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EVALUATION OF REGIONAL DEVELOPMENT POLICY-AN ALTERNATIVE APPROACH

by

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EVALUATION OF REGIONAL DEVELOPMENT POLICY-AN ALTERNATIVE APPROACH

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As a theoretical basis in evaluation of regional development policies which include capital subsidy in the form of low interest rate financing, we have the famous Borts' criteria. The Borts' criteria, however, presupposes the existence of immobile labor force as idle resource in a specific region, and this assumption makes them practically inapplicable to the situation of present Japan where the interregional mobility of labor force is extremely high. Only way to justify the meaningfulness of regional development policies with subsidy in Japan is to take the dispersion of population as a supreme social policy objective and to evaluate relative cost-effectiveness of alternative economic policies instead of cost-benefit approach of the Borts' criteria. In the present paper, different economic policies to attain a desired distribution of population between two regions are compared from the viewpoint of social cost as well as that of amount of subsidy needed.

INTRODUCTION

As a method of efficiency evaluation of alternative subsidy programs for the purpose of regional development, there is the famous and clear-cut analysis by George H. Borts (Borts [1966]). The Borts' criteria which were developed in his analysis were scrutinized by the Present another (Sakashita [1970]), and recently they were extended to the case in which the cost of interregional migration was taken into account (Boadway and Flatters [1982]).

In all cases cited above, however, the theoretical prerequisite of the analysis is the existence of an immobile factor of production (usually the labor force) in a specific region of the nation.
In Japan nowadays, we have extremely high mobility of the labor force among regions, and this makes the application of the Borts' criteria to

techniques is determined by Equations (6) and (7) independently of the value of $\bar{k}$, national capital-labor ratio as far as there exists an interior solution.

Now we leave the world of unintervened free market, and we assume that there is a preassigned value of n_1, i.e. $\bar{n}_1$ as a supreme policy objective. (Needless to say, $\bar{n}_2 \equiv 1 - \bar{n}_1$.) Then we have one relation for k_1 and k_2:

(10) $\bar{n}_1 k_1 + (1 - \bar{n}_1) k_2 = \bar{k}$.

Therefore, there is only one degree of freedom for k_1 and k_2 in this case. The problem of regional development policy now becomes that of choosing another relation between k_1 and k_2 according to some 'sub-optimizing' criterion.

Consider the following sub-optimizing proglem:

(11) Maximize $\{x = \bar{n}_1 f_1 (k_1) + (1 - \bar{n}_1) f_2 (k_2)$: national average of per capita output$\}$ under the constraint of (10).

It is easily shown that the optimizing conditions for (11) are given by the combination of:

$$\left.\begin{array}{ll}(10) & \bar{n}_1 k_1 + (1 - \bar{n}_1) k_2 = \bar{k}, \\ (12) & f_1' (k_1) = f_2' (k_2)\end{array}\right\} \text{Wage Subsidy Solution.}$$

The reason why we call this combination the wage subsidy solution is that it prohibits any policy intervention in capital market as shown by Equation (12) which has the same form as Equation (6). Instead, Equation (7) must be violated for the solution k_1 and k_2 of Equations (10) and (12) that means the necessity of some wage subsidy program for one of regions.

In other words, the combination of Equations (10) and (12) is nothing other than a proof of the fact that the wage subsidy is the best policy in order to achieve a given goal of interregional labor (population) distribution.

In comparison with the market solution given by Equations (6) $\sim$ (9), the wage subsidy solution can be said the second best solution in the sense that it minimizes the loss of national output induced by a compulsory goal of labor force distribution. The loss can be taken as the social cost which is brought by such a social goal.

If we assume that region 1 is less productive than region 2 in the market solution:

(13) $f_2\ (\hat{k}_2) > f_1\ (\hat{k}_1),\ \hat{k}_2 > \hat{k}_1$ for the solution $\hat{k}_1$ and $\hat{k}_2$ of Equations (6) $\sim$ (9),

the national per capita amount of subsidy for any subsidy policy to attain the goal $(\bar{n}_1,\ 1 - \bar{n}_1)$ which is not so far from the market solution $(\hat{n}_1,\ 1 - \hat{n}_1)$ can be expressed as:

(14) $s = (f_2' - f_1')\ k_1 + \{(f_2 - k_2\ f_2') - (f_1 - k_1\ f_1')\}.$

Now we can formulate another optimizing problem as follows:

(15) Minimize s

under the constraint of (10).

