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Regional Planning Under Conditions of Limited Information**

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Introduction

In recent years, regional scientists have become increasingly interested in the development of multi-and inter-regional models (Issaev, Nijkamp, Rietveld and Snickars, 1982; Albegov, Anderson and Snickars, 1982 and Bolton et al., 1980), the design of integrated models (Isard and Anselin, 1982) and the application of such modelling expertise to problems of regional development in developing countries (Bell, Hazell, and Slade, 1982, 1982; Lakshmanan, 1982 and Chatterji, 1982). Many of these new developments have incorporated the most advanced analytical techniques and, in some cases, the analytical frameworks have progressed far beyond the level of availability of the relevant regional information sources(see Figure 1)

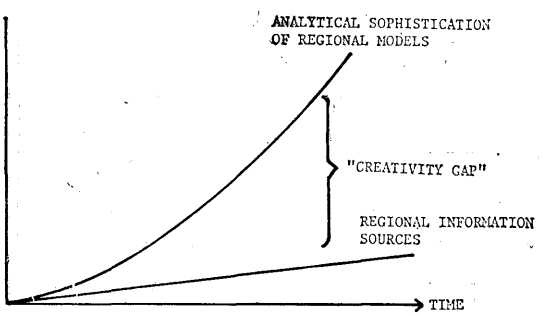

Figure 1. Creativity Gap

As a result, there is a clear degree of discrepancy between information availability and analytical models at the regional level. This gap presents a challenge to the regional researcher-what may be referred to as a 'creativity gap' reguiring considerable ingenuity in the way scarce data resources are used to facilitate the implementation of regional models. This paper addresses these issues in the context of models for spatial development planning.

Limited Information Modelling of Inter-industry Systems at the Regional Level

The debate over the use of survey versus nonsurvey data for the construction of regional models has not been resolved. In inter-industry (input-output) analysis, the general consensus would appear to be that some mixture of survey and nonsurvey data could be used to develop models which are suitable for detailed impact analysis and forecasting purposes. The major issue revolves around the identification of those sets of data for which survey material is mandatory. The approaches to this problem have varied including exchanging information from one region to another(Hewings, 1977; Hewings and Janson, 1980), the use of short cut multiplier techniques (see Jensen and Hewings 1983 for a review) and the identification of what may be termed 'the most important parameters' in a regional system (Bullard and Sebald, 19

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77; Jensen and West 1980; Hewings 1983b). While the interindustry model provides a focus on interdependence in production of outputs, not all elements in the system may be regarded as important in the sense that small changes in their values would lead to significant changes in estimated output levels. Tests with reference to the models for the Washington State economy for the years 19 63, 1967 and 1972 revealed a lack of stability in these important parameters (see Table 1). At the same time, the overall level of interaction in the economy remained relatively stable when measured in terms of entropy but not in terms of the number of transactions (See Table 2).

Table 1. Inverse Important Coefficients: Summary Evaluation for Washington State

		Purchases	Sales
Appeared in	1 year	40	42
	2 years	13	15
	3 years	9	7
Appeared only in			
1963 and 1967		3	7
1963 and 1972		2	2
1967 and 1972		8	6

An inverse important parameter was defined as a coefficient whose perturbation by I 20% lead to a change of ±30% in one or more of the elements of the associated inverse

Table 2. Summary Measures of Macro Level Changes in the Washington Economy

	1963	1967	1972
(a) Total Entropy (1)	5.3874	5.2832	5.2502
(b) Total Transactions(2)	2710	2557	3234

In applications of this technique to a small regional model in Greece(Hewings and Romanos, 1981) and to the Sri Lanka model (Hewings 1983a), it was noted that the concept of inverse importance was very sensitive to the exclusion or inclusion of the household sector as a column of expenditures or as a row of receipt of wages and salaries. This suggests that

(1) calculated as $\sum\sum P_{ij}$. In P_{ij} where $P_{ij}=X_{ij}/X$
and X_{ij} is the transaction flow from industry i to j.
and X is the total transactions among all industries

(2) calculated as a 'rounds of spending' inverse.
$X=[I+R+R^2+R^3\cdots\cdots]$
where R is the direct requirements matrix, a typical element of which,
$R_{ij}=X_{ij}/X_j$
where X_j is the total output for industry j
in construction future models or updating existing ones, greater attention should be focused on this sector and less attention on interindustry transactions.

