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Sustainable economic development and growth: roles played by agglomeration economies on regional policy

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Abstract The evaluation of economic development level is commonly measured by the growth rate of GDP. However, this single-dimensional measurement may cause potential issue to investigate sustainable economic development and growth model. An alternative framework is introduced to economic development analysis that includes the notion of growth feasible indicator (GFI). This indicator enables the examination to observe the potentiality of economic growth in the long run, which is normally hidden in the established model framework. The relationship between the GFI curve and public policy for sustainable development is also explored.

JEL Classification: D62; F12; O47; Q56; R58

Keywords: Economic development; growth theory; sustainable policy

1 INTRODUCTION

The extent of economic development and growth in a country is commonly measured by its GDP level. Since this measurement is useful to reveal the rate of economic growth within the nation and also to compare those levels between different countries, developed countries typically aim to maintain their stable level, and developing countries pursue to increase the value of this particular index. The GDP level may increase as the quantity of output enlarges along the locus of a given growth feasibility indicator (GFI) curve, if all other conditions are fixed constant. Here, the GFI may have similarity to the production function of producers in microeconomic terms. It is found in this analysis that the formation of GFI has to be changed as the growth stage upgrades. The initial part of three parts of the paper examines an alternative economic development and growth model. The

second part investigates the impact of changes in economic policy on GFI formation process. The final part of the paper explores policy implications for sustainable economic growth in a country within this alternative framework.

Since earlier theoretical establishment of economic development and growth (see North 1955; Tiebout 1956; Rostow 1956; Hirschman 1958), there have been various attempts to analyse long-run sustainable economic development. For sustainability, additional elements such as environmental factors have important roles to work with economic development policy. This point was initially argued in Siebert (1973) with respect to the relationship between negative externality and regional economic growth. In addition, Richardson (1978) indicated the importance of the quality of development and environment. As argued in Richardson and Townroe (1986; 652), developing country typically achieves faster economic growth. However, those countries have little concern of issues on sustainability in many cases. Since the structural difference between developing and developed countries has not been fully examined in terms of economic growth, the analysis attempts to compare these differences, and each corresponding governmental policy is considered.

2 THE MODEL

The main element of the alternative model framework is a GFI curve as illustrated in Fig. 1. In the figure, the curve Y_β shows a locus of GFI in a representative developing country. As the quantity of output increases, the GDP level enlarges rapidly on the beginning of economic growth. From certain point, the growth rate becomes gradually slower. Let us assume that output level is q_β and the corresponding GDP level is Y_1 . Under this circumstance, increases of the quantity of output do not efficiently reflect enough to the GDP level. The critical level can be indicated at the combination of \tilde{q}_β and \tilde{Y}_β . In order to keep such efficiency for larger scale of output, the restriction should be released at a higher level. The curve Y_α is assumed as a level of GFI in a developed country. Under this circumstance, the GDP level can be achieved by the quantity of output \bar{q} , which is much smaller than q_β . Also, the critical point appears much larger scale at the combination of

\tilde{q}_α and \tilde{Y}_α , by comparison with the combination of \tilde{q}_β and \tilde{Y}_β . These imply that a sole achievement of higher output level does not indicate real economic growth of a country. The more important interpretation is that the higher possibility level of the curve is much more preferential in terms of higher performance of productivity. However, it is not possible to select the upper curve from the beginning stage, which may be exemplified by a gear system of vehicle. In other words, a vehicle cannot start with the 5th gear but with the 1st or 2nd gear. In economics, the difference between two curves Y_α and Y_β can be regarded as the fundamental capacity of the economy. Also, this level may be able to upgrade but difficult to downgrade. During the lower stage, countries do not have sufficient stock of currency and these countries are generally available financial support and aid from developed nations. As the GFI level grows up, these support and aid may gradually be reduced. Once the nation is recognised as a developed country, the position becomes opposite and they are required to transfer those support to developing countries. This can be examined in a formal representation.

