14.54 International Trade
— Lecture 4: Exchange Economies —
Today’s Plan

1. Basic Setup of Endowment Economy
2. Autarky Equilibrium
3. Small Open Economy
4. Two Country Equilibrium

The small graphs on slides 10-17, 22, 23, 26-30, and 32-34 are courtesy of Marc Melitz. Used with permission.
We initially study an exchange economy where the production levels are fixed:

- Goods can be traded, but production levels can not adjust.

How unreasonable an assumption is this?

- Not too unreasonable for an analysis of trade in the very short run (less than a few years).
- Within this time frame, all factors of production are fixed (allocated to the production of a particular good).
- Moving these factors of production across sectors to produce different goods take time.
- Consumer demand, however, can react much more quickly to a change in prices.

Of course, an assumption of fixed production would not be valid for an analysis over a longer time frame:

- Then, production levels would respond to changes in prices.
- We will study this in the next section of the course.
For now GM workers cannot start looking for another job...

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... but U.S. consumers can buy Japanese cars

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Basic Setup of Endowment Economy

- Back to two goods: $C$ and $F$
- A country can produce a fixed amount of $C$ and $F$, which can be considered an endowment $E = (E_C, E_F)$
- Assume that all consumers share the same homothetic preferences
  - ... So aggregate demand is generated by a consumer with those same preferences who owns the aggregate endowment $E$
- If the country is open to trade, then consumers can trade $C$ and $F$ on world market at an international relative price $p^T = p^T_C / p^T_F$
Terms of Trade

- $p^T = p_C^T / p_F^T$ is often referred to as the country’s terms of trade
  - However, the accepted convention for a country’s terms of trade is that the price of the exported good (or average price of exported goods) is expressed in the numerator
  - ... and the price of the imported good in the denominator

- So if a country exports $F$ then its terms of trade would be $1 / p^T = p_F^T / p_C^T$
- To avoid confusion, will always write relative prices with $C$ in the numerator
Terms of Trade and Exchange Rates

- Important note: a country’s terms of trade is a very different concept from a country’s exchange rate.
- An exchange rate is the price of one country’s currency in terms of another country currency.
- All else equal, a depreciation of the U.S. dollar (a rise in the U.S. dollar prices of foreign currencies)
  - Raises the relative price of foreign goods in the United States ⇒ Lower volume of U.S. imports.
A country’s exchange rate affects the balance of trade or net flows: exports and imports move in opposite directions.

A country’s terms of trade affects the volume of trade or gross flows: exports and imports move in the same direction.

In this course, we will abstract from exchange rate movements and assume that trade is balanced: net flows are equal to zero.
**Definition:** A country is in autarky when it is completely closed to international trade.

In this equilibrium, a country must consume (in the aggregate) its endowment and achieves utility level $U^A$.

The MRS at $E$ represents the equilibrium relative price of $C$ and $F$ in autarky.
One can also think of the equilibrium relative price as determined by relative supply and demand.

We will also show that, in a closed economy with many consumers (with the same homothetic preferences but different endowments), $MRS^E$ is the equilibrium trade price between these consumers.
Now assume that this economy opens up to international trade at a given world relative price $p^T = p^T_C / p^T_F$
Now assume that this economy opens up to international trade at a given world relative price $p_T = p_C^T / p_F^T$. 

[Diagram showing a downward sloping line labeled with $p_C^T / p_F^T$.]

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**Small Open Economy (Cont.)**

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Case 1: $p^T > MRS^E$

Will these trade opportunities make the country better off?
**Small Open Economy (Cont.)**

- **Case 1:** \( p^T > MRS^E \)

- Will these trade opportunities make the country better off?
Case 2: $p^T < MRS^E$

- Do gains from trade depend on ranking of $p^T$ and $MRS^E$?

No! All the points in the new shaded area also represent higher welfare than in autarky

- All those points represent selling (exporting) $F$ and buying (importing) $C$
Given a world trade price $p^T$, how are trade volumes determined?

Hwk: redraw graph for case where $p^T < MRS^E$
Now introduce another country (home and foreign)

Can we find a trade price such that both countries agree to trade with one-another?

... and gain from such trade?

Assume that there are no trade restrictions so that consumers in both countries face the same trade price $p^T$
For this example, assume that $MRS^E < MRS^{E*}$

Is $p^T > MRS^{E*}$ a possible equilibrium trade price?
- No! Both countries would want to export $C$

Is $p^T < MRS^E$ a possible equilibrium trade price?
- No! Both countries would want to export $F$

Is $MRS^E < p^T < MRS^{E*}$ a possible equilibrium price?
- Yes! Home exports $C$ and Foreign exports $F$
- Both countries must gain from trade at any price in that range
Motives for Trade

- What happens if $MRS^E = MRS^E^*$?
  - There is no reason to trade
- Why will $MRS^E \neq MRS^E^*$?
- Countries have similar preferences but different endowments
  - Endowments must be different in the sense that $E_C/E_F \neq E_C^*/E_F^*$ (Why?)
- Countries have similar endowments but different preferences
  - Less likely to occur in the context of country trade
  - Example: POW camps and Red Cross packages
**Definition**: A country has a comparative advantage in a good if its relative price (before trade) is lower than the world relative price.

