Econ 1101
Summer 2013
Lecture 6

Section 005
6/25/2013

Announcements

- Homework 5 is due tonight at 11:45pm, CDT
  - Including the price ceiling assignment from last time
- Midterm coming up – this Thursday!
  - Will start at 5:40pm, there is a recitation beforehand.
  - Make sure to work through the practice problems posted on the website.

Agenda for today

- Possible policies for addressing the problem of greenhouse gas emissions
- New Issue: International Trade
- Impacts of Tariffs and Quotas
- Real life example of quota in trade
- Production possibility frontier
- Comparative advantage
- Real world example of comparative advantage
- China and US trade

Gas Tax

- If we set high taxes on gas like Europe:
  - Very good for the environment
  - Bad for the economy, aside from environmental impacts (Why? What decreases?)
  - Government surplus increases, since demand for gas is relatively inelastic in the short run
    - Revenue could go toward various things such as public infrastructure, education, or taxes can perhaps be cut in other industries
    - In principle, a tax could be set up that is revenue neutral. Income taxes could be lowered to exactly offset the increased revenue from gas taxes. Critics of a gas tax could argue, with some justification, that even if a gas tax was sold as something that would be revenue neutral, it might not be believable that the government would actually lower the income tax rates by that much. That is, when new taxes are added, total taxes tend to go up, not stay the same.

Gas Tax

- World oil price will be affected, since the US has a large share of the demand in the world oil market (US consumption is about 25% of world consumption)
  - Example: If US cuts its oil consumption by 20%, the world oil demand will fall by about 5%
  - This decrease in world oil demand will decrease the world oil prices
    - Is this good or bad for the US? (Think about whether we import or export oil more)
- What if just Minnesota passed a substantial gas tax and cut consumption by 20%? Would we still get this effect?
  - No. MN is only about 1/50 of U.S., such a cut would have a negligible impact on the world oil market.
- But as we said last class, gas tax is not very popular politically

Cap and Trade

In 2000 SO2 capped at 9.5 million tons.

In 2010 final cap of 8.95 tons.

SO_2 cut by half from 1980 emission of 17.3 tons. (Many lives saved as well as trees)

For every ton emitted, need one allowance.

Average trade in 2007 was $325 per ton.

More recently price has plummeted to under $10.

Cap and Trade of CO_2

Europe: legally binding caps

- Can find more information at the European Union Emissions Trading Scheme website

  http://ec.europa.eu/environment/climat/emission/index_en.htm

- Go to FAQ tab for some interesting discussion about the program.

- The price has collapsed from over €22 a few years ago to €7 a ton of CO2.

- UK is moving to adding a carbon tax to power plants burning coal to offset declines in allowance price. The tax will be on the order of €20 and will rise to €40 by 2020. Key idea is to provide incentives to reduce carbon production.

Cap and Trade of CO_2

United States:

- Currently no mandatory carbon allowance system.
- But a voluntary system is up and running. There exists a market in carbon offsets. Pay $10 and in return one ton CO_2 is offset.
- Minimal gas tax
- EPA is planning to introduce command and control regulations for new power plants: http://epa.gov/carbonpollutionstandard/basic.html
- Fuel efficiency standard for automobiles
- Subsidies for clean energy technology

Alternative policies

Subsidies for Green Energy

- With no externalities, subsidies reduce total surplus. However, if fossil fuels have a negative externality, then if we subsidize clean energy it raises total surplus as it induces people to substitute clean energy for dirty energy.
- Politically, we are more likely to see this. Politicians can pitch this as a jobs program. Subsidizing windmills means more jobs for people who make windmills.

Problem 1: Where's the money?

- One obvious problem with subsidies is coming up with the money to fund them in this era of budget deficits.

Alternative policies

Problem 2: Picking Winners and Losers

- The government won't necessarily be able to pick out the winners and losers. There is much controversy now about a solar panel company called Solyndra that received a $535 million loan guarantee from the Obama Administration. Solyndra went into bankruptcy, so taxpayers are on the hook for this loan. Critics of subsidies point to this case as clear evidence that the government should not be in the business of giving out subsidies. Advocates of subsidies argue that this is just one failure out of a larger package of loans, and in the larger package they point to successes.

Romney quip in first debate: Obama picking "losers" (instead of winners and losers).

- One thing to think about: If a carbon tax were set at the Pigovian level, you wouldn't need to subsidize alternative energy. Entrepreneurs would have plenty of incentive to create new low-carbon technologies.

Question

Why is U.S. regulating SO_2, but only minimally regulating CO_2?

- Why is the Republican platform basically saying it will undo the EPA regulations, pull back on fuel efficiency standards, stop subsidizing clean energy, etc…
- But the Republicans (at least 1990 variety including George H.W. Bush who signed the 1990 clean act) were on board with regulating SO_2
- A key point is that the level of acid rain in the U.S. is mainly determined actions taken in the U.S. If we cut SO_2 emissions by half in the U.S., we cut acid rain in the U.S. by half.

CO_2 is different.

- Not only are the impacts further down the road, what happens with climate change depends not only on what we do, but also what other countries do. We can cut back by a half and it won't make any difference if our cutbacks are completely offset by expansions by other countries. A key difference then is that CO_2 is an externality at the global level in a way that SO_2 is not.

- For example, we can think of the people in Econland as being countries, D1 could be the U.S., D2 could be Germany. We can think of the SO_2 issue as just D1 keeping his own house clean. It is a private good for D1 relative to his dealings with D2. But CO_2 is an externality, where D1's behavior impacts D2. So we see that getting efficiency for CO_2 will be more of a problem.

Internationl Trade

Suppose Econland opens up to trade with the rest of the world and widgets cost $1 in the world economy.

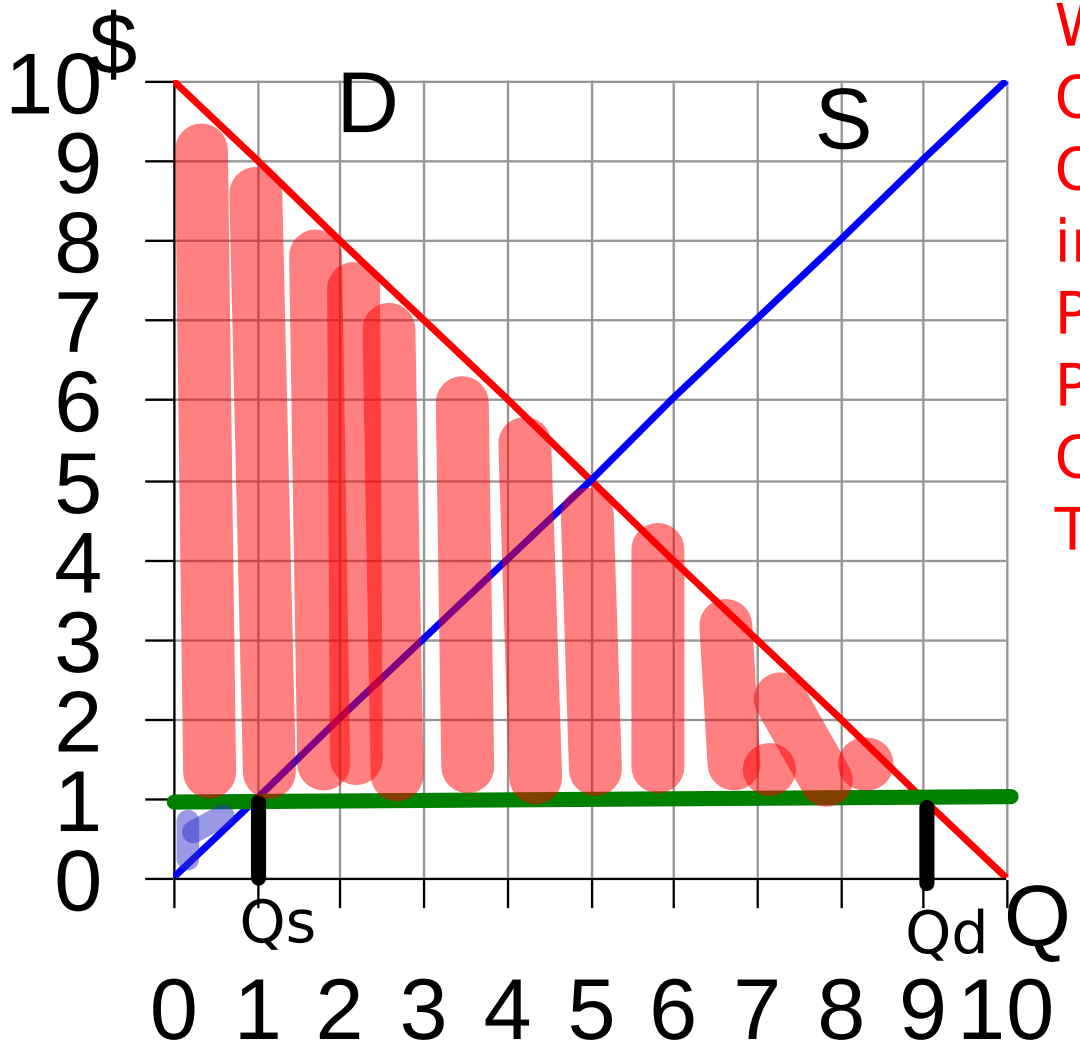
Assume Small Open Economy: an economy that trades with outside world and is small enough such that it does not influence the global market.

