Lecture Note 14 – Why is Free Trade Controversial? Theory and Evidence

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1 Why is Free Trade Controversial?

Theory and evidence suggest that when countries choose to trade with one another, the gains from trade are positive. Moreover, in contrast to popular perceptions, trade is not a Robin Hood operation that takes from rich countries to give to poor countries, or vice versa. Even very rich countries can gain from trading with very poor countries. See for example the *NY Times* editorial "Let Them Sweat" by Nicholas Kristof (on the class website).

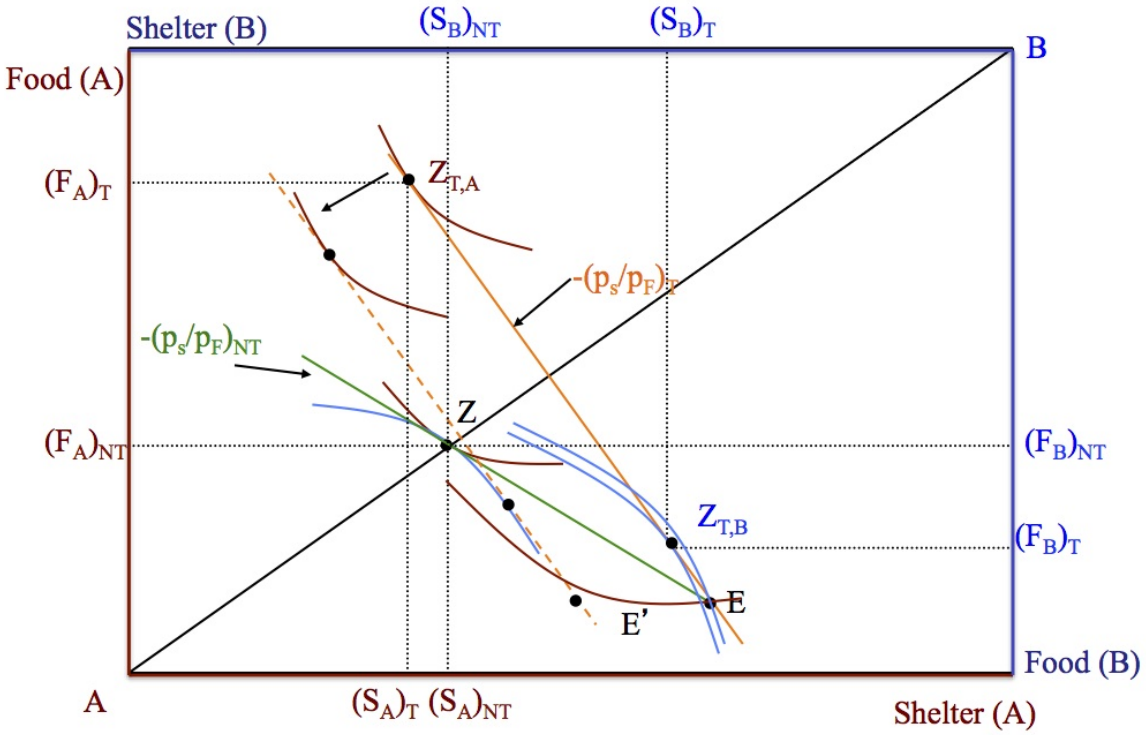
This raises a puzzle: If trade is so terrific, why isn't everyone in favor of it? Here are two potential explanations:

1. Politicians and lay people just don't get it. Like much of economics, the principle of Comparative Advantage is simple and yet not immediately intuitive. Once you understand the principle of 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. This view is spelled out in Paul Krugman's paper on your reading list, "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 potentially troubling about trade that people *do* recognize, and which our very simple models above don't capture. This thing, also implied by the model, is that although trade improves aggregate consumer surplus, it typically creates winners and losers within a country. This is because international trade maximizes the pie and *changes* the sizes of the slices. In the absence of an extremely flexible system of taxes and transfers, it is quite possible for trade to improve aggregate consumer surplus while leaving certain groups distinctly worse off than they would have been in Autarky, i.e. domestic trade alone. Here is why...

Refer to the following figure, where we consider what happens to two people (A and B) who both live in Home when it opens up to trade:



- In this economy:
  - 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 (those intersecting point E). Point Z represents a Pareto improvement relative to point E.

- Now consider what would have occurred had Home opened itself to international trade instead starting from the initial endowment, E.
- Assume that the world price ratio is given by $(p_s/p_f)_T$. 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 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 slightly less 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. This is reflected in the figure: the sum of A and B's food with trade is far higher than their countries' total endowment (the height of the Edgeworth box), while the sum of their consumption of shelter is less than their endowment (the length of the Edgeworth box). Home's chosen consumption bundle would not have been feasible absent trade.

