

# Preliminaries

1. Introductions:
  - a. Send me an email at [robert.driskill@vanderbilt.edu](mailto:robert.driskill@vanderbilt.edu) with the schedule of your other class.
  - b. Learning goes best when it is a cooperative venture.
2. Syllabus
  - a. Grading
    - i. Class attendance and participation: 25% (Note the CET policy, by which I abide).
    - ii. Journal: 25%
      - A. A Word (or word-like) document, sent to me ([robert.driskill@vanderbilt.edu](mailto:robert.driskill@vanderbilt.edu)) as an attachment, identified as "entry *i*, John Hancock."
      - B. Due 9:00 AM the day after class.
      - C. Writing to learn (not graded on style)
      - D. A conversation with yourself and with me about the material; part can be a summary (it usually helps organize your thoughts, and part should your response to what's going on: What did I not understand, and can I begin to put my finger on what was confusing and why? What did this remind me of? What facts did I not know? (Note: there is a difference between "understanding" and "knowing facts"). Does any of what we did relate to other things?
      - E. No quantitative stipulation, e.g., no requirement like "200 words." Most good entries for a three-hour class will be in the neighborhood of a double-spaced page. Feel free to write more if you have things you want to express, or less if you think you have covered what you wanted to convey.
    - iii. Midterm: 20%. Tentative date of Tuesday July 2.
    - iv. Final: 30%. time tbd by CET.
  - b. Readings: Travels of a Teeshirt (hereafter TT) and postings on <https://my.vanderbilt.edu/robertdriskill/econ-2260-international-trade-florence-italy>

c. Goals:

- i. Be able to think critically about the news: What do I not understand, do I agree/disagree, and why.
- ii. Understand the structure of arguments made by economists about international economics.

3. Expectations:

a. Interactive class?

b. I assume each of you has at most one other class. This means that out of four days—Monday through Thursday—each of you has at most 13 hours of class meetings. We meet 6.5 hours a week. I assign readings, and have you write a journal entry for each class, that I estimate will take you at most 8 hours per week outside of class. This should allow you enough time to experience and appreciate your time in a different country and culture, and give appropriate effort to another class. Va bene?

4. Strategy:

a. The three "C's". (I hope I don't pull a Rick Perry)

b. Words, graphs, equations (as needed).

5. What is happening now? Brexit? Tariff Man? Immigration?

6. What are your interests?

## Getting started.

1. What is economics? Study of allocation of scarce resources.

a. Economists do this differently.

i. Rational actors: Think before you act with consideration of:

**A.** Constraints you face.

**B.** Awareness of your preferences or objectives (know what you want, not necessarily why you want things).

**C.** What actions will obtain these objectives.

**D.** How your interactions with others affects the pursuit of your objectives (strategy).

ii. Models:

**A.** Motivation: The Monk problem.

- B.** Motivation: Krugman: "Justify modelling: do not presume, as I did, that people accept and understand the idea that models facilitate understanding."
- C.** Definition: Kane (1968): "An economic model is a logical (usually mathematical) representation of whatever a priori or theoretical knowledge economic analysis suggests is most relevant for treating a particular problem."
- D.** For virtually every economic model, a "logical representation" boils down to a collection of equations that express interrelationships among variables.
- E.** "A priori or theoretical knowledge:" the art of the economist.
- F.** "Most relevant for treating a particular problem" means we do not look for some universal model.
- G.** Canonical question: how do changes in exogenous components affect the values of endogenous variables.

**2.** What is international economics?

- a.** Purview: interactions between economic units (people, firms, gov'ts, orgs.) located in different sovereign nations
- b.** NB: Not *Nations* that "decide" to have trade def's, etc. but the decision-making entities within these nations, e.g., people, firms, gov'ts, orgs.

**c.** Why countries as line of demarcation?

- i.** Traditionally, factor mobility. Important for today's debates: "Protectionism for Liberals" by Robert Skidelsky, Aug 14, 2018, *Project Syndicate*:

**A.** "Experience ... shows," Ricardo wrote, "that the fancied or real insecurity of capital, when not under the immediate control of its owner, together with the natural disinclination which every man has to quit the country of his birth and connexions, and intrust himself, with all his habits fixed, to a strange government and new laws, check the emigration of capital. These feelings, which I should be sorry to see weakened, induce most men of property to be satisfied with a low

rate of profits in their own country, rather than seek a more advantageous employment for their wealth in foreign nations.”

B. "This prudential barrier to capital export fell as secure conditions emerged in more parts of the world. In our own time, the emigration of capital has led to the emigration of jobs, as technology transfer has made possible the reallocation of domestic production to foreign locations – thus compounding the potential for job losses."

ii. Sovereign policies: among other things: in US, no barriers to interstate trade; only dollars as legal tender.

### 3. The Great Divide: micro vs macro

#### a. Micro:

##### i. Great themes:

A. Causes, aka the "Pattern of trade."

B. Consequences: Effects of this pattern on different individuals, aka "gains from trade."

C. Conduct: institutions such as WTO; sovereign policies such as tariffs.

ii. What is hard for students? **Relative** prices.

#### b. Macro:

##### i. Themes:

A. What causes **nominal** prices: Currency prices of goods and services and exchange rates (domestic currency price of a unit of foreign exchange).

B. Conduct: Institutions, systems, e.g., fixed versus floating.

C. Consequences of macro policies.

D. Trilemma. It is impossible to have all three of the following at the same time: a fixed foreign exchange rate, free capital movement (absence of capital controls), and an independent monetary policy.

ii. What is hard for students? The neoclassical paradigm (more on this later).