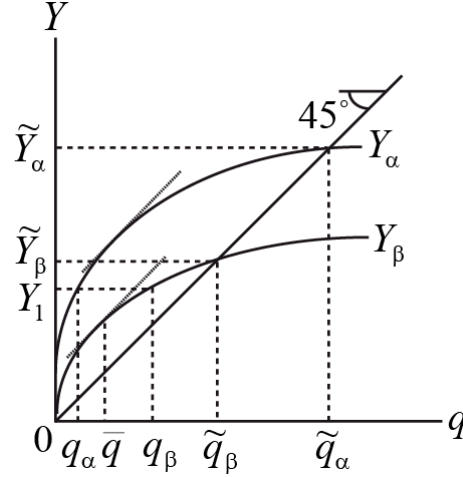


Fig. 1 Growth constraint and advantage in developing countries

The GFI in a developing country Y_β is given as the following equation.

$$Y_\beta = A_\beta q^\delta + F_\beta \quad (1)$$

where A_β = a non-negative constant variable, q = output level, δ ($0 < \delta < 1$) = productivity index and F_β ($F_\beta > 0$) = a fixed element. Similarly, the GFI in a developed country is given as:

$$Y_\alpha = A_\alpha q^\sigma + F_\alpha \quad (2)$$

where A_α = a non-negative constant, σ ($0 < \sigma < 1$) = productivity index and F_α ($F_\alpha > F_\beta$) = a fixed element. In Fig.1, the critical output level for each case can be solved as:

$$\tilde{q}_\beta = A_\beta q^\delta + F_\beta - q = 0 \quad (3)$$

$$\tilde{q}_\alpha = A_\alpha q^\sigma + F_\alpha - q = 0 \quad (4)$$

As a numeric example, if $A_\beta = 1$, $\delta = 0.5$ and $F_\beta = 0.4$, then:

$$\tilde{q}_\beta = q - q^{0.5} = 0.4 \quad (5)$$

Similarly, if $A_\alpha = 1$, $\sigma = 0.5$ and $F_\alpha = 0.8$, then:

$$\tilde{q}_\alpha = q - q^{0.5} = 0.8 \quad (6)$$

3 THE IMPACT ANALYSIS

The impact of changes in the GFI level shifted from Y_β to Y_α on cost and revenue function is examined in this section. The upward shift of the GFI from Y_β to Y_α not only increases price level but also production cost, which may cause profit reductions. Now it is assumed in the market that there are two types of product-differentiated substitutive commodities. One is a high quality of product q_H that is locally produced in a higher GFI condition, and the other is a low quality of product q_L that is imported from lower GFI countries. Once a country achieved at a higher GFI condition, the domestic production cost on average will be increased, and the higher quality of goods q_H can be more consumed. If the consumption ratio of q_H is defined as P , and that of q_L is $(1-P)$, the real economic growth increases the value of P . By contrast, economic depression may decrease revenue and P therefore $(1-P)$ will increase. These cause decline of w_H^*/w_L^* (wage-level ratio) and $(1-P)$ is more increasing. Meanwhile, import substitution reduces price level which can be assembled lower cost level.

Within this framework, an increase of price level brings upward shift of wage level therefore the opposite force also works as well. Also, an increase of w_H^*/w_L^* reduces $(1-P)$ and P increases. The market competition between two types of production differentiated scenario is illustrated in Fig. 2. Here, higher quality of production has attributes of higher cost and more inelastic revenue functions than those of lower quality of products. The impacts of shifts in these functions on the ratio of unit cost and price between two producers can be observed by the loci of coordinates in the quadrants II and IV, respectively.