A welfare analysis in three parts

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

Yes. Comparing the indifference curves at the endowment and along with free trade price ratio, we see that both A and B prefer $Z_{T,A}$ and $Z_{T,B}$ (respectively) 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 his or her initial endowment rather than trade.

Free trade is Pareto improving relative to the initial allocation.

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

Interestingly, the answer is **no**.

You can see 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? Recall that trade raised the relative price of shelter and lowered the relative price of food. According to their initial endowments, consumer A was relatively rich in shelter and consumer B was relatively rich in food. So, trade increased the value of $A's$ bundle and decreased the value of $B's$ bundle.

Moreover, trade affects consumer welfare *only* by altering prices. Conversely, if trade does not change prices, it does not affect consumer welfare. Trade raises aggregate consumer surplus by allowing consumers as a whole to consume bundles that were not previously feasible, given the country's original endowment and prices. But it also devalues the endowments of consumers within a country who specialize in goods whose relative price has fallen. So, if you were a food producer, and your country opened to trade with a country that had a relatively abundant supply of food, you may effectively be made poorer by the trade-opening. You still have a hefty endowment of food, but this endowment cannot buy as much shelter as it could under the Autarky equilibrium.

Does trade *necessarily* make one party worse off? Actually, the answer is no, not necessarily. Although rotating the price ratio through the initial endowment E has the effect of raising the value of food relative to shelter or vice versa—thus worsening the terms of trade for the agent who is relatively more endowed in the good whose relative price is falling—opening to trade has a second effect that potentially benefits both agents. Namely, trade makes it feasible for agents A and B to consume bundles that do not lie within the feasible set under Autarky. This is reflected in a property of this Edgeworth box that we have not seen before: although their indifference curves still need to be tangent to the price ratio in equilibrium, under trade their indifference curves no longer need to be tangent to one another. Since we've eliminated a key restriction that we have in the Edgeworth box under autarky, we should expect that trade *can be* Pareto improving. By playing with the diagram above, you can demonstrate to yourself that small changes in the price ratio from the initial Autarkic price ratio can in some cases make both parties better off relative to the point they would have attained on the contract curve under autarky.

Bottom line: International trade raises total consumption but may or may not yield a Pareto improvement relative to the Autarkic setting. Often, some parties within a country will be better off with trade relative to autarky while other parties within a country will be

worse off.

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

Now let's return to the case where there are distinct winners and losers from trade. Are the gains from trade *large enough* that we could make consumer A better off without making B worse off by redistributing the gains from trade? If yes, there is a *potential* Pareto improvement here, and trade could be (at least weakly) good for everyone.

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 with 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, so consumers A and B pay this relative price no matter how much they produce and consumer in equilibrium.

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

As we suspect from studying the Second Welfare Theorem (and noting that this market is competitive by assumption), there is no trade-off between equality and efficiency. Through an appropriate set of transfers, we can both exhaust all gains from trade and achieve any Pareto efficient allocation desired. 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. International trade does not overturn the $1st$ and $2nd$ welfare theorems.

How do we know that the Kaldor criterion will always be satisfied—that is, that the gains from trade are necessarily large enough to potentially make both parties better off? The answer is that international trade is equivalent to relaxing one constraint in our Edgeworth box. In the Autarkic Edgeworth box, the equilibrium required both that consumption was Pareto efficient (MRS equated among consumers) and that the sum of demands of all consumers was equal to the aggregate economy wide endowment. Trade relaxes the second constraint. Although the MRS of all consumers is equated to the price ratio under international trade, it no longer has to be the case that a country consumes only what it produces. So long as another country is willing to trade with it, its consumption may exceed its endowment in

some goods (though not all goods—since this would imply a trade imbalance).

In sum: International trade necessarily improves national welfare (crudely, GDP), by allowing countries to consume a different bundle than what they produce. But international trade does not necessarily raise welfare of all citizens. Indeed, it will typically make some worse off. The analysis above says that equity *does not have to* suffer due to trade. Gains from trade are inherently large enough to fully compensate the losers and still produce some winners. But trade often will produce **both** winners and losers unless governments implement redistributive policies to prevent this from occurring.

2 Relevance

The principle of comparative advantage is a fundamental economic insight of great relevance and generality. This principle 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 a key difference between these two conclusions. International trade does *not necessarily* benefit every individual. It's likely to create winners and losers (relative to trade among individuals in autarky). By contrast, free trade among individuals always generates Pareto improvements.

