

A CRITIQUE OF THE RATIONAL THEORY OF
URBAN PLANNING

by

PAUL RAYNOR

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APPROVAL

Name: Paul Raynor
Degree: Master of Arts
Title of Extended Essay: A Critique of the Rational Theory
of Urban Planning
Examining Committee:

Chairman: R.B. Horsfall

G.P.F. Steed
Senior Supervisor

L.J. Evenden

S.T. Wong

J. Munro
External Examiner
Associate Professor
Department of Economics and Commerce
Simon Fraser University

Date Approved: July 19 1975

ABSTRACT

This essay attempts to examine critically the rational theory of urban planning, the dominant paradigm within American urban planning thought over the past two decades. It distinguishes two basic models within rational theory and discusses them in relation to the normative and pragmatic difficulties that they encounter. The essay concludes that even if rational determination of the ends or means of social action is considered to be desirable, such a process may be both technically unattainable and politically irrelevant.

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TABLE OF CONTENTS

	Page
TITLE PAGE	i
APPROVAL PAGE	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
INTRODUCTION	1
I. THE RATIONAL THEORY OF URBAN PLANNING	6
II. THE TECHNICAL CAPACITY FOR RATIONAL PLANNING.	12
III. IMPLEMENTATION AND THE ENVIRONMENT OF PLANNING.	31
IV. PROCESS VALUES AND RATIONAL PLANNING.	44
V. WHEN REASON FAILS	61
VI. CONCLUSION.	72
BIBLIOGRAPHY	74

INTRODUCTION

American urban planning thought over the past two decades appears to have been characterised not by stability and consensus but by conflict and change. At the beginning of the 1950's, planning theory was dominated by the "traditional" model of planning, a model based on notions concerning the form and design of the physical city. However, that decade saw considerable criticism of this model and the emergence of the "new" urban planning which had, at its core, a conception of planning as a rational decision-making process based on applied science.

During the 1960's, rational planning was extensively adopted and elaborated, becoming, as Harris (1972, p. 9) notes, the mainstream paradigm in urban planning thought. At the same time, however, the rational theory itself came under increasing criticism and by the end of the decade a substantial number of views had developed over issues related to the nature and purpose of planning and the appropriate role of the planner, stimulating Kain (1970, p. 221) to comment that it would only be a mild exaggeration to diagnose urban planning as suffering from an advanced form of multiple schizophrenia.

This essay will attempt to identify the nature of the rational theory of urban planning, the criticisms and problems that it has encountered, and the impact of the

latter on the theory. It does not attempt to provide a comprehensive examination of urban planning thought over the past two decades but focuses on one theme within this complex web.¹ However, as rational theory appears to be at the core of contemporary thought, its examination must be fundamental to any larger attempt to understand the nature and diversity of the latter.

Urban planning theory, and the changes and debates within it, can be regarded as of geographical interest on at least two counts. Firstly, planners are actors who attempt to shape the urban landscape both directly, in the form of actions such as "urban renewal", and indirectly, by providing channelling constraints on the actions of others. As McNee (1970, p. 190) notes, in terms of relative importance in moulding the present landscape, the world of individual decision-making has been superseded by corporate and public planning bodies. To understand and, more importantly, to evaluate these actions, it may be necessary to turn to the procedural theory that shapes and legitimises them.

Secondly, there has been a partial recognition within the "new" geography that preoccupation with methodology has tended to result in the study of trivial problems,² and the search for social "relevance" that has ensued appears to have ended for many in the idea of a "policy-relevant" geography; in the contribution of "expert"

knowledge to planning and public policy. Conflicting action-orientated approaches³ have developed however, which differ in their definition of the nature of the changes required in society and the means by which they should be pursued, and thus adopt a differing conception of a "relevant" geography.

Examination of planning theory can help to clarify these ideas about the relationship between planning and geography, firstly by clarifying the conceptions of planning found within geographic thought, and secondly by establishing the role that "knowledge" can or should play within the present social system. It is important to recognise that the nature of planning is itself problematic and that, as Friedmann (1973b, p. 12) suggests, one of the central issues of our time is how society can develop through conscious choice.

The essay will begin by examining the rational theory of planning, partially with respect to its relationship to "traditional" planning but largely concentrating on the comprehensive and functional models which, it will be argued, constitute the two basic forms of rational planning. The second chapter will then examine these two models in relation to the degree of rationality that can be achieved in the tasks of goal-formation and means-determination, whilst the following chapter will consider the problems they face

in achieving implementation in the American urban environment.

Having established the technical and political capacity that exists for the rational determination of the goals and means of social action, the fourth chapter will attempt to identify the values embodied in rational planning as a process and discuss the question of whether such planning is a desirable form of social decision-making. The subsequent and last chapter then will re-examine this question of desirability in the context of the previously identified political and technical limitations on rational action.

Footnotes

¹The scope and complexity of such an undertaking perhaps may account for the lack of such attempts within the urban planning literature. For the most part, those sections of the literature concerned with theory tend to focus on particular issues or conceptions of planning and seldom attempt to locate these partial views within any broader framework, with the exceptions of work by Bolan, Fainstein and Fainstein, Paludi, and Friedmann and Hudson.

²In Taaffe's words, "All too often, laboring mountains of technique would produce a few intellectual mice, and formidably complex articles would triumphantly produce more parsimonious ways of doing things which probably weren't worth doing in the first place." Taaffe (1974, p. 10).

³Sometimes labelled "advocacy" geography.

I. THE RATIONAL THEORY OF URBAN PLANNING

From its reform origins in the late nineteenth century until the early 1950's, American city planning can be seen as having been dominated by a model of planning that defined its purpose and task as the production of a locational-physical plan depicting the ideal ultimate physical form of the city. The criticism that this model encountered in the 1950's was largely directed, as Branch (1971, p. 16) notes, at this preoccupation with "... a long range future, isolated and unrelated to short run operations and events." Out of this dissatisfaction and an associated change in the image of the city¹ there emerged the concept of process planning which now forms the basis of the "new" urban planning theory. The process model defines planning as the continuous attempt to guide and shape the ongoing processes of urban development; as Peterson (1966, p. 136) argues, it pertains "... not to some idealized future but to the mode of moving from the present."²

In the search for an action-shaping strategy of planning to replace the traditional end-stating approach, most theorists turned to the concept of rational action as a guide to the nature of the planning process.³ The procedures ensuring rational action are not seen as being specific to urban planning but as general procedures applicable to any kind of decision-making, and thus

rational urban planning is viewed as the application of such principles to the substantive task of planning the city.⁴

However, the theory of rational planning that has been developed is not monolithic; considerable variations in the precise nature of the process and the role attributed to the planner exist within it. These variations can be grouped around two basic models of the rational planning process. Differentiated by the inclusion or exclusion of goal-formation from the planning process, the functional and comprehensive rational models can be seen as corresponding to Friedmann's distinction between the functional and substantive forms of rationality.⁵

The functional model sees planning as involving only the deduction of means to given ends. Whilst goals must be explicitly set out, their formulation is not seen as the responsibility of the planner and occurs outside the planning system. Thus, as Faludi (1971, p. 261) notes, the functional model is based on a technical conception of rationality; it involves "... a form of technical expertise which assumes the goals to be given in a particular situation, and is rational only with respect to means."

The comprehensive model sees the task of planning as including the rational determination of a comprehensive set of goals as well as the deduction of the optimum means to those ends. Goal-formation is seen as the planner's

responsibility and "... the statement and elaboration of goals is itself the subject of rational analysis."⁵

Thus, Chadwick (1971, p. 117) defines rational planning as "... the process of determining goals and designing means by which these goals can be achieved."

