Lecture: International Trade and the Principle of Comparative Advantage

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1 International Trade and the Principle of Comparative Advantage

Given the General Equilibrium production model we sketched earlier, it is a simple matter to add free trade to this picture.

In this exercise, we want to answer the following questions:

1. Are the 'gains from trade' necessarily positive in aggregate? Or does the answer depend upon which country we are trading with?

2. What are the underlying economic factors that give rise to gains from trade (e.g., tastes, technologies, factors, wealth/poverty)?

3. Why is it only differences in the **price ratio** across countries that matter for trade, rather than differences in the absolute level of prices?

4. If the gains from trade are positive for all parties, why is trade so often violently opposed?

1.1 Trade in the General Equilibrium Diagram

- As noted previously, we can think of the General Equilibrium problem as a utility maximization subject to three constraints:

1. No actor is worse off in the market equilibrium than in the initial allocation. How do we know this is satisfied? A person could always refuse to trade and consume her original endowment instead.

2. In equilibrium, no party can be made better off without making another party worse off (otherwise there are unexhausted gains from trade).

3. No more goods can be demanded/consumed than the economy is endowed with. That is, sum of the consumption of both parties cannot exceed the total endowment.

3a [No goods are left unconsumed – that is, there is no excess supply. This is not truly a constraint – it's simply a property of any equilibrium, which follows from non-satiation.]

- Now, we want to analyze how opening to international trade affects utility in the previously closed economy.
- A critical thing to notice here is that opening to International trade relaxes the 3^{rd} constraint. Countries that are trading can potentially swap part (or all) of their endowments with their trading partners. In equilibrium, a country may consume a different bundle from what it is originally endowed with (e.g., it could trade some coffee for sushi and hence consume more sushi than it could possibly produce).
- Moreover, if the country opening to trade is *small* relative to the rest of the world, it effectively faces no upper limit on the supply of goods it wants to buy at world prices. That doesn't mean it can buy anything it wants – it has to be able to afford the goods it desires by trading other goods. It has to consume within its budget set. But its budget set is now not constrained by its own physical endowments.
- Let's formalize this insight. See Figure 1.
- The initial situation of the country Home under *autarky* (no trade) is depicted by the Production Possibility Frontier (PPF) for Food and Shelter (F and S) and the community indifference curve u_A.
- Assume for simplicity that $\left(\frac{P_S}{P_F}\right)_A = 1$. Hence, the slope of the PPF at the point of tangency with u_A is equal to 1.
- Production/consumption of F and S are given by F_A and S_A.
- Now imagine this country 'Home' opens to world trade.
- For simplicity, take the case where Home is small relative to the rest of the world. In particular, Home's consumption has no effect on World prices – it is a price taker.
- This means that the World price ratio $\left(\frac{P_S}{P_F}\right)_W$ is linear from Home's perspective. No matter how much F, S it buys/sells on world markets, the world price is fixed.
- How will Home's production, consumption, and utility be affected?
- Provided that $\left(\frac{P_S}{P_F}\right)_A \neq \left(\frac{P_S}{P_F}\right)_W$, the movement from autarky to free trade effectively expands the domain of Home's budget set. Aggregate utility must rise.

- Draw a ray with slope $\left(\frac{P_S}{P_F}\right)_W$ tangent to the PPF. Denote the points S_P, F_P as the quantities of S, F that correspond to this tangency point. The subscript P refers to Production. These points are the quantities of F, S produced.

- This ray is the new budget set for Home, I_H. Why? Because the world value of S_P, F_P is:

$$I_H = S_P P_S^W + F_P P_F^W,$$

  All other combinations of P, S that lie on this set are now feasible.

- Except for the single point of tangency, the new budget set lies everywhere above the original PPF. Home will necessarily be at a higher level of aggregate utility, represented in the figure by u_T.

- This higher utility is achieved through trade because Home can produce one bundle, represented by S_P, F_P and consume any other bundle on the new budget set. In this case, this new bundle is given by S_C, F_C where the subscript C denotes consumption.

- Notice that for each good, the quantity produced differs from the quantity consumed. Hence, there will be imports and exports. In particular

$$\begin{aligned} \text{Exports} &= S_P - S_C, \\ \text{Imports} &= F_C - F_P. \end{aligned}$$

- Will there be a trade imbalance? Both points (S_C, F_C) and (S_P, F_P) lie on the same budget line, so they must cost the same:

$$\begin{aligned} S_P P_S^W + F_P P_F^W &= S_C P_S^W + F_C P_F^W, \\ P_S^W (S_C - S_P) + P_F^W (F_C - F_P) &= 0. \end{aligned}$$

  There is no trade imbalance.

- This is an important observation because most policy discussions confuse the question of trade balance with trade itself. Trade itself is beneficial in aggregate. A trade imbalance may be harmful or beneficial, but this is an entirely separate question.

- So to summarize:

  - Home still produces on the original PPF.
  - But Home consumes above its original PPF.
  - The disparity between production and consumption reflects the gains from trade.

