Instructions for use

Title
ECONOMIC GROWTH AND INTERNATIONAL TRADE (2): Rybczynski Line and Engel Line

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VI.

We saw, through the above sections*, that the economic growth, whether caused by a factor accumulation or technological progress, made the production possibilities frontier shift outward in five different ways. And we also realize that “an offer curve”, which shows the intention to make an international exchange, might be moved out in five ways in accordance with the effects of economic growth on “the triangle of trade”. Let us start to examine in detail how an offer curve would be changed.

(1) Neutral case

First, let us investigate a case where the neutral economic growth occurs in country A (has comparative advantage in good X) and then, the production possibilities frontier shifts outward from AA to A'A' as showed in Figure 9-(a). Since, throughout this paper, we assume the prevailing price ratio (the slope of the consumption possibilities line MN or M'N') remains unchanged, the triangle of trade expands from \( \triangle CQP \) to \( \triangle C'Q'P' \) in Figure 9-(a). This means country A's offer curve OA, *ceteris paribus*, shifts rightwards as OA' shown in Figure 9-(b). In this case, Rybczynski line and Engel line intersect at the origin.

* See my paper “Economic Growth and International Trade” HOKUDAI ECONOMIC PAPERS. Vol. IV, 1974-75.
(2) Pro-trade bias case

Second, we consider a case in which the type of economic growth is an export-biased one. The production possibilities frontier AA moves in favor of exportables X as A'A' showed in Figure 10-(a). Rybczynski line and Engel line intersect acutely at the northeast of the origin. The expansion rate of triangle of trade is greater than that in a neutral case, which means this country wishes to offer more good X in exchange for more good Y before Pregrowth. Therefore, this country's offer curve should be moved rightwards fairly wider than a neutral case.

(3) Anti-trade bias case

The third case is an import-biased one in which the production possibilities frontier AA moves in the inclination to importables Y as A'A' represented in Figure 11-(a). In this case, the triangle of trade is still to be expanded, but it should be noted that the rate of expansion is much smaller than that of a neutral case, not to mention a pro-trade bias case.
Consequently, the rightward shifting of an offer curve is obliged to be much smaller than any of the above cases, too. Even though economic growth of this type increases production in both commodities, domestic production of importables $Y$ expands more rapidly than for exportables $X$, and it partly gives rise to the import substitution.

4) Ultra-pro-trade bias case

This is the aforementioned reinforced pro-trade bias case. The production possibilities frontier shifts outward to an extreme in favor of exportables $X$. As a result, Rybczynski line and Engel line intersect obtusely at the northeast of the origin, and the triangle of trade is very rapidly expanded ($\Delta CQP$ to $\Delta C'Q'P'$ as showed in Figure 12-(a)). Then, the offer curve is shifted rightwards in large scale like $OA'$ in Figure 12-(b).

5) Ultra-anti-trade bias case

Finally we examine a case where the ultra-import biased growth takes place. In this case, as already stated, there is a possibility that Rybczynski line and Engel line intersect within the region between two consumption possibilities line $MN$ (pregrowth) and $M'N'$ (postgrowth). If such a drastic change gets rise, the reversal of trade pattern occurs: this country will export good $Y$ and import good $X$. For simplicity we will exclude this possibility in the present discussion. In any case, we must realize that, different from the above four cases, such a biased economic growth makes world trade surely shrink. Because the increasing rate of production in exportables $X$ is much smaller than the increasing rate of production in importables $Y$, and moreover, the income elasticity of demand for good $Y$ is less than unity, in spite of economic growth, the propensity to engage in foreign trade declines. Therefore, contrary to the previous four cases,
ceteris paribus, the amount of foreign trade should be reduced.

VII.

Investigating the above five cases, we can grasp the relationship between the type of economic growth and the shift pattern of an offer curve. If we assume that there is no economic growth in the partner of this country, country B, we can see how the equilibrium terms of trade and quantity of trade change in accordance with different types of economic growth in country A. Observing Figure 14, we are able to draw obvious conclusions as to the effect of the economic growth type on the terms of trade. This figure, however, is drawn under the presumption that the rate of economic growth in this country remains constant in irrelevance to the varieties of economic growth. Therefore, we may give attention solely to the shifting pattern of an offer curve caused by the type of economic growth. In Figure 14, OA and OB indicate the offer curves of pregrowth in country A and country B respectively. And ON, OE, OM,
OU_E and OU_M represent five kinds of offer curves of postgrowth in country A (i.e., ON: neutral type, OE: pro-trade bias type, OM: anti-trade bias type, OU_E: ultra-pro-trade bias type, OU_M: ultra-anti-trade bias type). Except ultra-anti-trade bias case, the remaining four cases shift rightwards and the shifting rate is the largest in ultra-pro-trade bias case, OU_E, and is the smallest in anti-trade bias case, OM. Thus, the terms of trade in these four cases, as showed in Figure 14, get worse to country A and the rate of aggravation is consistent with the shifting rate of the offer curve. On the contrary, since the offer curve in an ultra-anti-trade bias case moves leftwards, the terms of trade should be better for this country and the equilibrium volume of trade is to be reduced.

