

An Indirect Approach to Measure Governmental Perceptions of Regional Welfare Inequalities*

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As an attempt to measure the implicit governmental tradeoffs arising in interregional welfare comparisons, an indirect approach is introduced by viewing the observed governmental expenditures as the result of a series of decisions. Given appropriate assumptions, this model takes the form of a multinomial logit model. The empirical results based on this approach using the U.S. data suggest that the U.S. federal government weigh the social and health factors more importantly than the economic and political factors when making inter-regional welfare comparisons.

I. Introduction

Since the national government may frequently wish to evaluate or monitor the relative levels of regional welfare so as to allocate public funds more equitably¹ among regions, it may be of great interest to investigate the question of how the national government perceives the relative welfare disparities among regions. For example, how does the national government implicitly assign relative weights to economic factors such as income and

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¹ Many empirical studies on the pattern of federal expenditures in the U.S.A. have reported that, in general, federal expenditures have been allocated more favorably to regions with lower welfare levels such as the Southern States (e.g., Cameron; Pack 1980; GRC 1977, 1981; and Pack 1982, etc.).

volve, at least implicitly, the monitoring and evaluation of the relative levels of regional welfare disparities.

Let us consider this implicit evaluation process in more detail by focusing on the national government's perceptions of regional welfare differences. In order to model such perceptions, it is assumed that, following a number of recent attempts on defining regional welfare, the government perceives *regional welfare* to be a multidimensional concept which is determined by the levels of some relevant set of *regional indicators* S^i ($i = 1, \dots, N$), reflecting the socio-economic and environmental characteristics of each region. Such indicators may include, for example, regional levels of per capita income, employment, education, health, environmental quality, housing, crime rate, transportation condition and so on. For simplicity it is assumed that the national government perceives higher levels of each indicator to correspond to higher levels of regional welfare, other things being equal.³ Given these regional indicators, let us assume that at any time t the *welfare* of each region r is determined by its *regional indicator profile*

$$(1) S_{rt} = (s_{rt}^1, \dots, s_{rt}^i, \dots, s_{rt}^N) ; \quad r = 1, \dots, R$$

where s_{rt}^i denotes the level of regional variable i in region r at time t .

Although such a profile can describe the welfare aspects of each region reasonably comprehensively, it is clear that the multidimensional nature of this set creates difficult problems in making interregional comparisons of welfare.⁴ Thus it is essential to focus on the nature of the tradeoffs implicit in any governmental comparisons of regional welfare levels.

To avoid such tradeoffs problem, we shall assume that such tradeoffs can be approximated, at least locally, by some implicit

³ For example, unemployment rates u might be expressed as a regional indicator $S_i = -u$.

⁴ For example, in comparing the regional profiles $S_{rt} = (s_{rt}^1, \dots, s_{rt}^N)$ and $S_{ut} = (s_{ut}^1, \dots, s_{ut}^N)$ for two regions r and u at time t , if $S_{rt} \geq S_{ut}$ (i.e., if $s_{rt}^i \geq s_{ut}^i$ were to hold for all $i = 1, \dots, N$) then it would be reasonable to say that the national government perceives the welfare level of region r to be at least as high as that in region u . However, if neither $S_{rt} \geq S_{ut}$ nor $S_{rt} \leq S_{ut}$ were true, then any overall comparison of regional welfare levels must necessarily involve implicit tradeoffs among the levels of regional indicators.

$$(3) 0 \leq P_r \leq 1; r = 1, \dots, R$$

where the equality signs hold in the limiting case of a deterministic choice, and that

$$(4) \sum_{r=1}^R P_r = 1$$

The usual theorems of probability theory are also assumed to hold. Furthermore, we assume the relative odds of choosing one region over another is unaffected by the presence or absence of any additional regions in the set of regions (i.e., *independence from irrelevant alternatives*).

In this context, the hypothesis that the central government allocate relatively more expenditures to regions with relatively lower welfare levels may be asserted that regions with lower welfare levels have higher probabilities of receiving a unit expenditure from the national government than regions with higher welfare levels. In other words there can be assumed to be a direct negative correlation between probability of expenditure allocation and regional welfare level. Hence it seems reasonable to postulate that a ratio of probabilities can be expressed as a inverted ratio of welfare levels.

$$(5) \frac{P_{rt}}{P_{ut}} = \frac{W_t(S_{ut})}{W_t(S_{rt})} \quad ; \quad r, u = 1, \dots, R$$

where P_{rt} and P_{ut} denote the probabilities of a unit expenditure's being allocated to region r and u at time t , respectively. Based on the above assumptions for the probability, P_{rt} can be expressed as follows⁶:

$$(6) P_{rt} = \frac{W_t(S_{rt})^{-1}}{\sum_{u=1}^R W_t(S_{ut})^{-1}} \quad ; \quad r = 1, \dots, R$$

Due to equation (2), we finally get a logit model:

⁶ For more technical discussions of these assumptions, see any standard textbook on the discrete choice model such as Ben-Akiva and Lerman.

variable g as well as regional state variables S . However there has been no common consensus on the best indicator of regional welfare, or appropriate expenditure data to imply regional policy.