- Note also that it is not an accident which good Home is importing and which good it is exporting. Because

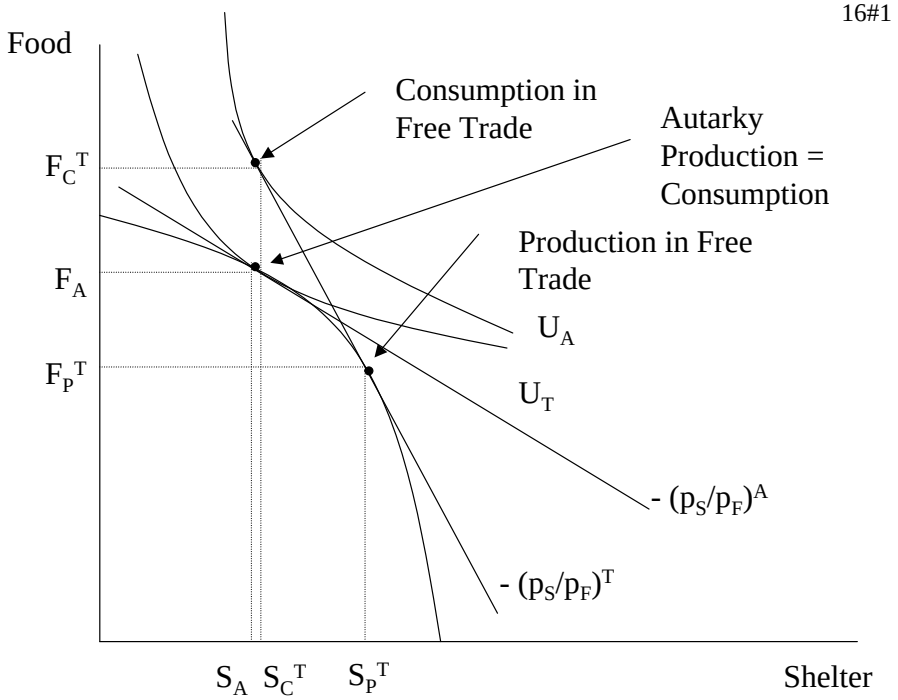
$$\left(\frac{P_S}{PF}\right)_W > \left(\frac{P_S}{PF}\right)_A,$$

Home holds a *comparative advantage* in producing shelter. It can produce S relative to F at comparatively low cost relative to the rest of the world.

- Accordingly, as Home opens to trade, it increases its production of S and decreases its production of F.

- Notably, after trade opening, Home's total consumption of S declines and its total consumption of F increases. Why? Because, when choosing consumption, Home faces the world price of these goods. Why not its original autarky price $\left(\frac{P_S}{PF}\right)_A$? Because it can now sell S, F at the world prices, and so the opportunity cost of consuming them at Home is the price they could have fetched on the world market.

- This last observation explains why, for example, Colombians usually drink poor quality coffee even though Columbia grows world-class coffee. Consuming this coffee is expensive, even in Columbia. Because the rest of the world is willing to pay a high price for it, it's opportunity cost of consumption is high in terms of foregone earnings. Comparatively poor Colombians would rather sell high quality coffee than drink it.



1.2 Where do 'gains from trade' come from?

- The first thing to notice is that if $\left(\frac{P_F}{P_S}\right)_A = \left(\frac{P_F}{P_S}\right)_W$, there will be no gains from trade whatsoever.

- This is a crucial observation: *Gains from trade come entirely from differences between countries.* If there were truly 'a level playing field' among trading partners–as many politicians demand as a condition for trade–then there would be no point in trading. The gains from trade come precisely from the fact that *relative* prices differ between Home and World. Hence, both countries will want to (and be able to) consume bundles that would not be feasible under their initial endowments (e.g., consuming more coffee than they are endowed with, and giving up some sushi).

- This observation immediately raises two further questions:

  1. Why would relative prices differ?
  2. Why is it *relative not absolute* prices that matter?

- Let's take these in turn.

1.3 Why do relative prices differ among countries?

- Based on our analysis of General Equilibrium price setting, there are three underlying factors that affect prices: tastes, technologies, and endowments:

  1. Tastes: Two otherwise identical countries might have different prices for the same goods if for example (facing the same prices) consumer's in Country A preferred sushi to coffee and consumer's in Country B preferred coffee to sushi. There would be gains from trade because A would export coffee and import sushi and vice versa for the B.
  2. Technology: If countries A, B have different technologies but are otherwise identical, they will have different relative prices. So, if country A has better sushi chefs and country B has better barristas, then A will export sushi and B will export coffee, even if tastes are identical. (They could instead export their technologies.)
  3. Endowments: If countries A, B have different endowments but are otherwise identical, there will also be gains from trade. If consumers in A, B both have the same taste for coffee and sushi but A has a hot climate suitable for coffee growing and B has abundant coastal waters for fishing, then A will be an exporter of coffee and B an exporter of sushi.

- As these examples show, any or all of these factors–tastes, technology,endowments–may give one country a comparative advantage in selling sushi relative to coffee (or vice versa). And as above,

it is precisely these differences that make trade beneficial. In general, the larger the differences, the greater the gains. That's because, the larger the differences, the more trade will allow countries to consume bundles that are desirable but infeasible under their initial endowments.