$P_{World} = 1$

With free trade, this will drive the price in Econland to the world price. At this price, producers want to supply 1 unit, consumers demand 9 units. The difference of 9-1=8 is made up by imports.

Econland under a world price

In the free market:
Q=5
P=5
CS=12.5
PS=12.5
TS=25



With trade:
Qd=9
Qs=1
imports=8
Pworld=1
PS=0.5
CS=40.5
TS=41

The difference (Qd-Qs) is amount imported.

Adding tariffs

Now suppose there is a tariff of $2.

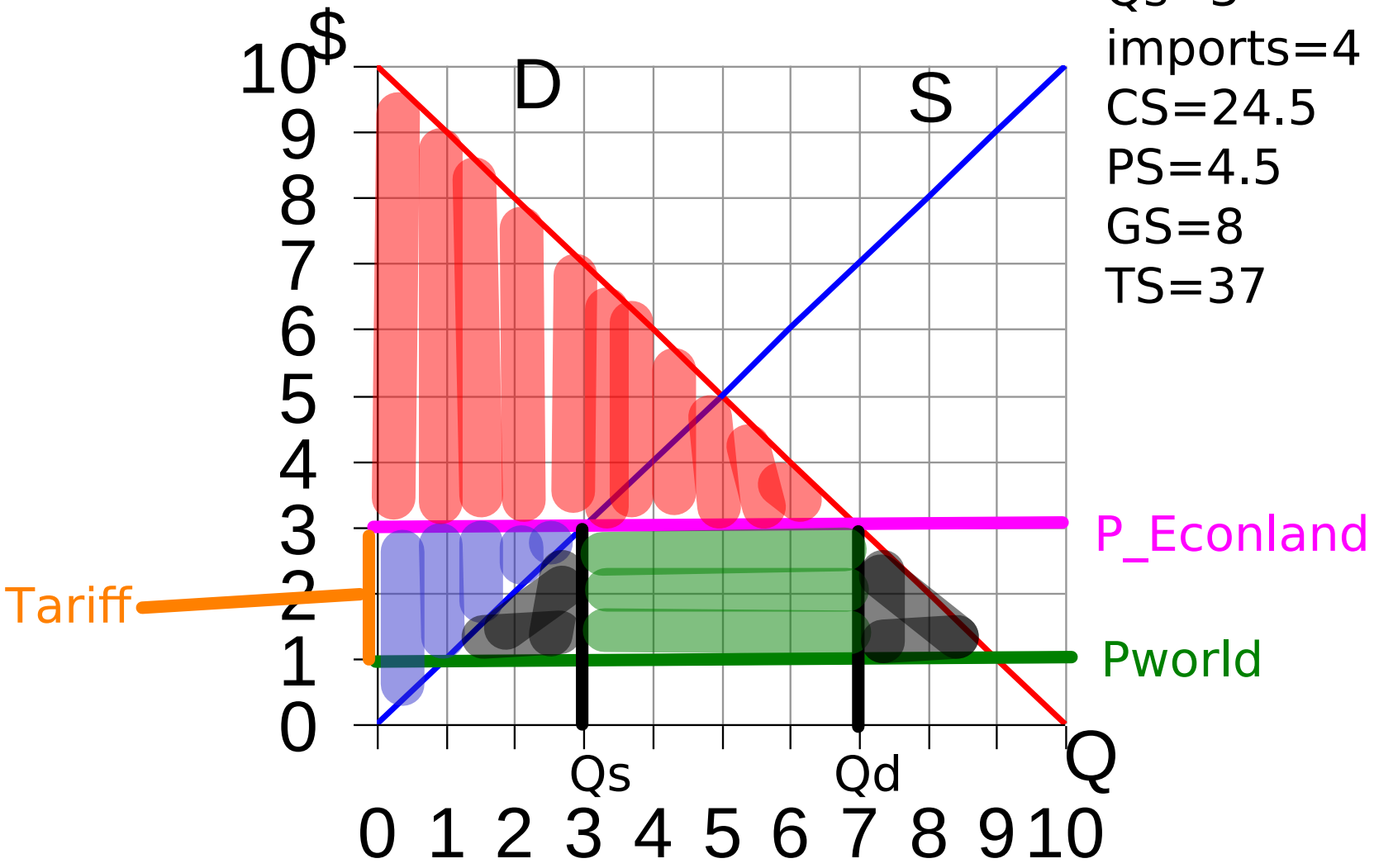
A tariff is a tax that is imposed on imports, but not domestic production. (For example, there is a large tariff on orange juice, 29 cents a gallon, that limits entry of Brazilian orange juice in the U.S.)

What happens?

- If P_{World} = 1 and the tariff is $2, the price in Econland will be....

Graphically…

With tariff:
Qd=7
Qs=3
imports=4
CS=24.5
PS=4.5
GS=8
TS=37



The difference (Qd-Qs) is the amount imported.

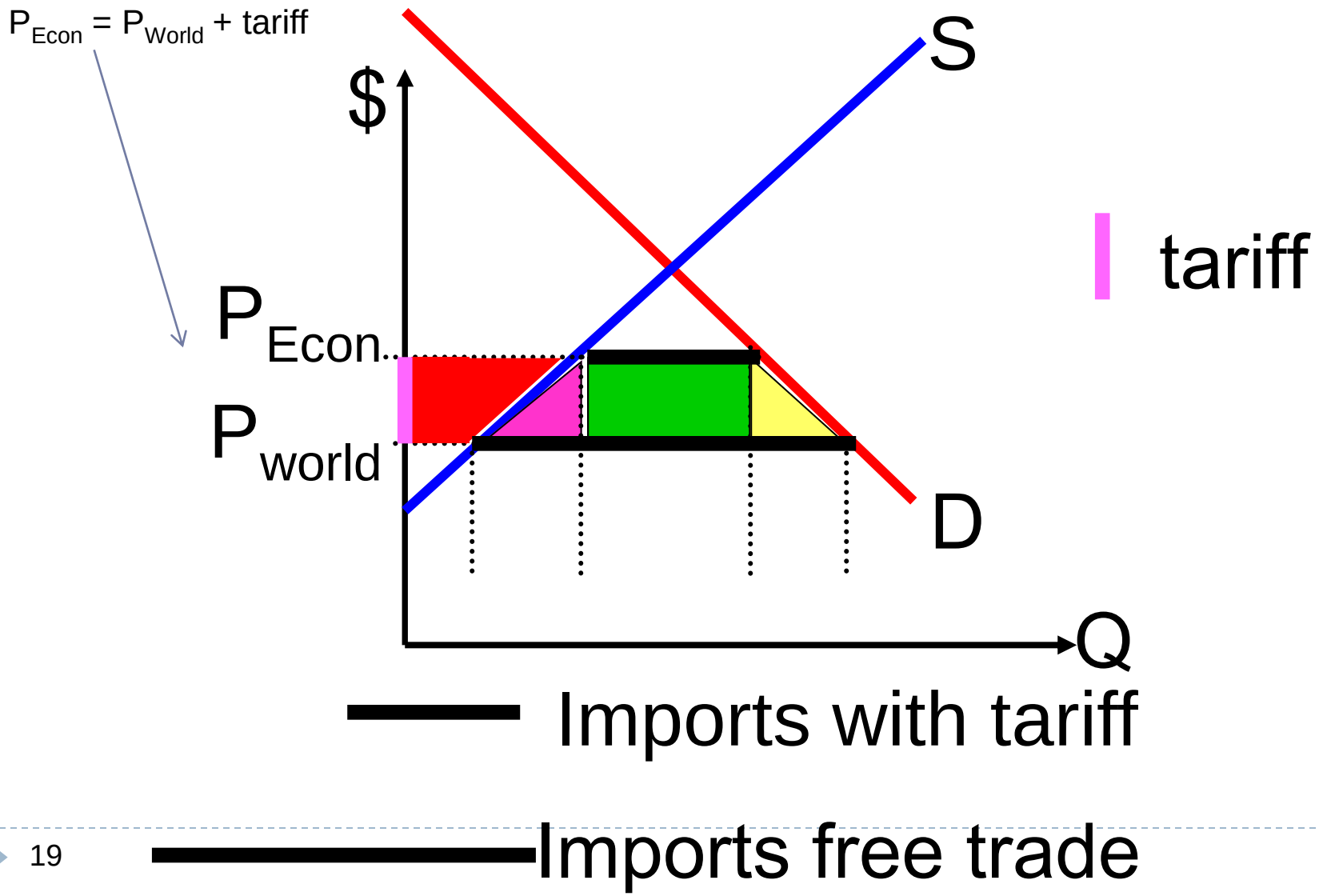
… and numerically

	Free Trade	Tariff $2	Change
P	1		
Q_{prod}	1		
Q_{con}	9		
Imports	8		
CS	40.5		
PS	.5		
Gov S	0		
TS (Econland)	41		