VIII

The conclusions on the change of terms of trade in the preceding section are based on the assumption that nothing happens in country B. Now let us take into account economic growth in country B. If we recognize economic change in country B also, the situation becomes more complicated and then, we cannot find satisfactory solutions for the change of terms of trade. The reason is that the terms of trade not only depend upon type of economic growth, but also rate.

Now, let \( \dot{Q}_A \) and \( \dot{Q}_B \) stand for the rate of economic growth (the increasing rate of total product for a given time) in countries A and B, respectively. We can distinguish three relationships among them as follows:

(i) \( \dot{Q}_A = \dot{Q}_B \)

(ii) \( \dot{Q}_A > \dot{Q}_B \)

(iii) \( \dot{Q}_A < \dot{Q}_B \)

Since, as is already seen, there are five varieties in economic growth type, taking into account three relationships in economic growth rate of both countries, there would be 75 possibilities in all as to the direction and range of the shifting of an offer curve in this two-country model. But, because about a half of them have the same or similar characteristics and some of them are not necessarily worthwhile to investigate, we need not examine all cases. It is enough to consider some representative ones.

For simplicity we will restrict combinations of economic growth types in both countries to five cases as follows:

Case 1: both countries are a neutral type.

Case 2: country A is a pro-trade bias type and country B is an anti-trade bias type.
Case 3: country A is an anti-trade bias type and country B is an ultra-anti-trade bias type.

Case 4: country A is an ultra-anti-trade bias type and country B is an ultra-pro-trade bias type.

Case 5: both countries are ultra-pro-trade bias type.

### TABLE 1 CHANGE OF TERMS OF TRADE IN COUNTRY A

<table>
<thead>
<tr>
<th>growth rate</th>
<th>case</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Q_A = Q_B$</td>
<td></td>
<td>C</td>
<td>U</td>
<td>U</td>
<td>F</td>
<td>C</td>
</tr>
<tr>
<td>$Q_A &gt; Q_B$</td>
<td></td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>F</td>
<td>U</td>
</tr>
<tr>
<td>$Q_A &lt; Q_B$</td>
<td></td>
<td>F</td>
<td>O</td>
<td>U</td>
<td>F</td>
<td>F</td>
</tr>
</tbody>
</table>

F: favorable, U: unfavorable, C: constant, O: obscurity.

The possible combinations of these five growth types and three growth rates are 15 in all as shown in Table 1. This table shows changes of terms of trade judged from the position of country A only. We cannot draw definite conclusions from this table, because the effects of economic growth on the terms of trade are very complicated in the case where both countries experience economic growth simultaneously. Nevertheless, some generalities can be pointed out.

### IX

It can be seen, through the above sections, that the terms of trade in the world economy depend upon the synthetic effects of the direction and the rate of relative shift of an offer curve in both countries. And we have learned that the relative shift of an offer curve relies on type and rate of economic growth in both countries. Even though the eventual situation is complicated and it is very difficult to formulate a general principle, we can draw the following conclusions:

(i) If the economic growth rate is the same in both countries, the change of terms of trade solely depends upon the type of economic growth. Namely, the rightward shifting rate of the offer curve is larger in a neutral case than an anti-trade bias case, larger in a pro-trade bias case than a neutral case, larger in an ultra-pro-trade bias case than a pro-trade bias case. Therefore, if the rate of growth is equal and bias type of growth is the same in both countries, the terms of trade remain changeless between them.

(ii) In the case where the bias type of growth is the same, except an ultra-anti-trade bias case, the terms of trade in the country with a larger growth rate always worsen.
(iii) On the other hand, in the case of an ultra-anti-trade bias, the terms of trade in the country with a larger growth rate surely improve. This conclusion is true, to say nothing of the case in which the home and the foreign growth type are an ultra-anti-trade bias and some other types except an ultra-anti-trade bias, even though both growth types are an ultra-anti-trade bias.

REFERENCES