Further Developments

Current research is being directed towards the examination of the *structure* of regional economics. Figure 2 shows a space-time presentation of a socio-economic system in matrix form. We are currently interested in trying to examine the *characteristic pattern* of the flows-whether they be commodity shipments, migration patterns or interindustry transactions. We are trying to develop generalizations which will enable us to discuss the characteristic pattern (a) as we move from very small, open regional economies to national level systems and (b) to provide guidance on the likely evolution over time of a system at one level in space. We feel that this work will provide guidance for modelling regional systems—especially in terms of data collection needs—since we would hope to be able to focus on those

elements or sets of elements likely to undergo the greatest change.

Summary

While regional scientists have focused on comparative analysis of regional *models*, they have neglected comparative analysis of regional *economies*. Given the limited information available at the regional level and the associated increases in demands on regional analysis, those issues are becoming more pressing. The role of limited information modelling is then seen as an important component of future research activity.

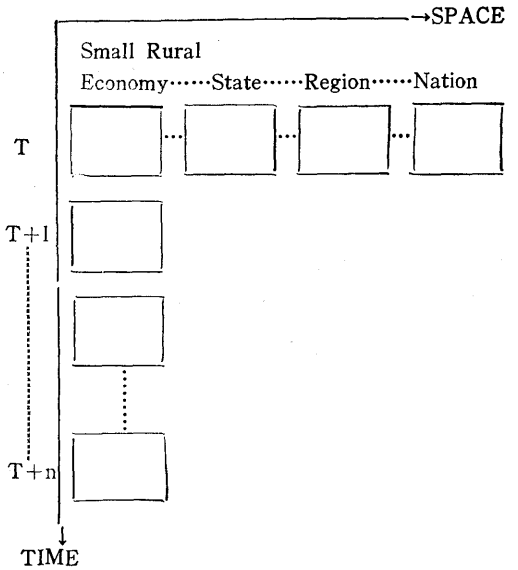

Figure 2 : Space—Time Representation of Regional Socio-Economic System

REFERENCES

Albegov, M., Anderson, A.E., Snickars, F., 1982, *Regional Development Modelling : Theory and Practice*, North Holland, Amsterdam.

Bell, C., Hazell, P,, Slade, R,, 1982, *Project Evaluation in Regional Perspective*, Johns Hopkins, Baltimore.

Bolton, R. *et al.*, 1980, "Symposium on multiregional forecasting and policy stimulation models", *Journal of Regional Science*, 20, 129~206.

Bullard, C.W., Sebald A.R., 1977, "Effects of parametric uncertainty and technological change on input-output models," *Review of Economics and Statistics*, 59, 75~81.

Chatterji, M., 1982, "Regional science and the developing countries," paper presented at the Conference on Urban Planning and Regional Development in a Rapidly Changing Society, Princeton, New Jersey.

Hewings, G.J.D, 1977, "Evaluating the possibilities for exchanging regional input-output coefficients," *Environment and Planning A* 9, 927~944.

Hewings, G.J.D, 1983a, "Limited information in spatial analysis and development planning," in G. Bahrenberg, M. Fischer and P. Nijkamp (eds)., *Theory and Measurement in Spatial Data Analysis* (forthcoming).

Hewings, G.J.D, 1983b, "The role of prior information in updating regional input-output models", *Socio-Economic Planning Sciences* (forthcoming).

Hewings, G.J.D., Janson B.N., 1980, "Exchanging regional input-output coefficients: a reply and further comments" *Environment and Planning A* 12, 843~854.

Isard W, Anselin L, 1982, "Integration of multiregional models for policy analysis," *Environment and Planning, A* 14, 359~376.

Issaev, B.I, Nijkamp, P., Rietveld, P., Snickars, P., 1982, *Multiregional Economic Models*, North-Holland, Amsterdam.

Jensen, R. C., West, G. R., 1980 "The effect of relative coefficient size on input-output multipliers," *Environment and Planning, A* 12, 659~670.

Jensen, R.C., Hewings G.J.D., 1983, "Short-cut 'input-output' multipliers; a requiem," mimeo available from Regional Science Program, University of Illinois, Urbana, IL 61801=3682, USA.

Lakshmanan, T.R., 1982, "Information systems for regional planning in developing countries," paper presented at a Workshop on Information Systems for Integrated Regional Development, IIASA, Austria.