( \frac{m}{p^*} \frac{\partial p^*}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} \right)$$

We note that home imports = foreign exports  $\Rightarrow m = x$

$$\frac{t^*}{p^*} = \left( \frac{x}{p^*} \frac{\partial p^*}{\partial t} \right) / \left( \frac{\partial x}{\partial p} \right) = 1 / \left( \frac{\partial x}{\partial p^*} \frac{p^*}{x} \right)$$

**The ad-valorem optimal tariff is the inverse of the elasticity of the export supply curve**

## OPTIMAL TARIFF – FORMAL APPROACH

$$t^* = \left( m \frac{\partial p^*}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} \right)$$

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**The elasticity of the export supply curve is positive, so as the the optimal tariff**

## OPTIMAL TARIFF — FORMAL APPROACH

Alternatively, we can express the optimal tariff in terms of domestic price

$$\frac{t^*}{p^*} = \left( \frac{m}{p^*} \frac{\partial p^*}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{\partial p}{\partial t} \right)$$

$$\frac{t^*}{p^*} = \left( \frac{1}{p^*} \frac{\partial p^*}{\partial t} \frac{\partial t}{\partial p} \right) / \left( \frac{\partial m}{\partial p} \frac{1}{m} \right)$$

$$\frac{t^*}{p^*} = \left( \frac{p}{p^*} \frac{\partial p^*}{\partial t} \frac{\partial t}{\partial p} \right) / \left( \frac{\partial m}{\partial p} \frac{p}{m} \right)$$

$$\frac{t^*}{p} = \left( \frac{\partial p^*}{\partial t} \frac{\partial t}{\partial p} \right) / \left( \frac{\partial m}{\partial p} \frac{p}{m} \right) = \left( \frac{\partial p^*}{\partial t} / \frac{\partial p}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{p}{m} \right)$$

## OPTIMAL TARIFF – FORMAL APPROACH

$$\frac{t^*}{p} = \left( \frac{\partial p^*}{\partial t} / \frac{\partial p}{\partial t} \right) / \left( \frac{\partial m}{\partial p} \frac{p}{m} \right)$$

$\frac{\partial m}{\partial p} \frac{p}{m}$  is the elasticity of the Home import demand. It is of course negative:  $\frac{\partial m}{\partial p} \frac{p}{m} < 0$

With a tariff, price should increase in Home:  $\frac{\partial p}{\partial t} > 0$

⇒ The optimal tariff is positive if  $\frac{\partial p^*}{\partial t} < 0$

## OPTIMAL TARIFF – FORMAL APPROACH

⇒ The optimal tariff is positive if  $\frac{\partial p^*}{\partial t} < 0$

A tariff increases Home welfare if and only if foreign export price decrease when the tariff increase

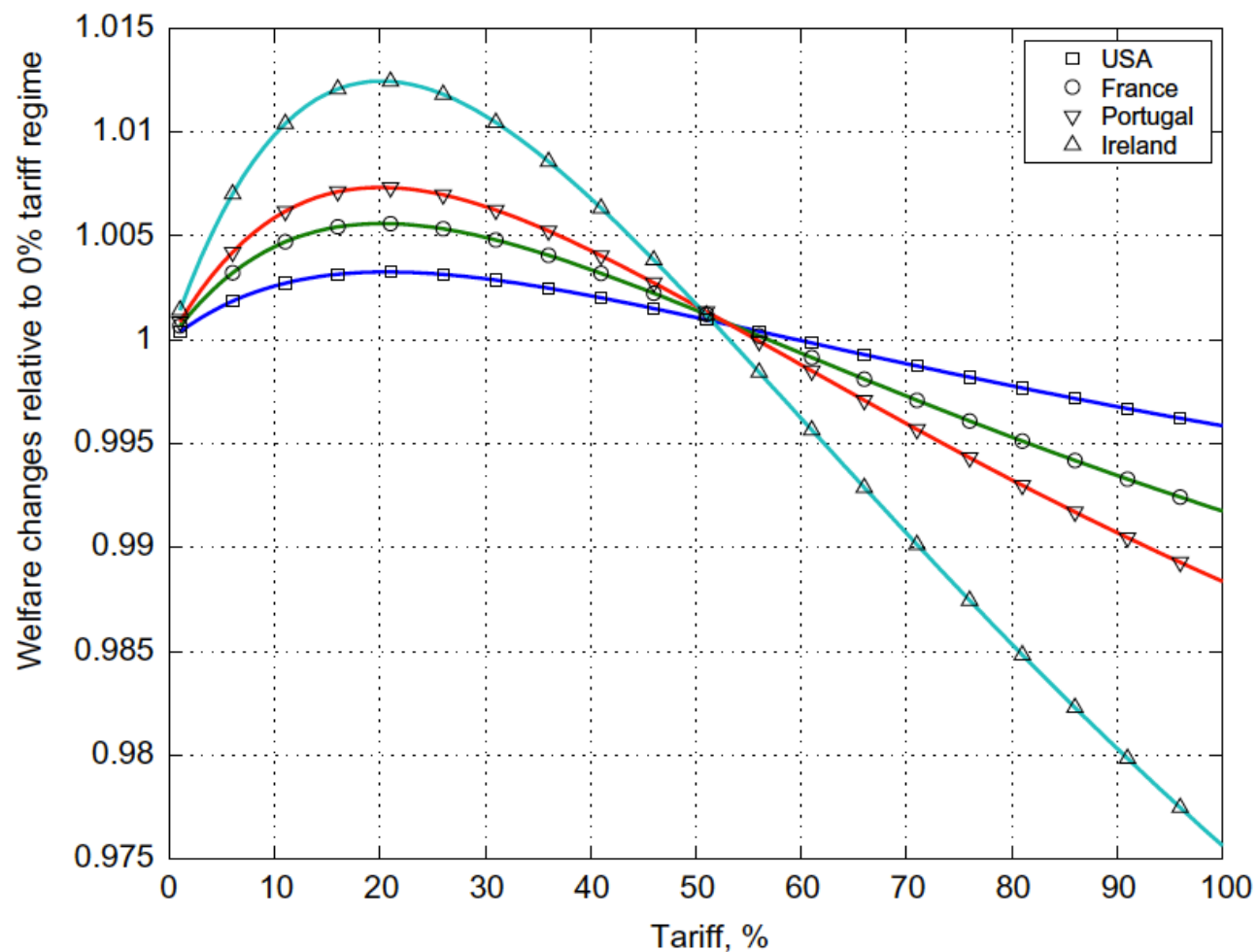
$\frac{\partial p^*}{\partial t} < 0$  This is an **increase of the ToT**

$\frac{\partial p^*}{\partial t} < 0$  This mean that the exporters absorb a part of the tariff =  
**incomplete pass-through**

# QUANTIFICATION

Costinot and Rodriguez-Clare (2014) estimate the welfare impact of tariffs with a more complex Armington model

- Confirm that the optimal tariff is close to 20-25%
- Show that impact of non-cooperative trade policy generates small but non-negligible welfare gains (about 6% for France)
- That country size has a non-trivial impact on gains (small countries are less able to manipulate their ToT, but they trade more, and then gain more from a improvement of their ToT: Ireland and Portugal gain more than the US, but Ireland gains more than Portugal because the country trades more)



**Figure 4.1** Welfare Changes Associated with a Unilateral Tariff in the Country Imposing the Tariff. (Trade elasticity  $\varepsilon = 5$ . Data are from WIOD in 2008.)

Costinot and Rodrigues Clare (2014)