**Law of comparative advantage**: A country will export goods in which it has a comparative advantage.
Differences in Country Endowments as a Source of Comparative Advantage

- Assume same (homothetic) preferences in both countries so that only endowments differ across countries.
- Endowments then determine MRS in autarky and hence also determined the pattern of comparative advantage.
Country Endowments and Comparative Advantage

- If \( \frac{E_C}{E_F} > \frac{E_C^*}{E_F^*} \) then Home has a comparative advantage in \( C \)
- ... and Foreign has a comparative advantage in \( F \)
- Thus, Home will export \( C \) and import \( F \)

Note that comparative advantage is not determined by the absolute size of countries (endowments) but by the relative endowments

- \( \frac{E_C}{E_F} > \frac{E_C^*}{E_F^*} \) implies that \( C \) is relatively abundant in Home (relative to foreign) and that \( F \) is relatively scarce
- If \( \frac{E_C}{E_F} = \frac{E_C^*}{E_F^*} \) then there is no motive for trade
When consumers all share the same homothetic preferences (no difference in tastes across countries) then a country will have a comparative advantage in its relatively abundant good.

It will export this good.
Consider first the case where consumers share the same homothetic preferences.

Since countries face the same world trade price \( p^T = p_C^T / p_F^T \), consumers everywhere will consume \( D_C \) and \( D_F \) in the same proportions: \( D_C / D_F = RD(p^T) \).

So world relative demand is also given by \( RD(p^T) \):
\[
\frac{D_C^w}{D_F^w} = \frac{D_C + D_C^*}{D_F + D_F^*} = RD(p^T)
\]

On the supply side, the world relative supply is fixed (just like the relative supplies in each country)
\[
\frac{E_C^w}{E_F^w} = \frac{E_C + E_C^*}{E_F + E_F^*}
\]

The world equilibrium trade price \( p^T \) must solve \( RD(p^T) = \frac{E_C^w}{E_F^w} \).
Determination of the Equilibrium Trade Price (Cont.)
Can also verify that $MRS^E < p^T < MRS^{E*}$:

$$\frac{E_C}{E_F} > \frac{E_C^*}{E_F^*} \Rightarrow \frac{E_C}{E_F} > \frac{E_C^{W}}{E_F^{W}} = \frac{E_C + E_C^*}{E_F + E_F^*} > \frac{E_C^*}{E_F^*}$$
Aside: The Equilibrium Trade Price in a Closed Economy

- Note that the equilibrium trade price $p_C^T / p_F^T$ is also the $MRS$ of a consumer who consumes the world aggregate endowment $E_W^C / E_W^F$.
- Can also apply this to the equilibrium with trade in a closed economy where consumers own different endowments.
- This shows that the autarky equilibrium trade price $p^A$ will be the $MRS$ of a consumer who consumes the country aggregate endowment $E_C / E_F$. 
Now consider the case where consumers in each country have different preferences.

For aggregation purposes, assume that all consumers in each country have the same homothetic preferences.

So aggregate demand in each country can still be represented by a single relative demand curve (independent of endowments):
Different Preferences Across Countries: World Relative Demand

- One can still calculate a world relative demand curve:
  \[
  \frac{(D_C + D_C^*)}{(D_F + D_F^*)}
  \]
  as a function of the world trade price \( p^T \)

- Given the endowments \( \mathbf{E} \) and \( \mathbf{E}^* \) and country preferences, one can calculate \( \mathbf{D} = (D_C, D_F) \) and \( \mathbf{D}^* = (D_C^*, D_F^*) \) as function of any trade price \( p^T \).
Different Preferences Across Countries: World Relative Demand (Cont.)

- From $\mathbf{D} = (D_C, D_F)$ and $\mathbf{D}^* = (D_C^*, D_F^*)$ as function of $p^T$, one obtains
  \[
  \frac{D_C^W}{D_F^W} = \frac{D_C + D_C^*}{D_F + D_F^*} = RD(p^T)
  \]

- Note that, unlike the case of common homothetic preferences across countries, this world relative demand curve will now depend on the endowments $\mathbf{E}$ and $\mathbf{E}^*$

- Also, $(D_C + D_C^*) / (D_F + D_F^*)$ must always be between $D_C / D_F$ and $D_C^* / D_F^*$. 
Different Preferences Across Countries: World Relative Demand (Cont.)
Different Preferences Across Countries: World Relative Demand (Cont.)

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Different Preferences Across Countries: Equilibrium

- Once $RD^W$ is constructed, equilibrium trade price is given once again by intersection of $RS^W$ and $RD^W$

- Technical note: $RD^W$ is not necessarily downward sloping everywhere (very unlikely, and will ignore this special case)