

THE STANDARD MODEL

ASSUMPTIONS

General formulation combining features of various specific models studied so far

Two goods that can be traded. Bowed-out production possibility frontier.
Constant returns to scale; details of factors and production kept in the background.
Factors cannot be traded across national borders.

Identical homothetic preferences; exact aggregation possible.
Country's demands can be found using same indifference curves as “social ICs”

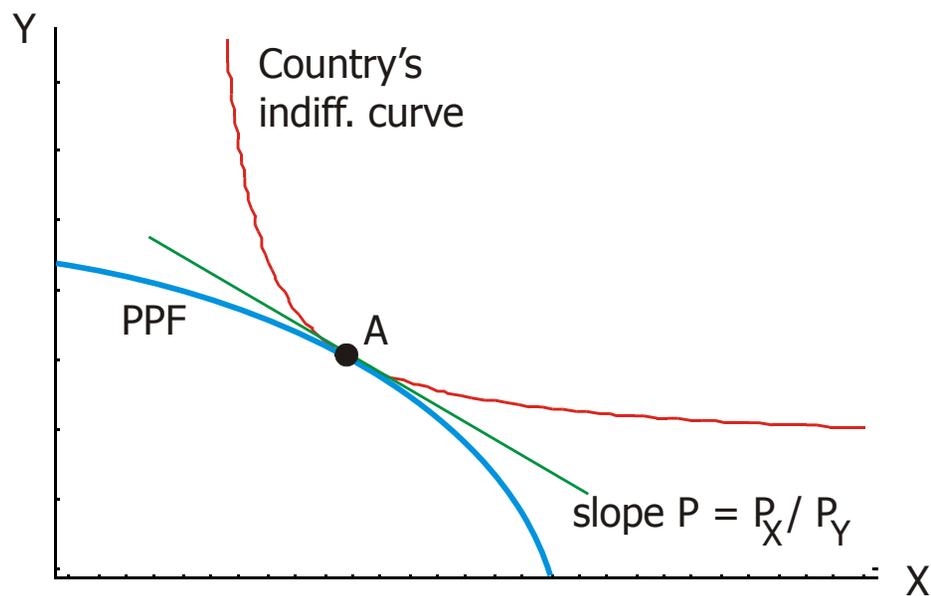
Perfectly competitive markets. Two countries, Home and Foreign.

Notation: Goods X and Y. Prices P_X and P_Y . Relative price of X is $P = P_X / P_Y$.
Superscript labels: Home none, Foreign $*$. Autarky A, Free trade T