TRADE POLICY

# Strategic trade policy

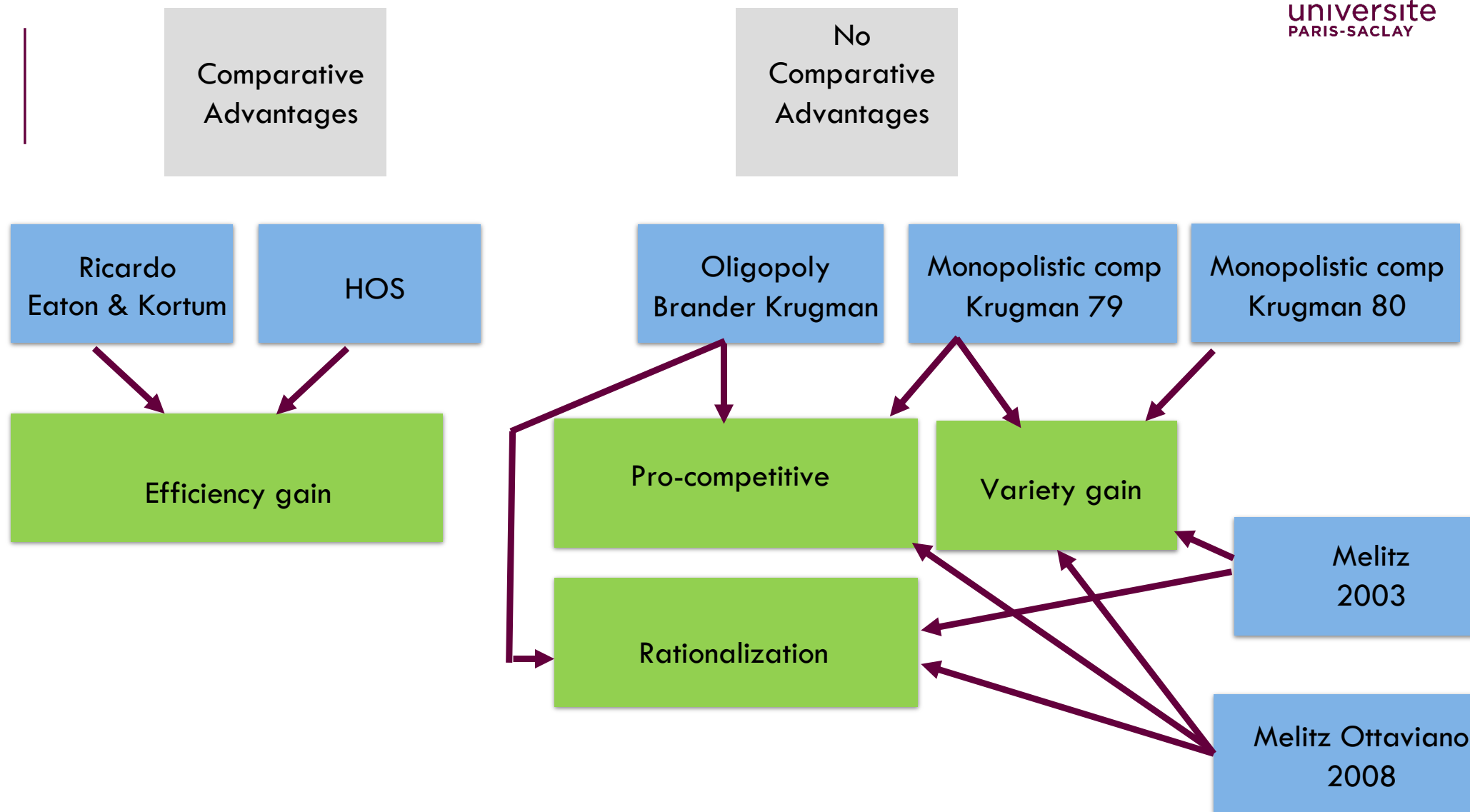
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## A family tree of trade models



# INTERNATIONAL OLIGOPOLY

Perrier sells water in Italy... and San Pellegrino sells water in France



# BRANDER (1981)



Journal of International Economics

Volume 11, Issue 1, February 1981, Pages 1-14



## Intra-industry trade in identical commodities

James A. Brander \*



Journal of International Economics

Volume 15, Issues 3-4, November 1983, Pages 313-321



## A 'reciprocal dumping' model of international trade

James Brander, Paul Krugman \*

# RECIPROCAL DUMPING

Let's see the most simple case: **Cournot duopoly**

2 firms:

1 from Home

2 from Foreign

Constant marginal costs =  $c$

Trade cost/tariff per unit =  $t$

Total supply on Home market =  $z$

Aim = observe how  
welfare varies with  $t$

# RECIPROCAL DUMPING

Profits on Home market:

$$\pi_1 = pq_1 - cq_1$$

$$\pi_2 = pq_2 - q_2(c + t)$$

## RECIPROCAL DUMPING

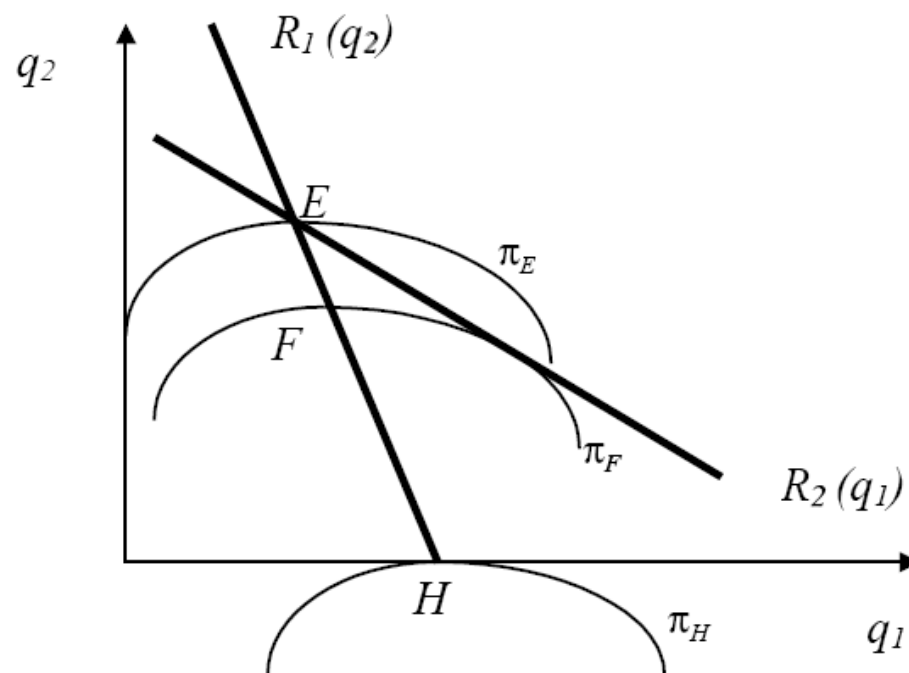
First order conditions:

$$\begin{aligned}\frac{\partial \pi_1}{\partial q_1} &= \frac{\partial p}{\partial q_1} q_1 + p - c = 0 \\ \Rightarrow p' q_1 + p - c &= 0 \\ p' q_2 + p - c - t &= 0\end{aligned}$$

This gives the two reaction curves. In a Cournot duopoly, they are decreasing (when one firm expands, the other steps back)



# RECIPROCAL DUMPING

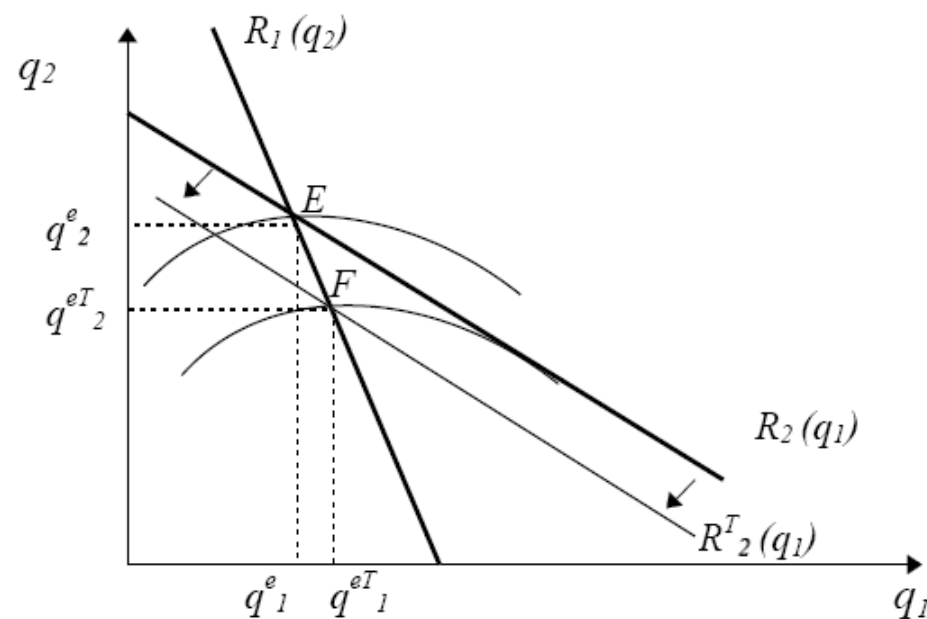


# RECIPROCAL DUMPING

Increase in tariff

Firm 1 reaction function is unaffected

Firm 2 reaction function moves down  $\Rightarrow q_1 \uparrow q_2 \downarrow$

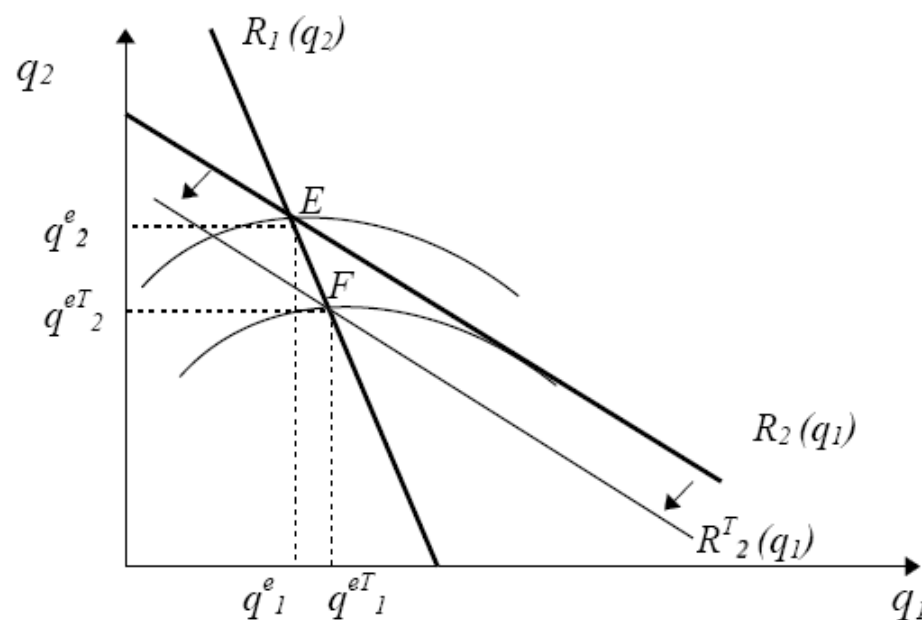


# RECIPROCAL DUMPING

Increase in tariff

Firm 1 reaction function is unaffected

Firm 2 reaction function moves down  $\Rightarrow \pi_1 \uparrow \pi_2 \downarrow$  (rent shifting)