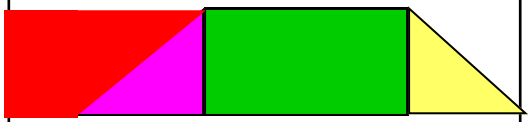
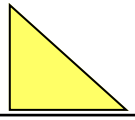
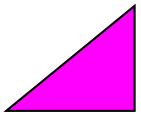
… and numerically

	Free Trade	Tariff $2	Change
P	1	3	+2
Q_{prod}	1	3	+2
Q_{con}	9	7	-2
Imports	8	4	-4
CS	40.5	24.5	-16
PS	.5	4.5	+4
Gov S	0	8	+8
TS (Econland)	41	37	-4

Economic Impact of Tariff in Econland



Effects of the Tariff

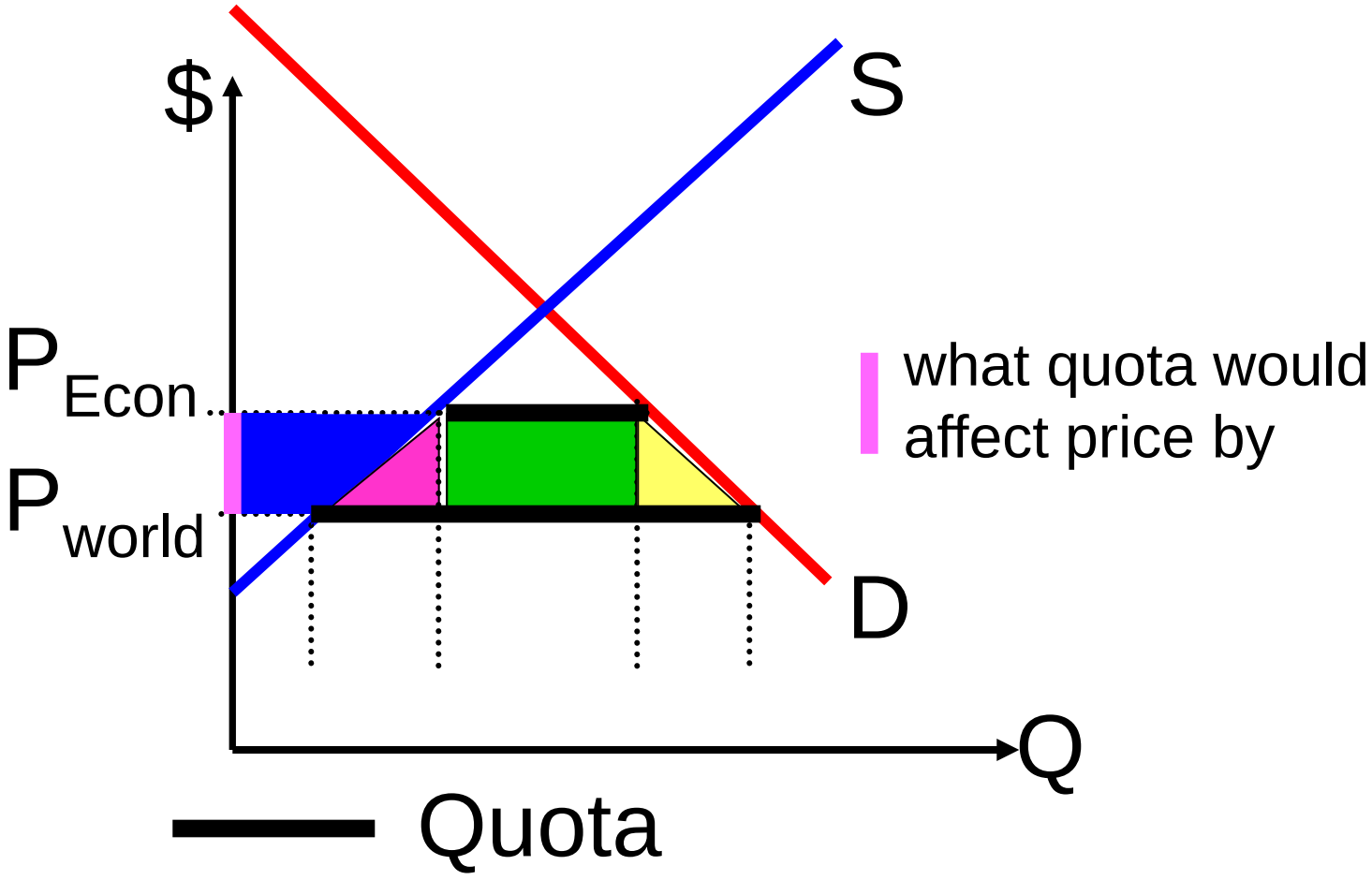
ΔCS (minus)	
ΔPS (plus)	
ΔGS (plus) (tariff revenue)	
ΔTotal Econland Surplus (minus) (i.e. DWL)	
Breakdown	
Q_{con} too small	
Q_{prod} too big	

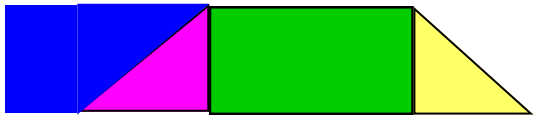
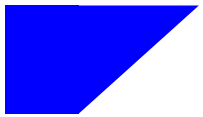
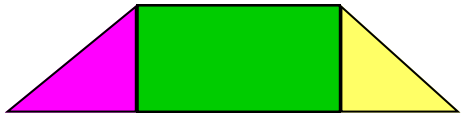
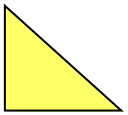
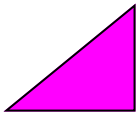
Quota

How should we think about quotas in the context of international trade?

Is there any difference between a quota in trade and a quota that we have looked at before (such as the Canadian milk market?)

Quota


$
S
D
Q
P Econ
P world
what quota would affect price by
Quota
Imports free trade

ΔCS (minus)	
ΔPS (plus)	
ΔGS	zero
ΔTotal Econland Surplus (minus) (i.e. DWL)	
Breakdown	
Q_{con} too small	
Q_{prod} too big	
transfer to foreigners	

Bottom Line

- Econland competing in a perfectly competitive global economy is better off overall from free trade in widgets.

- <u>Not a Pareto improvement though</u>
  - Consumers (D people) are better off with free trade
  - But the S people (the suppliers) are worse off.

- What is the example of a real world market where this analysis captures the main issues?
  - Sugar

Bottom Line

Because of quotas

- Price in US twice what it is in rest of the world
- So it's consumed less (e.g., don't use it to sweeten soft drinks like the rest of the world.

Suppose we open the US sugar market to free trade

- Analysis shows the U.S. net gain will be positive.
- Workers in sugar industry will lose jobs. So they are worse off if we get rid of quotas and do nothing else.
- But with a bigger pie, it is possible to compensate them.
  - Can help them out by paying for retraining for another job.
  - Trade Adjustment Assistance (Federal program to ease pain.) http://www.taacenters.org/

And if you want to talk about jobs?

- What about the jobs in industries like candy which use sugar as in input?

- With free trade in candy from the North American Free Trade Agreement (NAFTA), it makes sense to shut down candy factories here, build them in Mexico or Canada where sugar is cheap, then import the candy in to the U.S. from there, tariff free. (Sugar has a different deal in NAFTA than candy).

Fair Trade?

- Note the word “fair” has not showed up in the analysis. If other countries were to give away widgets for free, $P_{world} = 0$, overall in Econland there should be no complaining that this trade is “unfair.” Instead, the overall benefit is even bigger!

- Maybe you are starting to note a disconnect between what we are talking about here and what politicians here are saying about China. The complaint is that, in effect, China is giving us widgets for “free” or something like that and the trade is “unfair.”

- But let’s put China aside for a bit and learn a learn a new graph…
  - Old graph: one good (widgets) and money
  - New graph: two goods

Production Possibility Frontier

- Shows different production combinations available to society.

Let's do a simple example.

Robinson Crusoe.

- (Classic novel by Daniel Defoe, 1719)

Works 8 hours a day.

- In an hour, can catch 3 fish
- Or pick 1 coconut.

- If work all day fishing, catch 24.
- If work all day picking coconuts, pick 8.

Hours Fish	Hours Coconut	Q Fish	Q Coconut
8	0	24	0
4	4	12	4
0	8	0	8

Note: the point where Robinson spends half the day fishing and half the day collecting coconuts is a possible choice he might make when he is in autarky. For now, let's assume that is what he does.