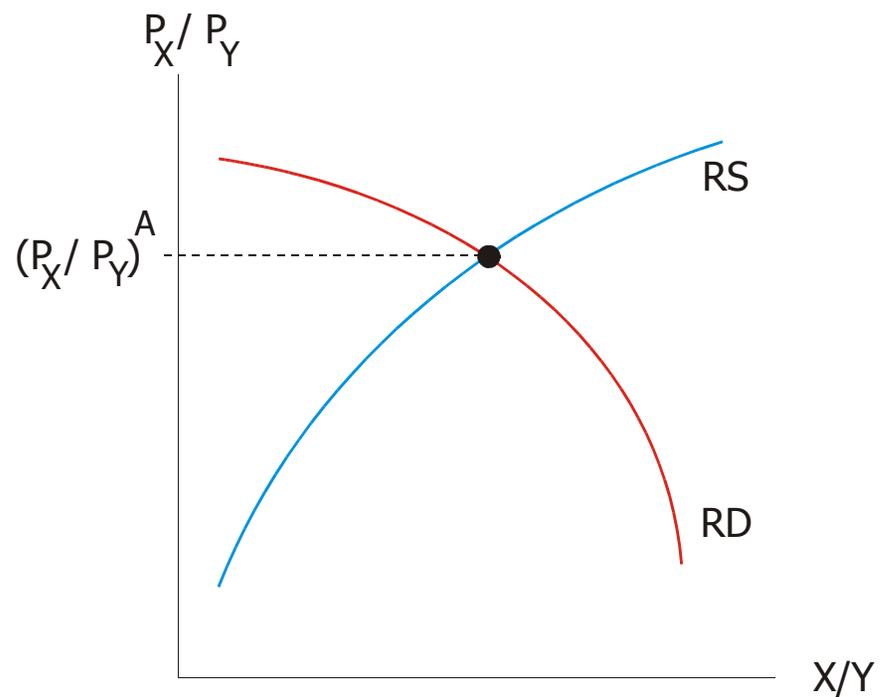
ONE COUNTRY IN AUTARKY

Two equivalent representations

PPF and social optimum

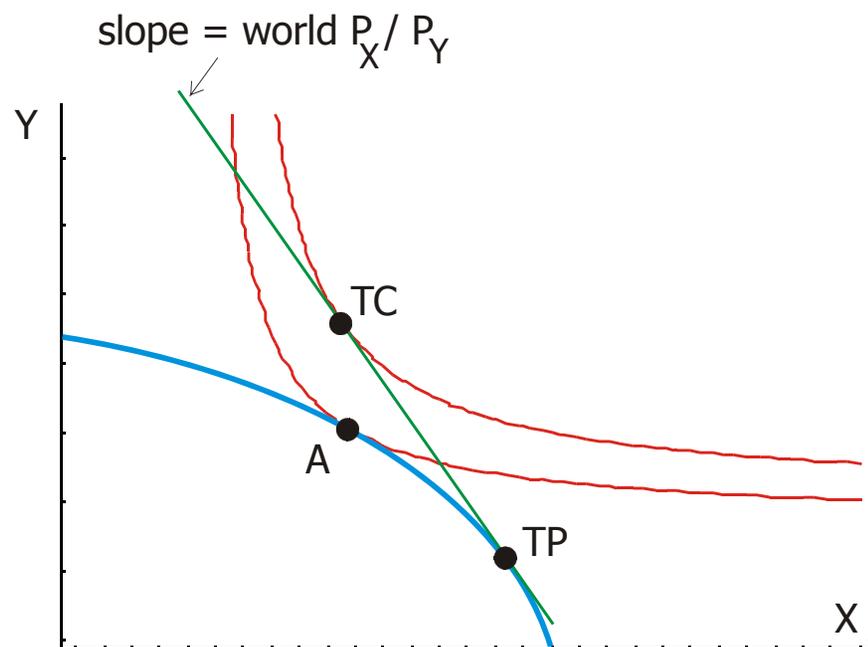


Relative supply and demand

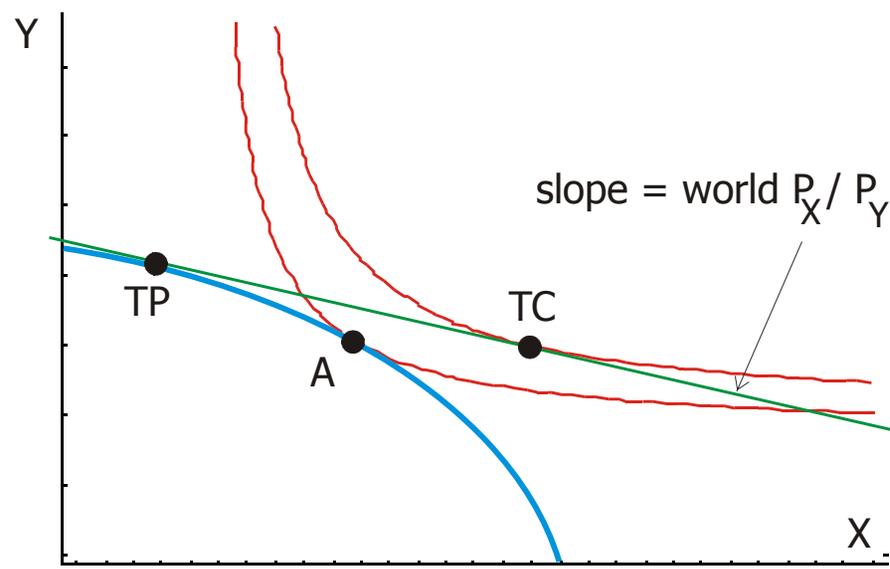


SMALL HOME COUNTRY TRADING WITH GIVEN WORLD RELATIVE PRICE

If world relative price of X is higher than the Home country's autarkic rel. price, Home exports X



