

Intertemporal Trade

Consider an economy that produces a good that can be either consumed or invested to produce more goods. The main decision problem in this economy is how much to consume today and how much to invest in order to consume tomorrow. The economy is characterized by the following production possibility frontier:

If the economy does not trade intertemporally, consumption is limited to points on the production possibility frontier. If present consumption is $Q^P_1$, there is nothing left for future consumption. But if present consumption is $Q^P_2$, then future consumption is $Q^F_2$. In this case the difference $Q^P_2 - Q^P_1$ represents the economy’s investment.

The economy can do better by trading intertemporally. Intertemporal trade takes place through the financial market. Suppose that there is no inflation, so that the good is worth $1 today and tomorrow. The relevant price in this model is the nominal interest rate $i$. It determines the relative price of present consumption in terms of future consumption, $P^P/P^F$. Suppose you have $1 to spend and you should decide whether to use it to consume today or tomorrow. By consuming today you can afford one unit of the good, but if you invest $1 in the financial market today you will get $(1+i)$ tomorrow, so you will be able to afford $1+i$ units of the good tomorrow. Therefore, consuming today involves an opportunity cost given by the interest rate, and $P^P / P^F = 1+i > 1$. Following a similar argument, you can conclude that the relative price of future consumption is $P^F / P^D = 1/(1+i) < 1$. 

![Diagram showing the production possibility frontier with points for present and future consumption.](image)

Future consumption

$Q^F_2$

0

$Q^P_2$

$Q^P_1$

Present consumption

If the economy does not trade intertemporally, consumption is limited to points on the production possibility frontier. If present consumption is $Q^P_1$, there is nothing left for future consumption. But if present consumption is $Q^P_2$, then future consumption is $Q^F_2$. In this case the difference $Q^P_2 - Q^P_1$ represents the economy’s investment.
If you have access to the financial market, you don’t need to consume at a point on the production possibility frontier. You will be able to choose a production point on the PPF and a consumption point above the PPF, enhancing your utility. The consumption point should be, nevertheless, on your intertemporal budget constraint (IBC). This means that the total value of your consumption over time should be equal to the value of your production over time:

$$P^p C^p + P^f C^f = P^p Q^p + P^f Q^f,$$

where $C^p$ and $C^f$ denote present and future consumption. Using $P^p$ as numéraire, and letting $W$ denote wealth, we can write the IBC as

$$C^p + (1/1+i)C^f = Q^p + (1/1+i)Q^f = W$$

or as

$$C^f = (1+i)W - (1+i)C^p.$$

Let’s now add the IBC to the graph:

The optimal production point for this economy is where the PPF is tangent to the IBC. (Why?) The optimal consumption point is where the IBC is tangent to an indifference curve. Depending on the location of the consumption point compared to that of the production point, a country can be classified as either a borrower or a lender. The diagram in the next page shows a borrower.
A borrower consumes in the present more than it produces. The difference, $C^p - Q^p$, represents the amount borrowed. The borrower will be able to enjoy more consumption in the present, but in the future it will need to consume less than it will produce. This difference $Q^f - C^f$ represents the amount of the loan plus interest, $-(1+i)(C^p - Q^p)$, that the borrower must repay to the lender.
A lender, on the other hand, consumes less than it produces in the present. The difference, $Q^p - C^p$, represents the amount of the loan it is lending. In compensation for sacrificing present consumption, the lender will be able to consume more than it produces in the future. The difference, $C^F - Q^F$, is the loan plus interest, $-(1+i) \cdot (Q^p - C^p)$.

Given this model, which countries are likely to be lenders and which countries are likely to be borrowers in the international financial market? If we assume, similarly to the Heckscher-Ohlin model, that preferences are the same across countries and that there is a perfectly competitive international financial market with a unique interest rate, comparative advantage in intertemporal trade will be determined by the differences in the PPFs. It is plausible to assume that developed countries have PPFs that are pretty symmetric. Developing countries, on the other hand, are likely to have PPFs biased toward the future. In the present, they are likely to have a scarcity of some important resources, such as capital and technology but they might have abundant natural resources that remain unexploited. These countries might be able to expand future production substantially compared to developed countries.

Given the above assumptions, it is easy to figure out that in autarky the interest rate will be higher in developing than in developed countries. (Show it.) Hence, intertemporal trade would be able to benefit both groups of countries. (Show it.) In an intertemporal trade equilibrium, the developed country produces more than it consumes in the present and loans this difference to the developing country. That loan allows the developing country to achieve a higher level of consumption in the present and also to devote more resources for future production, moving the production point along the PPF in the North West direction. In the future, the developing country produces more than it consumes in order to repay the loan plus interest to the developed country.