It is rather easy to show that the secondary condition of minimizing is satisfied for this problem if $f''' \underset{=}{\sim} 0$. Therefore, in that case a necessary and sufficient condition for the minimization of s is:

(16) $-f_2'' \ /\ (\frac{f_2' - f_1'}{k_2 - k_1}) = \frac{1 - \bar{n}_1}{\bar{n}_1}$,

which is not so easy to understand. Now we have another combination of conditions to achieve the social goal, i.e.

(10) $\bar{n}_1\ k_1 + (1 = \bar{n}_1)\ k_2 = \bar{k}$

(16) as above

} Minimum Subsidy Solution

For this combination, there is reproduction of neither (6) nor (7) so that we must have a mixture of wage and capital subsidies in order to minimize the amount of subsidy. Also we have shown that the policy which minimizes the amount of subsidy does not coincide with the policy which minimizes the social cost of the preassigned goal.

Returning to the wage subsidy solution, the effect of a small change in the assigned value of $\bar{n}_1$ can be calculated by the method of comparative statics, and we have:

$$(17)\quad \frac{dk_1}{d\bar{n}_1} = \frac{(k_2 - k_1)\, f_2''}{\bar{n}_1\, f_2'' + (1 - \bar{n}_1)\, f_1''},$$

$$(18)\quad \frac{dk_2}{d\bar{n}_1} = \frac{(k_2 - k_1)\, f_1''}{\bar{n}_1\, f_2'' + (1 - \bar{n}_1)\, f_1''},$$

$$(19)\quad \frac{dx}{d\bar{n}_1} = (f_1 - k_1\, f_1') - (f_2 - k_2\, f_2') = w_1 - w_2.$$

As before, if we assume that the wage subsidy solution is not so far from the market solution and $\hat{k}_2 > \hat{k}_1$ for the latter (see Relation (13)), we can safely say that:

$$(20)\quad \frac{dk_1}{d\bar{n}_1} > 0\ ,\quad \frac{dk_2}{d\bar{n}_2} > 0.$$

In addition, if we assume that region i is wage-subsidized, we have the following relations:

$$(21)\quad \bar{n}_1 > \hat{n}_1 \qquad (\hat{n}_1 \text{ is the market solution})$$

$$w_1 < w_2.$$

Here wi denotes, of course, the wage rate in region i <u>net of</u> subsidy. Wage rates are equated between regions with a wage subsidy program.

It is clear from (19) and (21) that if one wishes to increase the labor force share of region 1, which is already wage-subsidized, further, the national average per capita output decreases further, i.e. there will be additional social cost involued in the increase of $\bar{n}_1$.

If the initial value of $\bar{n}_1$ is equal to $\hat{n}_1$, the market solusion, then obviously we have $\left(\frac{dx}{d\bar{n}_1}\right)_{\bar{n}_1=\hat{n}_1} = 0$ because of Equation (7).

We can, however, show that:

$$(22)\quad \left(\frac{d^2x}{d\bar{n}_1^2}\right)_{\bar{n}_1=\hat{n}_1} = (k_2 - k_1)^2 \frac{f_1''\ f_2''}{\bar{n}_1\ f_2'' + (1 - \bar{n}_1)\ f_1''} < 0\ ,$$

which implies that the national productivity always decreases when $\bar{n}_1$ departs from $\hat{n}_1$ in either direction. Equation (22) also implies that $\frac{d(w_1 - w_2)}{d\bar{n}_1} < 0$ so that as $\bar{n}_1$ becomes bigger and bigger than $\hat{n}_1$ then the discrepancy between w_1 and w_2 becomes bigger too so that more amount of wage subsidy is needed.

Finally let us consider the case of capital subsidy. We have the following relation in this case:

$$\left.\begin{aligned} &(10)\quad \bar{n}_1\ k_1 + (1 - \bar{n}_1)\ k_2 = \bar{k} \\ &(23)\quad f_1 - k_1\ f_1' = f_2 - k_2\ f_2' \end{aligned}\right\} \text{Capital Subsidy Solution}$$

In this case, any policy intervention in labor market is prohibited as shown by Equation (23) which is the same relation as Equation (7).