If world relative price of X is lower than the Home country's autarkic rel. price, Home imports X

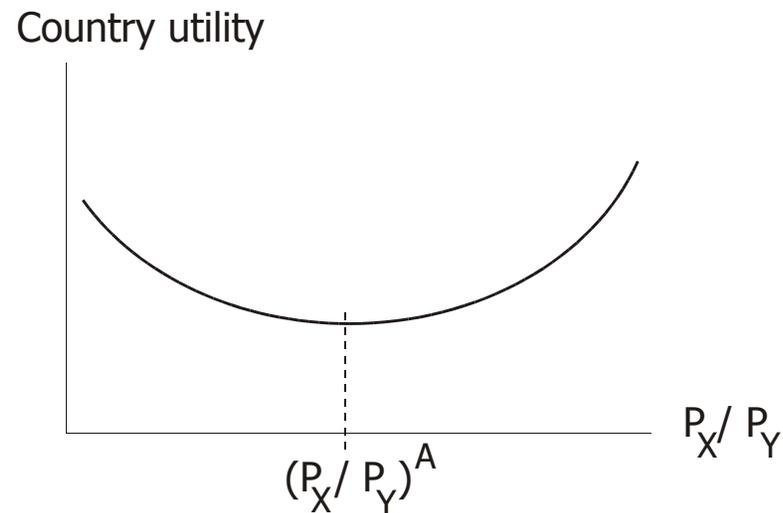


(In each case, TP is production point, TC consumption point, under trade.)

In both cases, Home country gains from trade! (TC on higher IC than A)

- [1] Observe the distinct economic adjustments that bring about this gain:
 Production shifts toward the good whose relative price is now higher
 Consumption substitutes away from the good whose relative price is now higher
 (but income effect may enable higher quantity consumption of both goods)
 Magnitudes of these adjustments will depend on (check earlier specific models)
 preferences – elasticity of substitution in demand
 technology – fixed coefficient versus input substitution
 factor specificity – length of the run over which adjustment can occur

- [2] Country's aggregate utility is
 U-shaped function of P_X / P_Y ,
 and minimum in autarky!
 This is just another way to
 think about gains from trade.
 While it exports X, reduction
 in P_X / P_Y worsens its terms
 of trade and hurts it. But when
 it starts importing X, further reduction improves its TOT and benefits it!



- [3] As usual, distributive conflicts hide behind these aggregate gains.