1.4 Why only relative prices matter for trade: Comparative versus absolute advantage.

- We've noted that it's only the *relative* price of F versus S in Home versus World that determines what the gains are from trade. But doesn't the *absolute* level of prices matter? Put more concretely, it's easy to see that the U.S. would benefit from trade with China since China makes just about everything cheaper than the U.S. does. [It has an 'absolute advantage' in that all goods are cheaper to produce in China.]

- But doesn't that mean that China will *not* benefit from trade with the U.S. since everything we make is too expensive for them? (i.e., the U.S. has an absolute disadvantage in all goods production.) In other words, isn't free trade with China good for the U.S. and exploitation for the Chinese.

- This is a profoundly important question to which the answer is **no**. As long as relative prices differ between China and the U.S., both countries experience gains from trade.

- The explanation is the principle of Comparative Advantage, one of the most fundamental and least well understood ideas in Economics.

- The principle of comparative advantage follows directly from the notion of opportunity costs.

  - In Home under Autarky, the opportunity cost of making one more unit of shelter at the margin is simply $\left(\frac{P_S}{P_F}\right)_A$, that is the amount of food the economy is foregoing at the margin to produce shelter instead. Notice that we can use the price ratio to express this value because the price ratio is equal to the slope of the PPF at the equilibrium production mix.
  - Similarly, in World (excluding Home), the opportunity cost of making one more unit of shelter at the margin is simply $\left(\frac{P_S}{P_F}\right)_W$, the amount of food one must forego to obtain shelter instead.
  - So, if it is the case that
    $$\left(\frac{P_S}{P_F}\right)_W > \left(\frac{P_S}{P_F}\right)_A,$$
    this means that the opportunity of shelter relative to food is relatively higher in the rest of the World relative to home.

- If so, Home should specialize further in shelter and buy more of its food from World, which is exactly what is shown in Figure 1. In fact, Home reallocates K, L from F to S until its opportunity cost of F relative to S is identical to the rest of the World.
- This is in fact a simple extension of the equilibrium concept in the Edgeworth box. We said that for an equilibrium to be Pareto efficient, the Marginal Rate of Substitution among goods for all consumers must be equated (how? by the price ratio). Otherwise, there are gains from trade. This same idea extends naturally to trade among countries. If two countries in autarky (no trade) have different marginal rates of substitutions among goods (due to tastes, technologies, or endowments), then trade between these countries will potentially make both better off.

- Notice that this conclusion in no ways depends on whether both F and S prices are in *absolute* terms higher or lower in the World than they are at Home. All that matters Home's cost of producing shelter relative to its cost of producing food is less than World's cost of producing shelter relative to World's cost of producing food. An example may make this point clearer.

1.5 A Concrete Example

- When I was a graduate student, I coauthored a research paper with my thesis advisor, Larry Katz. The paper involved both theory and empirical work. I did most of the empirical work and my thesis advisor did most of the theoretical work. Originally, I thought that this was because my advisor thought I (a 2^{nd} year graduate student) was a world-class empirical researcher. But I eventually realized that this was not quite what Katz thought. I eventually noticed that Katz was about 10 times as fast at empirical work – and far better at theoretical work. He had an *absolute advantage* in both activities.

- So the question: Why did he bother to coauthor with me if he could do the entire paper faster/better by himself? The answer is comparative advantage. Katz, as it turned out, was 10 times better at empirical work but 100 times better at theoretical work. By allowing me to do the empirical work, he freed his time to do the theoretical work, where his comparative advantage lay.

- Let's make this example explicit. Say writing has a research paper has two components E and T (Empirical and Theoretical) the only input into both activities is labor.

- The value of a completed paper is \$600 for a solo authored paper. If we coauthor the paper, it's worth \$300 to each of us.

- My advisor, Katz, can do E in 100 hours and T in 50 hours. Were he writing the paper himself, it would take him 150 hours.

- His internal rate of conversion of time into output is the following:

$$\left(\frac{P_E}{P_T}\right)_K = \frac{100}{50} = 2.$$

  One way to look at this 'price ratio' is that the opportunity cost of one hour is $1/100^{th}$ of the empirical part of a paper or $1/50^{th}$ of the theory part of the paper.

- Let's say that I (as a graduate student) could do E in $1,000$ hours and T in $5,000$ hours. So, it would take me $6,000$ hours to write the paper.

$$\left(\frac{P_E}{P_T}\right)_A = \frac{1,000}{5,000} = 0.2$$

- These price ratios, expressed as opportunity costs of each of our time, indicate that our internal trade-offs differ, In particular

$$\left(\frac{P_E}{P_T}\right)_K > \left(\frac{P_E}{P_T}\right)_A,$$

  Katz's opportunity cost of doing Empirical work is implicitly higher than Autor's opportunity cost of doing empirical work. So, there *should be* gains from trade.