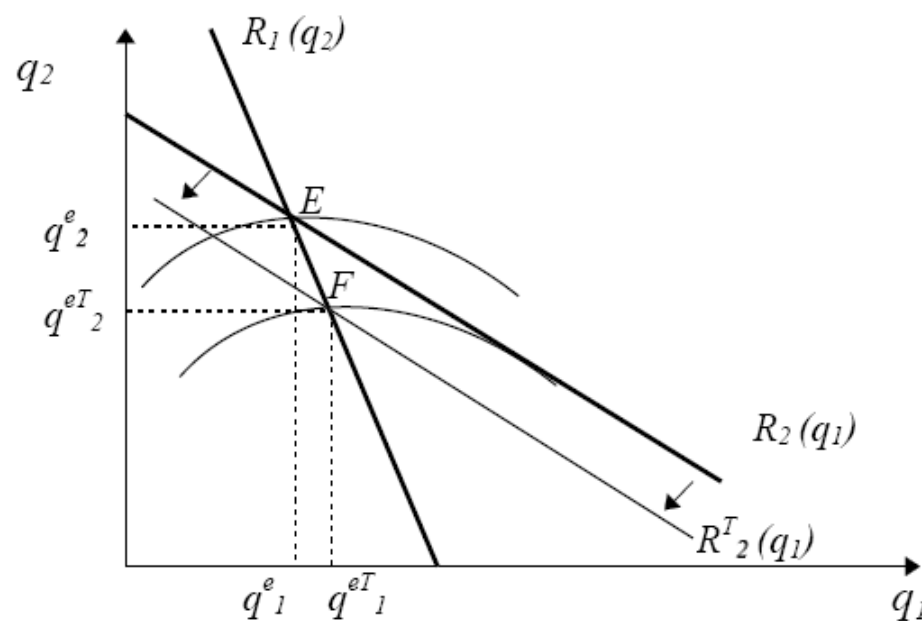


# RECIPROCAL DUMPING

Increase in tariff

Firm 1 reaction function is unaffected

Firm 2 reaction function moves down  $\Rightarrow p \uparrow$  ( $\downarrow$  consumer surplus)



## RECIPROCAL DUMPING

Let's sum the two first order conditions

$$2p + p'(q_1 + q_2) - 2c - t = 0$$

$$2p + p'z - 2c - t = 0$$

$$z = q_1 + q_2$$

Total differentiation (remember:  $p$  is a function of  $z$ )

$$2p'dz + p'dz + p''zdz - dt = 0$$

$$3p'dz + p''zdz - dt = 0$$

## RECIPROCAL DUMPING

$$3p' dz + p'' z dz - dt = 0$$

$$\Rightarrow \frac{dz}{dt} = \frac{1}{3p' + zp''}$$

Note:

$$\frac{dp}{dz} = p'$$

$$\Rightarrow \frac{dp}{dt} = \frac{p'}{3p' + zp''}$$

## RECIPROCAL DUMPING

The good is normal = the demand curve is decreasing

$$p' < 0$$

The tariff reduces imports iff

$$3p' + zp'' < 0$$

⇒ in this case, the tariff increases the price  
(inclusive of tariff)

$$\frac{dp}{dt} > 0$$

## RECIPROCAL DUMPING

A key question is whether the tariff increases the price more or less than the tariff,

i.e. is  $\frac{dp}{dt} < 1$  ?

$$\frac{dp}{dt} = \frac{p'}{3p' + zp''} < 1 \Rightarrow 2p' + zp'' < 0$$

Which it is satisfied by most demand curves



## RECIPROCAL DUMPING

$$\frac{dp}{dt} < 1 \Rightarrow \frac{d(p - t)}{dt} < 0$$

The price, net of tariff, charged by the exporter decreases.

= This is a ToT gain... again!

TRADE POLICY

# Tariff pass-through

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# WHO PAYS THE TARIFFS?



Enrique Peña Nieto (@EPN) responded to Donald J. Trump's tweet with the text: "Repito lo que le dije personalmente, Sr. Trump: México jamás pagaría por un muro." The response was posted at 2:06 PM on September 1, 2016, and has 1,302 retweets and 1,098 likes. A quote box shows the original tweet text: "Donald J. Trump @realDonaldTrump Mexico will pay for the wall!".

## WHO PAYS THE TARIFFS?



Following

I often stated, "One way or the other, Mexico is going to pay for the Wall." This has never changed. Our new deal with Mexico (and Canada) is the old deal, that just says PAYING

8:38 AM - 13 D



**Paul Krugman** ✓  
@paulkrugman



Follow

Tariffs aren't paid by the exporter; it depends a bit on the details, but it's basically a tax on domestic consumers 6/

Ok Paul.

But the details are really what matters here

# WHO PAYS THE TARIFFS?

Who wins and who loses from trade policy?

→ It depends on who pays the tariff

The more the foreign exporter pays by reducing the price (net of tariff) he charges, the more the importing country is likely to gain.

# TARIFF PASS-THROUGH

A key statistics to assess the possible trade gain is how much the import price inclusive changes with the tariff

= tariff pass-through rate

The smaller it is (= the larger is the decrease of the *fob* import price) the larger is the trade gain

# TARIFF PASS-THROUGH

If foreign exporters reduce their ex-tariff prices by an amount close to the scale of the tariff, the tariff's incidence will fall mainly on foreign countries.

Zero Pass-through

If foreign exporters do not change their ex-tariff prices, the importer pays the greatest cost.

« Complete » Pass-through

# TARIFF PASS-THROUGH

A key statistics is how much the import price inclusive changes with the tariff

= tariff pass-through rate

The smaller it is (= the larger is the decrease of the *fob* import price) the larger is the trade gain



# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

*Cf. Fajgelbaum, Goldberg, Kennedy and Khandelwal (2020); Fajgelbaum and Amit Khandelwal (2021)*

Welfare loss resulting from tariffs can be summarize by the Equivalent Variation = for each factor, the change in income (at initial prices) that would have left this factor indifferent with the changes in tariff.

Adding up these EV for each factor (and assuming a neutral redistribution of tariffs revenues) leads to the general formula:

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$

# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$

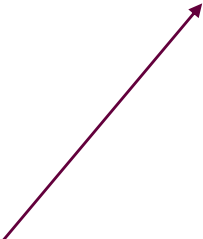
$m$  = vector with the imported quantities of each variety before the tariff

$x$  = vector with the exported quantities of each variety before the tariff


# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$

Change in import  
prices (including tariff)



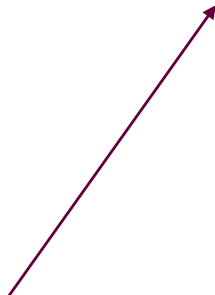
Change in export  
prices



# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY


$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$

Change in tariff  
revenue



# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$



$$xp_x\Delta\ln(p_x)$$

$$\frac{\Delta a}{a} = \Delta\ln(a)$$

## GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$

$$\Delta R = \Delta m p_m \tau$$

$$\Delta R = \tau \Delta m p_m = \tau [p_m \Delta m + m \Delta p_m]$$

$$\Delta R = \tau m p_m [\Delta \ln(m) + \Delta \ln(p_m)]$$

## GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$



$$-m [\Delta p_m] - m [\tau \Delta p_m]$$

$$-mp_m [\Delta \ln(p_m) + \tau \Delta \ln(p_m)]$$

## GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = -m\Delta[p_m(1 + \tau)] + x\Delta p_x + \Delta R$$

$$-mp_m\Delta\ln(p_m) - \tau mp_m\Delta\ln(p_m) + \tau mp_m\Delta\ln(m) + \tau mp_m\Delta\ln(p_m) + xp_x\Delta\ln(p_x)$$

$$EV = mp_m [-\Delta\ln(p_m) + \tau\Delta\ln(m)] + xp_x\Delta\ln(p_x)$$



# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = mp_m [-\Delta \ln(p_m) + \tau \Delta \ln(m)] + xp_x \Delta \ln(p_x)$$

Terms of trade effects

# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = mp_m [-\Delta \ln(p_m) + \tau \Delta \ln(m)] + xp_x \Delta \ln(p_x)$$

↑  
Distortions

# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

$$EV = mp_m [-\Delta \ln(p_m) + \tau \Delta \ln(m)] + xp_x \Delta \ln(p_x)$$

To quantify the impact of a tariff, one should estimate how each term vary with the tariff: the (tariff included) import price, the volume imported and the export price

# GENERAL FORMULA OF THE WELFARE IMPACT OF TRADE POLICY

Export price should not be affected... unless special cases (e.g. super big country and/or retaliation)