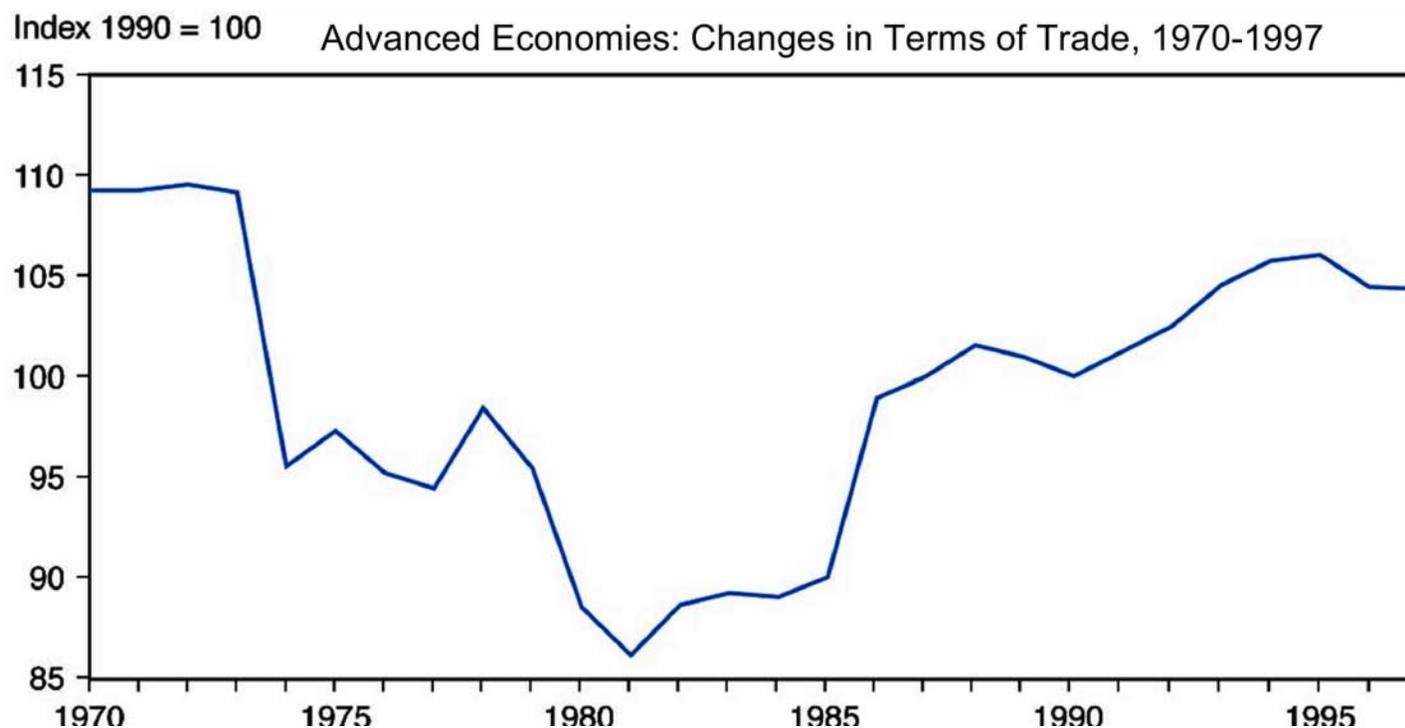
EMPIRICAL EVIDENCE ON TERMS OF TRADE CHANGES

Fear in developing countries: terms of trade will move over time against exporters of mining, agriculture etc. and hurt the LDCs

Fear in developed countries: as other countries start to develop and export manufactures too, their terms of trade will worsen

Empirically, how big are the terms of trade changes and their effects?

Advanced economies:



Primary products;
developing economies:

Overall conclusion:

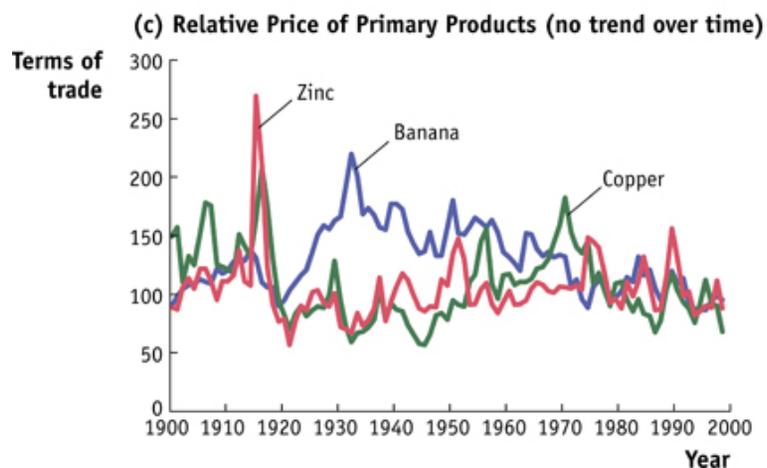
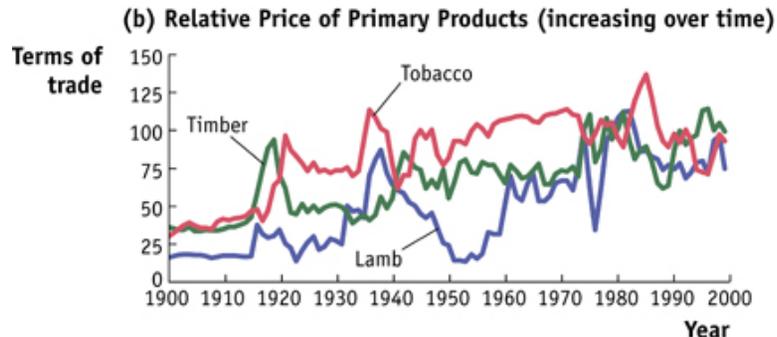
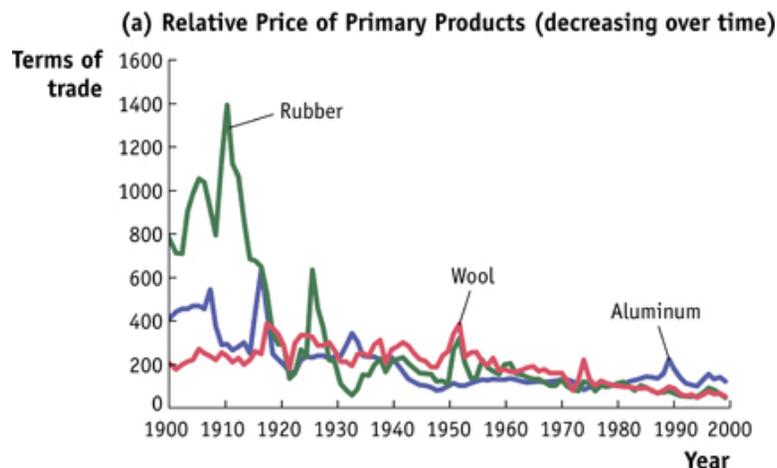
On average, no clear trend
or big effect.

But for specific countries,
commodities, there
are large changes
and volatility.

Questions:

[1] How to explain changes?
Need shifts in world
demand / supply curves

[2] How to calculate
welfare effects.



WELFARE EFFECTS OF TERMS OF TRADE CHANGES

Consider a country in balanced trade

Do all accounting in prices relative to the price (index) of imports

Value of exports (= Value of imports) = Price of exports * Volume of exports

When TOT change, welfare gain is measured as equivalent income gain

$$\Delta \text{Welfare} = \Delta \text{TOT} * \text{Volume of exports}$$

Therefore

$$\begin{aligned} \frac{\Delta \text{Welfare}}{\text{GDP}} &= \frac{\Delta \text{TOT}}{\text{TOT}} \frac{\text{TOT} * \text{Volume of exports}}{\text{GDP}} \\ &= \frac{\Delta \text{TOT}}{\text{TOT}} * \text{Trade as fraction of GDP} \end{aligned}$$

Developed countries: Average Trade = 20% of GDP, TOT changes < 1% per year

Welfare effect: Max 20% of 1%, so 0.2% of GDP

Developing countries: Average Trade = 20-50%, TOT changes 10-25% per year

Welfare effect between 2% and 12.5% of GDP.

(But note that TOT shocks can never reduce welfare below autarky level.)