As a counterpart to Equations (17), (18), and (19), now we have:

$$(24)\quad \frac{dk_1}{d\bar{n}_1} = \frac{(k_2 - k_1)\ k_2\ f_2''}{\bar{n}_1\ k_2\ f_2'' + (1 - \bar{n}_1)\ k_1\ f_1''}\ , \quad > 0$$

$$(25)\quad \frac{dk_2}{d\bar{n}_1} = \frac{(k_2 - k_1)\ k_1\ f_1''}{\bar{n}_1\ k_2\ f_2'' + (1 - \bar{n}_1)\ k_1\ f_1''}\ , \quad > 0$$

$$\left(\text{if } \bar{n}_1 \underline{\underline{\sim}}\ \hat{n}_1 \text{ and } \hat{k}_2 > \hat{k}_1\right)$$

$$(25)\quad \frac{dx}{d\bar{n}_1} = \frac{\bar{n}_1\ k_2^2\ f_2'' + (1 - \bar{n}_1)\ k_1^2 f_1''}{\bar{n}_1\ k_2\ f_2'' + (1 - \bar{n}_1)\ k_1\ f_1''} (f_1' - f_2') = k^* (\rho_1 - \rho_2),$$

(k^* is a weighted average of k_1 and k_2).

Obviously $\frac{dx}{d\bar{n}_1} = 0$ when $\bar{n}_1 = \hat{n}_1$, but $\frac{dx}{d\bar{n}_1} < 0$ when already $\bar{n}_1 > \hat{n}_1$ and therefore $\rho_1 < \rho_2$ in which ρi is the rental in region i net of subsidy.

It is not easy to obtain the second derivative of x with respect to $\bar{n}_1$, but if we can assume that k^* in Equation (26) is approximately constant, we may have:

(27) $$\left(\frac{d^2x}{d\bar{n}_1^2}\right)_{\bar{n}_1=\hat{n}_1} \cong \frac{k^*}{\bar{n}_1\, k_2\, f_2'' + (1-\bar{n}_1)\, k_1\, f_1''} (k_2 - k_1)^2 f_1'' f_2'' < 0$$

which is analogous to Equation (22). 2)

II. ACTUAL POLICY INTERVENTION AND A NUMERICAL EXAMPLE

In the previous section, we have shown that: (a) In order to attain the desired interregional distribution of labor force, the wage subsidy policy is most effective in the sense that the related social cost is minimized by this policy, (b) For the same purpose, the policy which minimizes the amount of subsidy needed is different from either of wage subsidy or capital subsidy.

In the real world, however, any subsidizing policy is usually implemented on a trial-and-error basis. If we start with a capital subsidy policy, the following system of equations is realized in order to induce the necessary change in n_1:

(28) $n_1\, k_1 + (1 - n_1)\, k_2 = \bar{k}$,

(29) $f_1 - k_1\, f_1' = f_2 - k_2\, f_2'$,

(30) $\lambda f_1' = f_2'$, $\lambda = 1 +$ rate of capital subsidy > 1.

(28)–(30): Capital Subsidy Scheme

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2) Another subsidy solution which can be said a "price subsidy solution" can be expressed as follows:

(a) $\bar{n}_1\, k_1 + (1 - \bar{n}_1)\, k_2 = \bar{k}$,

(b) $pf_1' = f_2'$,

(c) $p(f_1 - k_1\, f_1') = f_2 - k_2\, f_2'$,

in which p is one plus a rate of subsidy to the output of region 1. In this system p is an endogenous variable as well as k_1 and k_2. Probably this price subsidy is more inefficient compared with wage subsidy or capital subsidy.

From this system we can derive:

(31) $\frac{dk_1}{d\lambda} = - \frac{k_2 f_1'}{f_1'' (\lambda k_2 - k_1)}$,

(32) $\frac{dk_2}{d\lambda} = - \frac{k_1 f_1'}{f_2'' (\lambda k_2 - k_1)}$,

(33) $\frac{dn_1}{d\lambda} = - [\frac{f_1'\{n_1 k_2 f_2'' + (1 - n_1) k_1 f_1''\}}{f_1'' f_2'' (\lambda k_2 - k_1)(k_2 - k_1)}]$,

(34) $\frac{dx}{d\lambda} = - \frac{(1 - \lambda)}{\Delta} (f_1')^2\{n_1 k_2^2 f_2'' + (1 - n_1) k_1^2 f_1''\}$,

$$\Delta = f_1'' f_2'' (\lambda k_2 - k_1) (k_2 - k_1) \cong f_1'' f_2'' (k_2 - k_1)^2 > 0.$$

If we assume that $\hat{k}_2 > \hat{k}_1$, i.e. region 1 is less productive in the sense of average productivity, it is derived that: [3)]

(35) $(\frac{dk_1}{d\lambda})_{\lambda=1} > 0$, $(\frac{dk_2}{d\lambda})_{\lambda=1} > 0$, $(\frac{dn_1}{d\lambda})_{\lambda=1} > 0$ (supposing $\hat{k}_2 > \hat{k}_1$).