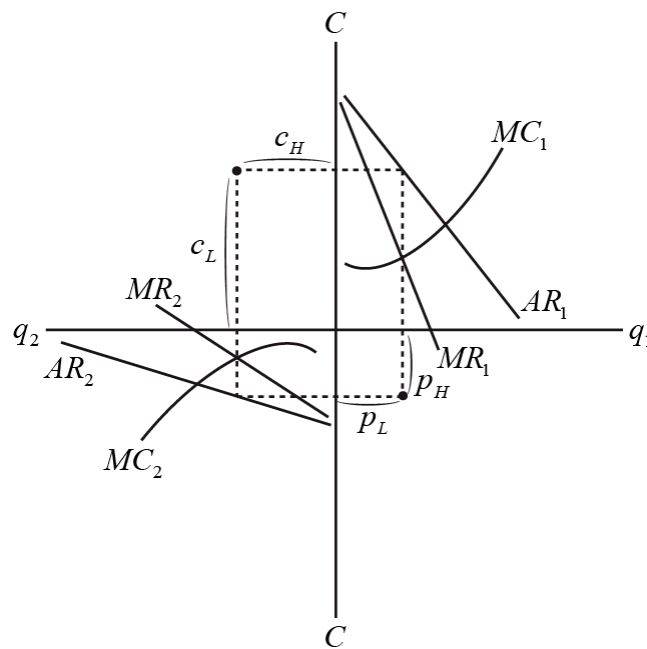


Fig. 2 Import substitution and differentiated market

In order to integrate the notion of growth feasibility index, the GFI is assumed to have a linear formation for reasons of simplicity. In addition fixed elements are also excluded from the analysis. The alternative circumstance is given in Fig. 3. In order to achieve any arbitrary y axis level, the required amount of output q is always larger in the lower type at $b/(b+d)$.

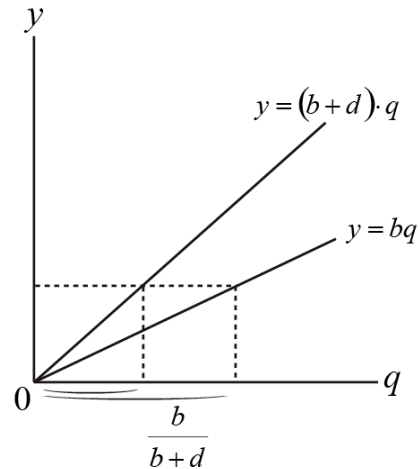


Fig. 3 The slope shift and x-axis ratio

4 POLICY IMPLICATIONS

Within a nation, one-way factor movement may be allowed if it is necessary to do so as a national economic policy. As shown in Fig. 4, the GFI level can be expanded by increasing the capacity of production feasibilities set, applying the regional comparative advantage transfer mechanism.

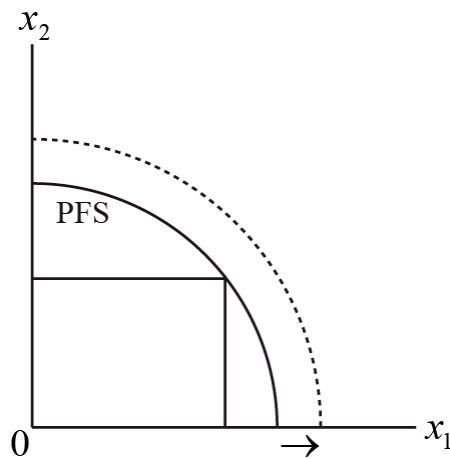


Fig. 4 Expansion of PFS by location shift

However, such transfer cannot be observed for international trade. In internal market system, the social optimal behaviour of consumers and producers to buy at a proper price is easily broken therefore price mechanism brings product price to reduce. If the domestic industries face difficulties to maintain paper price levels, public authority needs to consider

policy remedy for certain protection. It is commonly known to increase tariff for the long run and provide safeguards for the short run. However, such policies normally face concerns of the guideline of WTO protocol. In addition, these decrease the incentive of domestic producer to make appropriate effort against market competition. Under the perfectly competitive market in a uniform condition, the more advantageous producers can be survived in the market. However, it is common that developed countries suffer from price-differential opportunity of international trade. Also, the imported products have no information about safety and quality standard.