4. Micro/macro Crossovers: will tariffs affect the trade (current account) deficit?

## Let's find some questions (the engine of discovery and understanding)

1. Take 20 minutes to read "Killing the Pax Americana" by Paul Krugman. As you read (and perhaps re-read), make written note of what terms you do not understand, and think critically about what this column is trying to convey.
2. Lasciateci scrivere del nostro pensiero riguardo questo pezzo di pace (let's write our thoughts about this piece about peace) .

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## Terminology

### Macro

1. Imports of goods and services
2. Exports of goods and services
3. Trade account balance (surplus, deficit)
4. current account (surplus, deficit)
5. Capital account
6. Bilateral versus multilateral
7. Exchange rate
  - a. Nominal
  - b. Real
  - c. fixed versus flexible
8. Stocks vs flows:
  - a. Income
  - b. Consumption spending
  - c. saving(s): income that is not consumed
  - d. Accumulated savings, aka Assets.
  - e. Investment (as per economists' usage): flow of new means of production, i.e., additions per unit of time to the stock of capital.

### Micro

1. Relative price, nominal prices

2. Tariff
3. Quota

## Because of Trump ...

### Krugman, trade wars, some history

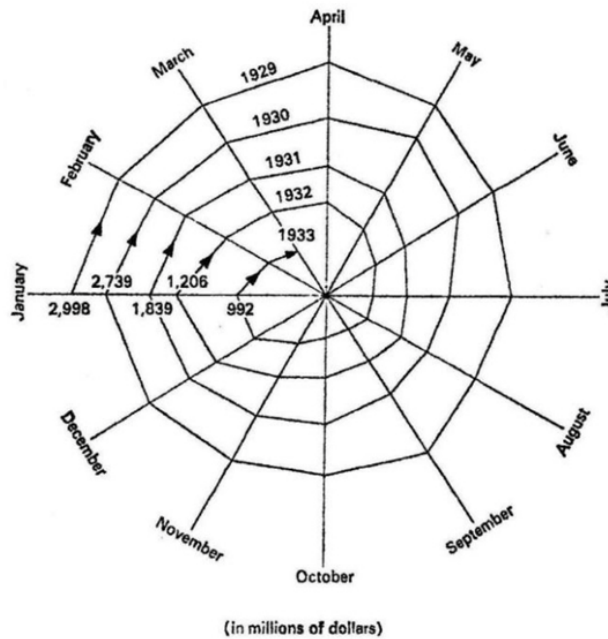
#### Economic Globalization Then and Now

"What an extraordinary episode in the economic progress of man that age was which came to an end in August, 1914, ... The inhabitant of London could order by telephone, sipping his morning tea in bed, the various products of the whole earth, in such quantity as he might see fit, and reasonably expect their early delivery upon his doorstep; he could at the same moment and by the same means adventure his wealth in the natural resources and new enterprises of any quarter of the world, and share, without exertion or even trouble, in their prospective fruits and advantages; or he could decide to couple the security of his fortunes with the good faith of the townspeople of any substantial municipality in any continent that fancy or information might recommend."

John Maynard Keynes, 1920, 11-12, *The Economic Consequences of the Peace*, New York, Harcourt, Brace, and Howe

1. "extraordinary episode" built upon steam power, telegraph and telephone
2. data on trade: in 1870, the ratio of world trade to GDP was 10%, but in 1914 was 21%.
3. globalization then, as it does now, created frictions: the people for whom globalization created opportunities were often not the same people for whom globalization created challenges. Lower grain prices in Europe brought about by the growth of American imports lead to political efforts to impose tariffs as European farmers suffered from the cheap imports; trade wars within Europe broke out as industries in one European country were displaced by new entrants from other European countries.
4. Smoot-Hawley 1930;
  - a. Concentrated interests, diffuse costs
  - b. Schattschneider
  - c. Great Depression
  - d. Trade contraction

*The contracting spiral of world trade, January 1929–  
March 1933: Total imports of 75 countries (monthly values in  
terms of old U.S. gold dollars [millions]).*



## 5. RTAA

- a. Congress "steps back."
- b. Exporters as counter to import-competing producers

## 6. GATT

- a. levers: "rounds" a legacy of RTAA
- b. ratchets: rules, dispute resolution mechanisms, to prevent backsliding
- c. eccezioni:
  - i. Mkt. disruptions
  - ii. Nat. Security
  - iii. Unfair practices, e.g., unfair subsidies
  - iv. Dumping
- d. Come implementare l'eccezioni? "quasi-judicial procedure" (Krugy); agencies gather facts, recommend to Pres.

## 7. The picture for US (similar for EU)





when WWII interrupted his studies.

- a. Taken prisoner.
- b. Described the economy of a POW camp
- c. Rest of story: finished his degree at Cambridge, came to US and worked as an economist for the IMF until he retired in 1980.
- d. Some perhaps unusual language: "Bully" (canned beef); "bungalow" (building), "Kam," (English delicacy), "treacle," (molasses), "relict," (survivor), "Bedlam," (chaos and uproar, IWM), "

3. "small and simple enough to prevent detail from obscuring the basic pattern and disequilibrium from obscuring the working of the system. But the essential interest lies in the universality and the spontaneity of this economic life ; it came into existence not by conscious imitation but as a response to the immediate needs and circumstances. Any similarity between prison organisation and outside organisation arises from similar stimuli evoking similar responses.

4. The impulse to "truck, barter, and exchange": "Goodwill" developed into trading as a more equitable means of maximising individual satisfaction."