In addition, it is clear that $\frac{dx}{d\lambda} = 0$ if $\lambda = 1$ and $\frac{dx}{d\lambda} < 0$ if $\lambda > 1$ by Equation (34). This result means that the policy objective of raising n_1 marginally can be realized without much social cost if we start from the market equilibrium.

Turning to the wage subsidy policy, the following system is realized:

(36) $n_1 k_1 + (1 - n_1) k_2 = \overline{k}$

(37) $\mu\{f_1 (k_1) - k_1 f_1'(k_1)\} = f_2 (k_2) - k_2 f_2'(k_2)$,

$\mu = 1 +$ rate of wage subsidy > 1

(38) $f_1'(k_1) = f_2'(k_2)$.

} Wage Subsidy Scheme

For this system we have the following qualitative relations:

(39) $\frac{dk_1}{d\mu} = \frac{-(f_1 - k_1 f_1')}{f_1'' (k_2 - \mu k_1)}$

(40) $\frac{dk_2}{d\mu} = \frac{-(f_1 - k_1 f_1')}{f_2'' (k_2 - \mu k_1)}$

(41) $\frac{dn_1}{d\mu} = [\frac{(f_1 - k_1 f_1') \{n_1 f_2'' + (1 - n_1) f_1''\}}{f_1'' f_2'' (k_1 - \mu k_1)(k_2 - k_1)}]$

3) From the market solution (6)-(9), it is clear that $\frac{f_2 - f_1}{\hat{k}_2 - \hat{k}_1} = f_1' = f_2'$ and therefore $f_2 > f_1$ if $\hat{k}_1 > \hat{k}_2$.

(42) $$\frac{dx}{d\mu} = -\frac{(1-\mu)}{\Delta^*}(f_1 - k_1 f_1')^2 \{n_1 f_2'' + (1-n_1) f_1''\},$$

$$\Delta^* = f_1'' f_2'' (k_2 - \mu k_1)(k_2 - k_1) \cong f_1'' f_2'' (k_2 - k_1)^2 > 0.$$

Under the same assumption as the case of capital subsidy, we can show that:

(43) $$\left(\frac{dx}{d\mu}\right)_{\mu=1} = 0, \ \left(\frac{dk_1}{d\mu}\right)_{\mu=1} > 0, \ \left(\frac{dk_2}{d\mu}\right)_{\mu=1} > 0, \ \left(\frac{dn_1}{d\mu}\right)_{\mu=1} > 0,$$

(supposing $\hat{k}_2 > \hat{k}_1$).

Again $\frac{dx}{d\mu} = 0$ if $\mu = 1$ and $\frac{dx}{d\mu} < 0$ if $\mu > 1$.

In order to compare the capital subsidy policy with the wage subsidy policy more closely, we first calculate the amount of per capita (per labor force) subsidy for each case starting with the state of $\lambda = \mu = 1$. The results are:

(44) $$\theta\lambda = \{f_2'(k_2 + \Delta k_2) - f_1'(k_1 + \Delta k_1)\}(k_1 + \Delta k_1)(n_1 + \Delta n_1)$$
$$= (\lambda - 1) f_1' \cdot (k_1 + \Delta k_1)(n_1 + \Delta n_1) \cong n_1 k_1 f_1' \cdot (\Delta\lambda),$$

for capital subsidy,

(45) $$\theta\mu = \{(f_2 - k_2 f_2') - (f_1 - k_1 f_1')\}(n_1 + \Delta n_1) = (\mu - 1)$$
$$(f_1 - k_1 f_1')(n_1 + \Delta n_1) \cong (f_1 - k_1 f_1') n_1 \cdot (\Delta\mu)$$

for wage subsidy.

Then we define the effectiveness ratio of subsidy in each case by the ratio of Δn, to $\theta\lambda$, or $\Theta\mu$ it is calculated as:

(46) $$\rho_\lambda = \frac{\Delta n_1}{\theta\lambda} = \frac{dn_1}{d\lambda} \cdot (\Delta\lambda)/\theta\lambda = -\frac{\{n_1 k_2 f_2'' + (1-n_1) k_1 f_1''\}}{n_1 k_1 f_1'' f_2'' (k_2 - k_1)^2},$$

for capital subsidy,

(47) $$\rho_\mu = \frac{\Delta n_1}{\theta\mu} = \frac{dn_1}{d\mu} \cdot (\Delta\mu)/\theta\mu = -\frac{\{n_1 f_2'' + (1-n_1) f_1''\}}{n_1 f_1'' f_2'' (k_2 - k_1)^2},$$

for wage subsidy.