Now an example is considered. First, it is assumed that a country *A* costs watermelon growing \$2 per unit (water, feed and machinery fuel as investment, and wages and other living prices, paying high tax to receive higher quality of life). By contrast, a country *B* costs watermelon growing \$1 per unit (the same but paying negligibly small amount of tax). Market price in country *A* is \$3, while market price in country *B* is \$2. If goods are traded between two countries, the producer in country *A* has no profit and loses shipping cost, tariff and transaction costs therefore no trade is attempted. By contrast, the producer in country *B* loses shipping cost, tariff and transportation costs but make certain profit \$2 per unit of sales which is much higher than the sales in the own country. In that case, there are some problems that the country *B* may have scarcity of domestic supply and also the producer in country *A* is completely alternated agricultural products sales (phenomena of industrial decay), as illustrated in Fig. 5.

One of solutions in the country *A* may be to assist (not pecuniary but technologically) from the tax revenue to protect the domestic producer without making safeguard protection. Or, create product differentiated market structure; high price but high quality or low price but low quality. However, this generates a problem of lemon market due to incomplete information of products particularly for food in public places and food processors those who solely pursue profit maximization without proper safety guidelines. An alternative solution may be an innovation strategy to create new differentiated products. However, it can be easily broken unless certain intellectual property protection is validated.

In conclusion, there are three factors which should be included in domestic products in developed countries to protect domestic economic activity. The first is perfect

information that enables consumers to distinguish between high quality domestic products and others. The second is agglomeration economies which minimise profit-level differences between higher price domestic products and lower price foreign products. Finally, the quality of life of consumers has to be improved as the GDP level increases. This may contribute to enhance overall sustainable economic activity through proper price policy which is led by several representative countries within the EU.

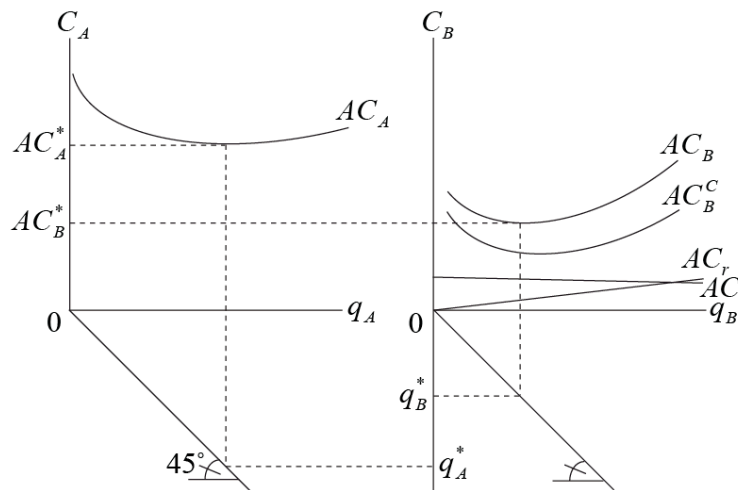


Fig. 5 Price competition and trade

5 CONCLUDING COMMENTS

In order to enhance regional comparative advantage within a country, interregional trade should be encouraged and therefore specialised industries in particular localities should be more expanded as a national economic development policy. This is for the purpose of minimising comparative-advantage trade from foreign countries. In other words, the failure of regional development may easily alternate supply of goods by import from overseas. In particular, necessity goods such as agricultural products can cause serious damages for domestic economic activity in the long-run perspective.

If a country has competent long-run product-differentiated output including intellectual technology, it is possible to sustain competitive and comparative advantage in

terms of international trade. However, even though there are highly advanced technologies, it is easily transferred or copied to somewhere else nowadays. While those are literally protected by law actions such as international patent scheme, it is difficult to aim at a complete protection. If the transferred countries are developing countries which are still available for competent lower wage level, the original country may lose the competition power at once as long as the market is controlled by price mechanism under incomplete information. In that case, the competition loser has losses in fixed cost for settlement investment and in creation of employment, which is more serious in developed countries, which have highly structural prices of goods and services as well as highly tax payment system. As indicated in the main part of the paper, it is more severe for those countries to achieve a prompt and sustainable additional growth.

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