

Foreign Trade University
Faculty of International Economics

KTE 316

Absolute and Comparative Advantage

Geoffrey Jehle

1. Framework

Two countries (I, II)

Two goods, food (X_c) and cloth (X_f)

2. Assumptions on Production

One factor, Labor, in inelastic (fixed) supply—internally mobile, externally immobile. C1

“Constant returns” (fixed coefficients) technology for producing each good in both countries. C2

3. Definitions and Notation (We distinguish countries by superscripts, but here omit them to avoid clutter)

$X_c \equiv$ units of cloth

$X_f \equiv$ units of food

$L_c \equiv$ labor employed in cloth industry

$L_f \equiv$ labor employed in food industry

$\bar{L} \equiv$ total labor endowment of country

$a_c \equiv$ # units of labor it takes to produce 1 unit of X_c

$a_f \equiv$ # units of labor it takes to produce 1 unit of X_f

4. Some Implications of our Assumptions:

C1 and C2 $\Rightarrow$

$$X_c = \frac{1}{a_c} L_c,$$

$$X_f = \frac{1}{a_f} L_f,$$

and therefore that

$$\Delta X_c = \frac{1}{a_c} \Delta L_c,$$

$$\Delta X_f = \frac{1}{a_f} \Delta L_f.$$

Definition: (Smith) Absolute Advantage.

Country I is said to have an *absolute advantage* over Country II in X_c production if producers in Country I use less labor to produce a unit of X_c than do producers of X_c in Country II. Hence, Country I has an absolute advantage in X_c production if

$$a_c^I < a_c^{II}.$$

Similarly, Country II is said to have an absolute advantage in X_f production if

$$a_f^I > a_f^{II}.$$

Theorem: Smith's Theorem.

If Country I has an absolute advantage in X_c production and Country II has an absolute advantage in X_f production, the world can gain from an international division of labor and specialization along the lines of absolute advantage.

Proof: Let $X_c^w \equiv X_c^I + X_c^{II}$ and $X_f^w \equiv X_f^I + X_f^{II}$ denote world totals of X_c and X_f , respectively. Let Country I shift one unit of labor out of X_f production into X_c production, and let Country II shift one unit of labor out of X_c production into X_f production. Convince yourself that world totals of both goods rise, and so the world can gain from this re-allocation of resources within each country along the lines of its absolute advantage. ■

Definition: (Ricardo) Comparative Advantage.

Country I is said to have a *comparative advantage* in X_c if X_c production in Country I requires relatively less labor than it does in Country II, compared to X_f production. Specifically, Country I has a comparative advantage in X_c iff

$$\frac{a_c^I}{a_f^I} < \frac{a_c^{II}}{a_f^{II}}.$$

Comment: Note carefully that from these definitions:

(Democracy) Country I has a comparative advantage in X_c if, and only if, Country II has a comparative advantage in X_f .

(Distinctiveness) “Country I has a comparative advantage in X_c ” $\nRightarrow$ “Country I has an absolute advantage in X_c ” and “Country I has an absolute advantage in X_c ” $\nRightarrow$ “Country I has a comparative advantage in X_c ”

Theorem: Ricardo's Theorem.

If Country I has a comparative advantage in X_c production (so that Country II has a comparative advantage in X_f production), the world can gain from an international division of labor and specialization along the lines of comparative advantage.

Proof: Suppose that Country I has a comparative advantage in X_c production, so that

$$\frac{a_c^I}{a_f^I} < \frac{a_c^{II}}{a_f^{II}}.$$

Let Country I shift $a_f^I a_c^I / a_c^{II}$ units of labor out of X_f production and into X_c production. Let Country II shift a_f^I units of labor out of X_c production and into X_f production. Convince yourself that world totals of neither good decline, and that total production of at least one good strictly increases, so the world can gain from this re-allocation of resources within each country along the lines of its comparative advantage. ■

Definition: (Haberler) Comparative Advantage.

Country I is said to have a *comparative advantage* in X_c iff the opportunity cost of a unit of X_c in terms of X_f foregone is lower in Country I than it is in Country II.

Lemma: Under our assumptions on production here, the definitions of comparative advantage due to Ricardo and to Haberler are equivalent.

Proof: Here, the opportunity cost of a unit of cloth in any country, $|\Delta X_f / \Delta X_c|$ as resources (labor) are shifted out of X_f production and into X_c production, is given by a_c / a_f in that country. Hence, the opportunity cost of X_c is lower in Country I than it is in Country II, and so Country I has a comparative advantage in X_c according to Haberler's definition, iff

$$\frac{a_c^I}{a_f^I} < \frac{a_c^{II}}{a_f^{II}}.$$

Rearranging, it is easy to see this is equivalent to the statement that Country I has a comparative in X_c according to Ricardo's definition. ■

Comment: In view of this equivalence between Haberler's and Ricardo's definitions of comparative advantage, we conclude with another proof of Ricardo's Theorem which uses the former definition.

Proof: Let Country I have a comparative advantage in X_c according to Haberler's definition. Then

$$\left| \frac{\Delta X_f}{\Delta X_c} \right|^I = \frac{a_c^I}{a_f^I} < \frac{a_c^{II}}{a_f^{II}} = \left| \frac{\Delta X_f}{\Delta X_c} \right|^{II},$$

so that

$$\Delta X_f^I = \frac{-a_c^I}{a_f^I} \Delta X_c^I$$

$$\Delta X_f^{II} = \frac{-a_c^{II}}{a_f^{II}} \Delta X_c^{II}$$

Let Country I shift enough resources out of X_f production into X_c production to produce one more unit of X_c ($\Delta X_c^I = +1$). Let Country II shift enough resources out of X_c production to reduce its production of X_c by one unit ($\Delta X_c^{II} = -1$), and put those resources into X_f production. Note that with this reallocation of resources along the lines of the countries' comparative advantage, world output of X_c has remained unchanged while world output of X_f rises by

$$\Delta X_f^w = \frac{a_c^{II}}{a_f^{II}} - \frac{a_c^I}{a_f^I} > 0. \quad \blacksquare$$