Goal-formation is included within the planning process to ensure that planning is comprehensive. As Robinson (1972, p. 34) notes, comprehensiveness represents "... a striving for the total welfare of all residents ... rather than a partial or sectoral approach related, say to education alone ... or to any special population groups or areas of the city." Unless planning considers all functional areas and all the goals related to each area, the means that it selects will not be rational with respect to the whole of the urban system.⁶

Although traditional planning focused solely on the physical environment of the city and its long-range future, the ideal of comprehensiveness was important in defining the limits of the city planning profession; actors who displayed no concern for the city as a whole were seen as falling beyond these limits. However, the post 1945 period saw considerable growth in numbers and importance of agencies concerned with the attainment of limited sets of goals for specific areas or sectors of the city. The redefinition of planning as a rational process not only included these functional planners within an expanded urban plan-

ning profession but also redefined comprehensive planning, extending it from the formulation of general goals to include the specification of means to achieve these goals.⁷

The existence of the two basic models within rational urban planning theory may thus be accounted for in terms of the development of the planning profession. Alternatively, however, because the functional model excludes goal-formation, it may also be viewed as a modification of the comprehensive model in response to criticisms of the latter. In either case, the comprehensive rational model can be regarded as the "modern-classical" model of planning.⁸

In adopting a rational conception of planning, planners also turned towards the social sciences and to the field of systems analysis, searching for both a theoretical understanding of urban processes and the tools with which to manipulate such knowledge, in an attempt to improve the analytic capabilities of planning. The subsequent development of systems, or systemic, planning has been based on the idea that systems analysis can provide not only techniques for planning but also a theoretical framework for their use; as Steiss (1973, p. 15) notes, systems planning involves the attempt to develop "... the philosophical and theoretical bases needed for a systems approach in planning." Drawing from the field of cybernetics, the planning process is seen as the scientific management or

control of the complex urban system.⁹

However, as Ramo (1969, p. 11) admits, this process model does not represent a third major variant within rational planning theory, as it is essentially a restatement of the comprehensive model in a new terminology. This essay will treat it as such.

Despite its identification with reason and common-sense,¹⁰ rational planning theory has come under serious questioning as a guide to social decision-making, and some have rejected it outright. As Wildavsky (1975, p. 128) notes, this is a paradoxical situation in that if planning is reason then surely reasonable people must support it. Criticism, however, has been directed not only at the technical and political feasibility of rational planning, but also at its desirability.

The task of the following three chapters is to examine the comprehensive and functional forms of rational planning in greater detail against the criticisms and problems that they have encountered. Only in the fifth chapter, where an overall assessment of the impact of these problems on rational planning theory is attempted, will the functional model be formally considered in terms of it being a modification of the comprehensive model.

Footnotes

¹The city came to be viewed as a complex dynamic system in which form and process interact, rather than as a set of objects to be arranged in some pleasing or efficient fashion. As Webber (1965, p. 290) notes, "those who would plan for such open, self-regulating systems must confront their tasks with quite different strategies than are appropriate to the design of mechanical systems."

²See also Faludi (1971, p. 255).

³Webber (1965, p. 292).

⁴Thus Chadwick (1971, p. 84) argues that "... the procedure or process of planning is the same whatever the subject matter, it is only the content of the plans which varies."

⁵Friedmann (1966, p. 107).

⁶Faludi (1971, p. 259), Friedmann (1966, p. 108).

⁷This extension to include short-run actions together with questions of long-range desirability forms part of what has been termed the new comprehensiveness. See Friedmann (1971, p. 315) and Robinson (1972, p. 22).

⁸See Rittel and Webber (1972, p. 9).

⁹McLoughlin (1969, p. 399). See also Catanese and Steiss (1970).

¹⁰As Wildavsky (1973, p. 141) comments, "planning, identified with reason, is conceived to be the way in which intelligence is applied to social problems." See also Ramo (1969, p. 11) and Tribe (1973, p. 68).

II. THE TECHNICAL CAPACITY FOR RATIONAL PLANNING

Rational planning, as previously noted, involves the application of reason to the establishment of the goals for an urban community and/or the reduction of these goals to means. The intention of this chapter is to examine the functional and comprehensive models in terms of their technical capacity to undertake these tasks. The question of whether planning has the technical capacity to rationally determine the means of social action, given that there is one set of goals for the system of concern, will be examined first. The possibility of obtaining such a set of goals through the application of reason will then be considered.

A. Rationality and the determination of means

A process that is functionally rational is one that leads to the selection of the action which, in a given set of circumstances, will maximise the attainment of the relevant set of goals. To ensure such rational selection, the planning process must consist of a series of sequential steps and at each step certain conditions must be fulfilled. Thus goals must be operationalised, all possible courses of action that might attain these goals must be specified, and the impact of adopting each of these alternatives must first be enumerated and then evaluated with respect to the degree of attainment of the set of goals. Unless these conditions can be fulfilled, planning cannot be seen as

involving a deductive or logical translation of goals into the best course of action. The question to be answered is the extent to which it is possible to satisfy these conditions.¹

As Chadwick (1971, p. 120) notes, goals can be considered "... the very crux and hinge pin of the rational process." The process can only be undertaken if it is provided with a set of clear, consistent, and ranked goals that can then be translated into the form of objectives, a translation necessary for both design and evaluation.² However, not only is the provision of such a list problematic as will be established in the subsequent section, but there also appear to be acute problems associated with their translation into objective form. Objectives, Gutch (1970) argues, cannot be deduced from goals.

The design of alternative courses of action also poses a number of problems. Firstly, it is not possible to deduce the range of alternative actions from the goals, and the design techniques used in the field of systems analysis appear to have little to offer with respect to systems as complex as the urban area.³ Although goals may "suggest" certain actions, the specification of alternatives must rely largely on intuition. Secondly, not all of those actions that can be specified can be examined; limitations of complexity and cost effectively prohibit

the systematic exploration of action space.

Thus the range of alternatives that can be considered is limited in number, by pragmatic constraints, and in nature, by the prior conceptions of the analyst. As Wildavsky (1973, p. 145) notes, a rational design process for the urban system would require the planner to know how subsequent analysis of alternatives will turn out. However, the narrower the goal set being considered and the larger the proportion of the environment considered to be taken as "given", the less complex the design process becomes.

Many conceptions of rational planning deliberately restrict the range of alternatives to be considered by confining rational action to the arena of the physical environment. This restriction appears to originate from city planning's definition of the public interest in terms related only to visual and locational aspects of the physical city. During the 1960's, however, physical and spatial arrangements began to be regarded as being of instrumental rather than of intrinsic value⁴ and thus, whilst all planning was seen as orientated toward social objectives, physical planning was retained as a field concerned with the ways of achieving those objectives through physical design.⁵

But as Gans (1968, p. 170) argues, in terms of the concept of rational action this limitation of design space

to environmental variables is essentially an arbitrary one. Faludi (1973, p. 74) concurs, commenting that "optimisation - whatever that is - is best attempted in a manner that suits the particular problem at hand and not necessarily by means of physical planning." Moreover, this type of physical planning assumes the existence of a theory of the nature and structure of the relationships between socio-economic phenomena and the physical environment that can be used to determine the consequences of changes in the latter on the former.

Turning to the enumeration stage of the rational process, the basic task here is to provide conditional predictions of the future under varying assumptions as to both policy actions and the nature of the system being planned. It is in this area that the techniques of systems analysis have had their impact, through the construction of models to simulate urban growth and development.⁶

Unfortunately, the prediction of the consequences of hypothetical actions requires a causal understanding of the urban processes in which interventions are being made, yet there is neither a rigorous nor unified body of theory on which to draw. Lacking coherent bodies of theory, most operational models that have been developed have been static in nature and have used observed regularities as their base.⁷ In consequence, these micro-analytic models do not provide a sound basis for forecasting as the

aggregate relationships that they use subsume the effects of a large number of unknown variables. As Lee (1973, p. 166) notes, "to assume that these relationships hold true in the same form when all other variables are allowed to vary independently has no basis in theory or experience."⁸

Attempts have been made to develop dynamic models and to disaggregate the Lowry model,⁹ but these attempts encounter two basic difficulties. Firstly, there remains the problem of the inadequate state of theory, a state that, as Lee (1973, p. 166) comments, results in "... each additional component introducing less that is known than is not known." Secondly, even if the model structure could be adequately specified, "... the more committed a model is to theoretical concepts ... the more difficult it is to operationalise it and to use for forecasting."¹⁰ The more realistic a model is, the more data it requires and even if this is available, Alonso (1968) argues, its quality may result in a decrease in the predictive ability of the model.

Thus modelling, "the technical heart of the operations of the planning office" as McLoughlin (1969, p. 299) characterises it, faces considerable difficulties stemming from a lack of adequate theoretical understanding of the urban system, combined with constraints imposed by cost, mathematisation, and data availability and accuracy. To the extent that models depend on inputs derived from projections and on assumptions regarding the stability of

the aggregate relationships used, they are essentially projection rather than predictive tools. It would appear that the urban models so far developed have not been successful in correctly identifying the consequences of actions other than over short periods of time and that for longer periods, as Friedmann (1973b, p. 56) argues, planners are operating "... in the darkness of their own ignorance."