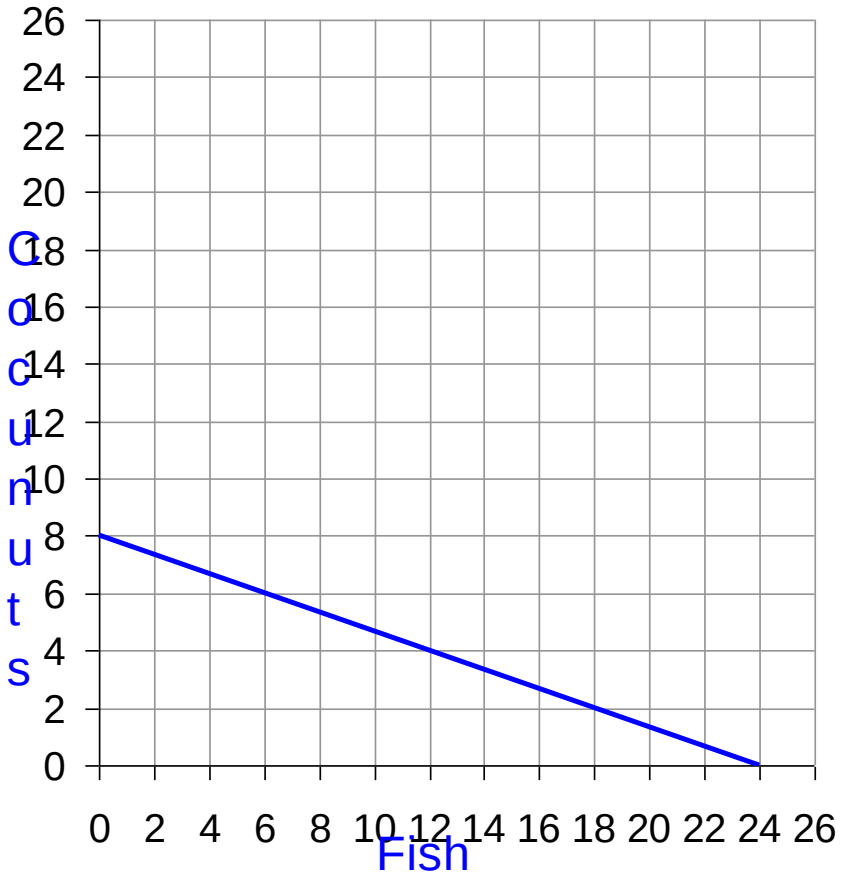
Autarky

Definition:

Autarky – when a country is not opened to trade. (This is what we have been looking at with Econland before)

In this case, this means that Robinson is not trading with anyone. He is producing everything by himself.

PPF



Slope: =1/3

Opportunity Cost of one more fish (in terms of coconuts)

- Can think of this as production possibilities for society as a whole.
  - Guns and Butter
  - Stadiums and K12 Education, etc

Comparative Advantage and Gains from Trade

Suppose another person named Friday lives on a neighboring island

Friday works only 2 hours a day.

- In one hour, can collect 12 coconuts or 4 fish.
- Remember: Crusoe can catch 3 fish or pick one coconut in an hour.

- So Friday has an absolute advantage at both jobs compared to Robinson Crusoe in terms of productivity per hour.

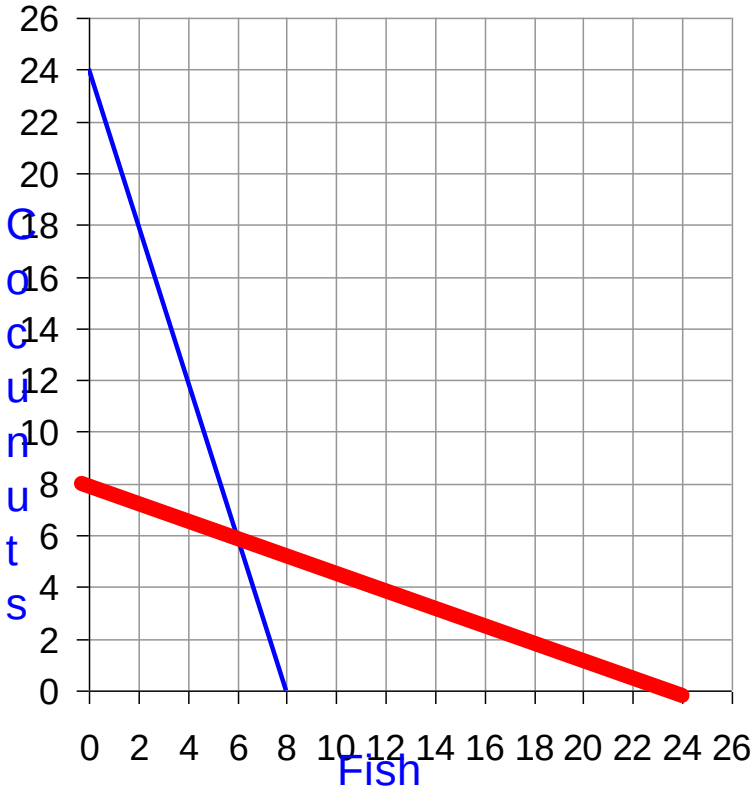
Definition (Absolute Advantage):

Being able to produce more of a good than the other(s) with the same amount of resources

i.e. in one hour, Friday produces 4 fish and Robinson only 3.

But considering the entire day…

Friday's PPF



Slope = 3. Opportunity cost of fish in terms of coconuts

Opportunity cost of fish: (to get one unit of fish, need to give up how many units of coconuts?)

- for Robinson: 1/3 coconuts
- for Friday: 3 coconuts

Robinson has a lower opportunity cost.

So,

- Robinson has a **comparative advantage** in fish.

(Since he needs to give up less coconuts to get a fish)

Opportunity cost of coconuts: (to get one unit of coconut, need to give up how many units of fish?)

- for Robinson: 3 fish
- for Friday: 1/3 fish

Friday has a **comparative advantage** in coconuts.

Notice: The opportunity cost of coconuts is just the inverse (i.e. flip the fraction) of the opportunity cost of fish.

This means: If one person has a comparative advantage in one good, the other person will have a comparative advantage in the other.

Specialization

Suppose they go to the market and trade. Suppose market price is one coconut for one fish. What do these guys do?

Specialize according to comparative advantage.

Robinson Produces 24 fish 0 coconuts

Friday Produces 0 fish 24 coconuts

Some accounting

Example of how both can be better off (this is just an example, NOT the only way!)