Imports should decrease

Import prices (net of tariffs) should decrease (big country assumption and ToT argument), but probably not enough to compensate the tariff itself, so that the import price inclusive of tariffs should increase

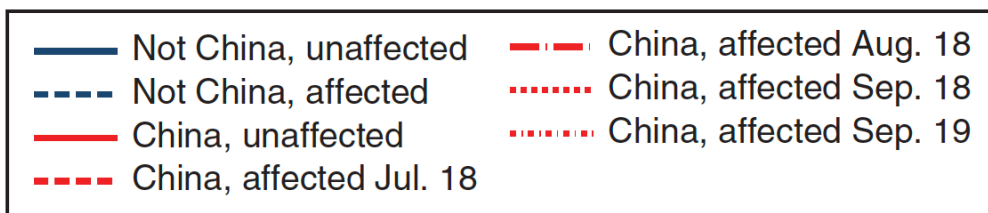
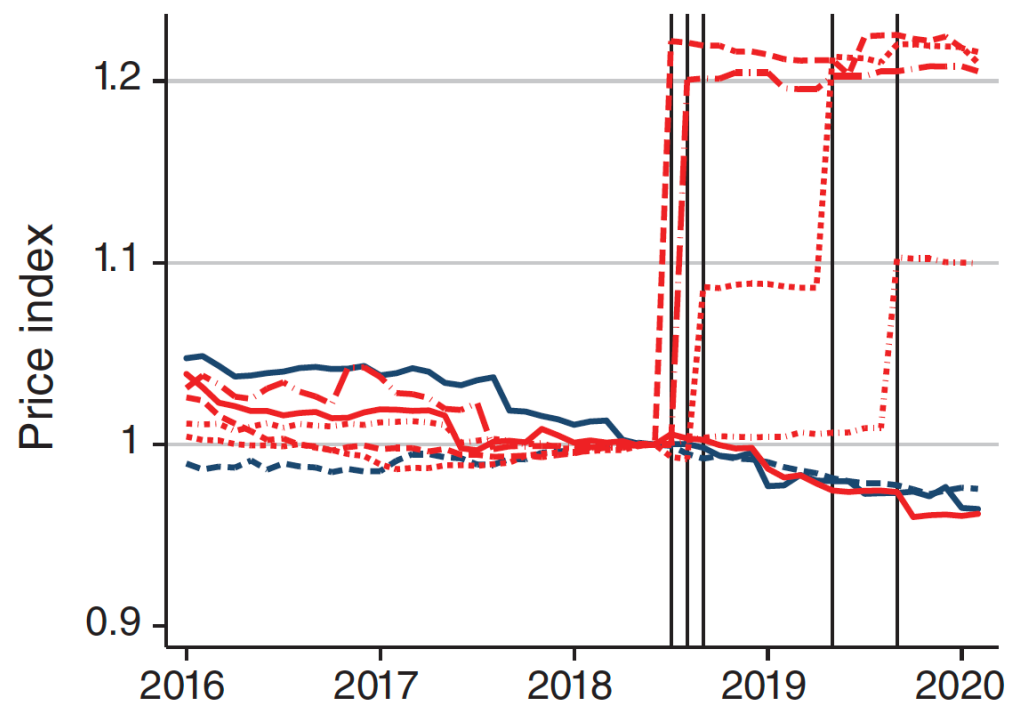
# TARIFF PASS-THROUGH IN TRUMP'S TRADE WAR

Alberto Cavallo, Gita Gopinath, Brent Neiman, and Jenny Tang (AER insights, 2021)

Study the impact of tariffs (US-China trade war) on US import and export prices

Monthly trade data of prices of imported goods (Survey conducted by the US bureau of labor statistics)

Panel A. Import price indices (including tariffs)



# TARIFF PASS-THROUGH

We estimate

$$(1) \quad \Delta \ln(P_{i,j,k,t}^{\mathcal{I}}) = \delta_k^{\mathcal{I}} + \phi_{CN}^{\mathcal{I},\Omega} + \phi_{CN}^{\mathcal{I},-\Omega} + \sum_{l=0}^{11} \gamma_{CN,l}^{\mathcal{I}} \Delta \tau_{CN,k,t-l} \\ + \sum_{l=0}^{11} \beta_l^{\mathcal{I},S} \Delta \ln(S_{j,t-l}) + \sum_{l=0}^{11} \beta_l^{\mathcal{I},X} \Delta \ln(X_{j,t-l}) + \epsilon_{i,j,k,t}$$

Sector  $k$  fixed effect =  
average sectoral inflation

Fixed effects for (i) goods  
affected by tariffs imported  
from China and (ii) goods  
not affected by tariffs  
imported from China

Ex-tariff price of item  $i$   
imported from country  $j$  in  
sector  $k$ , at month  $t$

# TARIFF PASS-THROUGH

We estimate

$$(1) \quad \Delta \ln(P_{i,j,k,t}^{\mathcal{I}}) = \delta_k^{\mathcal{I}} + \phi_{CN}^{\mathcal{I},\Omega} + \phi_{CN}^{\mathcal{I},-\Omega} + \sum_{l=0}^{11} \gamma_{CN,l}^{\mathcal{I}} \Delta \tau_{CN,k,t-l} + \sum_{l=0}^{11} \beta_l^{\mathcal{I},S} \Delta \ln(S_{j,t-l}) + \sum_{l=0}^{11} \beta_l^{\mathcal{I},X} \Delta \ln(X_{j,t-l}) + \epsilon_{i,j,k,t}$$

Tariff change : impact over 12 months

Exchange rate change :  
impact over 12 months

Exporter price index



# TARIFF PASS-THROUGH

We estimate

$$(1) \quad \Delta \ln(P_{i,j,k,t}^{\mathcal{I}}) = \delta_k^{\mathcal{I}} + \phi_{CN}^{\mathcal{I},\Omega} + \phi_{CN}^{\mathcal{I},-\Omega} + \sum_{l=0}^{11} \gamma_{CN,l}^{\mathcal{I}} \Delta \tau_{CN,k,t-l} \\ + \sum_{l=0}^{11} \beta_l^{\mathcal{I},S} \Delta \ln(S_{j,t-l}) + \sum_{l=0}^{11} \beta_l^{\mathcal{I},X} \Delta \ln(X_{j,t-l}) + \epsilon_{i,j,k,t},$$

$\gamma = 0 \Rightarrow$  Complete pass-through  $\Rightarrow$  US consumers pay the tariff

$\gamma = -1 \Rightarrow$  zero pass-through  $\Rightarrow$  Chinese producers pay the tariff

TABLE 1—REGRESSION ANALYSIS OF CHINESE IMPORT TARIFFS USING MONTHLY DATA

		US imports			US exports		US retail	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tariffs 1 year	$(\sum_{l=0}^{11} \gamma_l)$	-0.057 (0.023)	<b>Coefficient -0.057</b>					
Differentiated	$(\sum_{l=0}^{11} \gamma_l)$		<b>⇒ 10 percent tariff would be associated with a</b>					
Undifferentiated	$(\sum_{l=0}^{11} \gamma_l)$		<b>0.6 percent lower</b>					
ERPT 1 year	$(\sum_{l=0}^{11} \beta_l^S)$		<b>ex-tariff price ⇒ a 9.4 percent higher overall</b>					
PPI PT 1 year	$(\sum_{l=0}^{11} \beta_l^X)$		<b>price faced by the importer</b>					
			<b>US consumers pay the lion's share of the</b>					
			<b>tariffs US imposed to China</b>					
Adjusted $R^2$		0.002	0.003	0.004	0.001	0.002	0.003	0.001
Observations		835,722	835,722	583,391	446,527	446,527	295,179	1,118,870
Sector fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Fixed effects  $(\phi_{CN}^{\Omega})$  and  $(\phi_{CN}^{-\Omega})$  are included in all regressions, but we do not report the coefficients in the table because they are not economically significant in all cases. Robust standard errors shown in parentheses.