Indeed, the enthusiasm for modelling that was prevalent in the early 1960's has evaporated with the promised results, to be replaced by more pessimistic attitudes as the problems involved become more clearly defined. It appears, as Lee (1973, p. 163) notes, that models have "... like dinosaurs, collapsed rather than evolved"; "... initial conceptions were so far beyond actual capabilities that the increase in technical capacity was much more than offset by the awareness of real limitations."

Evaluation of the consequences that can be identified, relative to the original set of goals, has the central problem of finding some common basis for the measurement and comparison of the diverse effects generated by actions within urban systems. As Tribe (1972, p. 95) comments, the selection of the preferred course of action requires the expression of the consequences of alternative actions

"... in terms of greater or lesser amounts of certain qualities among which standards of commensurability are clearly established." The main technique used has been cost-benefit analysis, yet the use of monetary values as a common denominator is unsatisfactory, particularly with relation to so-called "intangible" effects.¹¹

Thus, it would appear that the planning process is a long way from achieving the comprehensive and accurate design, analysis and evaluation that technical rationality requires, despite the input of systems analysis techniques. The latter would seem to have most relevance to situations characterised by a small number of variables, a high degree of understanding of the relationships between those variables, simple objectives, and gradual change. Whilst such conditions exist in the corporate situations in which the techniques were developed, they would seldom appear to be satisfied in urban systems.¹²

As Cartwright (1973, p. 186) notes, this poses a dilemma for urban planning in that whilst there is a growing willingness to perceive urban problems as being complex, the techniques available are most suited to relatively simple problems. Thus, Friedmann (1973b, p. 132) argues:

where the need to plan is greatest, because changes have accelerated beyond the levels of past experience, planning tends to be least effective; where the amount of perceptible change is small, so that planning can be carried out on the basis of nearly perfect knowledge, it is not needed.

The problems posed by this lack of capacity to fulfill the conditions for rational selection of actions are considerably more acute for the comprehensive model than for the functional model. In the latter, the planner is not committed to search for actions that will attain a system-wide, long run social optimum, and as the goals to which the planning process is orientated become narrower it becomes easier to approximate rationality with respect to those goals. However, this is achieved precisely because the scope of rationality has been decreased, and action chosen in such a fashion may well be irrational in the context of the whole urban system.

This lack of technical ability also has a negative impact on the claim that means-determination is an objective process, transparent to considerations of value, involving techniques that are "... nothing beyond value-free devices for organising thought in rational ways."¹³ According to this view, Tribe (1972, p. 75) argues, goals and values are only inputs into a "... machine-like and hence inherently unbiased process of solving problems consistent with facts known and the values posited." Whilst a full examination of this claim would require a discussion of the problem of objectivity in the social sciences, it appears to be doubtful that the planning process can be considered objective, given the large number of choices that has to be made.

Some of these choices can and should be decided on the basis of the goals being sought. Thus the choice of which variables and relationships to model, for example, can be partially guided in this manner and indeed, as Lee (1973, p. 172) notes, should be if the models are to produce relevant output.¹⁴ But this choice is also influenced by the modelling procedure itself in that the requirement of mathematisation leads to a tendency to abstract, and therefore bias the analysis towards, those relationships and elements that are most easily quantified. Other choices, such as the selection of the explanatory system to be used and the subset of action alternatives to be considered, may have to be made on the basis of the pre-conceptions and world view of the analyst.¹⁵

Thus there would appear to be a considerable gap between the present technical capacities of urban planning and the technical requirements for rational means-selection. The level of rationality that is attainable would appear to be both bounded and distorted. Whilst these problems are less acute for the functional model than for the comprehensive model, the former cannot avoid them entirely.

B. Coal formation, rationality, and the public interest

As previously noted, rational theory conceives planning to be a goal-orientated process and thus, as Harris (1967,

p. 325) argues, goals can be seen as "... the controlling factor in the whole planning process." But to what ends is the process orientated and how are they to be found? The intention of this section is to examine the inter-dependent issues of the nature of planning goals and the role of the planner in their formulation, and to establish the extent to which the goals of social action can be rationally determined. Its concern is with the possible rather than the desirable; the values that legitimise the various roles given to the planner are considered subsequently in Chapter IV.

For both the functional and comprehensive models, the planning process is seen as serving the public interest.¹⁶ The planner is viewed as an expert helping to develop plans in the collective interests of the whole community, for the "... best benefit of the city as a whole" as Branch (1971, p. 9) notes. This orientation towards the public interest is also characteristic of traditional planning, but the nature of the latter's goal-orientation has met with criticism from rational planning theorists. Whilst many of these criticisms relate to a lack of rationality,¹⁷ it is those that have been directed at the conceptualisation of the public interest which are important here.

Traditional planning appears to have held what might

be termed an objective view of the nature of the public interest, seeing it as a set of ends pertaining equally to all members of a community, independent of and taking precedence over the latter's interests and values. As Clawson and Hall (1973, p. 229) note, where objectives were voiced "... they tended to be presented as absolute imperatives, almost entirely unrelated to any discussion of the aspirations and needs of the mass of people." Thus, the public interest was seen to have a particular substantive content that could be defined by the planner, and in practice it was defined largely in terms of the desirable nature of the physical environment of the city.¹⁸

This conception of the public interest has been criticised for its reliance on intuition and professional predilections. By emphasising certain aspects of the physical environment, traditional planning is seen to have served only the planner's values rather than the values of the whole public.¹⁹ Moreover, the physical environment itself is seen as irrelevant to the values and needs of other groups, particularly the poor.²⁰ The physical environment, it is argued, should be treated as a means to ends determined by the goals and desires of the general population rather than those of the planner. Thus Gans (1969) argues that planning should be for people, not buildings; it would then become "... an arena of response to personal and societal needs, ... not a playpen for the

designers and builders."²¹

The basis of such criticism is not a rejection of the public interest but a change in how its nature is conceptualised; a change towards a public interest based on the interests of the individuals who comprise the urban community that is being planned for. This individualist or user-orientated conception of the public interest appears to be predominant in rational urban planning theory. However, whilst there may be broad agreement on the nature of the public interest that the functional and comprehensive models seek to serve, the latter differ significantly in their assumptions as to how this public interest should be determined.²²

In the functional model, the formulation of the public interest is seen as the responsibility of the politician, and planning is restricted to the operationalisation of those goals and the determination of the means to achieve them. As goals are provided to the planning process and are not determined by it, the question of the technical possibility of rational goal-formation does not arise.²³ However, in the comprehensive model, the first stage of the planning process is seen to be the definition of the public interest.

As in traditional planning, this task is seen as involving the application of reason, but as the nature of the public interest differs, so does the role of reason

in its formulation. Whilst the role of the traditional planner could be described as to think out the nature of the public interest, applying professional training and judgement, the role of the rational planner is seen as the discovery of people's goals through empirical investigation and the use of expertise. Thus, from the perspective of rational planning, the goals of traditional planning are seen as "... more part of their creed than the result of rational inquiry."²⁴ The claim that the goals derived by traditional planning are non-sectarian and based on an impartial view of the good of the whole is rejected as merely a cover for the advancement of certain substantive goals. Only if the public interest is based on users' values, it is argued, can goal-formation be maintained as a technical, rational process. Thus, as Gans (1968, p. 45) notes, the role of the planner is to act as the agent or servant of the public rather than as a reformer seeking to attain substantive goals.²⁵

However, the rational determination of a user-orientated public interest requires that users' goals and values can be identified precisely, and that they can be welded into a hierarchy of community goals through the application of rational technique.²⁶ The identification of goals within a community and measurement of their relative importance are formidable tasks in themselves. Various techniques, such as public opinion surveys and

activity analysis, have been proposed, but these methods are non-rigorous and burdened with problems.²⁷ For example, attempts to infer values from behaviour, Silvester (1973, p. 92) notes, encounter the problem that behaviour is a function of opportunities as well as motives. A more fundamental difficulty is provided by the ambiguity and dynamic character of goals and it is much easier to presume they exist than to identify them. Thus the first assumption on which the claim to rational determination rests is far from being congruent with actual possibilities.