The principle of comparative advantage combined with the 1st and 2nd welfare theorems illustrates that it is *possible* to make each citizen better off through trade than under autarky, when trade is combined with lump-sum transfers. Whether this occurs depends upon the politically feasibility of implementing redistributive policies to counteract the redistribution accompanying trade liberalization. Little in the vast sweep of history suggests that the gains from trade are typically redistributed so that the losers are compensated.

As we discussed when reading the Feyrer paper, there is compelling causal evidence that trade increases GDP in both developing and developed economies. But trade between the developed and less-developed countries (LDCs) will generally tend to lower the wages of less-educated workers in developed countries. This is because developed economies have comparative advantage (relative to most other countries) in technology- and skill-intensive products and services. So, opening of developed countries to trade with LDCs generally raises the wages of highly skilled workers in developed economies and reduces the wages of less

skilled workers in these economies. The 2013 *American Economic Review* paper by Autor, Dorn and Hanson presents evidence that this is more than just a theoretical possibility. By the same token, however, 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. (Another example: India has an enormous comparative advantage in low-income workers who speak English well. It's no coincidence that you often speak with an Indian worker when you call help desks for major American companies.)

The Second 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. Perhaps as a consequence, trade unions and non-college workers are generally strongly opposed to international trade. These interest groups are probably neither sinister or foolish; they do not oppose *Pareto* improvements in general. They may, however, understand that international trade without accompanying redistribution makes them worse off. Politically, opening to trade is comparatively easy. Redistributing gains from winners to losers is politically extremely difficult. Permitting the first without pursuing the second may have strong redistributive consequences—and the redistribution induced by trade in industrialized economies is typically (though not always) from less affluent to more affluent workers.

3 Evidence on Trade, Employment and Earnings in Local Labor Markets (Autor, Dorn and Hanson *AER* 2013)

We have built a theoretical and empirical case that trade raises national income. We have also established a theoretical case that trade opening can be redistributive—that is, it need *not* be Pareto improving for all citizens in an economy. We'll now examine some recent empirical evidence on this point, specifically, how rising import competition from China appears to affect employment and earnings in local U.S. labor markets. For this evidence, we'll turn to the recent paper by Autor, Dorn and Hanson (*AER* 2013, ADH hereafter).

The challenge in analyzing how rising Chinese import competition affects U.S. labor markets is two-fold. First the rise in Chinese imports is *endogenous*—it's driven both by improving productivity in China (a supply shock from the perspective of U.S. producers) and *also* by rising consumer demand for various goods, some of which happen to be produced in China. Both supply and demand shocks will increase Chinese imports, but only the former is analogous to a unilateral, trade-driven price change in our conceptual model of a country opening to trade. The latter, by contrast, is probably capturing a rise in consumer wealth,

which would be expected to increase demand for both domestic and imported goods. That may in itself be an interesting object for study, but it is not the subject of our inquiry here: we want to understand how exogenous changes in domestic prices induced by international trade affects employment and wages of domestic workers who produce import-competing goods.

ADH propose to address this problem by using an instrumental variables strategy. The goal of their strategy is to identify plausibly exogenous variation in Chinese import competition facing the U.S. Their basic approach is as follows:

- Using data on imports and exports of 450 manufactured goods in the U.S. and eight other non-U.S., high-income countries, they *instrument* for (i.e., use instrumental variables) rising imports to the U.S. from China using the contemporaneous change in Chinese imports (by product category) in these eight other economies.

- The idea underlying this approach is that if these eight countries and the U.S. *simultaneously* increase their imports of Chinese goods in a certain detailed product category, this is likely due to rising Chinese competitiveness (i.e., falling Chinese prices) in this product category rather than a sudden cross-national surge in demand for goods from this category that happen to be produced in China. For example, if over the course of a 10 year period, we see that the U.S. and all other high-income countries begin importing luggage from China rather than from Mexico, we infer that this is because Chinese luggage is getting cheaper and not because consumers in these countries have developed a preference for Chinese over Mexican-made luggage.

- To develop notation, consider two categories of imported manufacturing goods, machine tools and luggage, respectively, denoted by $k \in \{0, 1\}$.

- Assume, plausibly, that imports of luggage from China are rising rapidly in high-income economies due to rising Chinese productivity (and hence falling Chinese prices) in these goods whereas imports of machine tools from China are relatively stagnant because these are goods in which high-income countries have strong comparative advantage.