5. Strings of bilateral negotiations: "Starting with simple direct barter, such as a non-smoker giving a smoker friend his cigarette issue in exchange for a chocolate ration, more complex exchanges soon became an accepted custom. Stories circulated of a padre who started off round the camp with a tin of cheese and, five cigarettes and returned to his bed with a complete parcel in addition to his original cheese and cigarettes; the market was not yet perfect." (not "**thick**") ... "In this camp we did not visit other bungalows very much and *prices varied from place to place* (italics mine); hence the germ of truth in the story of the itinerant priest."

6. Developing thickness: "By the end of a month, when we reached our permanent camp, there was a lively trade in all commodities and their *relative values* (italics mine) were well known, and expressed not in terms of one another—one didn't quote bully in terms of sugar—but in terms of cigarettes. The cigarette became the standard of value." (relative prices in the background, but there: **real-nominal principle**; note the importance of "money" in producing thickness. Why? Dbl Coinc Wnts). (bully beef is canned or pickled beef—like all wartime rations, sounds—and probably is—awful).

7. Safety and ease: "The inconveniences of this system in soon led to its replacement by an Exchange and Mart notice board in every bungalow, where under the headings " name ", " room number ", " wanted " and "offered " sales and wants were advertised. When a deal went through, it was crossed off the board. The public and semi- permanent records of transactions led to cigarette prices being well known and thus tending to

equality throughout the camp, although there were always opportunities for an astute trader to make a profit from arbitrage. With this development everyone, including non- smokers, was willing to sell for cigarettes, using them to buy at another time and place. Cigarettes became the normal currency, though, of course, barter was never extinguished."

8. The money shot for international trade: "The people who first visited the highly organised French trading centre, with its stalls and known prices, found coffee extract-relatively cheap among the tea-drinking English-commanding a fancy price in biscuits or cigarettes, and some enterprising people made small fortunes that way. (Incidentally we found out later that much of the coffee went " over the wire " and sold for phenomenal prices at black market cafes in Munich : some of the French prisoners were said to have made substantial sums in RMk.s. This has one of the few occasions on which our normally closed economy came into contact with other economic worlds.) ...

Eventually public opinion grew hostile to these monopoly profits—not everyone could make contact with the French—and trading with them was put on a regulated basis. Each group of beds was given a quota of articles to offer and the transaction was carried out by accredited representatives from the British compound, with monopoly rights. The same method was used for trading with sentries elsewhere, as in this trade secrecy and reasonable prices had a peculiar importance, but as is ever the case with regulated companies, the interloper proved too strong."

## A model

### Overview

Why important? Understand AERP to understand pattern of trade

1. Structure:
  - a. BC's
    - i. Endowment, prices: exogenous
    - ii. How markets work, how we model them
    - iii. graphs
    - iv. A *menu* of feasible choices.
  - b. Preferences: more is better
  - c. Ind. demand curves
  - d. Aggregate demand curves
  - e. Supply: simple

- f. Mkt equilibrium:  $D=S$
- g. Solution: What happens to endogenous variables when exog. factors change?

## Budget constraints: a problem we do insieme

1. Each month, Andy gets the following (exogenous) endowments:

$$\bar{C}_A = 5, \bar{T}_A = 3.$$

Andy can exchange these endowments for currency at market prices, which are exogenous to him, in a central marketplace.

- a. If the price of coffee is 7 units of currency per unit of coffee, and the price of tea is 5 units of currency per unit of tea, show why Andy's income/month measured in currency is \$50.00 .

A:

- b. What is his income/month measured in units of coffee? In units of tea?

A:

C/month

T/month

- c. What is the relative price of coffee? What are the units of this price?

A:

- d. Write his budget constraint in standard slope-intercept form with consumption of tea/month on the left-hand-side of the equality sign.

A:

- e. With tea on the vertical axis and coffee on the horizontal, draw a schematic diagram of his budget constraint, making sure you identify all relevant features, i.e., slope, intercepts, and endowment point.

A:

- f. What would happen to this schematic diagram if both  $P_C$  and  $P_T$  were to double? Triple? Be cut in half?

A:

2. Now consider another scenario. Andy grows coffee for a living, and takes his harvest to market once a year. There, he can sell as much of his crop as he wants at a market price of a certain amount of dollars per pound of coffee. While at the market, Andy can use the money he gets from selling his coffee to purchase the only other good he likes to consume, tea, at a market price of a certain amount of dollars per pound of tea.

- a. Suppose Andy grows 80 kilos of coffee per year, and coffee exchanges in the market place for \$2.00/kilo. Tea exchanges in the market place for \$4.00/kilo. Let  $C_A$  symbolize the variable that measures the amount of coffee Andy consumes per year, and  $T_A$  symbolize the variable that measures the amount of tea Andy consumes per year. Describe in an equation with only  $T_A$  on the left-hand-side of the equality sign all those pairs of kilos of coffee/yr. and kilos of tea/year that Andy could consume at these prices, assuming he spent all of his income.

Answer: Put the budget constraint in parametric form. First express in an equation the equality of income and expenditure:

$$\underbrace{\text{Expenditure}} = \underbrace{\text{Income}}.$$

Then rearrange to isolate  $T_A$  on the l.h.s. of the equality sign:

$$T_A = .$$

Upon substitution of the given values of the exogenous variables:

$$\frac{P_C}{P_T} = \text{---}; \bar{C}_A = 80;$$

$$T_A =$$

$$T_A =$$

- b. Again suppose Andy grows 80 kilos of coffee per year, and again suppose coffee exchanges in the market place for \$2.00/kilo, and tea exchanges in the market place for \$4.00/kilo. Which of the following amounts of coffee and tea can Andy take home with him from the market place?
- Ten (10) kilos of coffee and 35 kilos of tea.
  - 20 kilos of coffee and 30 kilos of tea.
  - 20 kilos of coffee and 35 kilos of tea.
  - 30 kilos of coffee and 30 kilos of tea.
  - 40 kilos of coffee and 20 kilos of tea.
  - 40 kilos of coffee and 30 kilos of tea.

c. What is Andy's income per year measured in units of dollars/year?