TABLE 1—REGRESSION ANALYSIS OF CHINESE IMPORT TARIFFS USING MONTHLY DATA

		US imports			US exports			US retail
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tariffs 1 year	$(\sum_{l=0}^{11} \gamma_l)$	-0.057 (0.023)	0.005 (0.025)	<b>Coefficient 0.005</b> <b>⇒ complete pass through</b>				
Differentiated	$(\sum_{l=0}^{11} \gamma_l)$			-				
Undifferentiated	$(\sum_{l=0}^{11} \gamma_l)$			( <b>US consumers pay all the tariffs US imposed to China</b>				
ERPT 1 year	$(\sum_{l=0}^{11} \beta_l^S)$		0.218 (0.023)	(0.026)		(0.018)	(0.023)	
PPI PT 1 year	$(\sum_{l=0}^{11} \beta_l^X)$		0.047 (0.033)	0.091 (0.037)		0.250 (0.038)	0.274 (0.045)	
Adjusted $R^2$		0.002	0.003	0.004	0.001	0.002	0.003	0.001
Observations		835,722	835,722	583,391	446,527	446,527	295,179	1,118,870
Sector fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes

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TABLE 1—REGRESSION ANALYSIS OF CHINESE IMPORT TARIFFS USING MONTHLY DATA

		US imports			US exports			US retail
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tariffs 1 year	$(\sum_{l=0}^{11} \gamma_l)$	-0.057 (0.023)	0.005 (0.025)		<b>Complete pass through for differentiated products</b>			0.035 (0.020)
Differentiated	$(\sum_{l=0}^{11} \gamma_l)$			-0.035 (0.034)				
Undifferentiated	$(\sum_{l=0}^{11} \gamma_l)$			-0.272 (0.103)				
ERPT 1 year	$(\sum_{l=0}^{11} \beta_l^S)$		0.218 (0.023)	0.288 (0.026)	<b>But much more incomplete for homogenous products (but these products account for about 10% of total imports)</b>			
PPI PT 1 year	$(\sum_{l=0}^{11} \beta_l^X)$		0.047 (0.033)	0.091 (0.037)				
Adjusted $R^2$		0.002	0.003	0.004				0.001
Observations		835,722	835,722	583,391				1,118,870
Sector fixed effects		Yes	Yes	Yes				Yes

Notes: Fixed effects  $(\phi_{CN}^{\Omega})$  and  $(\phi_{CN}^{-\Omega})$  are included in all regressions, but we do not report the coefficients in the table because they are not economically significant in all cases. Robust standard errors shown in parentheses.

## THE IMPACT OF TRUMP'S TRADE WAR

*Cf. Fajgelbaum, Goldberg, Kennedy and Khandelwal (2020)*

They estimate the welfare impact of the trade wars started by the Trump Administration in 2018

## THE IMPACT OF TRUMP'S TRADE WAR — EVENT STUDY

We visualize the effects of the tariff war on trade using an event-study framework. To assess impacts, we compare the trends of targeted varieties (those directly affected by a tariff increase) to varieties not targeted in the following specification:

$$\begin{aligned}
 \ln y_{igt} &= \alpha_{ig} + \alpha_{gt} + \alpha_{it} + \sum_{j=-6}^6 \beta_{0j} I(\text{event}_{igt} = j) \\
 (1) \quad &+ \sum_{j=-6}^6 \beta_{1j} I(\text{event}_{igt} = j) \times \text{target}_{ig} + \epsilon_{igt}.
 \end{aligned}$$

# THE IMPACT OF TRUMP'S TRADE WAR – EVENT STUDY

Price, import value,  
import quantity... of  
product  $g$  (HS-10),  
from country  $i$  at  
time  $t$

Fixed effects  
(country-product,  
product-time,  
country-time)

Event Dummies  
12 dummies /  
product specific:  
for each 6 months  
before the tariff,  
and 6 months after

$$\ln y_{igt} = \alpha_{ig} + \alpha_{gt} + \alpha_{it} + \sum_{j=-6}^6 \beta_{0j} I(\text{event}_{igt} = j)$$

$$(1) \quad + \sum_{j=-6}^6 \beta_{1j} I(\text{event}_{igt} = j) \times \text{target}_{ig} + \epsilon_{igt}.$$

=1 for origin  
country/product hit  
by the tariff

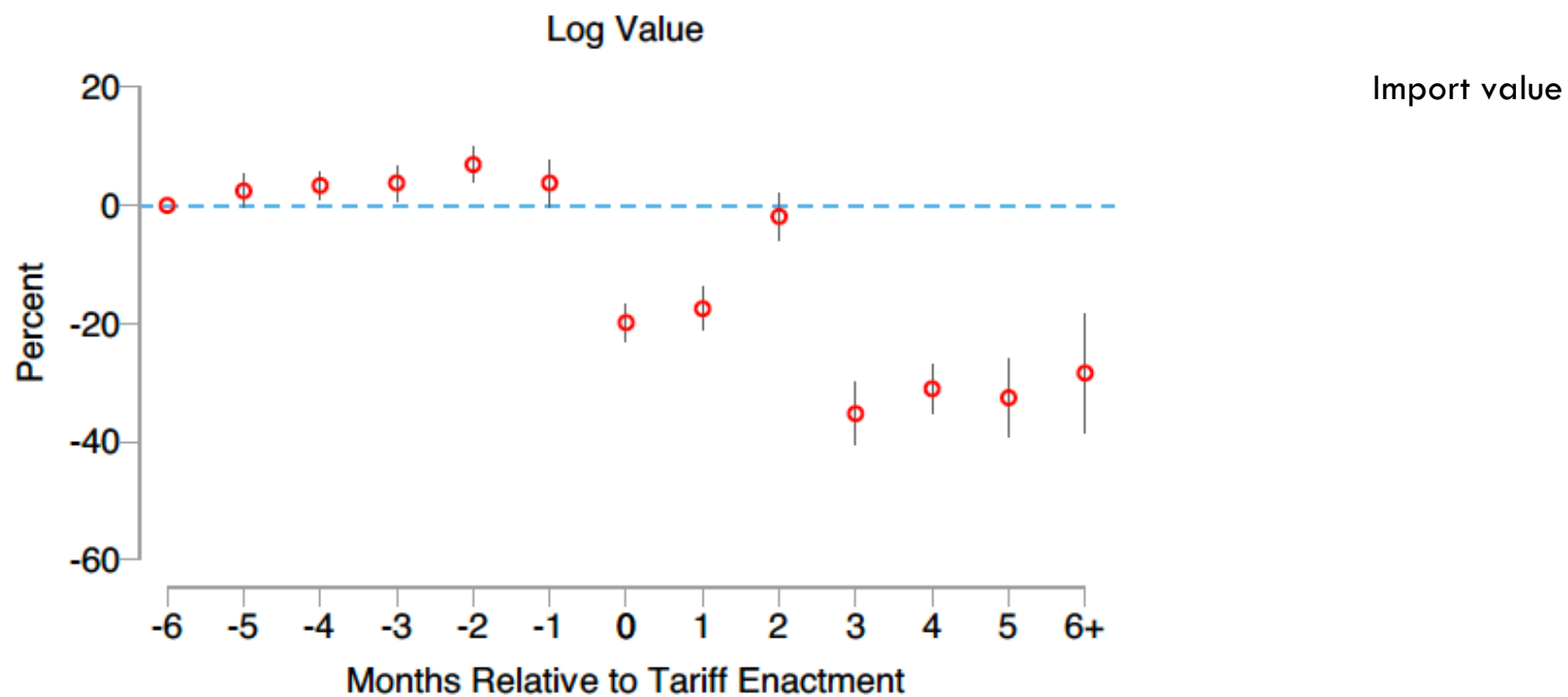
# THE IMPACT OF TRUMP'S TRADE WAR — EVENT STUDY

## Variety Event Study: Imports

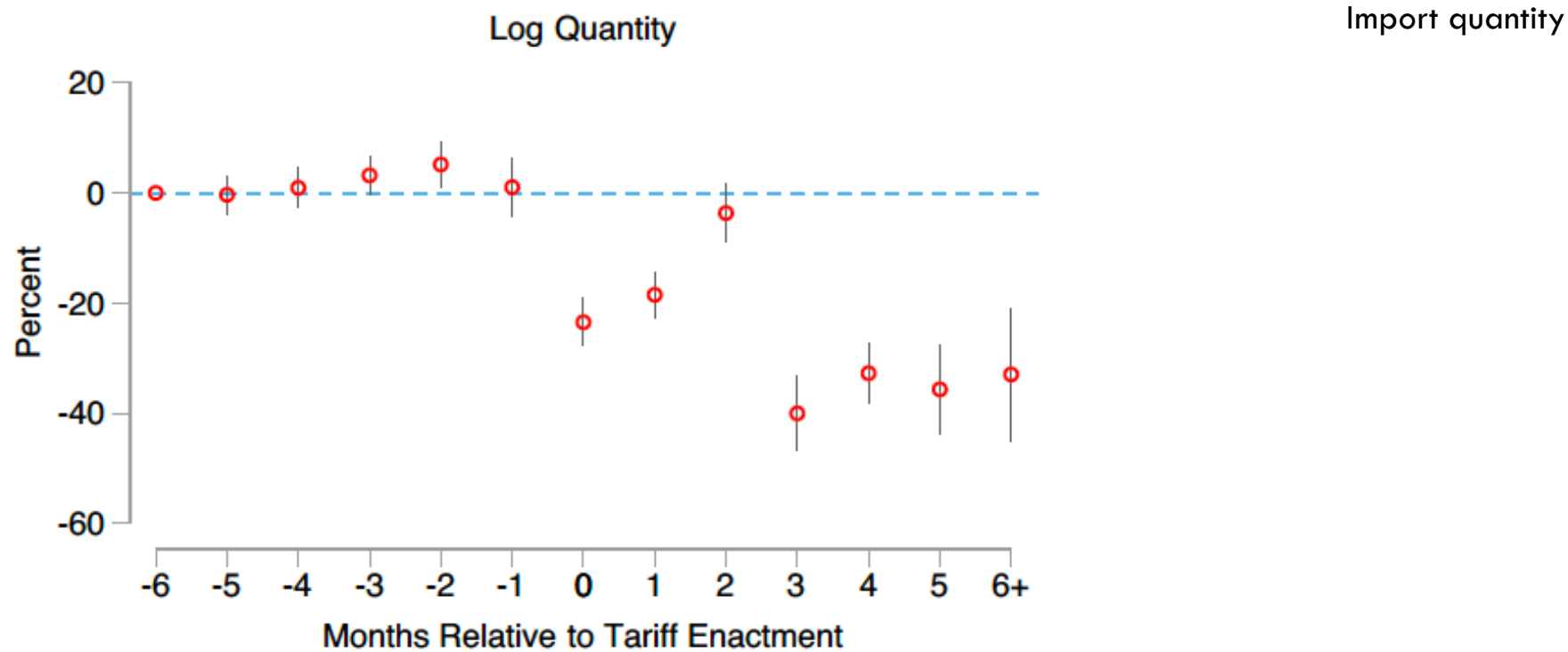
Figure plots event time dummies for targeted varieties relative to untargeted varieties. Regressions include country-product, product-time, and country-time fixed effects. Standard errors are clustered by country and HS-8. Event periods before  $-6$  are dropped, and event periods  $\geq 6$  are binned. Error bars show 95% confidence intervals. In [Online Appendix B](#) we provide evidence that the temporary surge in imports during event period 2 reflects an anticipation response to additional tariff threats on a subset of Chinese varieties. Sample: monthly variety-level import data are from U.S. Census. The sample period is 2017:1 to 2019:4.



