# Principles of Macroeconomics: International Trade 2

Class 12

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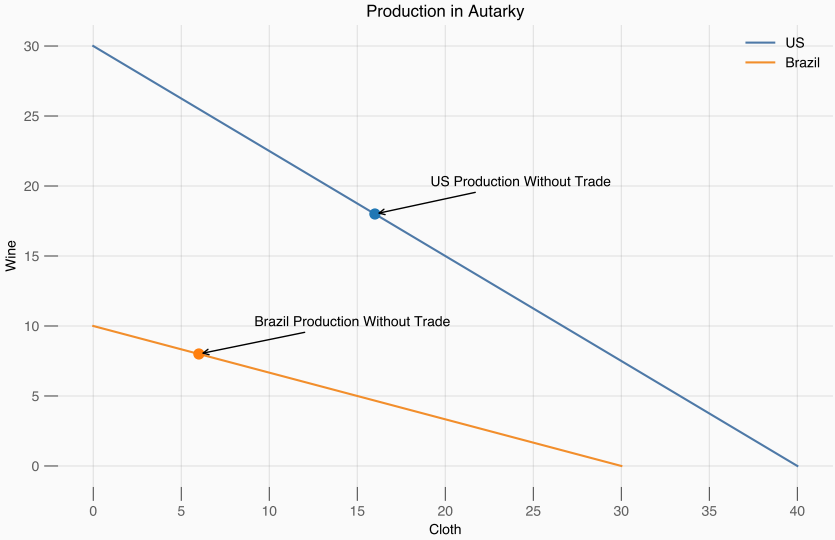
University of Notre Dame

# Overview

- Announcements:
  - LC 5, GH 5 due Friday at 11:59pm
  - Midterm: October 16 in class!
- Topics:
  - Comparative Advantage Review
  - Supply, Demand, and International Trade
  - Tariffs
- Readings:
  - Chapters 5.3 - 5.4
  - Chapters 18.1 - 18.3

# Autarky with Brazil



# Prices in the US and Brazil

- Suppose $A^{US}_{wine} = 30$, $A^{US}_{cloth} = 40$, $A^{Brazil}_{wine} = 10$, and $A^{Brazil}_{cloth} = 30$
- Autarky relative price in US: $\left(\frac{p^{US}_{cloth}}{p^{US}_{wine}}\right)^{\text{autarky}} = \frac{A^{US}_{wine}}{A^{US}_{cloth}} = \frac{3}{4}$
- Autarky relative price in Brazil: $\left(\frac{p^{Brazil}_{cloth}}{p^{Brazil}_{wine}}\right)^{\text{autarky}} = \frac{A^{Brazil}_{wine}}{A^{Brazil}_{cloth}} = \frac{1}{3}$
- The relative price of cloth is high in the US, but low in Brazil
- Opportunity for Trade!!

# Comparative Advantage

- Since $\left(\frac{p^{US}_{cloth}}{p^{US}_{wine}}\right)^{\text{autarky}} > \left(\frac{p^{Brazil}_{cloth}}{p^{Brazil}_{wine}}\right)^{\text{autarky}}$, US has a comparative advantage in wine and Brazil has a comparative advantage in cloth
- Alternative definition, compare TFP:

$$\frac{A^{US}_{wine}}{A^{US}_{cloth}} > \frac{A^{Brazil}_{wine}}{A^{Brazil}_{cloth}}$$

US has comparative advantage in wine because its relative productivity for wine is higher than Brazil's