A:

$$\underbrace{\bar{C}_A} \times \underbrace{P_C} = \text{___ } \$/\text{year}$$

3. Let  $P_C$  symbolize the variable that describes the market price of coffee in terms of dollars/pound of coffee, and let  $P_T$  symbolize the variable that describes the market price of tea in terms of dollars/pound of tea. Given that Andy produces 80 kilos of coffee per year, describe in an equation using the above symbols all those pairs of kilos of coffee/year ( $C_A$ ) and kilos of tea/year ( $T_A$ ) that Andy could consume for arbitrary values of  $P_C$  and  $P_T$ , assuming he spent all of his income. In this equation, put  $T_A$  as the only variable on the left-hand-side of the equality sign.

Answer:

$$T_A = .$$

4. Let  $\bar{C}_A$  symbolize the variable that describes Andy's production of lbs. of coffee per year. For arbitrary values of Andy's production of lbs. of coffee/yr. and arbitrary values of the price of coffee and the price of tea, describe in an equation all those pairs of kilos of coffee/yr. and kilos of tea/yr. that Andy could consume if he spent all of his income. Again, write this equation with  $T_A$  as the only variable on the left-hand-side of the equality sign.

Answer:

$$T_A = .$$

5. Draw a **schematic** diagram of the above equation in the coffee-tea plane. By coffee-tea plane, we mean the standard picture in which tea/year is measured on the vertical axis and coffee/year on the horizontal axis. By **schematic** we mean that the key qualitative features of the equation, namely the slope and the intercepts, are depicted and identified, although not necessarily to scale.

6. What would happen to this schematic diagram if both  $P_C$  and  $P_T$  were to double? Triple? Be cut in half?

## From structure to solution

### Sub-model of demand

#### English camp

A demand curve answers the question: for any feasible relative price, what is the quantity demanded? They usually slope down.

What we need to get an individual demand curve in the endowment economy is a specification of the individual's endowments and a specification of the individual's

preferences.

$$U_A = (C_A)^{\gamma_A}(T_A)^{1-\gamma_A}; U_A = (C_A)^{\frac{1}{3}}(T_A)^{\frac{2}{3}} \left(\gamma_A = \frac{1}{3}\right);$$

$$U_B = (C_B)^{\gamma_B}(T_B)^{1-\gamma_B}; U_B = (C_B)^{\frac{2}{3}}(T_B)^{\frac{1}{3}} \left(\gamma_B = \frac{2}{3}\right);$$

These preferences give rise to the following demand curves:

$$C_A^d = \frac{\gamma_A}{p}(\bar{T}_A + p\bar{C}_A); C_B^d = \frac{\gamma_B}{p}(\bar{T}_B + p\bar{T}_B);$$

$$T_A^d = \gamma_A(\bar{T}_A + p\bar{C}_A); T_B^d = \gamma_B(\bar{T}_B + p\bar{T}_B).$$

Assume Andy and Bobby each have endowments of one (1) unit of coffee and one (1) unit of tea per unit of time, i.e.,  $\bar{T}_A = \bar{C}_A = \bar{T}_B = \bar{C}_B = 1$ . The following are examples of demand curves (for coffee and for tea) that are possible with these endowments and preferences that satisfy the axioms that economists assume must be satisfied for any individual (Cobb-Douglas preferences for those with more training in microeconomics):

$$C_A^d = \frac{1}{3p}(1+p); C_B^d = \frac{2}{3p}(1+p); C^d = \left(\frac{1+p}{p}\right)\left(\frac{1}{3} + \frac{2}{3}\right)$$

$$T_A^d = \frac{2}{3}(1+p); T_B^d = \frac{1}{3}(1+p); T^d = (1+p).$$

$$C_A^d = \frac{1}{3p}(1+p); C_B^d = \frac{2}{3p}(1+p); C^d = \left(\frac{1+p}{p}\right)\left(\frac{1}{3} + \frac{2}{3}\right)$$

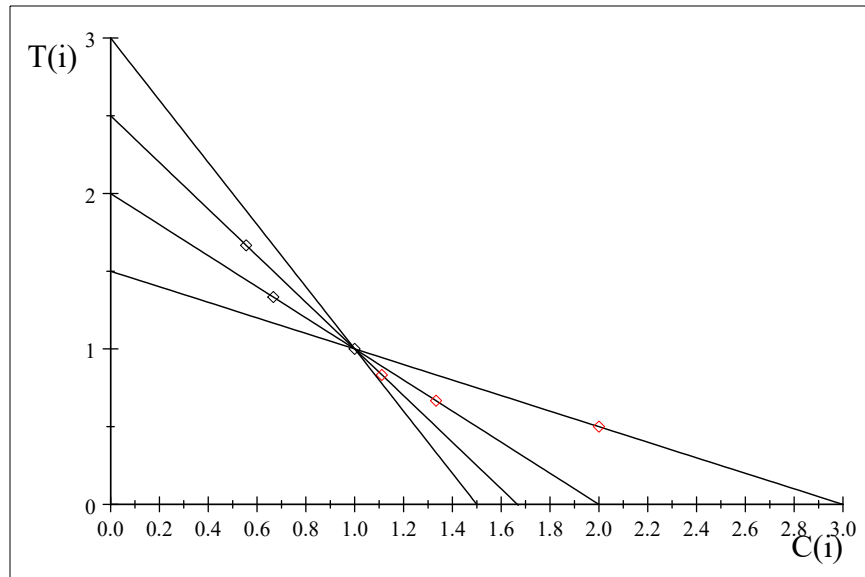
$$T_A^d = \frac{2}{3}(1+p); T_B^d = \frac{1}{3}(1+p); T^d = (1+p).$$