- Consider the following production possibilities

	Time E	Time T	Time Katz	Time Autor	\$ Katz	\$ Autor
Katz	100	50	150		\$4.00	
Autor	1,000	5,000	0			\$0.10
Katz: E Autor: T	100	5,100	100	5000	\$3.00	\$0.06
Katz: T Autor: E	1,000	50	50	1,000	\$6.00	\$0.30

- Consider Katz's choices:

  1. If Katz does the paper himself, he spends 150 hours. Hence, he effective wage is \$4 per hour for the solo-authored paper.
  2. If Katz does E and Autor does T, Katz spends 100 hours. Katz earns \$3 per hour for the joint-authored paper. He is better off to solo-author the paper.
  3. If Katz does T and Autor does E, Katz spends 50 hours. His effective wage is \$6 per hour for the joint paper.

- Consider Autor's choice:

  1. If he does the paper solo, he spends $6,000$ hours, for an effective wage of \$0.10 per hour (good for a graduate student).
  2. If Autor does T and Katz does E, Autor spends $5,000$ hours, and his effective wage is \$0.06 per hour for the joint-authored paper. Notice that even though Katz is absolutely better off at both activities, Autor is still worse off than if he wrote the paper solo. [Intuition would suggest (to most non-economists) that Autor would be better off to coauthor with Katz regardless of the allocation of tasks, simply because Katz's has an absolute advantage in writing papers. But this is not true. Autor would be specializing in the activity he's bad at (theory) in exchange for someone else doing the activity Autor is good at (data crunching).]
  3. If Autor does E and Katz does T, Autor spends $1,000$ hours, and his effective wage is \$0.30 per hour for the joint-authored paper.

- So, although Katz has an absolute advantage in both activities, both Katz and Autor gain from joining forces to have Autor do E and Katz do T. This is because Katz's comparative advantage is in T and Autor's comparative advantage is in E.

- If each does the task in which they *comparative disadvantage* (Katz does E, Autor does T), they are *both* worse off than not collaborating. This is true despite the fact that Katz has an absolute advantage at both activities.

2 Measuring the Gains from Trade: Frankel and Romer 1999

- Theory clearly predicts that trade increases economic well-being. But this is a difficult hypothesis to test in practice.

- Why? Because it's hard to conduct an experiment.

- Thinking back to our causal framework, we'd like to measure the causal effect of trade as follows:

$$\gamma_j = Y_j^T - Y_j^A,$$

  Y is some measure of well-being (let's say income per capita), γ_j is the causal effect of trade on Y in country j (where γ stands for Gain from trade), and the superscripts A and T signify Autarky and Trade.

- As always, the Fundamental Problem of Causal Inference says that we can never directly observe γ_j: that is, we cannot observe income per capita for country j both under both Autarky and free trade simultaneously.
- One standard solution would be to contrast incomes of trading and non-trading countries. We could form

$$\hat{\gamma} = E\left[Y^T | T = 1\right] - E\left[Y^A | T = 0\right],$$

where $T \in \{0, 1\}$ denotes whether or not a country is open to free trade.

- But for $\hat{\gamma}$ to be an unbiased estimate of γ, the following must be true:

$$\begin{aligned} E\left[Y^T | T = 1\right] &= E\left[Y^A | T = 1\right], \\ E\left[Y^T | T = 0\right] &= E\left[Y^A | T = 0\right]. \end{aligned}$$

That is, the Autarkic economies would have the same income per capita as the trading countries if they opened to trade, and vice-versa for the trading countries if they became Autarkic.

- Are these assumptions plausible? Probably not. The extent to which a country trades is an endogenous outcome that is very likely to be correlated with other factors that directly affect income for capita.
  - Countries that are rich for other reasons might trade more because they can afford to import more goods from overseas.
  - Countries that sound pursue economic policies that raise income may also choose to pursue trade (another sound economic policy).
  - Countries that are rich in natural resources may trade because there is high world demand for their goods. But it may be their rich endowments that account for their wealth, not trade *per se*.
- One should therefore be very skeptical of any 'causal inference' that stems from a naive comparison of the incomes of trading and non-trading countries. (By the way, this comparison is positive; countries that trade more are on average wealthier.)

2.1 Using the method of Instrumental Variables (IV) to measure causal effects

- What is needed is an experiment that exogenously raises or lowers trade in some group of countries. In past class examples, we've used as experiments policy changes such as the minimum wage and NH school finance laws to isolate exogenous variation in our treatment variable. We've also used economic shocks, such as price changes for rice and noodles in different regions of China. Finally, we've used actual experiments, such as the Food Stamps cash-out studied by Whitmore.

- In the case of free trade, such experiments are difficult to find. Even policy changes that open or close a country to trade (of which there are very few) are potentially suspect; they are likely to be correlated with *other* economic policy decisions that may also directly raise or lower real income.