# Comparative Advantage vs. Absolute Advantage

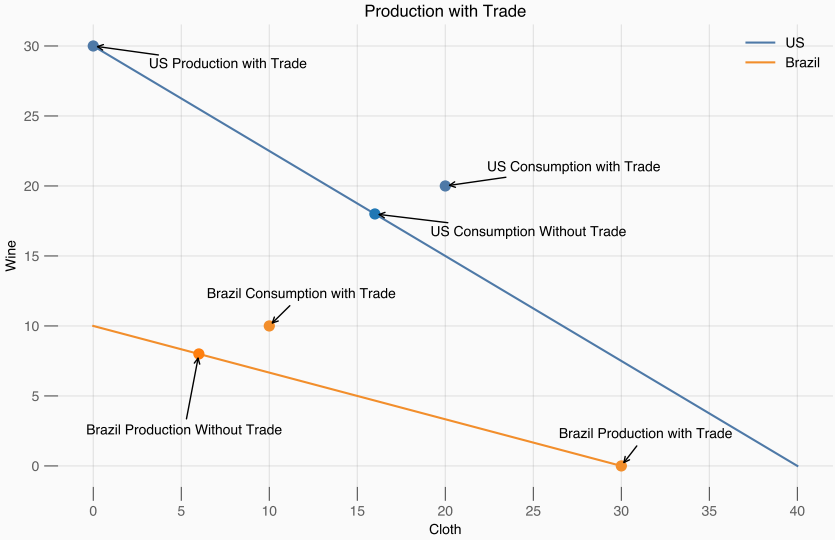
- US is better at everything: $A_{wine}^{US} > A_{wine}^{Brazil}$ and $A_{cloth}^{US} > A_{cloth}^{Brazil}$
- US has an absolute advantage in producing both wine and cloth
- But Brazil has a comparative advantage in cloth still

No one can ever have a comparative advantage in everything!!

# How Should We Trade?

- Suppose the US wants to sell Brazil wine and Brazil wants to sell the US cloth
  - What price? What quantity?
  - Need a much richer model – take an upper division international econ course
  - For now, we just need to find some terms of trade that beats autarky for both countries
- Proposition:
  (1) Specialization
    - US specializes in wine
    - Brazil specializes in cloth
  (2) Both countries consume more of everything
    - US gets 20 cloth from Brazil and trades 10 wine to Brazil
    - Brazil gets 10 wine from the US and trades 20 cloth to the US

# Graphically



## Does this Deal Work?

(1) Is this deal feasible and efficient in terms of production?
- Yes, both countries are on their PPFs

(2) Do production and consumption levels add up?
- US produces 30 wine. US consumes 20, Brazil consumes 10 ✓
- Brazil produces 30 cloth. US consumes 20, Brazil consumes 10 ✓
- Note: Total amount of wine and cloth has now increases (60 total goods now, compared to 58)
  - This increase is essentially free – no productivity increase required
  - Specializing in one's comparative advantage brought this about!

(3) Are both countries better off?
- Each country is consuming more wine and more cloth than before
- This consumption was not possible without trade
- If utility is increasing in consumption (standard assumption), then everyone wins

# Prices

- Recall:

$$\left(\frac{p^{US}_{cloth}}{p^{US}_{wine}}\right)^{autarky} \geq \left(\frac{p^{Brazil}_{cloth}}{p^{Brazil}_{wine}}\right)^{autarky}$$

- In general:

$$\left(\frac{p^{US}_{cloth}}{p^{US}_{wine}}\right)^{autarky} \geq \left(\frac{p_{cloth}}{p_{wine}}\right)^{trade} \geq \left(\frac{p^{Brazil}_{cloth}}{p^{Brazil}_{wine}}\right)^{autarky}$$

- Why? Because trade leads to price convergence between countries
  - When the US exports wine to Brazil, the domestic supply of wine drops and the price of wine increases – so the relative price for the US decreases
  - When Brazil exports cloth to the US, the relative price of cloth increases – so the relative price for Brazil decreases
- If we assume we only trade goods (no financial markets), then the value of the 10 wine going to Brazil must equal the value of the 20 cloth going to the US. Thus:

$$\left(\frac{p_{cloth}}{p_{wine}}\right)^{trade} = \frac{1}{2}$$

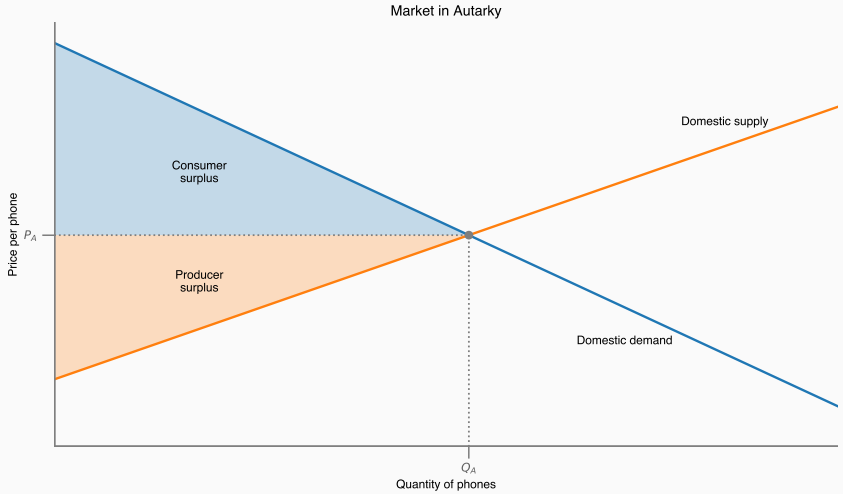
## Supply and Demand

Now that we understand the production decisions behind trade, let's represent this with a supply and demand diagram.

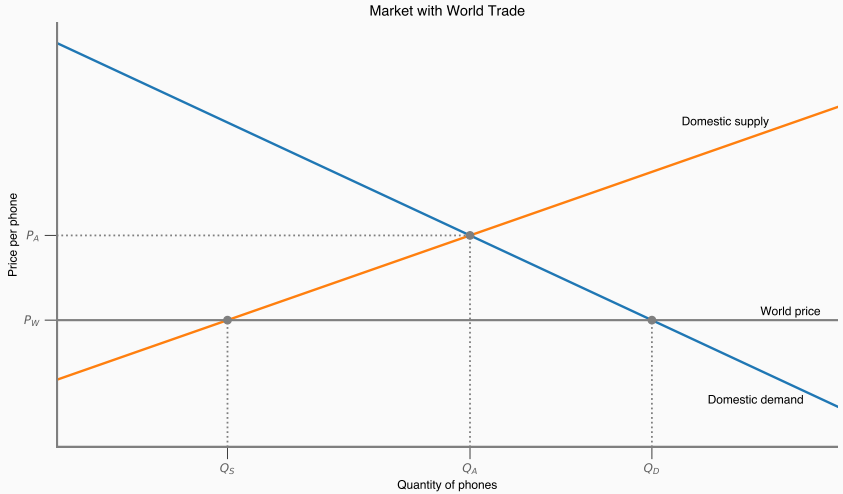
- Demand slopes down
  - Given $p$, how much $q$ is demanded?
  - Willingness to pay: maximal price consumers would be willing to pay for one additional $q$
  - $p$ is the maximal price consumers are willing-to-pay for $q$ goods
- Consumer surplus
  - Price paid = market price
  - For "infra-marginal" units willingness-to-pay > market price
  - The area under the demand curve, but above the market price, is the total surplus value received by consumers

- Supply slopes up
  - Given $p$, how much $q$ will producers supply?
  - Producers supply when $p > cost$
  - $p$ is the minimal price producers will accept to supply $q$ goods
- Producer surplus
  - Price received = market price
  - For "infra-marginal units, market price > cost
  - The area above the supply curve, but below the market price, is the total surplus value received by suppliers

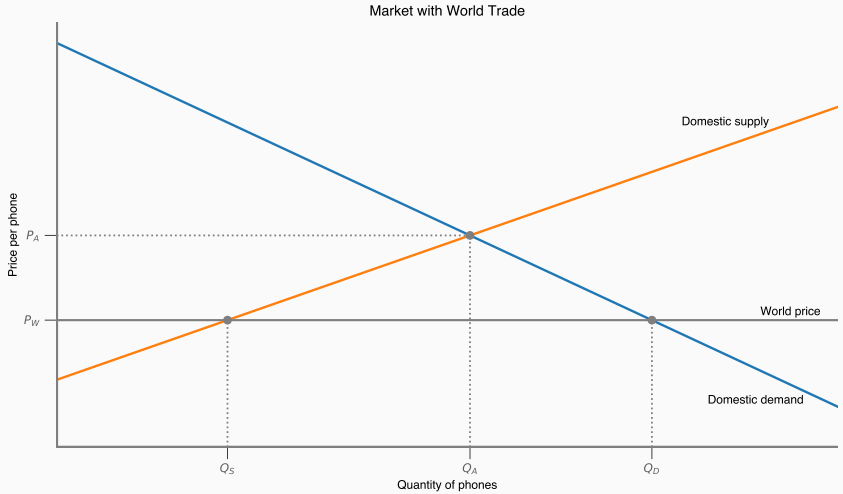
# Producer and Consumer Surplus Graphically - Phones