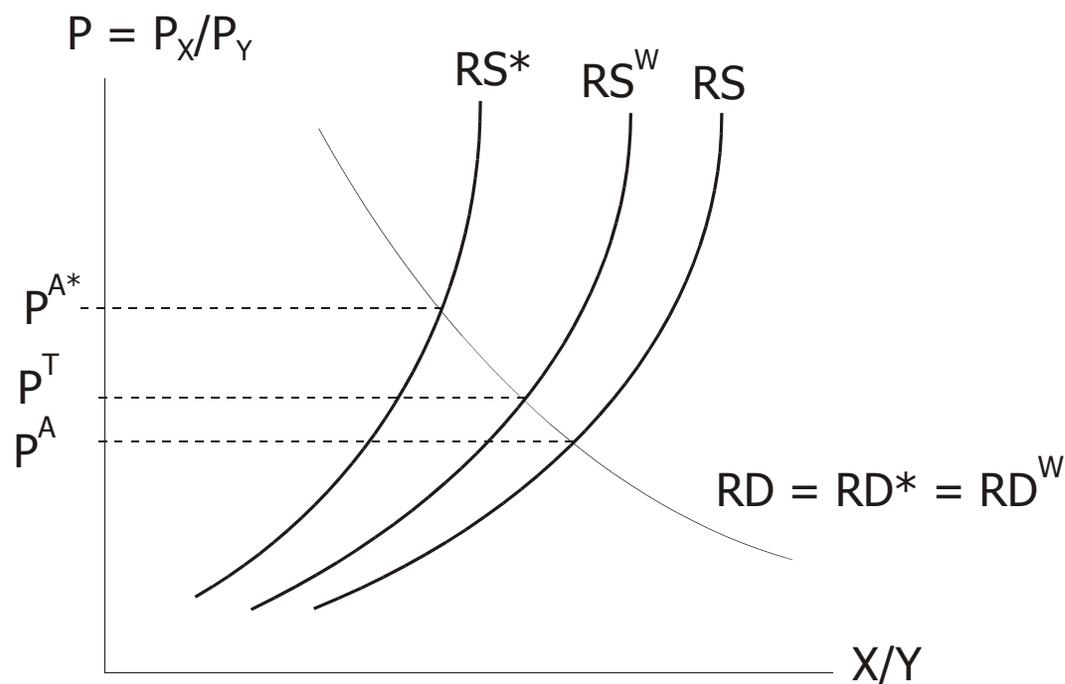
Read K-O Math. Postscript to Ch. 5, pp. 671-2, for a detailed derivation.

TRADE EQUILIBRIUM WITH TWO COUNTRIES

If Home country's RS curve is to the right of Foreign's, then Home will have a lower autarky relative price P of X , and so a comparative advantage in X .

When trade occurs, Home will export X ; P will rise above Home's autarky level; Home's TOT will improve.

Foreign will import X ; P will fall from Foreign's autarky level; Foreign's TOT will improve



APPLICATION: EFFECTS OF TECHNICAL PROGRESS

Suppose Home experiences technical progress biased toward its export sector X:

For given $P = P_X/P_Y$, supply of X increases, Y decreases (Rybczynski-like)

When RS shifts to right,

$RS^W = (X+X^*)/(Y+Y^*)$ increases;

RS^W moves to right from
 RS^* toward RS

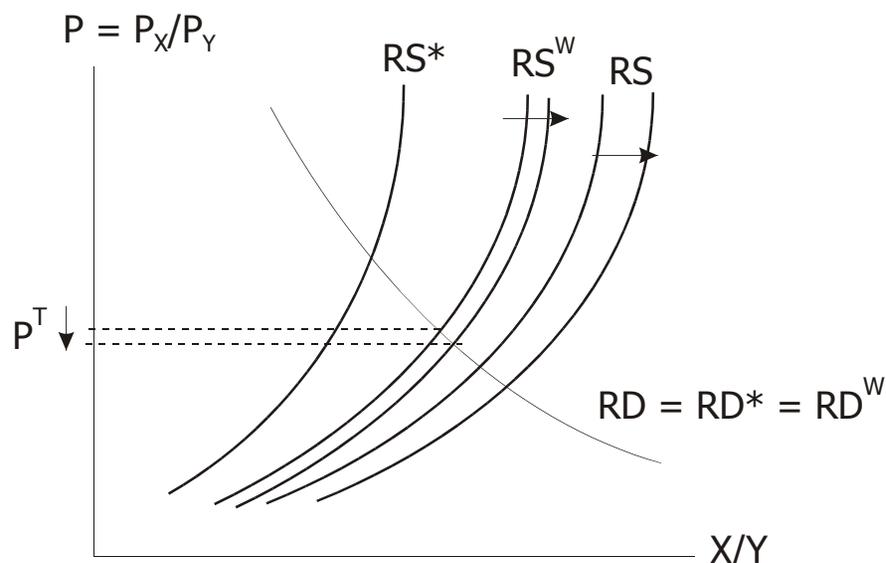
In trade equilibrium, P falls:

Home's terms of trade worsen.