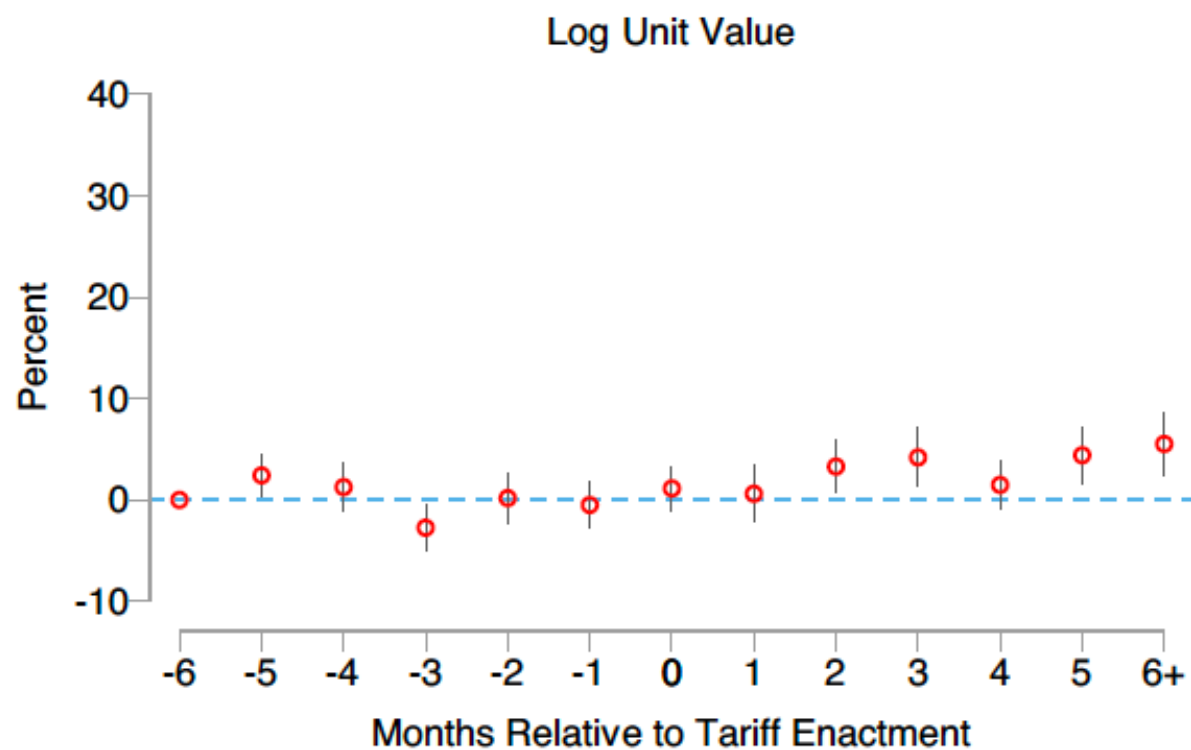
# THE IMPACT OF TRUMP'S TRADE WAR — EVENT STUDY



# THE IMPACT OF TRUMP'S TRADE WAR — EVENT STUDY



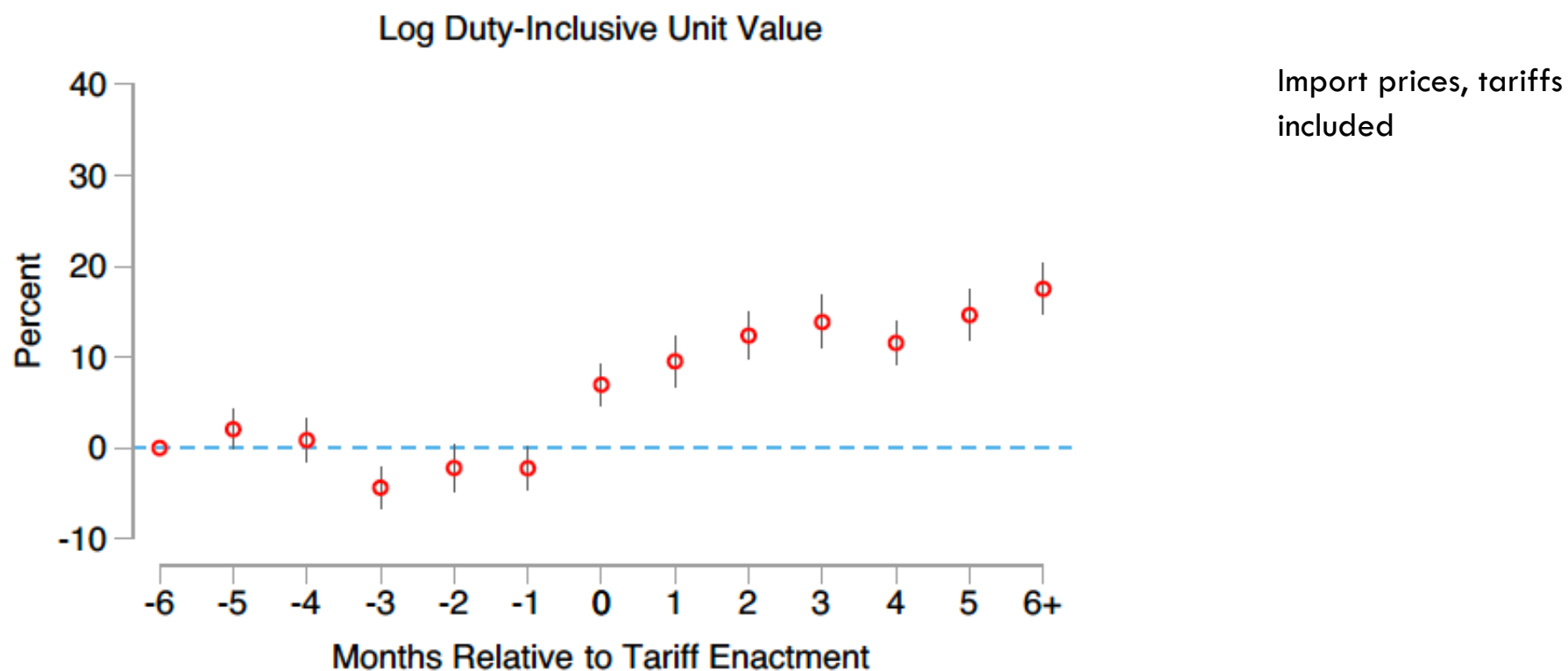
# THE IMPACT OF TRUMP'S TRADE WAR — EVENT STUDY