# World Trade


Market with World Trade
Domestic supply
Price per phone
$P_A$
$P_W$
World price
Domestic demand
$Q_S$
$Q_A$
$Q_D$
Quantity of phones

# World Trade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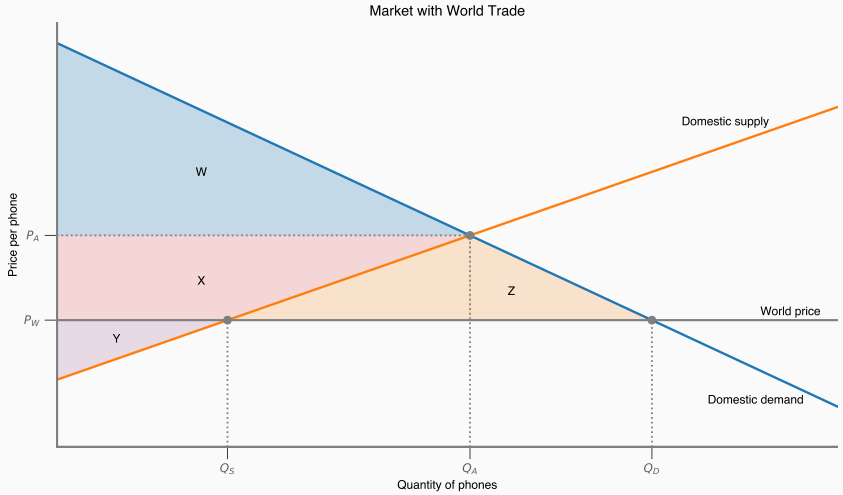
# Welfare with Trade

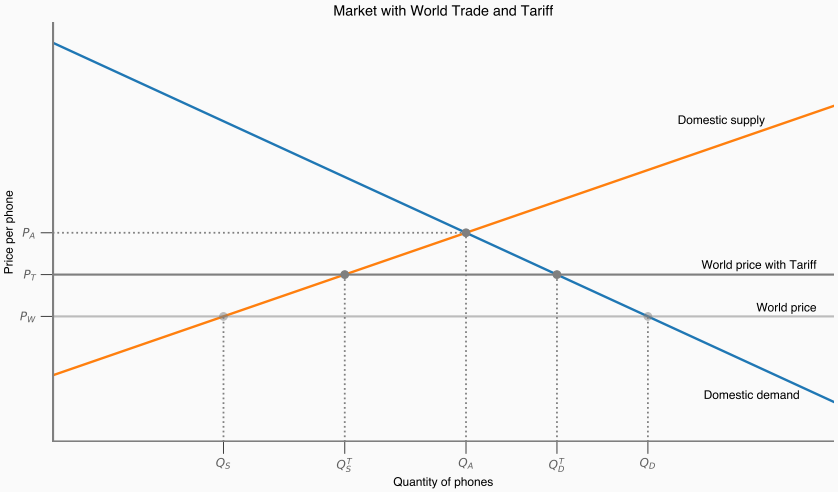


- Consumer surplus: anything above the price paid and below willingness-to-pay
  - Here: W, X, and Z
- Producer surplus: anything below the price received and above cost
  - Here: Y
- What's the overall change from opening up to trade?
  - Consumer Surplus: $W + X + Z - W = X + Z$
  - Producer Surplus: $Y - (X + Y) = -X$
  - Total Surplus: $+Z$
- So producers lose a little, but consumers gain a lot. Overall, the country is better off
- Numerically, we can calculate the gains by finding the area of triangle $Z$: $\frac{1}{2} \times (Q_D - Q_S) \times (P_A - P_W)$