To represent the vector of regional state variables (S_{rt}), let assume that the variable S_{rt} is consists of six broadly-defined components

$$(12) \quad S_{rt} = (\text{ECON}_{rt}, \text{EDU}_{rt}, \text{ENV}_{rt}, \text{HEL}_{rt}, \text{POL}_{rt}, \text{SOC}_{rt})$$

where ECON_{rt} = economic components of region r at time t ;
 EDU_{rt} = educational components of region r at time t ;
 ENV_{rt} = environmental components of region r at time t ;
 HEL_{rt} = health components of region r at time t ;
 POL_{rt} = political components of region r at time t ; and
 SOC_{rt} = social components of region r at time t .

Then we constructed six aggregate indices corresponding to the above six components, widely known as quality of life (QOL) indices.⁷ These QOL indices are based on 75 regional indicators which have been selected for the 48 continental states⁸ for 1982.

On the other hand, the data G_{rt} are supposed to represent by definition the expenditure categories which can be regarded as regional polices aimed at stimulating regional growth. In fact, however, it is difficult to decide what expenditure programs should be termed as regional policy expenditures since it has been argued that the United States does not currently have a set of strong, explicit regional policies. However even if the government professes to operate no regional policies at all, there is no doubt that many government policies introduced to achieve nonspatial objectives discriminate in favor of some places and against others. In fact, even when spatial policies are at work their effects may be swamped by the geographical repercussions of these nonspatial policies.

With this observation in mind, we have used three different type of expenditure categories as the data for g_{rt} ; i) the expenditures explicitly aimed at stimulating regional development⁹

⁷ Liu (1976) provides excellent explanations for the concept of quality life indices.

⁸ Hawaii, Alaska, and District of Columbia are not included because of their special place in the federal budget.

⁹ This includes five specific expenditure programs: *Regional Development Programs*

Table 1
RESULTS OF THE LOGIT APPROACH

| Variable number | Variable name | Coefficient Estimates | | |
|----------------------------|---------------------|-----------------------|--------------------|--------------------|
| | | E.R.P.E. | F.A.S. | F.O.F. |
| 1 | Economic Index | 2.152* (2.172) | 0.968* (1.582) | 1.466* (3.065) |
| 2 | Educational Index | -0.169 (-0.163) | 0.104 (0.170) | 0.228 (0.608) |
| 3 | Environmental Index | 1.569* (2.342) | -0.275 (-0.865) | -0.207 (-0.962) |
| 4 | Health Index | 1.745* (1.555) | 1.190* (2.394) | -0.103 (-0.211) |
| 5 | Political Index | -0.284 (-0.322) | 0.184* (1.387) | 0.003 (0.009) |
| 6 | Social Index | 1.206 (0.282) | 1.961* (1.459) | 1.780 (1.111) |
| Likelihood Ratio Statistic | | 47.134 | 82.338 | 69.607 |

Figures in parenthesis are the asymptotic t-values

*Coefficient significantly different from zero at 5% level

Economic Index: based on 18 regional indicators.

Education Index: based on 8 regional indicators.

Environment Index: based on 9 regional indicators.

Health Index: based on 11 regional indicators.

Political Index: based on 12 regional indicators.

Social Index: based on 17 regional indicators.

E.R.P.E.: Explicit Regional Policy Expenditures

F.A.S.: Federal Aid to States

F.O.F.: Flow of Federal Funds

explicit valuations of the relative welfare implications of the corresponding regional index (e.g., QOL indices). Among the four significant variables, the social index has the highest weight (1.961) followed by, in order, the health index (1.19), economic index (0.968) and political index (0.184). In our context, this implies that the federal government weighs social factors (such as the condition of housing, transportation and public safety) most importantly in evaluating and comparing the relative welfare level among regions while it pays relatively less attention to the political

Appendix**Components of 6 Quality of Life Indices****I. Components of the Economic Index***1) Individual Economic Well-being***A. Income**

1. personal income per capita
2. median income of 4-person families

B. Wealth

1. savings per capita
2. percent of owner-occupied housing units
3. asset per capita

*2) Community Economic Health***A. Income Distribution**

1. percent of persons below poverty level
2. ratio of the highest percentile to the lowest

B. Employment Condition

1. unemployment rate
2. labor force participation rate
3. female participation rate
4. wage rate
5. percent of insured unemployed

C. Degree of Economic Concentration

1. concentration rate

D. Productivity

1. value added in manufacturing
2. value added in retail
3. value added in wholesale
4. value added in services

E. Capital Availability

1. total bank deposits per capita

II. Components of the Education Index

2) Community Conditions

1. dentists per 1,000 population
2. physicians per 1,000 population
3. hospital beds per 1,000 population
4. hospital occupancy rates
5. daily room charge
6. nursing beds per 1,000 population
7. state and local government health expenditure
8. mental patients per 1,000 population

V. Components of the Political Index*1) Individual Participation*

1. presidential election voting rate

*2) State Local Government***A. Professionalism**

1. total municipal employment per 1,000 population
2. police and fire protection employment per 1,000 population
3. public welfare employment per 1,000 population

B. Performance

1. revenue per capita
2. percent of federal government aid in total revenue
3. debt outstanding per capita
4. tax base (approximate market value of locally assessed ordinary realty per capita)

C. Welfare Assistance

1. per capita welfare expenditure
2. monthly benefits of retired workers
3. monthly benefits of disabled workers
4. monthly benefits of widows and widowers

VI. Components of the Social Index*1) Individual Concerns***A. Family Life**

1. divorce rate
2. marriage rate

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