Robinson gives Friday 10 fish

Friday gives Robinson 10 coconuts

Robinson consumes : 14 fish 10 coconuts

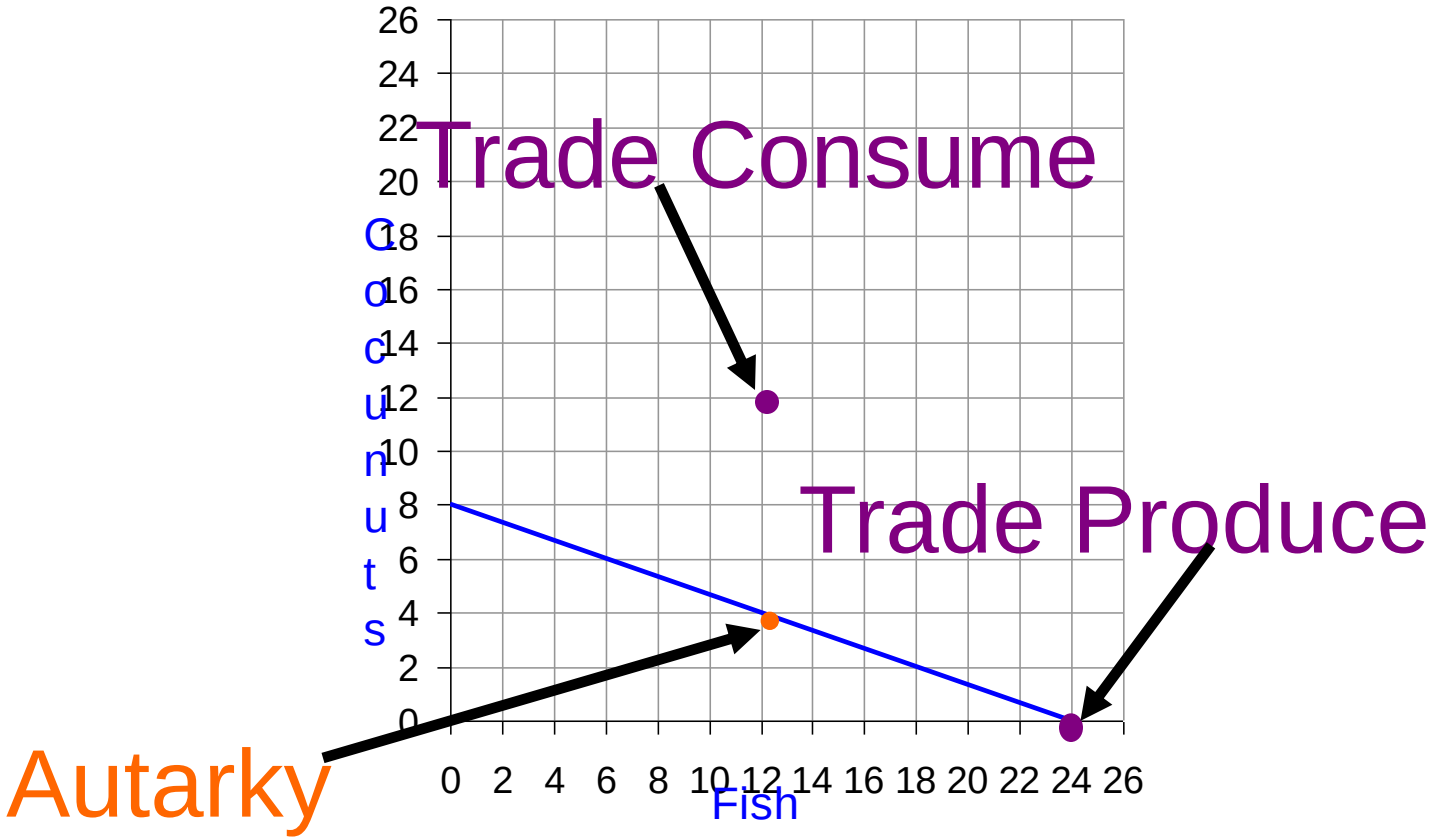
Friday consumes : 10 fish 14 coconuts

Pareto improvement compared to autarky!

- Let's see the a famous picture.

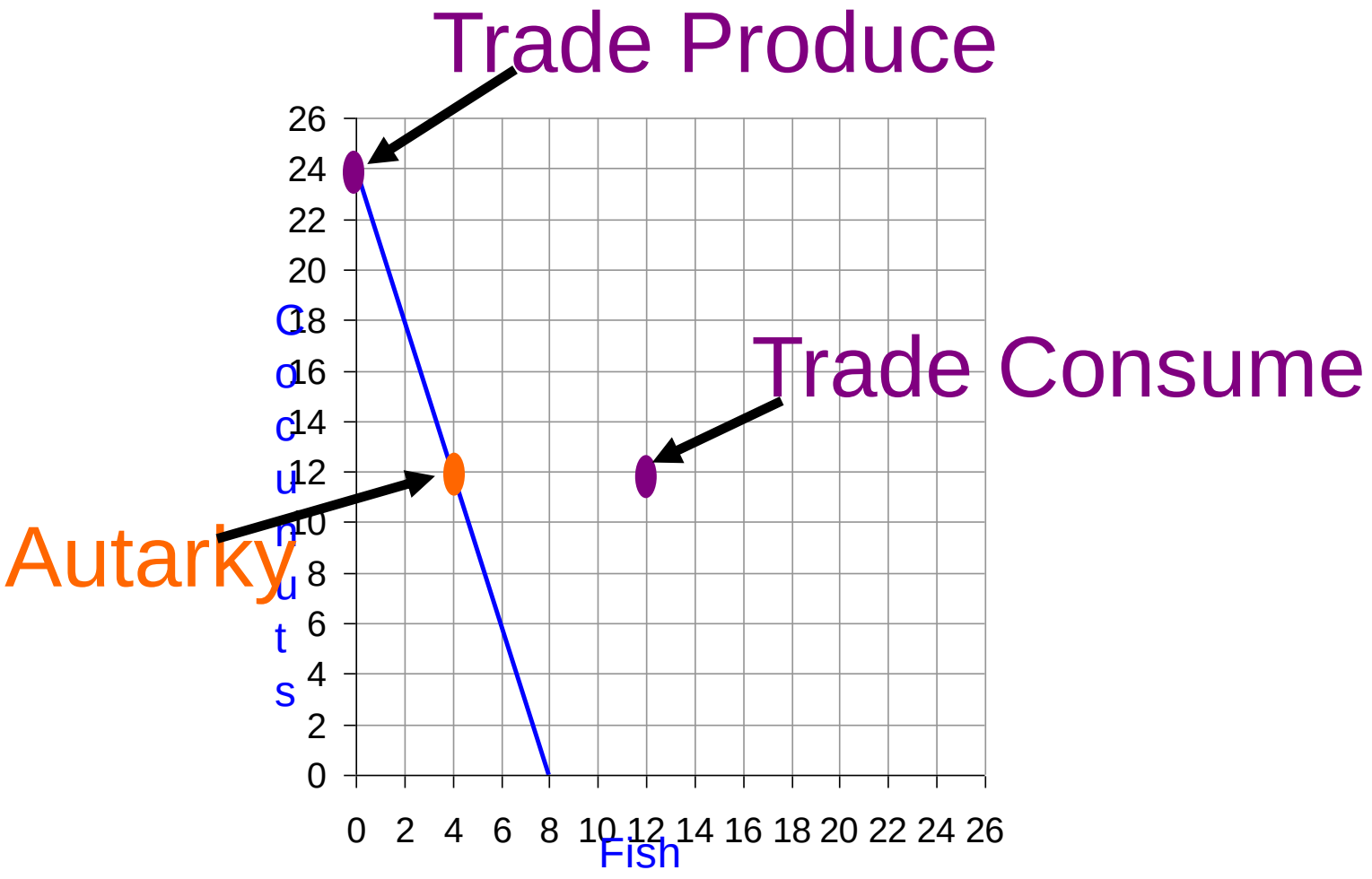
In autarky: Robinson consumes 12 fish and 4 coco
Friday consumes 12 coco and 4 fish.

Robinson



Op. Cost 1 Fish = 1/3 Coconuts

Friday



Op. Cost 1 Fish = 3 Coconuts

Summary

Robinson:

	Produce	**Consume**
Autarky	12 F, 4 C	12F, 4 C
Trade	24F, 0 C	12F, 12 C

Friday:

	Produce	**Consume**
Autarky	4 F, 12C	4 F, 12 C
Trade	0 F, 24 C	12F, 12C

Another example

- Global perspectives course – as usually let's consider Central and Eastern Europe!
- Two countries – Russia and Poland
- Only two goods are absolutely necessary to survive in these countries:

Another example

- Global perspectives course – as usually let's consider Central and Eastern Europe!
- Two countries – Russia and Poland
- Only two goods are absolutely necessary to survive in these countries:
  - vodka (v)

Another example

- Global perspectives course – as usually let's consider Central and Eastern Europe!
- Two countries – Russia and Poland
- Only two goods are absolutely necessary to survive in these countries:
  - vodka (v)
  - matryoshka (m)

Some assumptions

- A representative citizen of each country works 12 hours a day
- The Polish guy needs **four** hours to produce 32 oz. of vodka and **three** hours to manufacture one matryoshka
- The Russian guy takes **two** hours to produce 32 oz. of vodka and **one** hour to manufacture one matryoshka

How do we plot the PPF?

- What are some possible production plans?

Polish			Russian		
4m	0 v	4*3h + 0*4h = 12h	12m	0v	12*1h + 0*2h = 12h
3m	¾ v	3*3h + ¾*4h = 12h	10m	1v	10*1h + 1*2h = 12h
2m	1½ v	2*3h + 1½*4h = 12h	6m	3v	6*1h + 3*2h = 12h
1m	2¼ v	1*3h + 2¼*4h = 12h	2m	5v	2*1h + 5*2h = 12h
0m	3 v	0*3h + 3*4h = 12h	0m	6v	0*1h + 6*2h = 12h

- How do we make the PPF plot out of it?

Slopes

- slope(P) = -3/4 slope(R) = -1/2
- Slopes as opportunity cost:
  - For a Polish guy: to get every subsequent m, needs to give up ¾ lt of v.
  - For a Russian guy: to get every subsequent m, needs to give up ½ lt of v.
- PPF is an analogue to ind. budget constraint:

  Poland/Russia or Polish/Russian consumer
  - labor requirements as prices

Summary

Initial information:

	Vodka	**Matrioshka**
Poland	4 hours per 32oz.	3 hours per 1 unit
Russia	2 hours per 32oz.	1 hour per 1 unit

Opportunity costs:

	Vodka	**Matrioshka**
Poland	4/3 matryoshka	¾ vodka
Russia	2 matryoshka	½ vodka

Remember, since there are only two goods, the opportunity cost of a good must be written in terms of the other good.

Notice that opportunity costs are also the respective minimum and maximum prices that countries can accept to make the trade possible.

Who has advantages?

- Absolute advantages:
  - Russian in matryoshka's (12/day vs. 4/day)
  - Russian in vodka (6 lt/day vs. 3 lt/day)

Who has advantages?