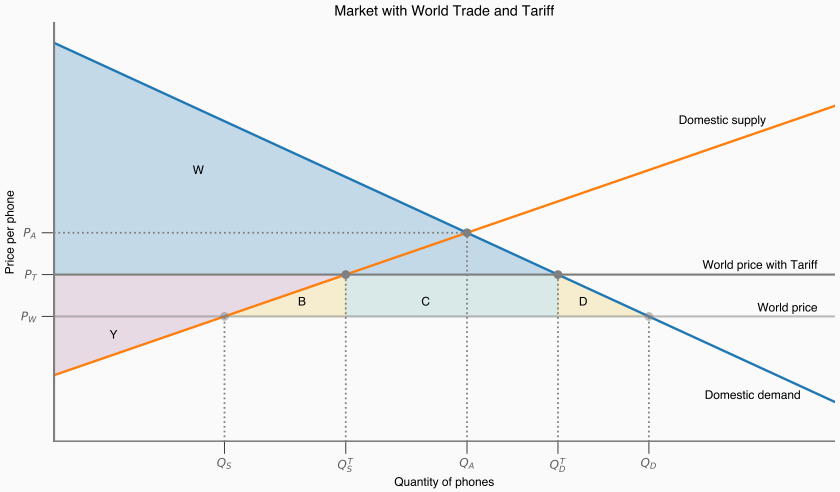
# What's Happening Domestically?

- World prices lower than domestic prices $\longrightarrow$ increase competition
- This pushes out inefficient producers domestically, dropping domestic supply ($Q_S$)
- Lower $Q_S$ reduces demand for labor and capital in phone production
- What happens to workers and capital then?
  - If workers and capital can easily move to other sectors, the decrease in domestic demand doesn't do much
  - If workers and capital cannot move to other sectors, then problems:
    - Returns to "trapped" factors will fall
    - Either wages will fall or phone workers will become unemployed
    - Why would there be barriers to movement? Phone specific skills/capital, geographic mismatches

# What if We Want to Protect Those Workers? Tariffs



# Welfare with Tariffs



- Consumer surplus: W
- Producer surplus: Y
- Government Revenue: C
- But B and D used to be part of consumer surplus
- We call B and D deadweight loss from tariffs – this is surplus someone in society would have captured
- Size of the DWL:

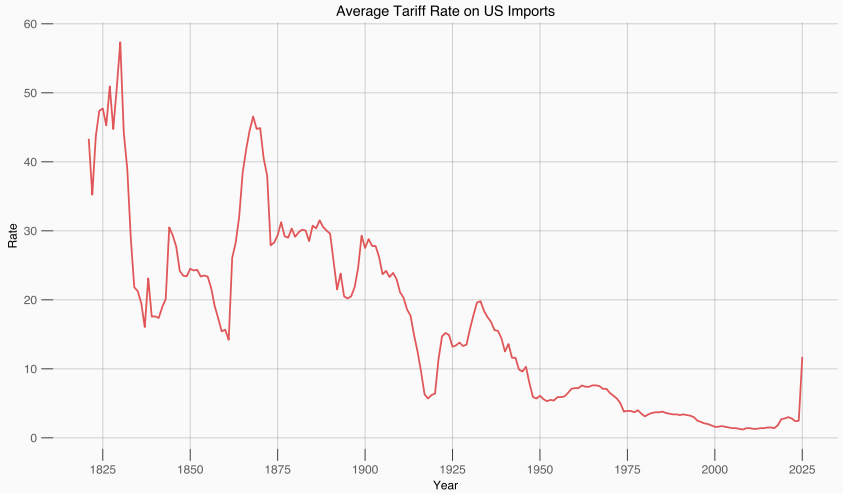
$$\frac{1}{2} \times (P_T - P_W) \times (Q_S^T - Q_S) + \frac{1}{2} \times (P_T - P_W) \times (Q_D - Q_D^T)$$

- This DWL increases with the size of the tariff

# So Why do Tariffs Exist?

- Obviously, in our model, the optimal tariff is zero
- Then why do governments impose tariffs
  - Tax revenue
  - Politics – tariffs move income around
    - From consumers to producers
    - From exporters to import-competing sectors
  - Real world complications
    - Terms-of-trade for countries with market power
    - National security (little discussed until Trump)
    - Infant industry protection – economies of scale
    - Strategic policies with imperfect competition