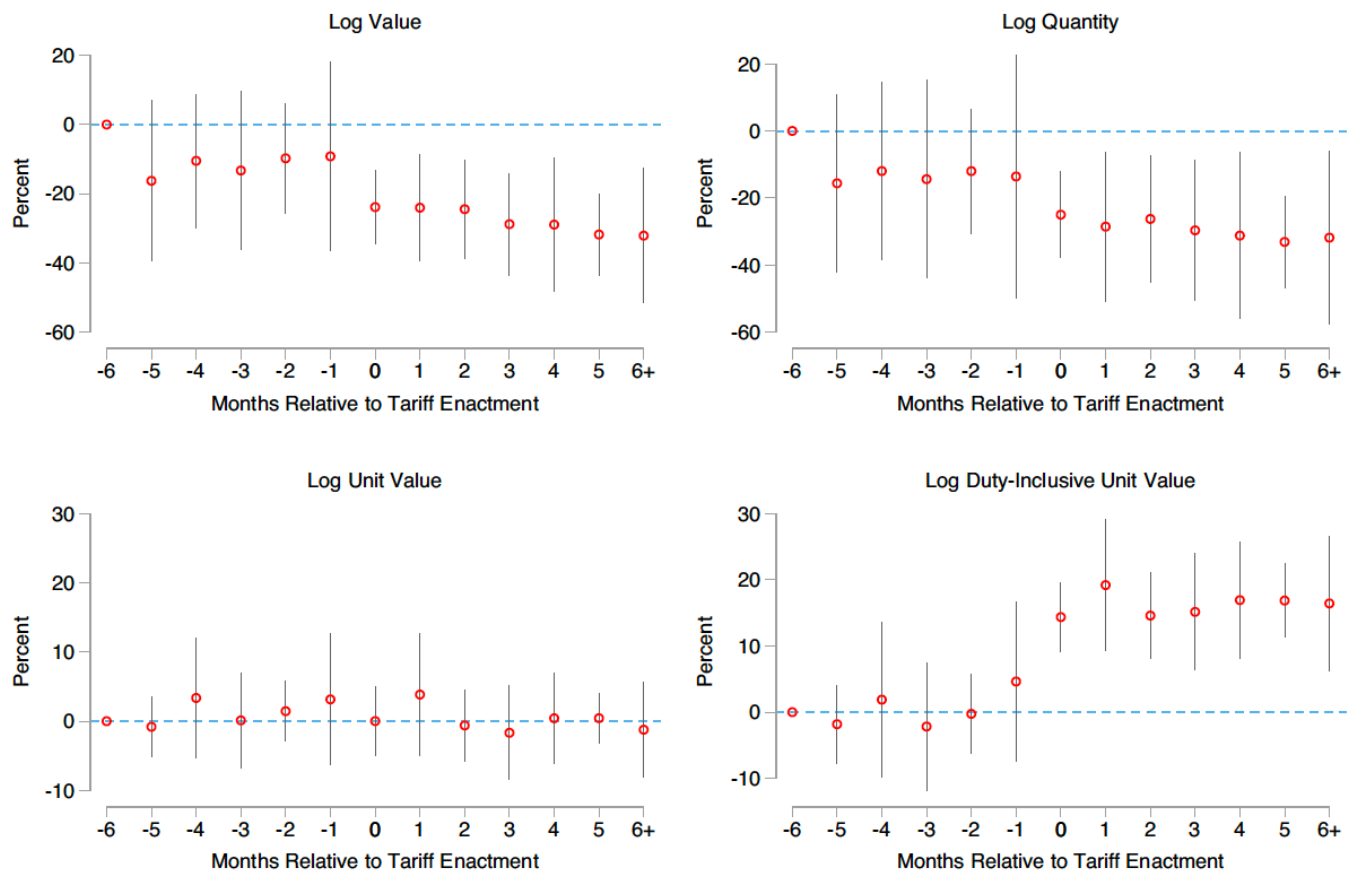


Import prices

Complete pass-through !

# THE IMPACT OF TRUMP'S TRADE WAR — EVENT STUDY





Retaliation:

Change in US export value, quantity and price of targeted products-destinations

Complete pass-through to foreign consumers

FIGURE III  
Variety Event Study: Exports

# THE IMPACT OF TRUMP'S TRADE WAR — AGREGATE IMPACT

They assess the total impact on welfare (as above)

$$EV = \underbrace{-\mathbf{m}' \Delta \mathbf{p}^M}_{EV^M} + \underbrace{\mathbf{x}' \Delta \mathbf{p}^X}_{EV^X} + \Delta R,$$

Where  $\mathbf{m}$  is the vector of imports (for each products),  $\mathbf{x}$  the vector of exports and  $R$  is the tariff revenue

AGGREGATE IMPACTS

	$EV^M$	$EV^X$	$\Delta R$	$EV$
	(1)	(2)	(3)	(4)
<b>2018 trade war</b>				
Change (\$ b)	-51.0	9.4	34.3	-7.2
	[-54.8,-47.2]	[4.1,15.6]	[32.3,36.1]	[-14.4,0.8]
Change (% GDP)	-0.27	0.05	0.18	-0.04
	[-0.29,-0.25]	[0.02,0.08]	[0.17,0.19]	[-0.08,0.00]
<b>2018 U.S. tariffs and no retaliation</b>				
Change (\$ b)	-50.9	16.6	34.8	0.5
	[-52.9,-49.0]	[13.2,20.3]	[32.8,36.5]	[-4.0,5.7]
Change (% GDP)	-0.27	0.09	0.19	0.00
	[-0.28,-0.26]	[0.07,0.11]	[0.18,0.20]	[-0.02,0.03]

U.S. buyers of  
imports lost  
\$51 billion

*Notes.* Table reports the aggregate impacts in column (4) and the decomposition into  $EV^M$ ,  $EV^X$ , and tariff revenue ( $\Delta R$ ) in columns (1)–(3). The top panel reports the effects from the 2018 trade war. The bottom panel simulates a hypothetical scenario where trade partners do not retaliate against U.S. tariffs. The first row in each panel reports the overall impacts of each term in billions of US\$. The third row scales by 2016 GDP. These numbers are computed using the model described in [Section V](#) with  $\{\hat{\sigma} = 2.53, \hat{\eta} = 1.53, \hat{\kappa} = 1.19, \hat{\omega}^* = -0.00, \hat{\sigma}^* = 1.04\}$ . Bootstrapped 90% confidence intervals based on 1,000 simulations of the estimated parameters are reported in brackets.

AGGREGATE IMPACTS

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\$9.4 billion gain result from an increase in export prices

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Tariff revenue

*Notes.* Table reports the aggregate impacts in column (4) and the decomposition into  $EV^M$ ,  $EV^X$ , and tariff revenue ( $\Delta R$ ) in columns (1)–(3). The top panel reports the effects from the 2018 trade war. The bottom panel simulates a hypothetical scenario where trade partners do not retaliate against U.S. tariffs. The first row in each panel reports the overall impacts of each term in billions of US\$. The third row scales by 2016 GDP. These numbers are computed using the model described in [Section V](#) with  $\{\hat{\sigma} = 2.53, \hat{\eta} = 1.53, \hat{\kappa} = 1.19, \hat{\omega}^* = -0.00, \hat{\sigma}^* = 1.04\}$ . Bootstrapped 90% confidence intervals based on 1,000 simulations of the estimated parameters are reported in brackets.

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Net impact = loss

Without retaliation

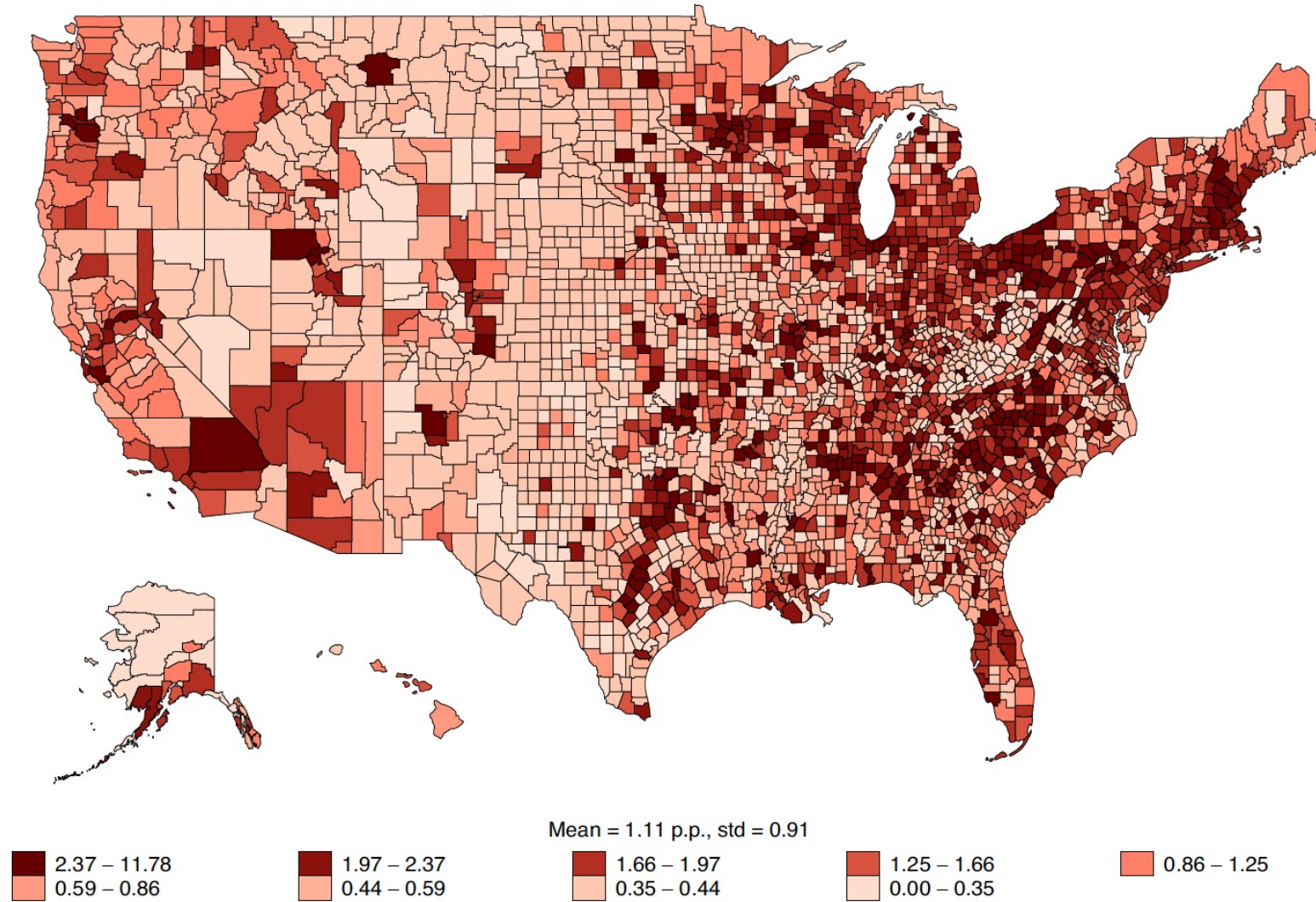
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# THE IMPACT OF TRUMP'S TRADE WAR — WHO GAINED WHO LOST?