From Equations (46) and (47), it can be shown that $\rho\lambda > \rho\mu$ when

$\hat{k}_2 > \hat{k}_1$ and $\lambda = \mu = 1$. This implies that if the subsidized region is the less productive region (in the sanse of average productivity again) - and this is the usual case of regional development policy, the capital subsidy policy is less subsidy-consuming compared with the wage subsidy policy. This property could be one of reasons why the capital subsidy is more preferred in spite of its apparent disadvantage in terms of social cost involved.

As a numerical example, we specify the productivity functions of two regions and national capital labor ratio as follows:

(48) $x_1 = Ak_1^{\alpha_1}$, $x_2 = k_2^{\alpha_2}$, $(A = 1.25,\ \alpha_1 = 0.4,\ \alpha_2 = 0.6)$

(49) $\bar{k} = 3.0$

With this specification, the interregional equilibrium under the particular subsidy scheme is given as follows:

Case of Capital Subsidy

(50-1) $k_2 = \dfrac{\alpha_2(1 - \alpha_1)}{\lambda\alpha_1(1 - \alpha_2)} k_1$, $(k_2 > k_1$ when $\lambda \underset{=}{\sim} 1)$,

(50-2) $k_1 = [(\frac{\alpha_2}{\alpha_1})^{\alpha_2} (\frac{1 - \alpha_2}{1 - \alpha_1})^{1 - \alpha_2} (\lambda^{\alpha_2} A)^{-1}]^{\frac{1}{\alpha_1 - \alpha_2}}$,

(50-3) $n_1 = (k_1 - \bar{k}) / (k_2 - k_1)$,

(50-4) $x = n_1 A k_1^{\alpha_1} + (1 - n_1) k_2^{\alpha_2}$,

(50-5) $\theta\lambda = (\lambda - 1) \alpha_1 A k^{\alpha_1} n_1$.

Case of Wage Subsidy

(51-1) $k_2 = \dfrac{\mu\alpha_2(1 - \alpha_1)}{\alpha_1(1 - \alpha_2)} k_1$, $(k_2 > k_1$ when $\mu \underset{=}{\sim} 1)$.

(51-2) $k_1 = [(\frac{\alpha_2}{\alpha_1})^{\alpha_2} (\frac{1 - \alpha_2}{1 - \alpha_1})^{1 - \alpha_2} \{\mu^{(1 - \alpha_2)} A\}^{-1}]^{\frac{1}{\alpha_1 - \alpha_2}}$,

(51-3) = (50-3),

(51-4) = (50-4),

(51-5) $\theta\mu = (\mu - 1)(1 - \alpha_1)\ A\ k_1^{\alpha_1}\ n_1$.

In addition to the endogenous variables given above, the following indices are calculated:

(52) interregional (average) productivity gap:

$g = x_1 - x_2$,

(53) effectiveness of subsidy:

$\rho_j = \frac{n_1 - n_{10}}{\theta_j}$, $j = \lambda, \mu$, n_{10} is the value of n_1

when $\lambda = \mu = 1$.

(54) effectiveness elasticity of the social cost:

$\eta = -\{\frac{(n_1 - n_{10})}{n_{10}} / \frac{(x - x_0)}{x_0}\}$, x_0 is the value of x when

$\lambda = \mu = 1$.

An exhaustive list of the results is given in Table 1. A remarkable feature of this numerical example is the very high sensitivity of the subsidizing policies. For instance, ten percent rate subsidies ($\lambda = \mu = 1.10$) change the labor force share of region 1 from 62% to 90% (capital subsidy) or to 85% (wage subsidy). This sensitivity is, 1 think, due to the Cobb-Donglas production functions which we adopted and which have an elasticity of substitution of high value (unity).