Even if goals could be identified with acceptable precision, rational goal-formation then encounters the problem of reconciling conflict in order to obtain a unitary set of community goals. If there is widespread consensus between individuals, then this problem does not arise. If goals are not shared or equally ranked however, then the formulation of the public interest must involve conflict resolution; as Lithwick (1970, p. 38) notes, it requires procedures to "collect" objectives and to aggregate them. In such a context the comprehensive model must assume that conflict can be resolved by reason.

The discussion of the possibility of this appears to centre on Arrow's work and the idea of the social welfare function.²⁸ The balance of this discussion suggests that, assuming that individual preference functions can be ascertained, it is not possible to aggregate them into one

for the social unit as a whole so that none are compromised. Aggregation requires the weighting of competing ends and thus requires decisions as to which goals are more important than others and which groups should gain or lose. Such decisions, Gutch (1970, p. 391) argues, are political in that they "... involve value judgements, where the value judgements that are made represent some sector of the community." As Friedmann and Hudson (1974, p. 8) argue, the weighting of values provides an insurmountable barrier to a scientific politics; in a pluralistic society where there is an array of different and contradictory scales of value, there may be no aggregate measure for social welfare "... if the measure is claimed to be objective and non-partisan."²⁹

Thus, as Branch (1971, p. 17) argues, where goals conflict, comprehensive planning can only have illusions of non-political purity. Goal-formation cannot be rationally undertaken as the task of resolving conflicts is beyond the capabilities of analysis; rational analysis can identify the distribution of costs and benefits of particular actions "... but it cannot provide a decision rule by which groups should gain or lose."³⁰ As in traditional planning with its objective public interest, the planner must make political judgements yet "... he evades admitting that he is advancing the particular values or interests of some segment of society; rather he

claims to be acting in the public interest."³¹ And as Webber (1973, p. 3) comments, the planner's choice of a resolution between conflicting values can be regarded as no better than that of the non-planner.

In conclusion, it would appear that planning lacks the technical capacity to rationally establish the public interest and the best means to such goals. Means-determination can only be based on partial analysis and inadequate knowledge, and may not be value-free. A unified set of goals can only be rationally established where there is a high degree of consensus; where there is conflict, goal formation must involve political decisions.

In terms of the distinction between the functional and comprehensive models, the latter, with its demands for rational formulation of goals that are comprehensive both in functional areas and time period considered, is technically less realistic than the former. As the functional model lacks goal-formation and can attempt to be rational relative to a much narrower set of goals, it can be regarded as being more adapted to the technical difficulties that rational social decision-making faces.

Footnotes

¹This question is common to both the functional and comprehensive models. However, the latter involves an attempt to optimise with respect to all important goals related to the urban system whilst the functional model may optimise with respect to a much narrower set of goals, the "breadth" of the latter being unspecified by the model. This significantly affects the capacity for rational selection.

²See Young (1966, p. 78) for definition of these terms.

³See Gutch (1970) and Catanese and Steiss (1970, p. 7).

⁴They derive their utility from the extent to which they are instrumental in the accomplishment of specific social goals. See McDougall (1973, p. 82) and Webber (1963, p. 233).

⁵The relationship of physical and social planning is a complex one in which clarity is not assisted by the confusion in terminology and meaning that abounds. Brooks (1970) and Mayer (1972), however, provide useful typologies of attitudes toward the relationship between planning and social problems, and to the social responsibility of the planner. See also page 22.

⁶A model is essentially a mathematical representation of the structure and behaviour of a system that can be used to simulate the impact of changes external or internal to that system. In theory, model-building involves identifying the relevant elements and interrelationships within the system and expressing these in equation form. In practice, as Lee (1973, p. 167) reminds us, "... models are not simply constructed and operated; they must be 'massaged' into being, first to make them operate at all and then to get sensible output."

⁷Sometimes known as growth force or elementary models, the majority of these are extensions of the conceptual framework developed by the Lowry model; a model based on the "gravity" concept of interaction. See Goldner (1971) and Lee (1970, p. 12).

⁸See also Friedmann (1973b, p. 125), Lee (1970, p. 13), and Lowry (1965, p. 10).

⁹See Batty (1972).

¹⁰Colemutt (1970, p. 126).

¹¹The problem Hill (1968) attempts to deal with through his goals-achievement matrix is that of obtaining a unified set of goals; this is discussed in the subsequent section.

¹²As Lee (1973, p. 166) notes, the confrontation of complexity through modelling was the rationale for model-building, but "... permitting the interaction does not necessarily mean that the modeller either has any control over it or learns anything from it."

¹³Tribe (1972, p. 75). See also Fainstein and Fainstein (1971, p. 343) and Goodman (1972, p. 199).

¹⁴This, in itself, poses a further problem for contemporary urban models. As Lee notes, the vast majority of the latter are land use models, and these cannot be adapted to the change of concern in the late 1960's away from the physical environment towards social problems. If the latter are important, then the land use models may not be designed to answer the "right" questions. See also Colemutt (1970, p. 144).

¹⁵Rittel and Webber (1972, p. 22) and Friedmann (1973b, p. 125).

¹⁶Although the goals that the functional model serves may be partial in scope, they are usually seen as being in the public interest.

¹⁷Thus it is criticised for lacking explicit goals, the latter finding expression in vague and ambiguous lists or, more usually, in physical standards such as minimum space requirements, and for confusing ends and means through merging them in a conception of the "good" environment. On the first point, see Webber (1965, p. 291) and Fainstein and Fainstein (1971, p. 360); on the second, see Chadwick (1971, p. 120).

¹⁸The good environment was seen as one that was attractive and efficient, displaying a balanced and orderly arrangement of land use. See Fainstein and Fainstein (1971, p. 342), Gans (1968, p. 61), Heikoff (1968, p. 60), and Pahl (1970, p. 208). As Reade (1969, p. 1181) notes, although the physical environment may have been regarded as a means to social goals by the nineteenth century reformers, "...over the years environmental improvement

appears increasingly to have become an end in itself and the original social objectives forgotten."

¹⁹See Gans (1968, p. 21) and Pahl (1970, p. 201), and Webber (1969, p. 289).

²⁰As concern for social welfare and social justice grew in the 1960's, physical planning came to be seen as both distant from, and irrelevant to, the major problems of society. See Dyckman (1969, p. 300), Friedmann (1971, p. 316), and Heikoff (1969, p. 49).

²¹Loeks (1968, p. 55). See also page 14.

²²Again, we are concerned here only with technical feasibility, not desirability; the latter is examined in the fourth chapter.

²³The functional model is thus dependent on the nature of the goals the politician is willing to provide.

²⁴Young (1966, p. 77). See also Fried (1964, p. 318).

²⁵Gans (1973, p. 3) argues that traditional planning's emphasis on inherent values can be explained in terms of the reform origins of planning, reform being an attempt to eliminate conditions regarded as inherently undesirable. However, as Davidoff and Reiner (1962, p. 108) note, technical competence does not enable the planner to accept or reject goals for people as these are value statements.

²⁶Robinson (1972, p. 21), for example, argues that systems methodology can help not only in the deduction of means but can also "... help city planning make better decisions about what is the most desirable and feasible future to seek."

²⁷See Chadwick (1971, p. 138) and Robinson (1972, p. 37).

²⁸See, for example, Kahn (1969, p. 100) and Rabinovitz (1969, p. 146).

²⁹Rittel and Webber (1972, p. 25).

³⁰Rein (1971, p. 304). See also Gutch (1970, p. 390), Hague and McCourt (1974, p. 152), Seeley (1964), Waterson (1971, p. 151) and Webber (1969, p. 292).

³¹Fainstein and Fainstein (1971, p. 375). See also Gutch (1970, p. 391).

III. IMPLEMENTATION AND THE ENVIRONMENT OF PLANNING

The preceding chapter has examined the deficiencies of the functional and comprehensive rational models with respect to the technical limitations on rationality. However, even if means and goals could be rationally established, the actions selected must also be implemented if planning is to be effective.