- Absolute advantages:
  - Russian in matryoshka's (12/day vs. 4/day)
  - Russian in vodka (6 lt/day vs. 3 lt/day)

- Comparative advantages:
  - Polish in vodka: $1v^P = 1.33m^P$ vs. $1v^R = 2m^R$
  - Russian in matryoshka: $1m^R = ½\ v^R$ vs. $1m^P = ¾\ v^P$

Effect of specialization

- What if they don’t specialize and don’t trade?
  - Suppose Polish produces (2m, 1.5v)
  - Suppose Russian produces (9m, 1.5v)
  - Together they have (11m, 3v)

Effect of specialization

- What if they don't specialize and don't trade?
  - Suppose Polish produces (2m, 1.5v)
  - Suppose Russian produces (9m, 1.5v)
  - Together they have (11m, 3v)

- What if they specialize according to their comparative advantage?
  - Polish produces (0m, 3v);
  - Russian produces (12m, 0v)
  - Together they have (12m, 3v)
  - If they can work out some arrangement, both are strictly better off.

Idea of comparative advantage as the basis for trade:

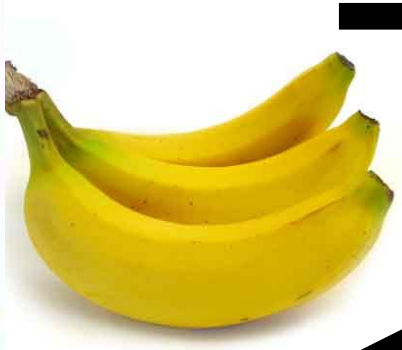
David Ricardo: 1772-1823

- Trade based on comparative advantage:
- Low skill country: specialize in labor intensive sectors, e.g. assemble sneakers
- High skill, high capital country: do design, marketing, engineering

Usual trade patterns

Warm Climate

Temperate Climate



Low Skill

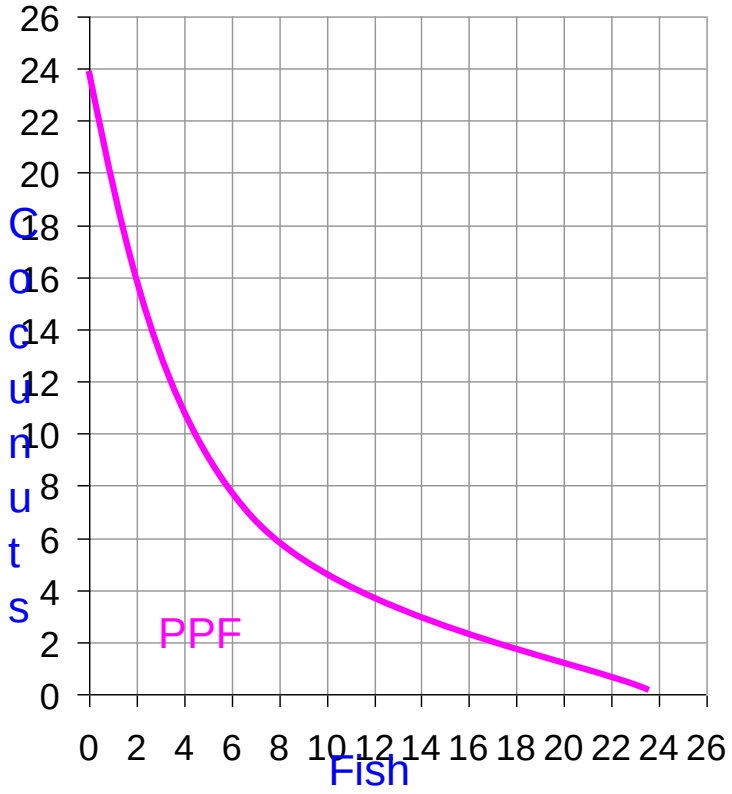
High Skill

Discussion

- What does the trade pattern (and potential gains) critically depend on?
- What do you think about the perfectly linear shape of PPF?
  - Can we modify it somehow to better resemble the reality?
  - What effect would it have on magnitude of the potential gains from trade?

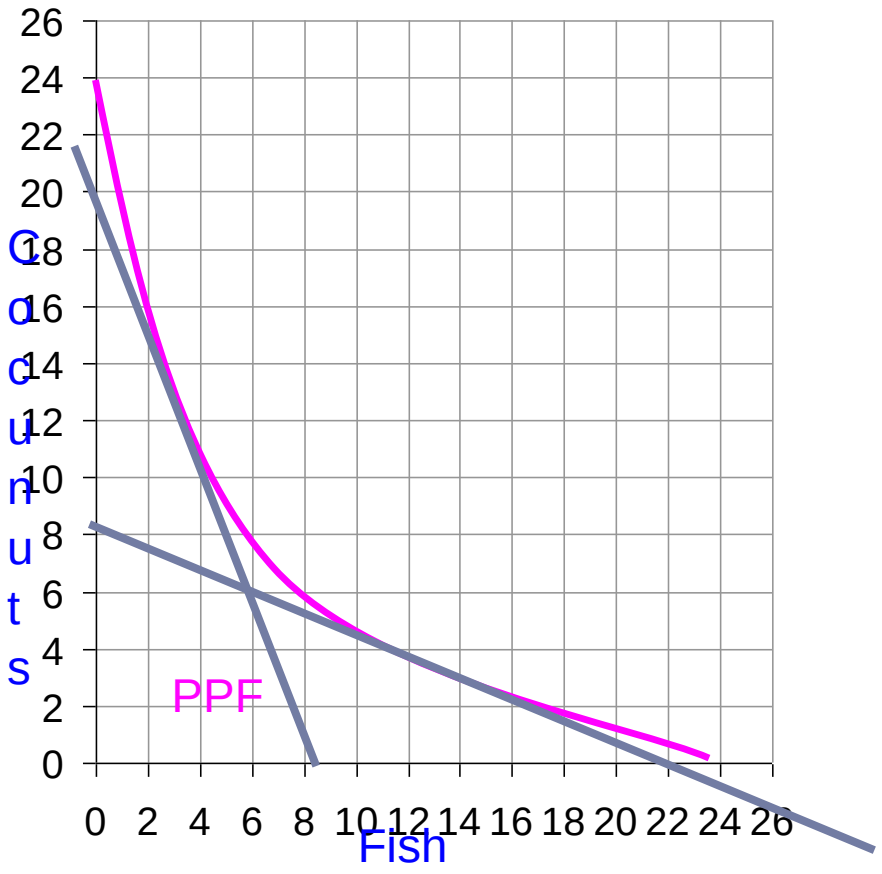
Increasing Returns (And Gains from Trade)

- Suppose the PPF looks like:



Opportunity cost of one more fish falls as fish production increases (One reason: learning by doing)

Slope of the curve decreases as we go down the curve, which means opportunity cost of fish is decreasing.



Can specialize and make:

24 fish, 0 coconuts
or
0 fish 24 coconuts

Or try to do both and make
7 fish and 7 coconuts

“Jack of all trades but master of none”

With autarky still might do both (no specialization) even if not particularly good at either task.

Robinson in autarky

- Perhaps produce and consume 7 coconuts and 7 fish.

Now suppose Robinson can trade with clones of himself? (So we have Robinson 1 and Robinson 2)

What do we expect to happen?

Specialization!

Robinson 1:

- Produces 24 Fish 0 Coconuts

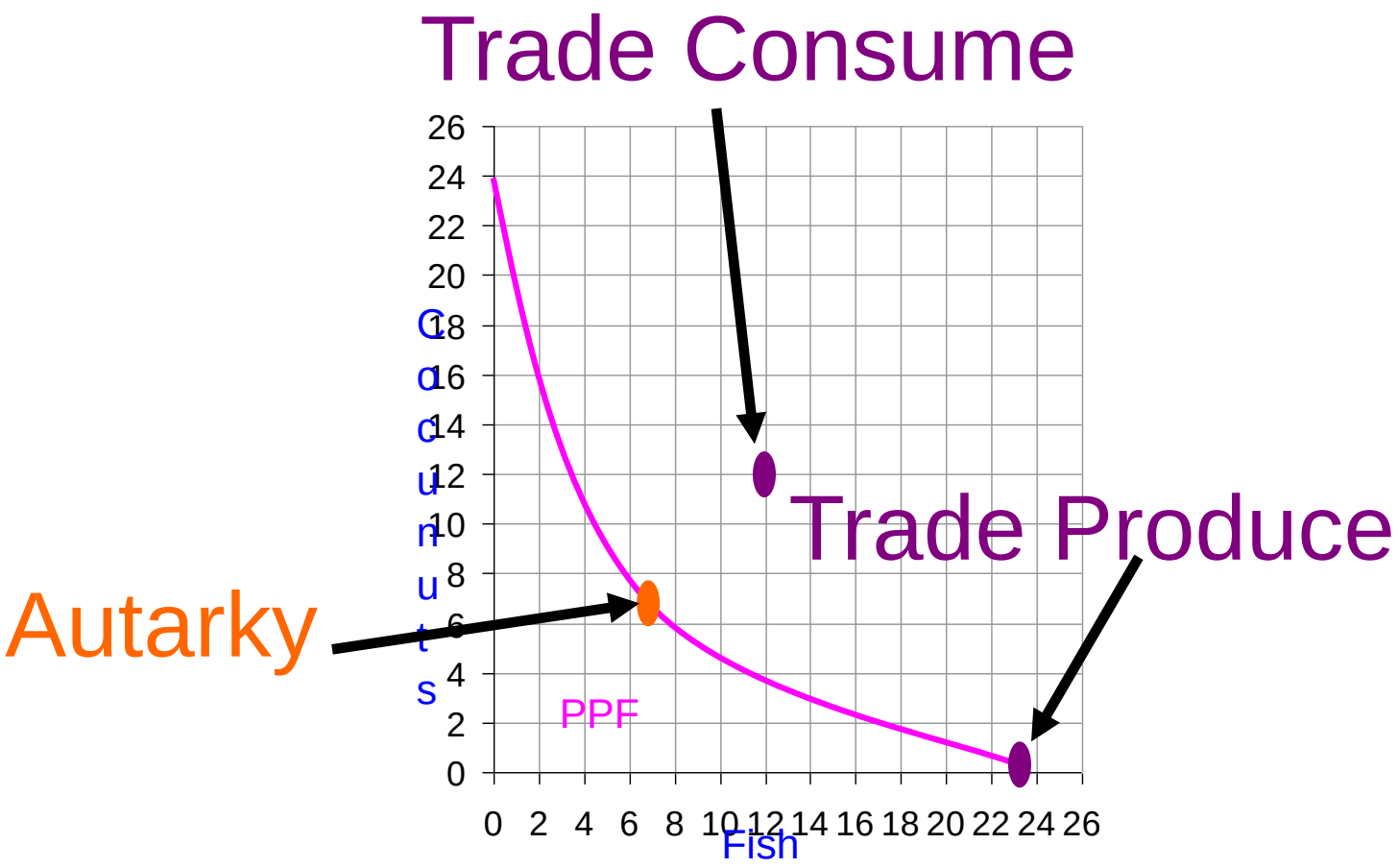
Robinson 2:

- Produces 0 Fish 24 Coconuts

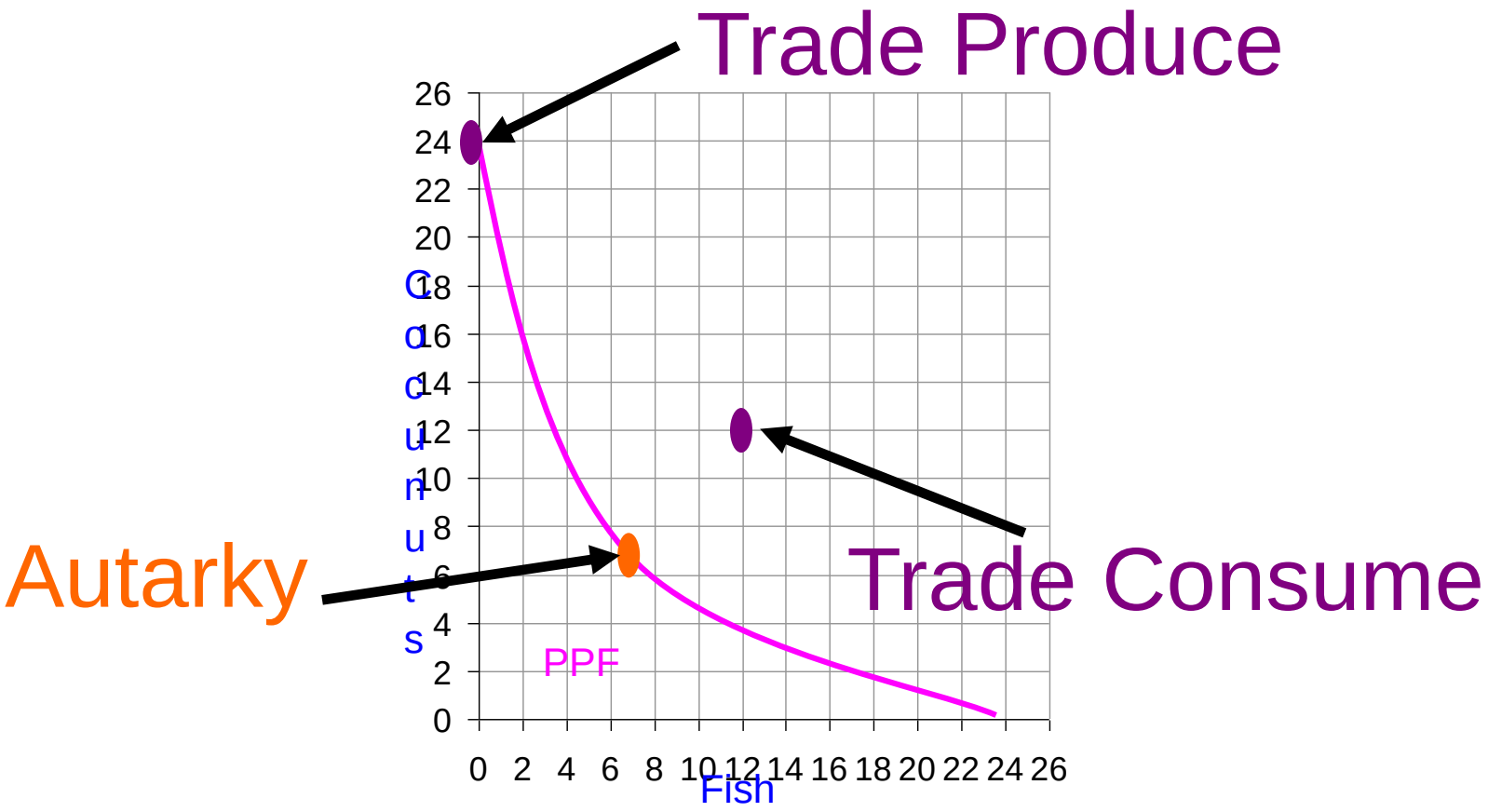
Each consumes

- 12 Fish 12 Coconuts

Robinson 1 (Increasing Returns)



Robinson 2 (Increasing Returns)



- Robinson 1

	Produce	Consume
Autarky	7 F, 7 C	7F, 7 C
Trade	24F, 0 C	12F, 12 C

- Robinson 2

	Produce	Consume
Autarky	7 F, 7C	7 F, 7 C
Trade	0 F, 24 C	12F, 12C

Interest in the theory of increasing returns is driven by the empirical observation that a bulk of trade is between similar countries:

- U.S. and Canada
- U.S. and Europe
- U.S. and Japan
- all high skill countries.

With increasing returns, through trade, it's possible to:

(1) have large production volumes of any given product

(2) have consumers consume a large variety

Real Life Example

International Division of Labor and the iPhone

- iPhone 5 32GB is $299.99 at Sprint
- (But Sprint pays Apple more than this, let's say $600 as rough guess)

- How is this made and how is the money being divided up?

Components: about $200? (Like Robinson 1 and Robinson 2 trading)

- All made in advanced economies (nations similar to US with high skill labor and capital intensive production)
  - high skill labor used to develop these top-of-the-line technologies.
  - capital intensive production processes use hardly any labor.
  - Toshiba (Japan) making memory
  - Samsung (Korea) processor
  - Infineon (Germany) baseband
  - Broadcom (U.S) Bluetooth
- There are huge scale economies at work here, in research and development and development of production processes.

We also have specialization according to comparative advantage (Like Robinson and Friday trading)

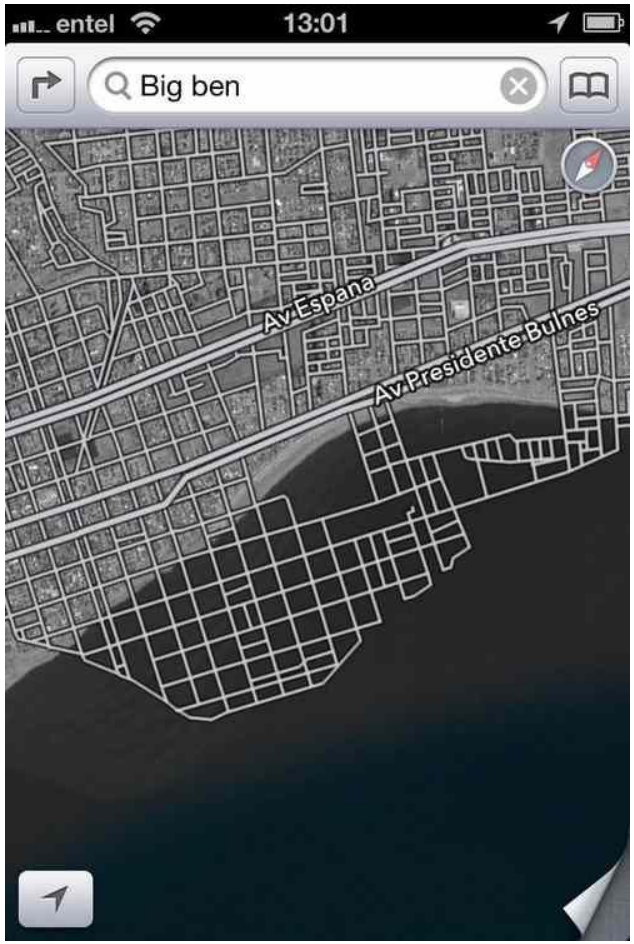
- Assembly in China (maybe $10-$15)
- Estimates of about $6.50, but this seems low, may not include manufacturing of the very nice box, etc.