Table 1 Numerical Example

$$\left[x_1 = 1.25 \, (k_1)^{0.4}, \; x_2 = (k_2)^{0.6}, \; \overline{k} = 3.0 \right]$$

0	λ / μ	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.08	1.09	1.10
1	$K_1(\lambda)$	2.03151	2.09615	2.15903	2.22316	2.28854	2.35519	2.42313	2.49236	2.56289	2.63474	2.70793
	$K_1(\mu)$	2.03151	2.07540	2.11670	2.15841	2.20052	2.24304	2.28597	2.32931	2.37305	2.41720	2.46175
2	$K_2(\lambda)$	4.57764	4.66965	4.76257	4.85641	4.95117	5.04684	5.14343	5.24094	5.33936	5.43869	5.53894
	$K_2(\mu)$	4.57764	4.71634	4.85782	5.00211	5.14922	5.29919	5.45204	5.60780	5.76650	5.92817	6.09283
3	$n_1(\lambda)$	0.62035	0.64879	0.67699	0.70499	0.73280	0.76044	0.78794	0.81531	0.84257	0.86973	0.89683
	$n_1(\mu)$	0.62035	0.64990	0.67776	0.70405	0.72887	0.75232	0.77447	0.79543	0.81525	0.83401	0.85177
4	$x_1(\lambda)$	1.66071	1.68066	1.70065	1.72067	1.74074	1.76084	1.78099	1.80117	1.82139	1.81164	1.86194
	$x_1(\mu)$	1.66071	1.67398	1.68723	1.70045	1.71364	1.72681	1.73996	1.75308	1.76617	1.77[illegible]24	1.79229
5	$x_2(\lambda)$	2.49106	2.52099	2.55097	2.58101	2.61111	2.64126	2.67148	2.70175	2.73208	2.76246	2.79290
	$x_2(\mu)$	2.49106	2.53608	2.58146	2.62719	2.67328	2.71973	2.76653	2.81369	2.86120	2.90906	2.95727
6	$x(\lambda)$	1.97595	1.97579	1.97531	1.97448	1.97330	1.97176	1.96983	1.96750	1.96476	1.96159	1.95798
	$x(\mu)$	1.97595	1.97580	1.97538	1.97472	1.97383	1.97274	1.97147	1.97005	1.96848	1.96678	1.96498
7	$g(\lambda)$	0.83035	0.84033	0.85032	0.86034	0.87037	0.88042	0.89049	0.90058	0.91069	0.92082	0.93097
	$g(\mu)$	0.83035	0.86210	0.89123	0.92674	0.95964	0.99292	1.02657	1.06061	1.09503	1.12982	1.16499
8	$\theta(\lambda)$	0.0	0.00436	0.00921	0.01456	0.02041	0.02678	0.03368	0.04112	0.04911	0.05766	0.06679
	$\theta(\mu)$	0.0	0.00653	0.01372	0.02155	0.02998	0.03897	0.04851	0.05857	0.06911	0.08013	0.09160
9	$\rho(\lambda)$	0.0	6.51926	6.14935	5.81428	5.50945	5.23107	4.97594	4.74131	4.52497	4.32486	4.13930
	$\rho(\mu)$	0.0	4.52653	4.18351	3.88397	3.62011	3.38602	3.17700	2.98932	2.81992	2.66632	2.52645
10	$\eta(\lambda)$	0.0	570.90733	280.11137	183.44972	135.21640	106.34162	87.14179	73.46807	63.24643	55.32479	49.01203
	$\eta(\mu)$	0.0	643.20042	322.75650	216.15120	162.88617	130.94538	109.66425	94.47363	83.08932	74.21246	67.17178

III. CONCLUSION

In the preceding two sections, we discussed relative advantage and disadvantage of the capital and wage subsidies as a measure of attaining a desired pattern of interregional population (labor force) distribution. The superiority of wage subsidy from the viewpoint of lesser social cost is almost unchallenged, but it is not a policy which gives the minimum amount of subsidy. We did not examine the property of price subsidy, but its relative ineffectiveness is easily conjectured.

Regional allocation of public investment is also taken as a form of preferential regional policy and effectiveness of this policy should be studied very carefully. Furthermore a combined policy of public investment and wage or capital subsidy can be studied from the similar viewpoint.

Another aspect of the regional policy is the difference in adjustment (moving) speeds of capital and labor. Any subsidizing policy cannot expect instantaneous effect if there is certain stickiness for the interregional mobility of factors. Therefore, we should distinguish long-run effect from short-run effect in such a case. The cost of short-run adjustment may make the desirable regional policy infeasible. We should proceed to this sort of dynamic analysis.

In any case, the approach adopted in the present paper can be understood as a necessary and important procedure in order to give a scientific basis to the analysis of regional development policy.

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