Although rational planning is viewed as the determination of the nature of the rational movement towards the desired future from the present, this movement is apparently seen as a purely technical matter. When the question of implementation is considered, it is treated as problematic only in terms of designing the correct control or information feedback systems. The effectiveness of planning, Kelba (1974, p. 153) notes, must therefore be regarded as a function of technical rationality, to be improved by technically improving each component of planning.¹

However, planning does not take place in a vacuum but within a decision-making environment. The nature of the plans that are implemented is governed by the social and political framework of the community that the planner is attempting to plan, and of which planning is a part. It is the nature of this environment, and particularly the degree of consensus and the distribution of power within it,² that determines the fate of planning proposals and

thus the effectiveness of planning.

The intention of this chapter is to examine the conditions in the decision-making environment under which the public interest, determined by planner or politician, can be served through deductive reasoning, and to establish if such conditions are realised in the American urban environment. The concern is therefore with the limitations on rational action that may be imposed by the social and political environments of American metropolitan areas, and thus with the "political" feasibility of the two rational models.

The distinction between the two models is again important as they involve differing relationships to the decision-making environment. In the comprehensive model, goal-formation is included within the planning process, and thus implementation of "rationally" determined ends and means must be achieved. As goals are determined by the political representatives of the system in the functional model, implementation must be sought for a set of "politically" defined ends and "rationally" determined means. Both models, however, regard planning as a purely technical activity and their concomitant conception of the role of the planner is as technician.³

If there is a high degree of consensus within a

community, then implementation of the output of rational planning is unlikely to be problematic, unless the process is itself considered undesirable. As a public interest can be defined that is acceptable to all members of the community, questions of power may be irrelevant. However, an acceptable definition of means also requires that value consensus include a principle determining the distribution of costs and benefits that stem from the implementation of any plan.

Whether such consensus exists is not a question that can be directly approached here. However, it does appear that the last two decades have seen considerable changes in how this dimension of American society has been conceived, both within the planning profession and outside of it. During the 1950's and early 1960's, the predominant image seems to have been one of a society characterised by basic value consensus and linked by common needs and interests. As Rittel and Webber (1972, p. 2) note, where the planner was hired as bureaucrat, it was to solve problems that appeared to be definable, understandable and consensual; "we were all working together, and men needed only to be shown the right way for them to follow it."⁴ During this period, Tribe (1972, p. 66) argues, it was believed

...that ideology, like God, was dead. In postindustrial society, it was said, man would increasingly live by reason rather than conviction. Because significant differences would center less on ends than means, it followed that the crucial choices would be essentially technical in character, the crucial techniques those of rational choice among competing means to largely settled ends.

The emergence of race and poverty as problems and the urban upheavals of the 1960's had a dramatic impact on this image, and thus on the planning profession. The latter was shaken to its roots: "yesterday's themes were consensus, comprehensiveness, rationality and order; today the dominant themes are diversity, conflict, division and tension."⁵ As Crick (1972) notes, the last half of the decade saw the death of the theory of consensus, and a recognition of the existence of groups with competing values and interests.⁶

If consensus on ends and means is lacking, then power becomes important. As a plan can express only one hierarchy of values, and as different means to those ends will vary in their distributional effects, any plan is likely to meet opposition from those whose values are not served or whose interests are adversely affected, providing that these consequences are perceived. In conflict situations, rational planning must rely on encroachment to achieve implementation of the set of goals and means decided upon, and the outcome of such efforts

will depend on the distribution of power between the plan's advocates and opposition.⁷ As Wildavsky (1973, p. 132) argues, in conflict situations "... planning assumes power. Planning is politics." The less consensus that exists, Etzioni (1968, p. 466) notes, the more power that must be available if planning is to be implemented. For the comprehensive model to be feasible, power must be concentrated in a single decision-making centre responsible for the whole urban system; for the functional model, it is sufficient to have jurisdiction over the area to which the goals that it is given are related.

However, unless planners themselves possess this power, they must depend on the acceptance of their plans by those who do hold it. In American society, formal authority to undertake social action is located within the governmental system, and thus planners must assume that the latter not only possesses sufficient power to implement plans but is also willing to do so.⁸ Given the lack of a high degree of consensus in most American urban communities, the feasibility of rational planning must depend on the validity of these two assumptions.⁹

In American urban systems, Friedmann (1966, p. 107) argues, planning is politically acceptable only to the extent that it appears "... as a purely technical function within a system of normative constraints that are imposed from outside." The formulation of goals is seen as a

political rather than a planning activity, and the planner's claim to legitimacy in this sphere is not accepted. Thus planning action with regard to goals will be ineffectual, as plans will be ignored when the conceptions of goals held by the planner and politician diverge. Unless goal-formation is modified by the criterion of feasibility, and the politician's definition of the public interest accepted, comprehensive planning will not be acceptable to the politician.¹⁰ With the functional model, this conflict over goals does not occur, but the planner's definition of means must still be acceptable.

However, even if both models were acceptable, their feasibility is also dependent on the ability of the politician to exercise a high degree of control over the urban system. Whilst the question of the distribution of power in American communities is a complex one, it would appear that the majority are characterised by non-centralised power distributions with no single decision centre. Moreover, formal authority is not only fragmented between agencies and other decision-making units, but is also limited by the influence of interest group pressure.¹¹

The type of social decision-making that results from, and which is seen as an index of, this fragmented power is sometimes referred to as disjointed incrementalism.¹² Decisions are made through a process of mutual adjustment

between the competing interests and objectives of the various organisations and interest groups. Decisions are the result of bargaining and compromise and thus tend to be both incremental and remedial; change is marginal and involves a movement away from particular problems rather than towards goals.

If local government lacks the power to impose actions, then acceptance of plans must be won from the groups and organisations that can successfully oppose them. Such acceptance will occur if the plan reflects an acceptable reconciliation of the interests and goals of these groups, and this, Warren (1971, p. 131) argues, can only be achieved through an inductive bargaining process in which both the ends and means of social action are compromised. In such circumstances neither of the rational models will be able to implement the plans that it determines. The functional model would be feasible, however, if conflict centered on goals and could be resolved at the goal-formation stage but, as Friedmann (1969, p. 311) argues, it appears that this conflict tends to be focused on the output of, rather than the input to, the planning process. The planner must therefore compete with other government agencies and interest groups to influence policy.¹³ Social decision-making, as Etzioni (1968, p. 300) notes, is never a process

... in which means are allotted according to a systematic plan or policy; rather it is a process in which a significant role is played by the power of the supporters of various societal goals and by the power of the decision-making elites and their goals ... Each goals-means constellation has a different political weight.

The conflict between the requirements of rational planning and the nature of the decision-making environment has been confirmed by the empirical studies of planning undertaken over the last two decades.¹⁴ These studies have found the practice of planning to bear little relation to the rational theory of planning. Where planning has attempted to be rational, it has failed to influence decisions. Only by compromising its rationality, through adapting both plans and role to the nature of the decision-making system, has planning been "effective".

Thus Rabinovitz (1969, p. 159) and Warren (1969, p. 252) argue that the role of the planner has not been that of a disinterested technician, but rather that of a political actor, advocating or representing the interests of his client and mobilising support for plans. Similarly, plans have been designed on the basis of short run estimates of political feasibility; confined to issues on which agreement can be reached¹⁵ or avoiding non-ambiguous statements of objectives or distributional consequences.¹⁶

The plans that this "adjusted" process has produced, however, appear to have served the values of the more

powerful groups in American society, and have had a negative impact on those who lack influence, notably the poor.¹⁷ To gain implementation, goals and means must be adjusted to the interests and values of those who possess power, whether formal or informal, and thus planning has been "... a handmaiden of the dominant interests in society" Friedmann (1973, p. 56) argues.