- This dilemma motivates an alternative approach. We are interested in the effect of trade on income. Since trade is endogenous, we are reluctant to make any causal inferences from the observed correlation between trade and income. Assume now that there is some third, exogenously assigned variable, $N \in \{0, 1\}$ that affects the extent to which countries trade. Assume further that we have reason to believe that N has no effect on growth/income *except*, potentially, through its effect on trade. Under these assumptions, N may serve as an "instrument" that exogenously manipulates trade, allowing us to study trade's effect on income. Economists would say that N is a valid "instrumental variable" (IV) for analyzing the causal effect of trade on income.

- Jeff Frankel and David Romer, in their 1999 *American Economic Review* paper, propose a creative instrumental variable (IV) for trade flows: distance from other countries (alternatively, geographic isolation). They hypothesize that countries that are relatively geographically remote will, all else equal, be less likely to engage in international trade, simply because transportation is difficult or expensive and/or they may not historically have had the opportunity to communicate and coordinate trading opportunities. They give the examples of New Zealand and Belgium, which have unusually low and high volumes of trade, respectively, perhaps due to the fact that New Zealand is an island nation with no nearby neighbors, whereas tiny Belgium is surrounded by four other countries (and is nearby to numerous others).

- You object: Geography is not the *only* determinant of trade. Japan and China trade heavily with North America; Cuba hardly trades with the U.S. But that's not a problem for the IV approach; geography need not be the *only* determinant of trade. All we need is that: a) geography has a direct causal effect on trade; b) geography does not plausibly affect national income through any other channel but trade.

- Table 1 and Figure 1 of Frankel and Romer indicate that proximity appears an important determinant of trade among nations.

- How can we use this information on geography to find the causal affect of trade on income?

- Imagine that we have a set of potentially comparable countries that differ according to whether they are Nearby ($N = 1$) or Distant ($N = 0$) to their neighbors.

1. [First stage relationship.] We must be willing to assume that distance has a direct causal effect on the likelihood that countries trade. Write T_j^0, T_j^1 as the trade status of country j if it is Nearby or Distant. That is, we are imagining two counterfactual states for each country j, one if it is geographically isolated and the other if it is nearby to other countries. We require the following :

$$E\left[T_j^1 - T_j^0\right] > 0.$$

This inequality does not have to be satisfied for all countries j; it must simply be true on average. Due to the Fundamental Problem of Causal Inference, this assumption is not directly testable; we only see countries in one state, either Nearby or Distant.

2. [Exclusion restriction.] A second requirement for a valid IV is that it satisfy an "Exclusion Restriction." In this case, this restriction says that distance *only* affects national income through its impact on trade. Otherwise, we cannot interpret any measured relationship between distance and income as the causal effect of trade on income. The exclusion restriction can be expressed formally as:

$$\begin{aligned} E\left[Y^T|N=1\right] &= E\left[Y^T|N=0\right], \\ E\left[Y^A|N=1\right] &= E\left[Y^A|N=0\right]. \end{aligned}$$

These equations say that conditional on trading status, distance has no direct effect on national income. If trading economies were either nearby or distant, their incomes would be the same in expectation (again, provided that are trading). Similarly, if autarkic countries (those that don't trade) were either nearby or distant, their incomes would be the same in expectation provided that were *not* trading. If these exclusion restrictions are satisfied, distance is uncorrelated with countries' counterfactual *potential* incomes; only with the probability that they engage in trade. As with the assumption above, the exclusion restriction is not directly testable – it's a postulate.

Implementation

- If we accept the two conditions above, the empirical analysis is straightforward.

1. First check that trade is higher in Nearby versus Distant countries:

$$\Pr\left[T=1|N=1\right] > \Pr\left[T=1|N=0\right] \Leftrightarrow E\left[T|N=1\right] > E\left[T|N=0\right].$$

This condition is necessary but not sufficient for number (**1**) above. If this inequality is satisfied *and* we believe that $E\left[T_j^1 - T_j^0\right] > 0$, then N is a candidate instrument for T. If this inequality is not satisfied, then (**1**) is certainly false (at least in our sample of j countries).

2. If we pass the first test, we can now test whether income is higher (or lower) in Nearby versus Distant countries. The hypothesis that trade raises income implies that

$$E[Y|N=1] > E[Y|N=0].$$

Note that $E[T|N=1] - E[T|N=0] \leq 1$.When we compare countries that are nearby and distant, we are not generally not comparing exclusively trading versus exclusively non-trading economies. Hence, $E[Y|N=1] - E[Y|N=0]$ is not causal effect of trade on income (though it's closely related to it). We'll come back to this below.