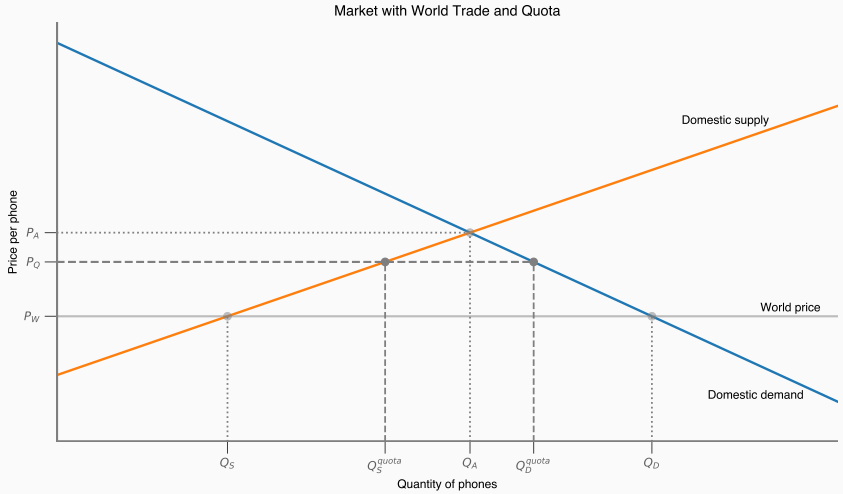
# US Tariff Rates Over Time



# So Why has the US Adopted Free Trade?

- Consumers gain and efficient producers survive
- Free trade $\longrightarrow$ foreign policy
  - Soft power
- International agreements have worked to some degree
  - Cooperation can lower tariffs everywhere (WTO, for example)
  - Leads to greater regional integration (NAFTA, EU, etc)
  - These can help reduce conflict
- So what has happened recently?
  - Strategic rivalry between US and China
  - Political winds from those hurt by free trade in the US
  - Complaints that international agreements haven't been equally kept by all parties

# Quotas


Market with World Trade and Quota
Domestic supply
Price per phone
$P_A$
$P_Q$
$P_W$
World price
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$Q_S^{quota}$
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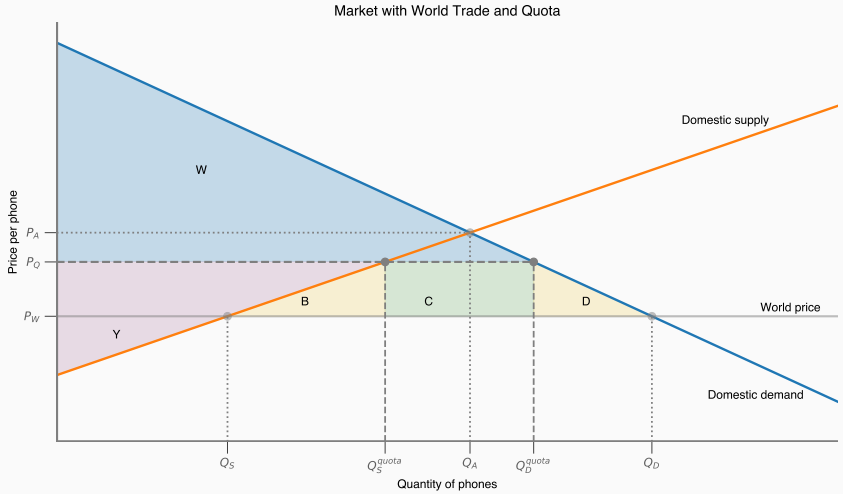
Quantity of phones

# Quotas and Welfare



- The picture looks the same (there exists a quota that can replicate the tariff), but who captures $C$ changes
- If the government auctions quota licenses, then the government still captures $C$
- If domestic producers are granted quota licenses for free, then domestic producers capture $C$
- If foreign producers are granted quota licenses (as is common), then domestic producers and consumers both lose out on $C$ and foreign producers gain $C$

## Summary

- By specializing and trading, countries can move consumption beyond their PPFs
- We can analyze global trade using supply and demand graphs
- Free trade increases welfare, but consumers gain relative to producers (if importing)
- But there are reasons we might want to impose tariffs anyway
- How would the tariff graph look if the world price was higher than the domestic price?
- How would both the tariff and quota graph look under a demand shock? (Think about what a quota means for quantity)

- Remember: homework due Friday night
- Read chapters 18.1 - 18.3