They exploit local specialization patterns to study the geographical distributions of gains and losses

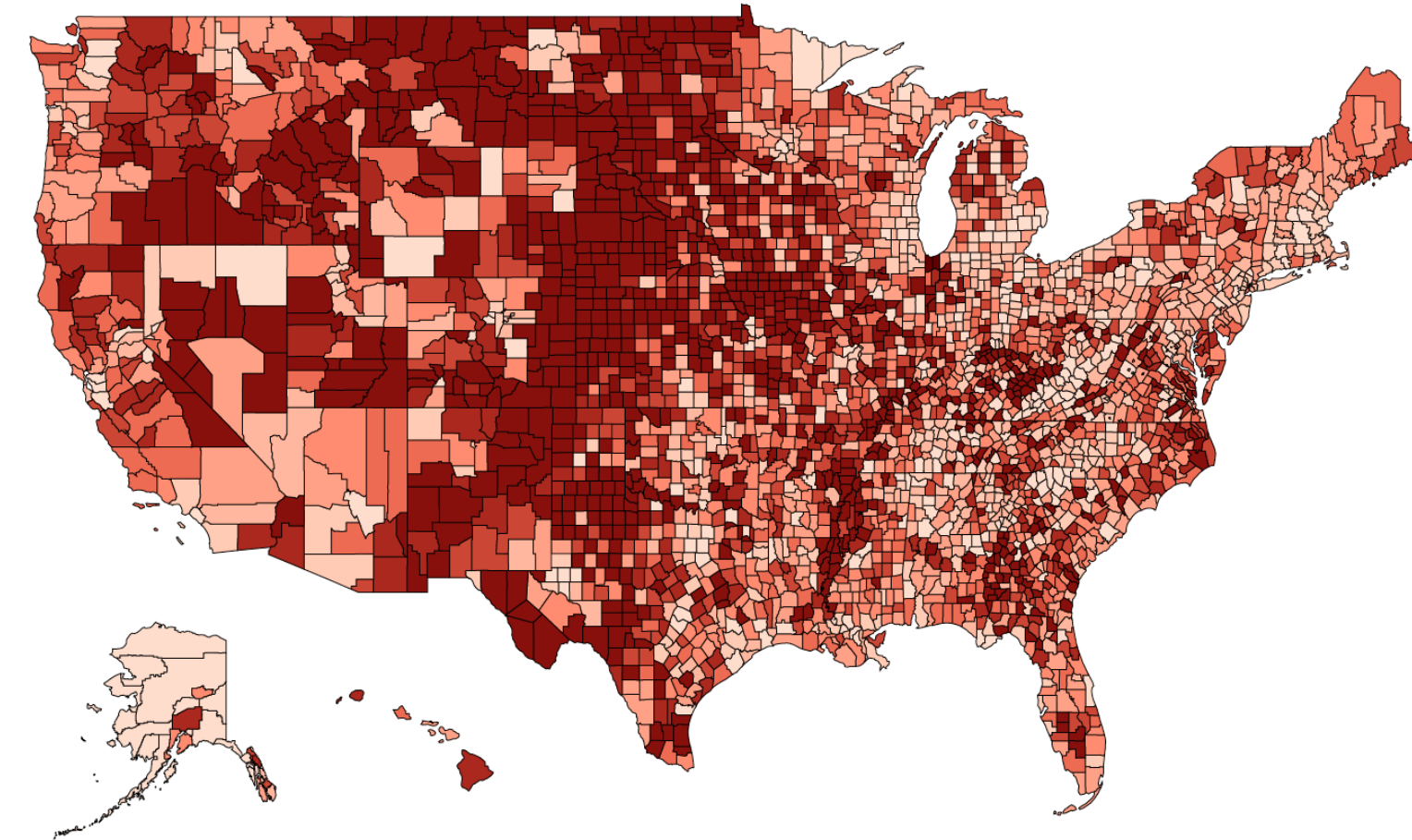
### (A) Tariff Increase on US Imports, 2017–2018

Weighted by Variety-Level U.S. Import Share and County-Level 2016 Tradeable Sector Employee Wage Bill

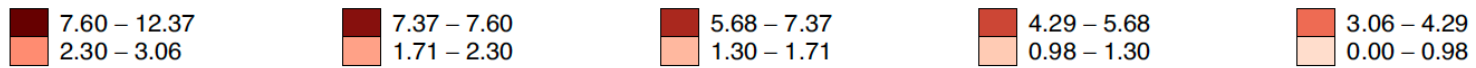


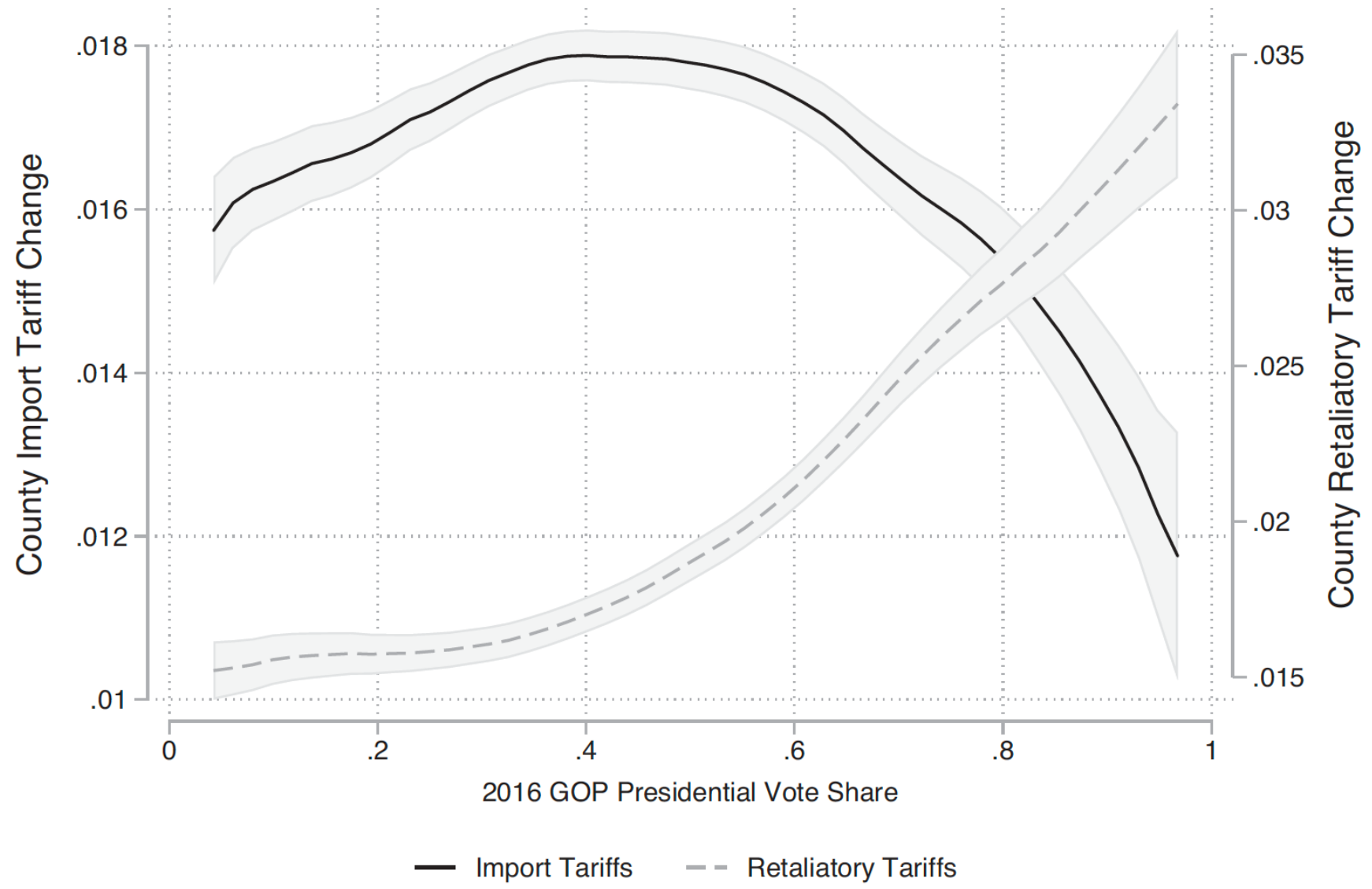
## (B) Tariff Increase on US Exports, 2017–2018

Weighted by Variety-Level U.S. Export Share and County-Level 2016 Tradeable Sector Employee Wage Bill



Mean = 4.17 p.p., std = 2.67





THE END