- All components go to the massive Foxconn complex (300,000 workers!) for assembly. Assembly is labor intensive.

- Specialization according to comparative advantage. Low skill workers earning about $170 a month.
- Customer Service
  - Consumers need to call someone to get phone hooked up and resolve glitches. This is labor intensive, so goes where labor is cheap and the population can speak English.
  - Philippines, where pay is ≤$500 a month.

- Apple (U.S) is estimated to keep more than half of the $600! Employs high skill workers. The $300 plus is a return on:
  - Innovations?
  - Flashy design?
- It's a pity they spend part of this money to prevent their document viewers from reading PDFs created by competing software (though in accordance to global standards).
- This time though, for once, I'm not the one affected by this policy ☺

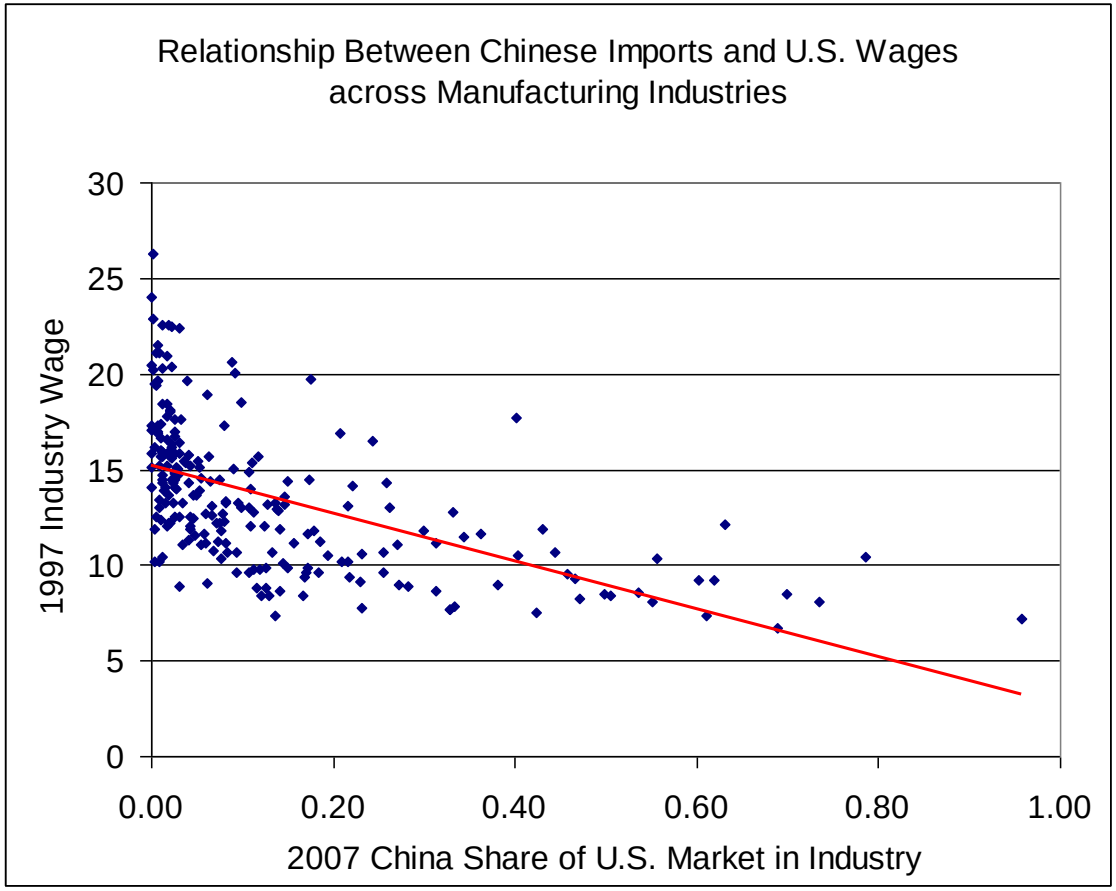
And then there's this…



China/US trade

- Some industries are intensive in low-skill labor. **China has a comparative advantage in these**.
- Other industries are intensive in high-skill labor and high technology. **The U.S. has a comparative advantage in these.**
- The homework provides some evidence that the pattern of trade is consistent with specialization according to comparative advantage. (Note: you still have to do the homework to calculate the slope of the regression line!)
- Low skill industries tend to pay low wages. There is pattern in the data that China has tended to gain the most market share in those industries that paid low wages within the US

Example: House slipper manufacturing wage = $7.16 in 1997.
As of 2007, this industry has been virtually wiped out by Chinese.



中国
China

美国 US

UNIVERSITY OF MINNESOTA
Driven to Discover℠

assembly of iPad

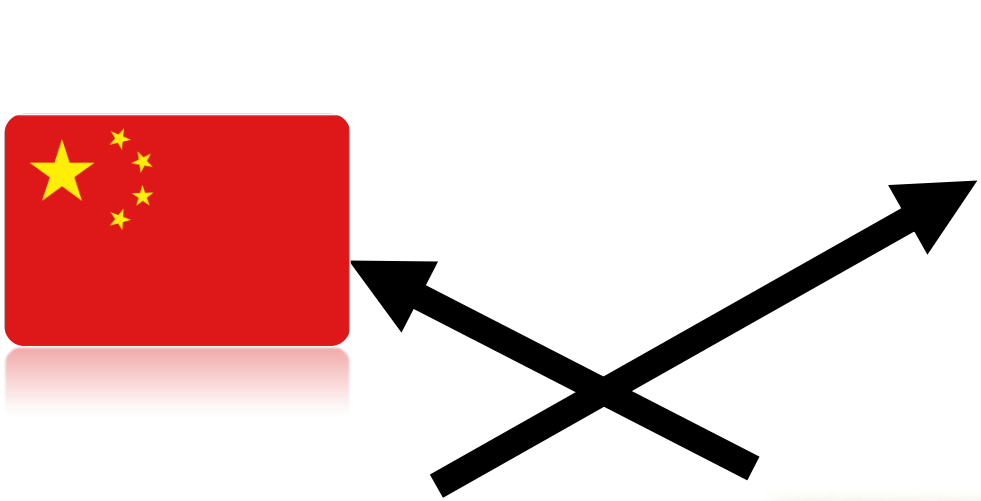
R&D for iPad

- Manufacturing jobs that involve labor-intensive, repetitive tasks in the manufacturing of standardized good have been wiped out in the U.S.
- The textile and furniture industries, that had earlier located in places like North Carolina for low wages, have been decimated.

- One take on U.S-China trade is that it is simply mutually beneficial Robinson-Friday trade, based on comparative advantage.
- There may be more to it than that, and we will look at three issues.

Issue 1:

Much of trade looks like:



U.S. seems to have a comparative advantage in consumption!

- Robinson sits on his butt and gets both coconuts and fish from Friday. Robinson promises to give some of his island to Friday in return.
- U.S. is paying for imports by going into debt.
- U.S. blames China for manipulating the Renminbi to promote exports and discourage consumption. (See the news accounts in Reading 5)
- U.S.can't really be viewed as innocent bystander, as it engorges itself on a consumption binge.
- Germany, like China, has a huge trade surplus. Why is Germany saving and US not saving?

Issue 2:

Much of trade looks like:

中国

$0

For example, Microsoft makes tiny revenues there, even though there are more PCs with Windows in China than in the U.S.

Revenues are low because:

(1) It is easy to make illegal copies, and many people get Windows that way.

(2) To actually get some people to pay rather than use illegal copies, Microsoft has to set really low prices in China.

(3) How about those knock-off Apple Stores?

- In actuality, U.S. firms are making some money in China from intellectual property, but at a lower rate than we might expect, given the size of their economy.

- Royalty and License Fee data for 2011 from the Bureau of Economic Analysis to US from countries. (in billions $US)

Country	Royalties to US ($US Billions)	GDP ($US Billions)
China	4.1	7,298
Japan	10.6	5,866
Korea	4.5	1,116
Austrialia	3.3	418

Issue 3:

- There is little doubt that China is aggressively subsidizing industries of the future, like green energy. The price of solar panels has fallen by two thirds.
- Should we send the Chinese premier Wen Jia Bao a thank you note for cheap solar panels? If you think this is a strategic industry with knowledge spillovers and increasing returns you probably don't want to send the thank you note.
- The solar panel industry here, of course, doesn't want to send a thank you note. In the past, they filed a complaint about Chinese subsidies, asking the U.S. to respond with a 100% tariff on Chinese imports.