Thus, although rational planning can be regarded as an abstract-technical model, abstract in that it abstracts planning from the social and political context in which planning must occur and therefore from the total set of problems that may be involved in rational decision making,¹⁸ it is nonetheless a style of planning that is adapted to a particular set of environmental conditions. Given the models' emphasis on technique and their lack of concern with implementation, they are feasible only where power is centralised and freely available to the planner or where consensus exists; only under these conditions will implementation of plans be non-problematic. The ability of the planner to exercise rationality will depend on the degree to which these environmental conditions are met, and different environments will exhibit different "tolerances" of rationality.¹⁹ If planning is to influence the substance and direction of decision-making where these conditions are not met, then it must adapt to those conditions that do exist.²⁰

As these conditions are not approximated in the American decision-making environment, Friedmann (1971, p. 325) argues, rational planning is a style inappropriate to the social context within which it has to work. In this environment, effective planning requires a political role and the subordination of rational processes and considerations to the inductive process of bargaining, negotiation, and the mobilisation of support "... among the holders of influence in urban areas whose backing is necessary to make planning effective."²¹ If planning is limited to being a technical process and the role of technical expert is maintained, then, as Webber (1965, p. 292) notes, the only important function its plans can fulfill will be hortatory in nature; political considerations cannot be disregarded as irrelevant and extraneous.²²

It is possible to account for the environmental assumptions of rational planning in terms of the latter's partial derivation from experience with the engineering and control of industrial and corporate systems.²³ As Etzioni (1968, p. 7) notes, because the objects that comprise these systems lack political power and ethical status, a relatively high degree of power over system performance is possible. The transfer of ideas and techniques to urban systems and municipal government thus presumes environmental resources that are not available.

However, the overriding concern for technique and the disregard for implementation can be seen as stemming not from assumptions about the decision-making environment, but from the normative nature of rational planning. Thus it could be argued that planning theory should define what ought to be rather than what is possible and that if there is a gap between the desirable and the possible then the limitations on rational action should be eliminated rather than be adjusted to. Before this position can be assessed, the basis of the desirability of rational planning must first be examined. This is the task of the following chapter.

Footnotes

¹Robinson (1972, p. 21), for example, argues that systems methodology offers "... an enormous potential for making urban planning more rational and comprehensive, and thus more effective and relevant."

²Bolan (1969, 1971) considers a much broader range of factors, but these two appear to be the most significant. See Friedmann (1973b, p. 50), Silvester (1973, p. 97) and Warren (1971, p. 11).

³Friedmann (1969, p. 311).

⁴Lee (1973, p. 172). See also Gross (1971, p. 282).

⁵Bolan (1972, p. 1). The change in image had such a profound impact on rational planning because of the importance of consensus to the latter, both for implementation and rational goal-formation.

⁶See Lee (1973, p. 172), Rittel and Webber (1972, p. 23), and Webber (1973, p. 8). One interesting approach to conflict is to admit that it does exist with respect to social goals but deny that it relates to the physical environment. Thus Catanese and Steiss (1970, p. 324) argue that systems planning is more relevant to physical development goals than to "... the elusive, unordered, non-consensus goals such as those usually associated with social planning." See also Chadwick (1971, p. 334) and Cullingworth (1973, p. 122) for similar arguments.

⁷Hudson, Wachs, and Schofer (1974, p. 258).

⁸Implementation is then a matter of communication between planner and politician. See Branch (1971, p. 15) and Silvester (1973, p. 97).

⁹See Friedmann (1973b, p. 68), Warren (1971, p. 57), and Webber (1965, p. 291).

¹⁰Comprehensive planning would then become bureaucratic in substance, if not in form. See Friedmann (1966, p. 112) and Tabb (1972, p. 29).

¹¹See Bolan (1971, p. 301), Benveniste (1971, p. 14), Clawson and Hall (1973, p. 181), Heikoff (1968, p. 54), Mann (1964), and Rabinovitz (1969).

¹²See Braybrooke and Lindblom (1963), Lindblom (1965), and Rondelli (1971).

¹³See Wildavsky (1973, p. 133) and Webber (1973, p. 3).

¹⁴See Altshuler (1965), Meyerson and Banfield (1955), Hyman (1969), Rabinovitz (1969), and Warren (1969). These studies, Lee (1973, p. 172) notes, had little influence on planning theory until the late 1960's, possibly because, as Friedmann and Hudson (1974, p. 12) suggest, "... the recorded experience with planning threatened the foundations of rationalist planning."

¹⁵Warren (1971, p. 104) notes that as most issues are controversial, this limitation is a major one: "... to act only in consensus is to immobilise oneself."

¹⁶See Rabinovitz (1969, p. 153), Reade (1969, p. 1179), and Tabb (1972, p. 29).

¹⁷See Bolan (1971, p. 304), Clawson and Hall (1973, p. 278), Etzioni (1968, p. 314), Fainstein and Fainstein (1971, p. 354), Graves (1971, p. 335), Meyerson (1968, p. 1415), and Pahl (1970, p. 206).

¹⁸Warren (1971, p. 157). See also Silvester (1973, p. 103).

¹⁹See Faludi (1971, p. 260) and Dyckman (1971, p. 380).

²⁰See Bolan (1967, p. 238; 1971, p. 391), Rondelli (1971, p. 21) and Warren (1971, p. 11). Friedmann (1973b) and Rabinovitz (1969) have developed typologies of effective planning styles in various environments. Bolan (1969, p. 302) argues that a more general conception of planning would be to view it as a social process involving a client, a planner, and a community decision network, all revolving around a public agenda. In this view there is no process of planning independent of the characteristics of the planner's environment.

²¹Rabinovitz (1969, p. 131). See also Bolan (1969, p. 306).

²²Hudson, Wachs, and Schofer (1974, p. 263).

²³Branch (1971, p. 18) and Webber (1965, p. 291).

IV. PROCESS VALUES AND RATIONAL PLANNING

The preceding chapters, in examining the technical and political limitations on the capacity for rational planning, have considered such planning to be problematic only in terms of its feasibility and thus have implicitly assumed that its normative basis is acceptable. However, despite the tendency within rational planning to ignore or deny the existence of values attached to the planning process itself, a particular conception of planning can only be regarded as desirable if the form and role specified express or reflect an acceptable set of values or goals.

These values, or meta-goals as Gutch (1970, p. 390) terms them, form the normative basis and thus the core of planning theory. The intention of this chapter is to examine the values that are embodied in rational planning theory and the contention that exists over the desirable nature of the planning process. The subsequent chapter will then re-examine this question of desirability in relation to the technical and political feasibility of rational planning.

Rational planning is seen as a desirable form of decision-making precisely because it is based on reason. As Wildavsky (1973, p. 141) notes, "... planning, identified with reason, is conceived to be the way in which intelligence is applied to social problems ... The virtue

of planning is that it embodies universal norms of rational choice." Planning, in its rational form, is seen as a purely logical and common sense approach to decision-making that produces plans or policies which would lead to maximisation of the social welfare of a community with the minimum use of resources,¹ in contrast to the irrationalism of policy decisions produced by other forms of decision-making that are not based on rational considerations.

The normative basis of rational planning can be seen as resting on two assumptions. Firstly, as Dyckman (1961, p. 342) points out, there must be some right answer or solution that can be rationally and objectively determined by the planner; rational determination of goals or means must be assumed to be possible. The implications of this assumption will be explored in the subsequent chapter. Secondly, the process by which social decisions are made must be considered of only instrumental value; that is, it must be valued not for its own sake but as a means to attain certain results.² Rational planning is valued because the decisions it arrives at are rational with respect to the substantive ends sought.

But as Tribe (1972, p. 79) argues, the procedures that shape individual and social activity can be seen as having significance independent of the final product they generate.

Indeed, he continues, in most endeavours "... the processes and rules that constitute the enterprise and define the roles of its participants matter quite apart from any identifiable "end state" that is ultimately produced."³ To treat the process of social decision-making as nothing more than a machine for generating outcomes is to collapse process into result, and thus is to overlook both the significance of the process as such and the political thought associated with it. As Dimitriou (1973, p. 58) comments, to advocate rational planning because of its efficiency or because

...it gives us the power to improve 'our' condition, ignores that power is exercised by some over others, legitimately or otherwise ... (and) ... disregards the debate on political obligation which is central to this issue and which has had a profound influence over men's thought and actions over the past two and a half millenia.

The instrumental conception of decision-making adopted by rational planners has led to a narrow debate over the problems of who should make social decisions and how such decisions should be made. Although these problems are at the core of political philosophy, planners have attempted to justify their views "... by evaluating the merits of the policies each type of planning is likely to produce, rather than looking at the fundamental questions of social power that each raises."⁴ However, as a theory of planning

specifies the desirable nature of social decision-making, it must be based on a conception of how society ought to be governed and thus, as Allison (1971, p. 458) notes, it must presuppose a political theory. Indeed, Fainstein and Fainstein (1971, p. 349) argue that political theory must form the "value skeleton" on which planning theory is built.