We put in chart form some feasible relative prices and the associated quantities demanded:

$p$	$C_A$	$T_A$	$C_B$	$T_B$	$C$	$T$
$\frac{1}{2}$	$\frac{2}{3}\left(\frac{3}{2}\right) = 1$	$\frac{2}{3}\left(\frac{3}{2}\right) = 1$	$\frac{2}{3}\frac{2}{1}\frac{3}{2} = 2$	$\frac{1}{3}\frac{3}{2} = \frac{1}{2}$	3	$\frac{3}{2}$
1	$\frac{1}{3p}(1+p) = \frac{2}{3}$	$\frac{4}{3}$	$\frac{4}{3}$	$\frac{2}{3}$	2	2
$\frac{3}{2}$	$\frac{2}{9}\frac{5}{2} = \frac{10}{18} = \frac{5}{9}$	$\frac{2}{3}\frac{5}{2} = \frac{5}{3}$	$\frac{4}{9}\frac{5}{2} = \frac{20}{18} = \frac{10}{9}$	$\frac{1}{3}\frac{5}{2} = \frac{5}{6}$	$\frac{15}{9} = \frac{5}{3}$	$\frac{5}{2}$
2	$\frac{1}{6}\frac{3}{1} = \frac{1}{2}$	$\frac{2}{3}\frac{3}{1} = 2$	$\frac{2}{6}\frac{3}{1} = 1$	$\frac{1}{3}\frac{3}{1} = 3$	$\frac{3}{2}$	3

We

display the budget constraints associated with these four (4) relative prices below, along with the most-preferred points for Andy and Bobby at each of these prices



Andy black, Bobby red

We depict the coffee inverse demand curves for Andy and Bobby, and the "market" or equivalently "aggregate" coffee inverse demand curve:

$$C_A^d = \frac{1}{3p}(1+p)$$

$$3pC_A^d = 1+p$$

$$p(3C_A^d - 1) = 1$$

$$p = \frac{1}{3C_A^d - 1};$$

$$C_B^d = \frac{2}{3p}(1+p);$$

$$3pC_B^d = 2(1+p);$$

$$p(3C_B^d - 2) = 2$$

$$p = \frac{2}{3C_B^d - 2};$$

$$C^d = \left( \frac{1+p}{p} \right) \left( \overbrace{\frac{1}{3} + \frac{2}{3}}^1 \right);$$

$$p(C^d - 1) = 1;$$

$$p = \frac{1}{C^d - 1}.$$

Submodel of supply: easy

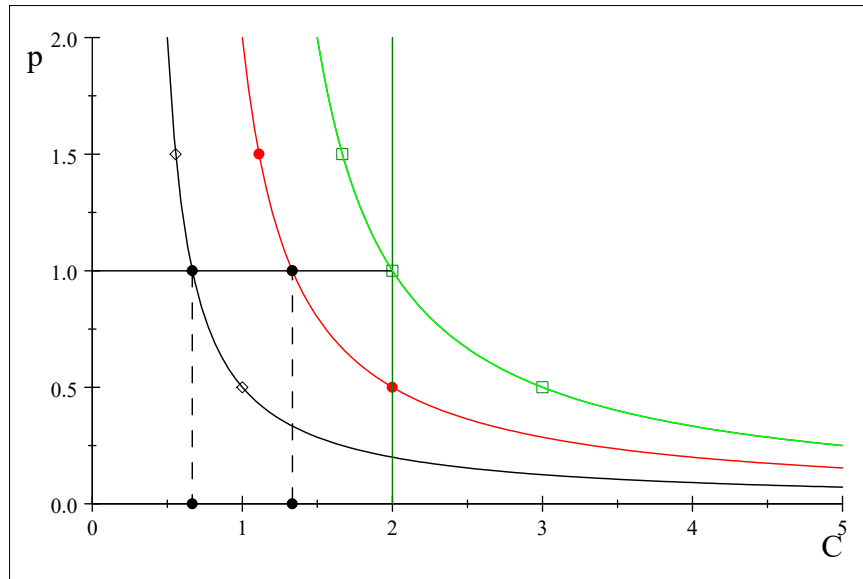
$$C^S = \bar{C}_A + \bar{C}_B;$$

*e.g.,*

$$C^S = 1 + 1 = 2.$$

## Equilibrium

$$C^S = C^d.$$



## Excess demand, excess supply

For the English camp: excess supply:

$$\bar{C} \equiv \bar{C}_A + \bar{C}_B = 2 = C^S;$$

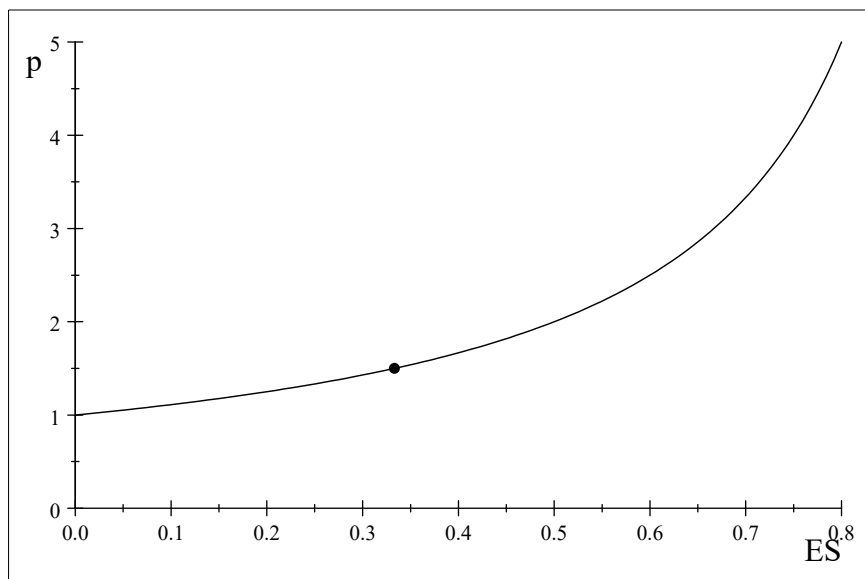
$$ES = C^S - C^d = 2 - \frac{1+p}{p};$$

$$pES = 2p - 1 - p = p - 1;$$

$$p(ES - 1) = -1;$$

$$p = \frac{1}{1 - ES}$$





Autarkic equilibrium ( $ES = 0, C^s = C^d$ )

$$p_a = 1$$

$$C_A^d = \frac{1}{3p}(1+p) = \frac{2}{3}; C_B^d = \frac{2}{3p}(1+p) = \frac{4}{3}; C^d = \left(\frac{1+p}{p}\right)\left(\frac{1}{3} + \frac{2}{3}\right) = 2$$

$$T_A^d = \frac{2}{3}(1+p) = \frac{4}{3}; T_B^d = \frac{1}{3}(1+p) = \frac{2}{3}; T^d = (1+p) = 2.$$

Foreign: Antoine and Baptiste

$$C_A^{*d} = \frac{1}{2p^*}(1+p^*); C_B^{*d} = \frac{3}{4p^*}(1+p^*); C^{*d} = \left(\frac{1+p^*}{p^*}\right)\left(\frac{1}{2} + \frac{3}{4}\right) = \frac{5}{4}\left(\frac{1+p^*}{p^*}\right)$$

$$T_A^{*d} = \frac{1}{2}(1+p^*); T_B^{*d} = \frac{1}{4}(1+p^*); T^{*d} = \frac{3}{4}(1+p^*)$$

$p^*$	$C_A^*$	$T_A^*$	$C_B^*$	$T_B^*$	$C^*$	$T^*$
$\frac{1}{2}$	$\left(\frac{3}{2}\right)$		$\frac{3}{4} \frac{2}{1} \frac{3}{2} = \frac{9}{4}$		$\frac{15}{4} = 3.75$	
1	$\frac{1}{2p^*}(1+p^*) = 1$		$\frac{3}{4} \frac{2}{1} = \frac{3}{2}$		$\frac{5}{2} = \frac{10}{4} = 2.5$	
$\frac{3}{2}$	$\frac{1}{2} \frac{2}{3} \frac{5}{2} = \frac{10}{12} = \frac{5}{6}$		$\frac{3}{4} \frac{2}{3} \frac{5}{2} = \frac{15}{12} = \frac{5}{4}$		$\frac{10}{12} + \frac{15}{12} = \frac{25}{12} = 2.0833$	
2	$\frac{1}{4} \frac{3}{1} = \frac{3}{4}$		$\frac{3}{4} \frac{1}{2} \frac{3}{1} = \frac{9}{8}$		$\frac{3}{2} = 1.5$	

$$\frac{25}{12} = 2.0833$$

$$C^{*d} = \frac{5}{4} \left( \frac{1+p^*}{p^*} \right);$$

$$ED^* = \frac{5}{4} \left( \frac{1+p^*}{p^*} \right) - \bar{C}$$

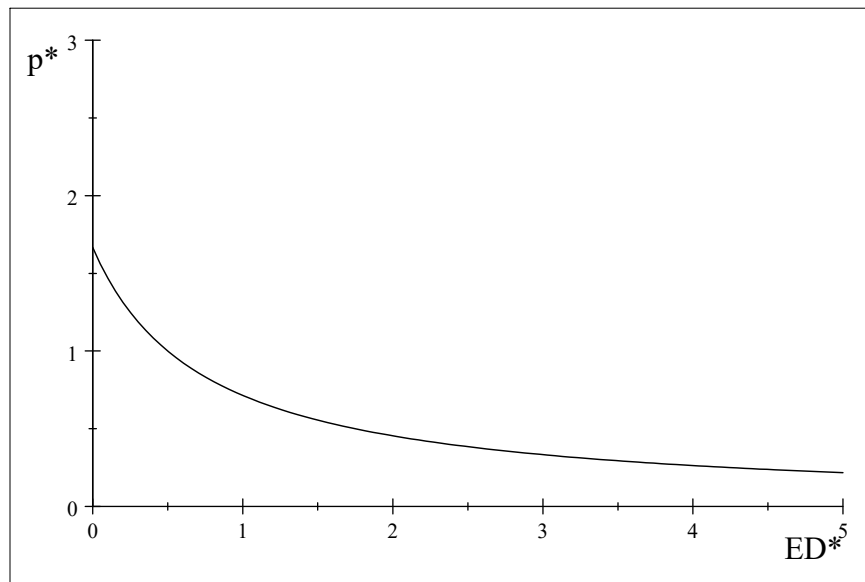
$$= \frac{5}{4} \left( \frac{1+p^*}{p^*} \right) - \frac{8}{4};$$