- Assume both empirical relationships are verified by the data. We may want to conclude that trade has a positive causal effect on national income. We need to take one more step.
- We want the following causal effect:

$$\gamma = E\left[Y_j^T - Y_j^A\right]$$

- We found that Distance is correlated with the probability that a country trades, and given our assumptions above, we view this correlation as causal:

$$\beta = E[T|N=1] - E[T|N=0] > 0$$

- We compare the incomes of Distant and Nearby Countries.

$$\pi = E(Y|N=1) - E(Y|N=0). \tag{1}$$

Here, π is the causal effect of *Distance* (not trade) on income. That's a start, but we have not yet estimated γ, *the causal effect of trade on income.*

- Consider the following equations:

1. Causal effect of distance on Trade

$$\begin{aligned} E(T|N) &= \alpha + \beta N \\ \beta &= E(T|N=1) - E(T|N=0). \end{aligned} \tag{2}$$

2. Casual effect of Trade on Income.

$$\begin{aligned} E(Y|T) &= \eta + \gamma T \\ \gamma &= E(Y|T=1) - E(Y|T=0). \end{aligned} \tag{3}$$

3. Substituting:

$$\begin{aligned} E(Y|N=1) &= \eta + \gamma E(T|N=1) = \eta + \gamma(\alpha+\beta) \\ E(Y|N=0) &= \eta + \gamma E(T|N=1) = \eta + \gamma\alpha \\ \gamma\beta &= E(Y|N=1) - E(Y|N=0). \end{aligned}$$

[Note that $\gamma\beta$ is equal to π in equation (1) .]

4. Combining (2) and (3), we can obtain an estimate of the causal effect of trade on income:

$$\hat{\gamma} = \frac{E(Y|N=1) - E(Y|N=0)}{E(T|N=1) - E(T|N=0)} = \frac{\gamma\beta}{\beta}.$$

We estimate the causal effect of trade on income by taking the ratio of the two causal effects: 1) the causal effect of distance on income; and 2) the causal effect of distance on trade. This ratio gives us $\hat{\gamma}$, our Instrumental Variables estimate of the causal effect of trade on income.

- Intuitively, we are comparing incomes among potentially similar countries that have different degrees of distance/isolation. This comparison gives us the causal effect of isolation on income ($\gamma\beta$). We convert this number into an estimate of the causal effect of trade on income by re-scale the income difference between isolated and non-isolated countries by the causal effect of isolation on trade, β.

- Instrumental Variables is a subtle technique that has become central to causal empirical analysis in economics. The IV method was developed in 1928 by the economist, P.G. Wright, who wanted to measure the causal effect of supply changes on the price of flaxseed. He used weather shocks as an exogenous source of variation in supply of flaxseed. (I'll give some further examples in class.)

2.2 Frankel and Romer results

- Table 1 shows that a 10 percent increase in distance between countries appears to cause about a 8.5 percent decline in trade as a share of GDP. So, in our notation $\beta \approx -0.8$.

- Figure 1 shows this graphically. There is a strong relationship between actual trade and the trade that would be predicted solely due to isolation (and also population).

- Table 3 shows the main IV estimates (and also the Ordinary Least Squares (OLS) estimates, which do not have a causal interpretation). These estimates suggest that a 1 percent increase in trade per GDP raises national Income per Capita by 2 to 3 percent! That's a very large effect. Hence $\gamma \approx 2$.

- Frankel and Romer (unfortunately) do not show a regression of Income per Capita on distance/isolation. But if they did, it would show that: $\gamma\beta = E(Y|N=1) - E(Y|N=0) \approx -1.6$. Hence, $\gamma\beta/\beta \approx 2$.

3 Why is Free Trade so Controversial?

- The analysis above suggests that if countries trade, the gains from trade are positive–otherwise, countries will not trade.

- Moreover, in contrast to popular perceptions, trade is not a Robin Hood operation – taking from the rich countries to give to the poor countries, or the opposite. See for example the *NY Times* editorial by Nicholas Kristoff on the class web site ("Let Them Sweat").

- This raises a puzzle: If trade is so terrific, why isn't everyone in favor of it? There are two possible explanations:

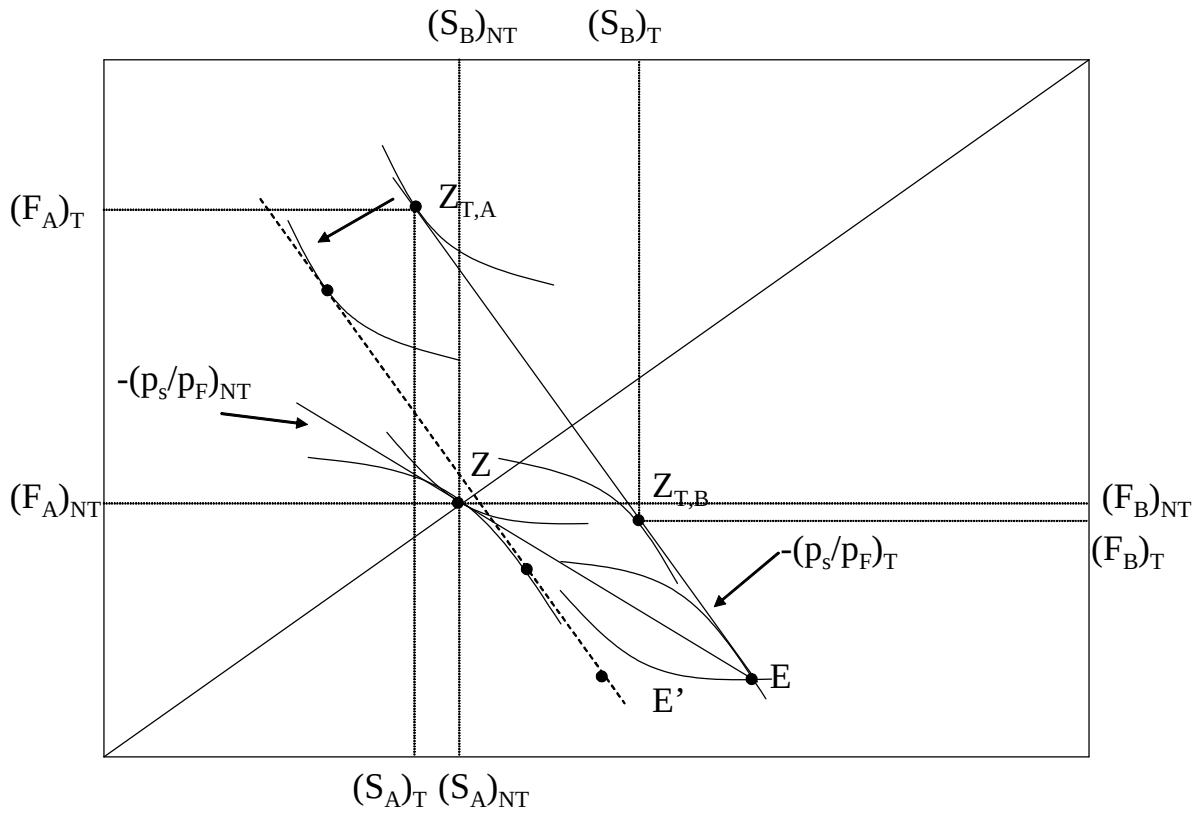
  1. Politicians and lay people just don't get it. Like much of economics, the principle of Comparative Advantage is pretty simple and yet non-intuitive. Once you understand Comparative Advantage, you start to ask, how could anyone else think differently?

     But in fact there is a long tradition of thinking differently. An influential school of thought called Mercantilism believes that trade is a zero-sum game: if a foreign country buys my goods, I win and it loses. And vice versa if I buy its goods.

     It's clear from current trade negotiations that countries continue to strongly believe in Mercantilism. They act as if the objective of trade is to maximize exports and minimize imports. Which suggests that many people really still "just don't get it." This view is spelled out in Krugman's paper on your syllabus called "Ricardo's Difficult Idea." (Ricardo was the economist who first formally articulated the principle of Comparative Advantage.)
  2. But it's also possible that there is something unpleasant that people *do* recognize. This thing, also implied by the model, is that although trade improves aggregate efficiency, it *necessarily* creates winners and losers. This because it maximizes the pie and *changes* the sizes of the slices simultaneously. In fact, it is quite possible for trade to improve aggregate efficiency while leaving certain groups distinctly worse off. Here is why...

Refer to the following figure:

- In this economy:


$(S_B)_{NT}$
$(S_B)_T$
$(F_A)_T$
$Z_{T,A}$
$-(p_s/p_F)_{NT}$
Z
$(F_A)_{NT}$
$Z_{T,B}$
$(F_B)_{NT}$
$(F_B)_T$
$-(p_s/p_F)_T$
E
E'
$(S_A)_T$ $(S_A)_{NT}$

- E is the initial endowment.
- The two goods are F and S (food and shelter) on the X and Y axes respectively.
- $A's$ consumption is increasing as we move from the lower-left corner to the upper-right corner, and vice versa for consumer B.
- The subscripts NT and T refer to "No International Trade" and "International Trade." (We assume that trade among consumers within the Home economy always occurs.)

- First, consider the equilibrium under no trade (NT).
  - The equilibrium price ratio that clears the market is $-(p_s/p_f)_{NT}$ and consumption is at point Z on the Contract Curve (CC).
  - The markets for Food and Shelter both clear.
  - Consumers A and B are both better off relative to their initial indifference curves that (intersecting point E). Point Z is a Pareto improvement relative to point E.

- Now consider what would occured had Home opened itself to international trade starting from the initial endowment, E.

- Assume that the world price ratio is given by $(p_s/p_f)_T$ and this ratio places a higher relative value on shelter than the home price ratio: $(p_s/p_f)_T > (p_s/p_f)_{NT}$.

- Now, the equilibrium looks quite different:
  - The price ratio now rotates clockwise to $-(p_s/p_f)_T$.
  - Although both A and $B's$ chosen bundles are tangent to the world price ratio, they are not tangent to one another. That is $Z_{T,A}$ and $Z_{T,B}$ both lie along the budget set $-(p_s/p_f)_T$, but they are not the same point.
  - Consumer A is now consuming much more food than under the NT equilibrium and also slightly more shelter.
  - Consumer B is now consuming more food than under the NT equilibrium and much *less* shelter.
  - Home is now a net exporter of shelter and a net importer of food. Home's chosen consumption bundle would not have been feasible without trade.

3.1 Now, let's do a welfare analysis in three parts.

3.1.1 Is the equilibrium under free trade Pareto superior to the initial allocation, E?

Yes. It's clear that both A and B prefer $Z_{T,A}$ and $Z_{T,B}$ to E.