Whilst rational planning theorists may deny the planning process has a political nature they cannot avoid politics, but rather hide the political theory that they have adopted from examination by themselves,⁵ or by others. In the latter context, the latent function of such a denial is to disassociate planning from the ethical questions involved in the use of power, and from the controversy that surrounds such questions. If other values are applied to the process of decision-making, then rational planning may be regarded as undesirable despite its consequences. As Wildavsky (1973, p. 133) notes, although rational planning is a form of government, government need not necessarily involve such planning nor may it be desirable for it to do so.

Conflict over the desirable nature of the planning process can be seen as centering on the roles that "rational" and "democratic" procedures should play in deciding future social action for an urban area. As

neither rational planning theory nor democratic theory is monolithic, discussion of their relationship must proceed on a disaggregated basis, and for rational planning this involves distinguishing both the functional and comprehensive forms.⁶

From the perspective of the comprehensive model, the political process of decision-making is seen as an inter-group struggle based on personal and group advantage and involving opportunistic bargaining over short term and incremental changes in policy. This process, it is argued, has little if any relationship to the pursuit of the common good and neglects both long term and system-wide considerations. In contrast, the comprehensive planner is seen as "... the spokesman for comprehensive, unitary, system-wide objectives, remaining above the fray of competing interest groups seeking localised or special advantage",⁷ and seeking to minimise the expenditure of resources in attaining those objectives.

Thus in its comprehensive form, rational planning sees itself as having command of a body of expertise that enables it to challenge irrationality in the political process. As planning can rationally determine both the goals and means of social action, it is therefore seen as a more desirable and appropriate means of decision-making than that of the political process.

In this desire, for the substitution of reason for politics and the conferring of legitimacy to power on the basis of possession of expertise and ability, comprehensive planning would appear to be based squarely on the "... ever-recurring intellectual doctrine" of technocratic political theory.⁸ As the power to determine the ends and means of social action is legitimated by reason rather than by the consent or involvement of those being planned for, the technocratic form of government is explicitly anti-democratic. As Gouldner (1965, p. 285) notes,

Since they know what is best for others, the important thing is that this be done somehow, not whether it is accepted voluntarily or imposed. If imposition is not preferred, neither is it rejected on principle.

However, comprehensive planning based on an individualistic conception of the public interest appears to accept the premise of liberal democracy that values are arbitrary and subjective in nature. As all views on the desirable ends of social action are seen to be equally valid, no set of values can be regarded as superior to any other and traditional planning's conception of an objective public interest is rejected. The planner's views on substantive goals are seen as purely personal and the legitimacy of the imposition of such goals is denied. User-orientated planning presents the planner as "... an

impartial arbiter who seeks the plan that will be most satisfying to the largest number of people"⁹ rather than as a reformer intent on substantive change, and therefore may be regarded as an attempt to be democratic in the "substance" of planning.¹⁰

Whatever the nature of the goals determined, however, comprehensive planning is a form of social decision-making that is neither controlled by nor responsible to the community being planned for, and it is therefore not a democratic process. If one accepts the right of citizens to either determine goals or choose those who are to determine them, then the ends of social action should not only be those of citizens but should be determined by citizens or by those responsible to them.

In the functional model of rational planning, the role of reason is more restricted and thus the role of the political process in social decision-making is extended. Planning remains technocratic in that control over means determination by the planning process is justified by the maximisation of efficiency to which it is seen to lead. However, whilst political determination of means is seen as inappropriate and undesirable, goal-formulation is seen as the legitimate responsibility of the politician rather than the planner. Elected representatives are not seen as "... an ignorant bunch of second raters,"

Ward (1972, p. 364) notes, but rather as being both responsible for, and capable of, defining the public interest.

Because of the exclusion of goal-formation from the planning process, functional planning is regarded as less desirable than the comprehensive model, from the perspective of the latter. Such planning, it is argued, will not ensure that action is rational relative to the goals and components of the whole urban system, and neither will it ensure that the public interest will be followed. As the public interest that functional planning serves is defined politically rather than rationally, planning "... may lose its objectivity and become the handmaiden of a particular political perspective."¹²

Functional planning, however, may be regarded as a more desirable form of planning precisely because of its acceptance of goals which are indirectly determined by citizens through their elected representatives. As the latter are responsible to the community for their decision-making power, their control and guidance of planning activity can be seen as conferring democratic legitimacy on this form of rational planning.¹³ For this reason, the desirable social decision-making process may be one in which decisions are made by elected representatives and their technical experts.

But as Hague and McCourt (1974, p. 154) note, this conception of desirable decision-making rests on an elite theory of democracy in which decision-making is seen as democratic if those who make decisions do so with the consent of citizens. Democracy, in this view, involves the choice of those who are to govern rather than the exercise of direct popular sovereignty. The active involvement of citizens in the process of government is viewed as unnecessary and undesirable and citizen participation is limited to the choice of elites through the elective process. In terms of planning and political theory, functional planning can therefore be regarded as a combination of democratic elitism and bureaucratic technocracy.

The centralisation of power that this form of decision-making involves appears to meet with criticism from those advocating an "interest group" version of elite democracy and from those adopting a participatory theory of democracy. The conflict between the "bureaucratic" and "interest group" forms of democracy is well illustrated in the debate between Needham and Faludi (1973). In the interest group conception, it is argued that elitism should be mediated not only through periodic elections but also by a continuous process of citizen influence through pressure groups. A democratic procedure of decision-

making is seen as one in which there is continual bargaining and mutual adjustment between interest groups and government over the ends and means of social action.

This process is seen as more desirable than the determination and imposition of policies by a third party, whether this be the planner alone or the planner and politician combined, as only through this "market-like" process can policy be "... brought into rather close accommodation to the aggregate interests of the diverse parties" of which society is composed.¹⁴

From the perspective of participatory democratic theory, both of these elite forms of democracy are considered undesirable. Democracy, it is argued, should involve more than the giving of consent to ruling elites and attempts to indirectly influence those elites through participation in interest groups. Such a conception of democracy conceives it to be a mechanism for satisfying wants, a process in which it is only the correspondence between the values of citizens and the output of the process that is important. Whilst this responsiveness is not considered unimportant, participatory theorists dispute the proposition that competition of elites or interest groups is, as Lindsay (1973, p. 493) notes, "... a sufficient condition for mass publics to derive close to the maximum benefits of politics."

The main value of the process by which a community is governed, they argue, should lie in the creative development of individuals, and only through active and continuous involvement in, and direct control over, decision-making can the individual's quest for self-fulfillment be satisfied.¹⁵ Moreover, individuals are seen as having a right to be actively involved in the reshaping of their own lives and environment and thus, as Hague and McCourt (1974, p. 154) argue, participation can be seen as a goal that is itself part of the public interest.

In elitist systems, this participation is substituted for by hierarchical systems of control that tend to treat individuals as passive objects for whom decisions should be made. Thus, rational planning "... views man as a mechanical object who can be controlled by 'guidance systems'; not as a conscious, purposeful individual who can choose to create and change his social world."¹⁶ The consequence of such dependence, it is argued, is an alienated and inert citizenry.¹⁷

In terms of the correspondence between citizen values and the output of elite democratic processes, the latter are also criticised as having inherent tendencies toward differential responsiveness. As Carter (1973, p. 145) notes:

The idea of an equilibrium of pressure groups creating a situation of maximum satisfaction is as unreal as the idea of the automatic regulation by market forces, and rests on the same unrealistic assumption that perfect competition prevails between equal units.

Because resources and access are unequally distributed, the needs and preferences of unorganised or inarticulate interests will be neglected.¹⁸ Whilst participatory theorists and comprehensive planners may agree on this point, the former see the solution lying in the dispersal of power into the hands of citizens rather than in the concentration of power into the planning profession.

Thus, where elite theory sees direct and continuous individual involvement in social decision-making as undesirable, participatory theory stresses such participation as a right and as a means by which individuals can retain power and become better able to govern themselves. The process of social decision-making, Friedmann (1973b, xvii) argues, is too important to be left to elites and their experts, and at the centre of the process should be "... a citizenry which participates in and directs the range of forces that shape the quality of its existence."¹⁹

In rational planning, participation is seen as desirable only if it improves the efficiency of the process, either by helping planners to understand the needs of citizens or by helping citizens to understand and endorse changes determined at the city level.²⁰ If continuous and

unconstrained participation is accepted as the central value of the decision-making process, however, then the ideal of rational planning must be rejected; as Aleshire (1970, p. 389) notes, planning becomes part of the citizen participation process and changes in the scale, process and role of planning are required.