- We would thus expect that

$$\begin{aligned} \Delta I_{US,1} &= \alpha_1 + \pi_1 \Delta I_{EU,1}, \\ \Delta I_{US,0} &= \alpha_1, \\ \Delta I_{US,k} &= \pi_1 \Delta I_{EU,k} \end{aligned}$$

where I denotes imports (in dollars), the subscript EU denotes the European Union, and we expect that $\pi_1 > 0$.

- Note that we *do not* directly observe the change in the price of Chinese luggage relative to Chinese machine tools. But we infer that this price change is the force that causes imports of Chinese luggage to surge simultaneously in the EU and US (and of course if they did not rise in tandem, we would have $\hat{\pi}_1 = 0$). For shorthand, we will say that π_1 is the causal effect of the change in Chinese prices on US imports from China.

The second empirical challenge for the paper is identifying *which* labor markets are potentially affected by trade with China. It would be unproductive to study the impact of rising competition from China on the U.S. "in its entirety" since this approach would leave us lacking an appropriate comparison group. As in Card & Krueger's New Jersey/Pennsylvania study, we want to compare trade-exposed U.S. regions to non-trade-exposed regions over time in a DD, since general trends in the U.S. may be driven by a wide variety of factors. Luckily for our study, although luggage is consumed in every state, city and suburb of the U.S., it is only produced in a few locations. (In general, manufacturing is geographically concentrated. Furniture, luggage, footwear and textiles tend to be made in the East-South-Central U.S. Machine tools and heavy industries are found much more in the mid-West. High technology industries like computers and pharmaceuticals are more commonplace on the two coasts, and are particularly clustered near to leading research universities.)

This set of observations motivates the ADH's approach of identifying labor markets that are *potentially* affected by imports in each good category according to whether or not each good was produced in that labor market at the start of the time period of study (1980). Let's again develop some notation.

- Let j index local labor markets, and let Z be an indicator variable that is equal to 1 if labor market j produces good k and 0 otherwise. Thus $Z_{jk} \in \{0, 1\}$ is a matrix that denotes which labor markets produce what goods.

- Concretely, imagine we have two labor markets, Raleigh NC and Pittsburgh PA. Both are manufacturing centers, but Raleigh produces luggage and Pittsburgh produces machine tools. Let $j = 0$ denote Pittsburgh and $j = 1$ denote Raleigh. Then, we have the following values of Z:

$$
\begin{array}{rlcc}
 & & Tools & Luggage \\
Z_{jk} = & Pittsburgh & 1 & 0 \\
 & Raleigh & 0 & 1
\end{array}
$$

- More generally, we'll have many labor markets j and many goods k (to be precise, in ADH $j \in [1, 722]$ and $k \in [1, 450]$). So, for each labor market k, we can calculate a weighted average causal effect of Chinese prices on competing imports faced by that labor market:

$$\Delta \hat{I}_j = \sum_{k=1}^{K} \frac{Z_{jk} \times \hat{\pi}_1 \Delta I_{EU,k}}{K} = \hat{\pi}_1 \times \sum_{k=1}^{K} \frac{Z_{jk} \times \Delta I_{EU,k}}{K}.$$

We are at last ready to estimate the causal effect of interest.

- Let's say the causal relationship between import competition and labor market outcomes can be written as

$$\Delta Y_j = \delta + \gamma \Delta I_j^* + e_j,$$

  where ΔI_j^* is the exogenous import supply shock due to falling import prices and ΔY is a labor market outcome such as employment, unemployment, or wages.

- We *cannot* estimate this causal relationship using the correlation between imports and outcomes ($\Delta Y_j = \delta' + \gamma' \Delta I_j + e_j'$) since the observed change in imports (ΔI_j) includes both supply and demand shocks. Instead we use our Instrumental Variables toolkit.

- Write the reduced form relationship as:

$$\Delta Y_j = \alpha_2 + \pi_2 \times \left(\sum_{k=1}^{K} \frac{Z_{jk} \Delta I_{EU,k}}{K} \right).$$

- As above, the first-stage relationship is

$$\Delta \hat{I}_j = \hat{\pi}_1 \times \sum_{k=1}^{K} \frac{Z_{jk} \times \Delta I_{EU,k}}{K}.$$

- And of course

$$\pi_2 = \gamma \times \pi_1.$$

- Hence, our IV estimate is

$$\hat{\gamma} = \frac{\hat{\pi}_2}{\hat{\pi}_1}.$$

  We'll discuss the findings of the ADH paper during lecture.

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