Chapter 32

Revisiting the Problem of Regional Allocation of Investment:
Aggregate Efficiency or Regional Equity?

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ABSTRACT

This note attempts to rekindle interest on the problem of regional allocation of investment and detect cases of compatibility between two often competitive aims, namely aggregate efficiency and interregional equity.

INTRODUCTION

Michel et al (1983) developed a model of regional allocation-of-investment that explicitly embodies two competitive aims, 'aggregate efficiency' and 'interregional equity'. According to their analysis, there is only one case of compatibility is possible. A simple modification of the objective function, however, allows detecting more such cases. In order to achieve this, the note is divided into three further sections. Section 2 provides a discussion of salient strands in the relevant literature which have important bearing on the regional allocation-of-investment. Section 3 then outlines an alternative framework, suitable to increase national output together with an allocation in favour of the lagging regions. Section 4 summarises the arguments and considers lessons for policy making.

REGIONAL ALLOCATION OF INVESTMENT

Intriligator (1964), building upon the work of Rahman (1963) and supplemented by Takayama (1967), showed that Optimal Control Theory (hereafter OCT) enables to maximise national output in a two-region economy by allocating savings across regions. Initially, savings are allocated to the region with

the higher growth rate and subsequently to the region with the higher output/capital ratio. Nevertheless, if regional incomes differ at an initial time, this policy might lead to increasing, and persisting, regional inequalities. Interregional equity might arise, although this cannot be said with confidence since the aim is to maximise total income. Is it feasible, however, to obtain maximum output for the economy as a whole and reducing regional income inequalities? Stated in alternative terms, is there a way to achieve simultaneously the aim of aggregate efficiency and regional equity? At a first sight there seems to be a 'trade-off' between these aims. Nevertheless, under certain conditions a redistribution policy might help to avoid this conflict.

This line of thought has been carried further by Michel et al (1983) in which the objective function appears with two, competitive, concerns. One related to maximisation of total income (aggregate efficiency) and another to the equalisation of regional incomes (regional equity). According to their conclusions, for a given level of interregional inequalities, there is only one case where the two concerns are compatible. Ever since, this issue has remained a rather unexplored area. However time change. Nowadays the compatibility in aims is a topic that appears to be attracting increasing attention and interest amongst policy-making bodies. It is possible that several cases of compatibility can be detected even if the objective function aims exclusively to maximise national income. A slight modification of the objective function, however, is necessary. The purpose of this next section is to contribute in that direction.

AN ALTERNATIVE PERSPECTIVE

Consider a 'two-region' economy[1] characterised by a fixed capital coefficient - constant returns production function $Y_i = v_i K_i$ and a saving's function of the form $S_i = s_i Y_i$, $\forall \, i = 1,2$ then capital accumulation evolves as $\dot{K}_1 + \dot{K}_2 = \gamma_1 K_1 + \gamma_2 K_2$, where the term $\gamma_i = s_i v_i$ can be interpreted as the autonomous growth rate of each region. Total savings are pooled in a central agency and then allocated to one region. Once capital is placed in one region, it cannot be shifted into the other region[2]. In other words, at any point in time the optimal value of the allocation parameter, δ, is either $\delta^*(t) = 0$ or $\delta^*(t) = 1$.

Planners wish to achieve simultaneously maximum total income (aggregate efficiency) and equalising regional incomes (regional equity) at a terminal time (T) or at least to reduce the initial income 'gap' between the two regions, defined as $Y_1(0) - Y_2(0) \equiv G_{1,2}(0) > 0$; hence $G_{1,2}(t) \to 0$, as $t \to T$. Attaching a weight to each region (ω_i) incorporates the aim of regional equity, although indirectly, in the objective function[3]. Based on the initial 'gap' in regional incomes, the aim of regional equity can be specified further by imposing $\omega_1 < \omega_2$. This might very well be a fruitful angle from which to appraise the possibility of achieving the two aims simultaneously.

Using OCT as the basic vehicle of analysis the problem is defined as $\underset{\delta}{Max} \, Y_N(T) = \omega_1 v_1 K_1(T) + \omega_2 v_2 K_2(T)$, subject to the constraints $\dot{K}_1 = \delta(\gamma_1 K_1 + \gamma_2 K_2)$, $\dot{K}_2 = (1-\delta)(\gamma_1 K_1 + \gamma_2 K_2)$ and $0 \le \delta \le 1$. The problem can be solved by identifying the value of $\delta(t)$ that maximises the Hamiltonian function, $H = [\delta(p_1 - p_2) + p_2](\gamma_1 K_1 + \gamma_2 K_2)$, where p_1 and p_2 are the auxiliary variables, frequently referred to as the implicit price of capital. Lemma 1 and 2 develop the optimality conditions over a given planning period, let $[0 \dots T]$.

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