The effect can be large enough
to worsen Home's welfare
despite it having more output:
this is "immiserizing growth".

It is more likely when the RD curve is steep (inelastic).

Technical progress biased toward import-competing sector Y
will improve Home's TOT; bring it a double benefit.



How realistic is the possibility of immiserizing growth?

One country's actions rarely cause a significant change in world relative prices. But for shifts common to a groups of countries, effect can be significant. Countries that recognize this possibility can try to get together in a cartel to restrict output and improve their TOT.

This runs into the usual prisoners' dilemma of cartels:

each wants others to be restrained, and sneak in some cheating itself.

Most such cartels don't last long: copper, coffee, ...

OPEC has lasted but has had mixed success through the decades.

What about the effect of Foreign's technical progress on Home's welfare?

If the technical progress is in Home's export sector, it will worsen Home's terms of trade and reduce Home's welfare.

So LDCs industrialization can hurt advanced countries.

But empirically, such TOT effects have been small.

If in Home's import-competing sector, it will

improve Home's TOT, and will clearly raise Home welfare.

Again paradoxical benefit of trade: cheaper imports.

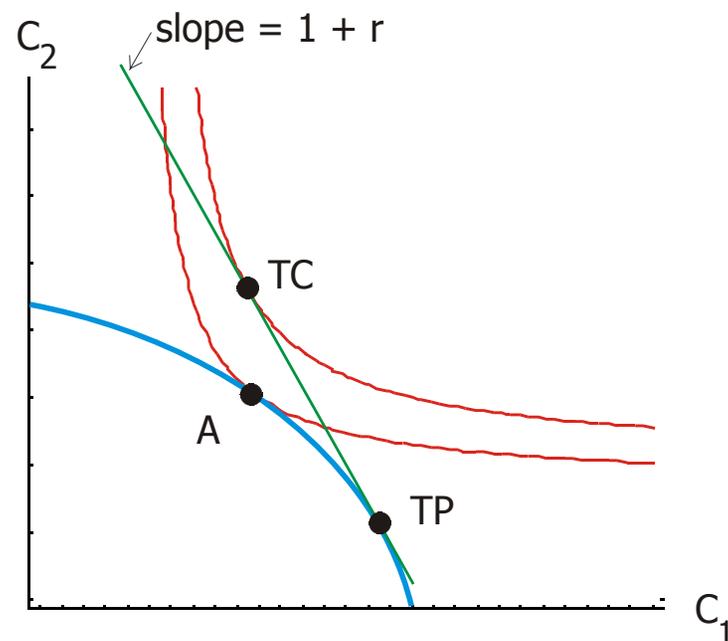
APPLICATION: BORROWING AND LENDING

Suppose two periods: 1 = present, 2 = future. (Can generalize to any number.)

Interpret the goods as $X =$ present consumption C_1 , $Y =$ future consumption C_2 .

Then PPF show the ability to get more C_2 by transferring labor, capital etc. away from production of goods for immediate consumption (C_1) and into production of investment goods that enhance future consumption.