$$4p^*ED^* = 5 - 8p^* + 5p^*$$

$$p^*(4ED^* + 3) = 5$$

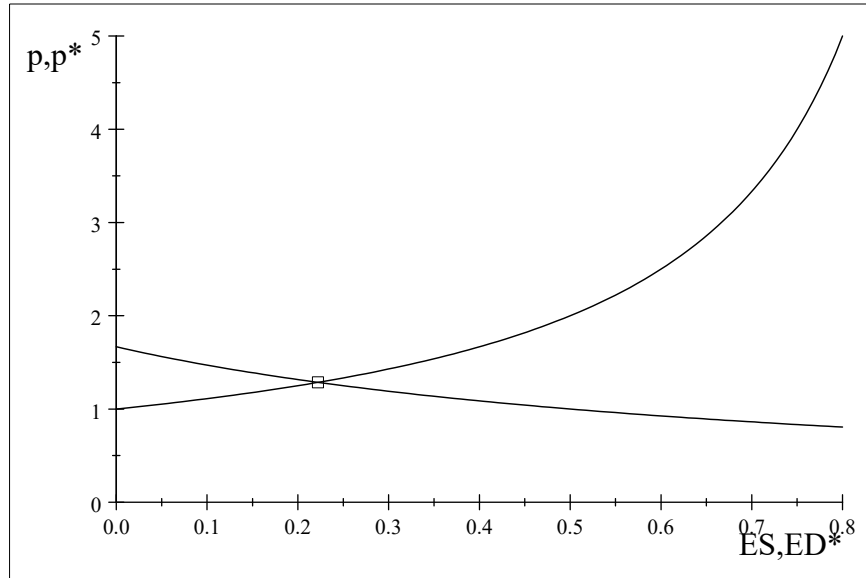
$$p^* = \frac{5}{4ED^* + 3}.$$

$$y = \frac{5}{4x+3}$$



Market equilibrium

ES=ED



## Arbitrage (zero profits)

1. What are profits: revenue minus cost

$$\Pi = \overbrace{p^*A - t^*A}^{rev} - \left( \overbrace{pA + \chi(A)}^{cost} \right)$$

2. Profit max rule:

$$\frac{d\Pi}{dA} = 0.$$

$$p^* - p = \frac{d\chi(A)}{dA} + t^*.$$

3. Implications with  $\frac{d\chi(A)}{dA} + t^* = 0$

$$\pi_A = p^*A - pA - \chi(A);$$

$$\Rightarrow p^* = p.$$

4. Implications with  $\frac{d\chi(A)}{dA} = 0$

$$p^* = p + t.$$

## Solution, depiction of equilibrium

$$\frac{5}{4ED^* + 3} = \frac{1}{1 - ES};$$

$$ES = ED^*$$

$$\frac{5}{4A + 3} = \frac{1}{1 - A};$$

$$4A + 3 = 5 - 5A;$$

$$9A = 2;$$

$$A = \frac{2}{9};$$

$$p = \frac{5}{4 \times \frac{2}{9} + 3} = \frac{5}{\frac{8+3 \times 9}{9}} = \frac{5}{\frac{35}{9}}$$

$$= \frac{45}{35} = \frac{9}{7}.$$

$$p_{FT} = \frac{9}{7};$$

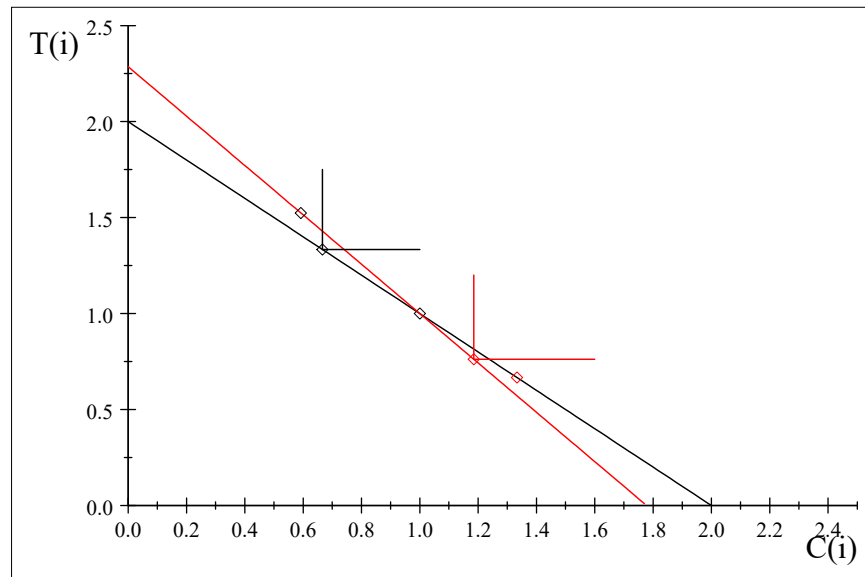
$$C_A = \frac{1}{3p}(1+p); T_A = \frac{2}{3}(1+p);$$

$$1+p = 1 + \frac{9}{7} = \frac{16}{7}, \frac{1+p}{p} = \frac{16}{7} \frac{7}{9} = \frac{16}{9};$$

$$C_A = \frac{1}{3} \frac{16}{9} = \frac{16}{27}; T_A = \frac{2}{3} \frac{16}{7} = \frac{32}{21};$$

$$C_B = \frac{2}{3} \frac{16}{9} = \frac{32}{27}; T_B = \frac{1}{3} \frac{16}{7} = \frac{16}{21}$$