Moreover, there is no way that trade could make them worse off than they were at E since either party could always choose to consume their initial endowment rather than trade.

Free trade is a Pareto improvement relative to the initial allocation.

3.1.2 Is the equilibrium under free trade Pareto superior to the equilibrium Autarky (*only* within-country trade)?

Interestingly, the answer is **no**.

It's clear that party A is much better off at $Z_{T,A}$ than Z and party B is considerably worse off at $Z_{T,B}$ than Z.

Why did this happen? Because trade raised the relative price of shelter and lowered the relative price of food. A was relatively rich in shelter and B was relatively rich in food. So, trade increased the value of $A's$ bundle and decreased the value of $B's$ bundle.

Moreover, you can see that no matter which way trade rotates the price ratio, either A or B will be worse off than the at point Z. (If the price ratio rotates clockwise, A ends up further from his origin and B ends up closer to his origin. If the budget set rotates counter-clockwise, the opposite occurs.)

Hence, international trade does not generate a Pareto improvement relative to the Autarkic setting. One party wins, the other loses.

3.2 Is there a *potential* Pareto improvement from opening to international trade?

The Second Welfare Theorem says that there is no trade-off between equity and efficiency. But we seem to have found one here. We showed previously that trade raises 'national welfare,' yet this seemingly comes at the expense of harming at least one consumer.

Now ask: are the gains from trade *large enough* that we could make consumer A at least somewhat better off without making B worse off. If yes, there is a *potential* Pareto improvement here.

Keeping B as well off as he was at point Z requires that he consume on the same indifference curve on which point Z lies.

Consider moving the endowment from point E to point E'. That is, we redistribute some shelter from A to B (a lump-sum transfer).

Now, starting from point E', the same world price ratio prevails: $(p_s/p_f)_T$. (Remember that Home is a price-taker on world markets.)

If we draw the ray with slope $-(p_s/p_f)_T$ extending from point E', this ray is tangent to $B's$ indifference curve intersecting Z. Therefore, B is indifferent between trade under autarky and world trade with redistribution from E to E'.

Crucially, A A is unambiguously better off. He can still consume on a higher indifference curve.

This answers our question above. There is no trade-off between the 1st and 2nd welfare theorems.

The aggregate gains from trade do not *necessarily* come at the expense of equity – a *potential Pareto improvement* (sometimes called a Kaldor improvement) is always feasible.

However, the 1st welfare theorem come automatically: international trade improves aggregate efficiency, generating a Pareto improvement over the autarkic equilibrium.

By contrast, the application of the 2nd welfare theorem requires government intervention. Equity *does not have to* suffer due to trade, but it *will* unless governments implement policies to prevent it.

3.3 Conclusion

- The principle of comparative advantage is a fundamental economic insight, both powerful and general. This insight explains why, almost to a person, economists support free trade everywhere and always.

- The argument is as fundamental as the general welfare theorems, and closely analogous. The welfare theorems (as seen in the Edgeworth box) demonstrate that allowing individuals to trade freely with one another until all gains from trade are exhausted necessarily benefits all parties.

- The principle of comparative advantage says that allowing countries to trade always raises welfare in both countries.

- But there is one key difference between these two conclusions. Trade does *not necessarily* benefit every individual. It's almost certain to create winners and losers. By contrast, free trade among individuals always generates Pareto improvements.

- The principle of comparative advantage combined with the 1st and 2nd welfare theorems proves that it is possible to make every single individual better off through trade when combined with lump-sum transfers.

- Whether this will occur depends on the politically feasibility of implementing redistributive policies to counteract the redistribution accompanying trade liberalization. Little in recent political history suggests that the gains from trade are typically redistributed so that the winners compensate the losers.

3.4 Relevance

- This insight is relevant to the political economy of trade in developed countries such as the U.S., Japan, the OECD, the U.K., etc.
- As Frankel and Romer show, trade appears to increase GDP across the board in developing and developed economies.
- But, trade between the U.S. and less-developed countries (LDCs) will generally tend to lower the wages of less-educated U.S. workers. This is because the U.S. has a comparative advantage (relative to most other countries) in technology- and skill-intensive products and services.
- By the same token, trade raises the earnings of less-educated workers in LDCs because LDCs hold a comparative advantage in low-skill, labor-intensive production such as agriculture and mass production.
- The 2^{nd} welfare theorem says that we could compensate less-educated workers in Developed countries for their losses and still make everyone else better off.
- But the political reality is that this is quite unlikely to happen.
- Trade unions and less educated workers are generally strongly opposed to international trade (also called 'outsourcing' in the current U.S. presidential debate).
- These interest groups are probably neither sinister or foolish. They are probably not opposed to Pareto improvements.
- But they understand that trade without redistribution will probably make them economically worse off. That's because opening to trade is comparatively easy whereas redistributing resources from rich to poor is politically extremely difficult.
- So, it's arguably sensible for them to oppose trade since the potential Pareto improvement (for them) will likely never be realized. It's likely that they don't want to expand the pie because they understand that they ultimately will receive a smaller slice.