Slope of PPF =
= $1 +$ marginal product of investment
= $1 +$ real rate of interest (r)



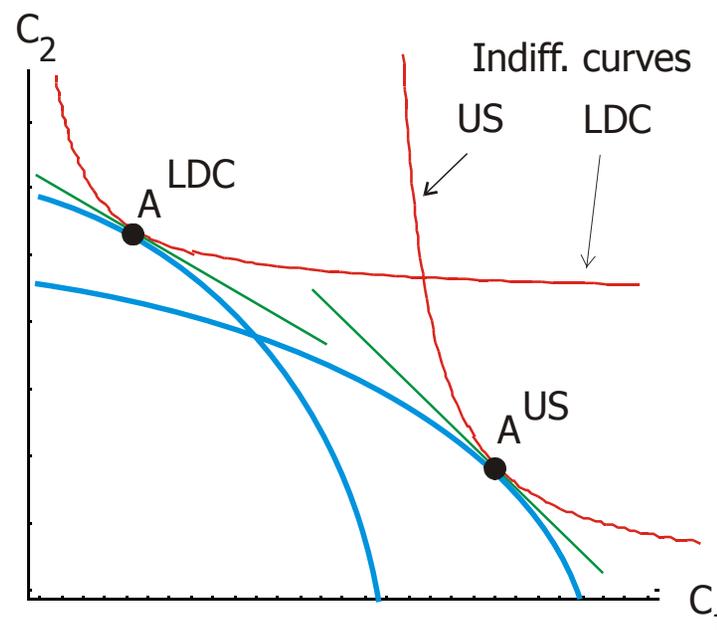
Trade in this context means consume less in the present than the country's output of present consumption goods and export them (send excess to the other country) in exchange for promise to get $(1+r)$ times that amount of future cons. goods i.e. run a trade surplus now, planning to run a trade deficit in the future OR vice versa.

Less-developed countries (LDCs) have less capital relative to labor than does US. So the marginal product of capital should be higher there than in the US. Autarkic r should be higher. They should be importing capital from the US. We should be running a trade surplus. But exactly the opposite is happening.

Possible explanations:

[1] Preferences are different: US is much more impatient, has steeper indifference curves. Then despite US having a flatter PPF, autarkic interest rate can be higher in US. With trade, LDCs will export capital to US!

[2] Marginal product of capital is lower in the LDCs despite their scarcity of capital – because of poor institutions for property right protection and contract enforcement. Such countries must reform institutions to attract capital.



Welfare Effects of Growth and Terms of Trade Changes

Notation

Three goods, X exported, Y imported, Z non-traded

Consumption quantities C_X, C_Y, C_Z

Production quantities Q_X, Q_Y, Q_Z

Prices P_X, P_Y, P_Z

Utility measure of social welfare $u = U(C_X, C_Y, C_Z)$

Will choose import good as numeraire, so $P_Y = 1$

Equilibrium for non-traded good requires $C_Z = Q_Z$

When the production technology and/or terms of trade change,

$$du = \frac{\partial U}{\partial C_X} dC_X + \frac{\partial U}{\partial C_Y} dC_Y + \frac{\partial U}{\partial C_Z} dC_Z = \lambda (P_X dC_X + P_Y dC_Y + P_Z dC_Z)$$

So the change in utility measured in “money” terms is

$$\frac{du}{\lambda} = P_X dC_X + P_Y dC_Y + P_Z dC_Z = P_X dC_X + dC_Y + P_Z dQ_Z \quad (1)$$

Now consider the national income identity (aggregate budget constraint)

$$P_X C_X + P_Y C_Y + P_Z C_Z = P_X Q_X + P_Y Q_Y + P_Z Q_Z$$

which becomes the trade balance constraint

$$P_X C_X + C_Y = P_X Q_X + Q_Y \quad \text{or} \quad C_Y - Q_Y = P_X (Q_X - C_X)$$

Differentiating this,

$$P_X dC_X + C_X dP_X + dC_Y = P_X dQ_X + Q_X dP_X + dQ_Y$$

Substituting into (1) and simplifying

$$\frac{du}{\lambda} = [P_X dQ_X + dQ_Y + P_Z dQ_Z] + (Q_X - C_X) dP_X$$

The terms in the square brackets on the right hand are the effects of growth or technical progress: a quantity index of change in GDP evaluated at the base prices. The rest is the effect of change in terms of trade: the volume of exports times the change in TOT, or equivalently, the value of exports times the proportional change dP_X / P_X .

Growth and TOT effects may be present simultaneously; for example growth in a large country will change its terms of trade.