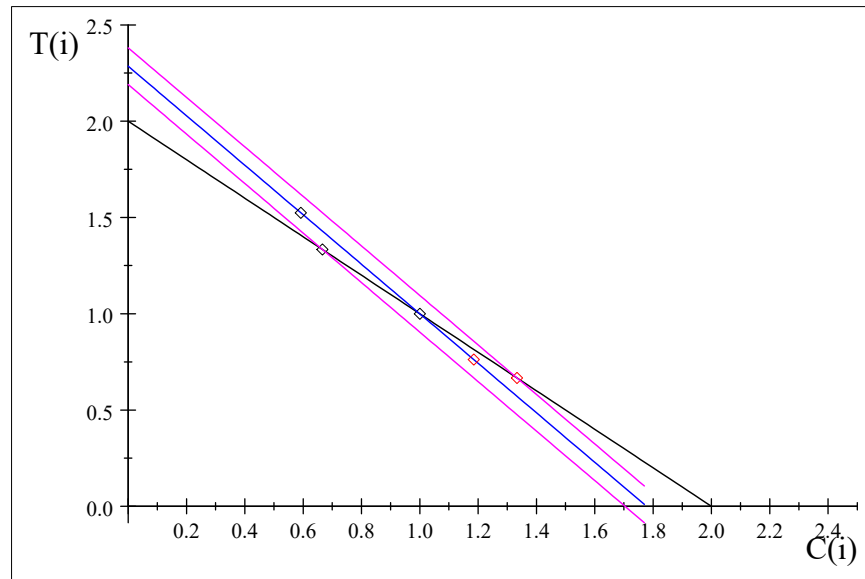
$$1 + \frac{9}{7}$$



Andy black pts, Bobby red pts

More is better: construct right-angle lines; think about what BC tells you: you **could** consume anywhere on it.

PPI (Potential Pareto Improvement); aka "satisfaction of compensation criterion."



Andy black pts, Bobby red pts

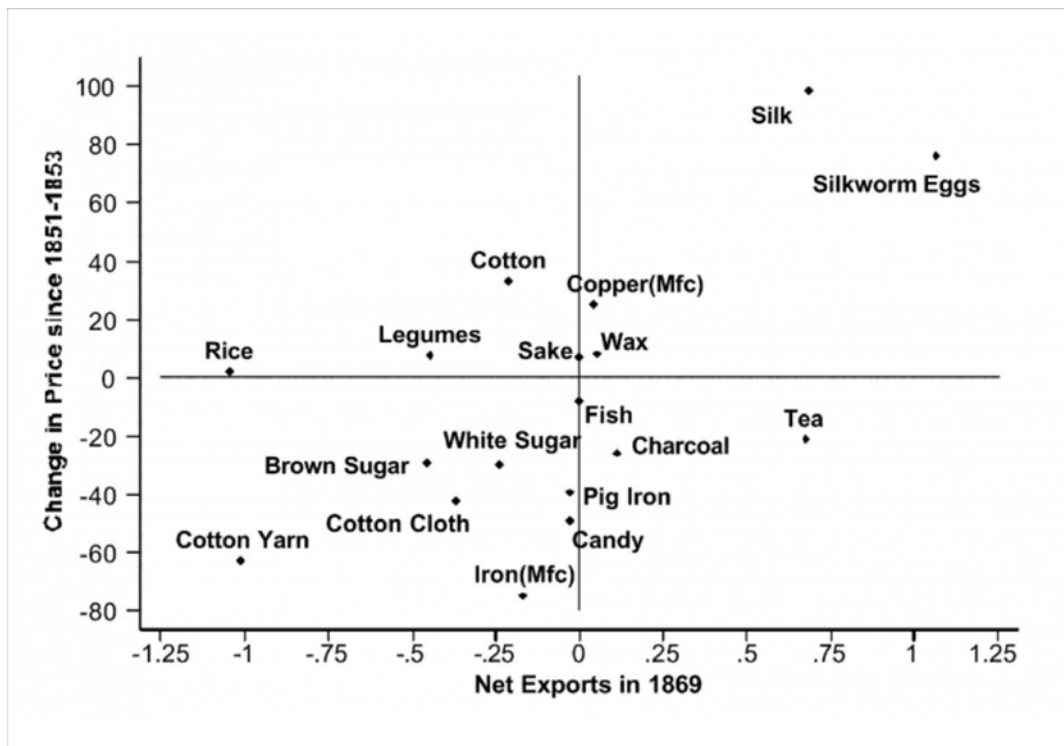
## Pareto, Potential Pareto

1. Pareto efficient means (for a particular group of people) there exists no redistribution of resources such that any person could be made better off without making someone worse off.
2. PPI's:
  - a. There exists a hypothetical redistribution of resources under free trade such that, if this redistribution took place, and it was costless, then at least someone would be better off and no one would be worse off than was the case under autarky.
  - b. It could be that everybody would be better off—but not likely in actual economies.
  - c. A thought experiment: it doesn't say that compensation takes place.
  - d. In reality, paying compensation would be problematic and would use up resources.
3. General issue in policy; we say that if we compare two situations (I and II) and if there exists a hypothetical redistribution of resources under II such that, if this redistribution took place, and it was costless, then at least someone would be better off and no one would be worse off than was the

case under I, then this change represents a PPI (or equivalently, satisfies the Kaldor-Hicks Compensation Criterion).

4. "The introduction of changed prices leading to trade cannot, of course, be expected always to better each and every individual. After trade, the prices of items chiefly consumed by a particular individual may have risen, making him worse off." (Paul Samuelson)

Note: the canonical natural experiment for which we have data is opening of Japan. What happened to prices?



Who wins, who loses?

## The defense and counter of Hicks-Kaldor

1. An "average" result (Hicks)
2. A policy chosen from behind a veil of ignorance
3. Fairness

## Conclusions

- Scratching the surface
- What about jobs?
- Importance of substitutability