In terms of scale, continuous participation requires a much smaller unit of decision-making than that of the whole city. Decentralization is a necessary condition for a process in which policies are formulated and implemented by citizens themselves, and plans for the metropolitan area must be achieved through an inductive process of bargaining and discussion between component units.²¹ In this process the role of the professional planner, if he or she is seen to have any role at all, involves

.....rallying the community around the common tasks, helping its members to learn more about the problems they are facing and the available methods for dealing with them, and providing a constant stream of information about relevant aspects of the external environment.²²

In conclusion, it can be argued that rational planning theory is based on an end theory of value that evaluates the process of social decision-making in terms of the rationality of its output. In both its comprehensive and functional forms, it postulates a centralised power system with the planner as "... a helmsman steering the

city"²³ and authoritarian relationships between government and the governed. The desirability of such decision-making can be seen as resting on technocratic or democratic elitist political theories. Paradoxically, if other values are attached to social decision-making, then rational planning may be both undesirable and irrational.

However, as Kahn (1969) notes, the normative debate over the nature of the planning process is academic in the sense that the planner has no control over the form that social decision-making takes. Whilst comprehensive rational planning may be more appropriate to totalitarian societies than to pluralistic democratic societies, as Friedmann (1971, p. 317) notes, this question has little to do with the performance of planning; comprehensive planning having failed to be effective.

Indeed, Altshuler (1968, p. 423) argues that the neglect of the democratic problem by rational planning has been the result of the weakness and fragmentation of the public sector. The re-emergence of the debate on planning and democracy in the 1960's can be related to the strengthening of positive liberalism in the United States and the consequent increase in the effectiveness of bureaucratic forms of planning.²⁴

Footnotes

¹Lithwick (1970, p. 36).

²See Friedmann (1971, p. 215; 1973b, p. 123), Rittel and Webber (1972, p. 7), and Smith (1973, p. 278).

³Tribe (1972, p. 83).

⁴Fainstein and Fainstein (1971, p. 348).

⁵As Krieger (1974, p. 156) notes, those who consider themselves the least explicitly interested in theory are likely to be most bound into one. Whilst the denial of the political nature of planning is treated here as stemming from the procedural values adopted, again it can be related to the "origin" of rational planning in industrial and corporate systems. Alternatively, it may also be related to the extension of the concept of rational action from the individual to the social sphere: as McDougall (1973, p. 81) comments, the process by which individuals make decisions does not involve the same normative considerations as the process "... by which planners, acting for the State or public interest, attempt to define another's goals and decide another's future."

⁶Given the author's lack of depth in understanding in the complex field of political theory, such an attempt to examine the relationship between reason and democracy perhaps could be aptly described as stepping into a conceptual minefield. However, as such an attempt is crucial to the understanding of planning theory, it must be undertaken. The following should be regarded as a tentative attempt to find order in the planning literature.

⁷Hudson, Wachs, and Schofer (1974, p. 264). See also Ward (1972, p. 364) and Steiss (1973, p. 11).

⁸Meynaud (1969, p. 12). See also Fainstein and Fainstein (1971, p. 349).

⁹Fainstein and Fainstein (1971, p. 347).

¹⁰Fainstein and Fainstein (1971, p. 352) classify such planning as democratic planning.

¹¹This question is left for further consideration in the next chapter.

¹²Lowenstein and McGrath (1973, p. 16). Friedmann (1973b, p. 104) also notes that the acceptance of politically determined goals may lead to tunnel vision in that "... all values peripheral to those centrally held by the analyst's client will be understated."

¹³See Kaitz and Hyman (1970), p. 57) and Rein (1969, p. 234).

¹⁴Warren (1971, p. 38). See also Dyckman (1971, p. 330). This desirable process is the process of disjointed incrementation that is seen to characterise contemporary American social decision-making.

¹⁵Smith (1973, p. 658).

¹⁶McDougall (1973, p. 88). See also Dimitriou (1973, p. 58), Gabrow and Heskin (1973, p. 108), and Smith (1973, p. 660).

¹⁷Thus Kasperson and Breitbart (1974, p. 9) argue that alienation and lack of participation are the result of elite power structures and not the justification for them. See also Etzioni (1968, p. 321), Friedmann (1973b, p. 154), and Lindsay (1973, p. 487, p. 503).

¹⁸See Rein (1969, p. 234; 1971, p. 306) and Waterson (1968).

¹⁹Kasperson and Breitbart (1974, p. 58). See also Kravitz (1968, p. 39).

²⁰See Hague and McCourt (1974, p. 154).

²¹See Fainstein and Fainstein (1971, p. 358), Kahn (1969, p. 34), and Smith (1973, p. 286).

²²Friedmann (1973b, p. 78). See also Gabrow and Heskin (1973, p. 106), Goodman (1971, p. 221), and Tribe (1972, p. 83). As Friedmann and Hudson (1974, p. 6) note, the early 1970's saw the emergence of a "new" paradigm in planning that "... insisted on man's psycho-social development as a central focus of planning." Such a form of planning appears under labels such as participant or transactive planning (Friedmann, 1973b), dispersed planning (Friedmann and Hudson, 1974), and humanistic planning (Fromm, 1972; Gross, 1971). It is unfortunate that Friedmann's main work is ambiguous as to whether his conception of transactive planning is based on pragmatic or normative considerations. Whilst the latter are emphasised, he does note that such

planning is not "appropriate" "... where expertise carries sufficient authority to act without the benefit of mutual learning." Friedmann (1973b, p. 190).

²³McLoughlin (1969, p. 89).

²⁴On the re-emergence of the "democratic" debate, see Friedmann and Hudson (1974, p. 6), Gabrow and Heskin (1973, p. 108), and Gross (1971, p. 284); on the institutionalisation of planning, see Arnold (1973, p. 28), Barr (1972), Dyckman (1969, p. 294), Powers (1970, p. 33), and Seeley (1964, p. 57).

V. WHEN REASON FAILS

Whilst the preceding chapter has examined the desirability of the two rational models, it has done so without reference to the political and technical limitations that have been previously identified. The intention of this chapter is to briefly re-examine the desirability of rational planning in the context of these limitations, considering first the comprehensive model and then the functional model.

As has been previously established, the comprehensive model appears to be technically unattainable. The selection of the best plan to attain a comprehensive set of goals is impossible given the limited nature of the resources, theoretical knowledge, and technical tools that are available; only a few alternative plans can be explored and their consequences cannot be accurately established nor evaluated. Additionally, planning cannot establish the substance of the public interest, whether conceived as objective or individualistic in nature, through the application of technique and rational analysis. Given the conflicting values and interests within urban communities, goal-formation requires determining what and whose values should be served. As Paine and Paine (1971, p. 360) note, "realistic planners must give up the

delusion that they can serve the whole public equally well, that there is an indissoluble social good which they are particularly well circumstanced to ascertain."

Thus the establishment of a comprehensive set of goals and the selection of the best means with which to attain them are not tasks that can be accomplished by rational analysis.

Moreover, the comprehensive model is also in conflict with the nature of the decision-making environments of American urban areas. As consensus is lacking, comprehensive planning is dependent on the existence of centralised power that is freely available to the planner. Formal power is located in government, and whilst the latter's ability or willingness to initiate action has increased over recent decades, in the majority of American cities this formal power appears to remain fragmented between numerous agencies and authorities and limited by interest group pressure. In those systems where power is centralised, comprehensive planning is acceptable only if it relinquishes goal-formation and accepts the goals determined by government. In other systems, action is dependent on the acceptance of plans by influential groups and thus requires the adjustment of both ends and means through bargaining. Thus, whilst comprehensive planning may be regarded as superior to the system of decision-making that exists, it is dependent for implementation on this same

system that it is intended to supplant. Unable to regulate or replace politics, comprehensive planning cannot be effective.

Thus, as Rein (1969, p. 242) notes, it would appear that rational comprehensive planning "... is a myth when the value consensus on which it must depend is illusory." If the determination of comprehensive goals and means through reason is an unattainable "ideal", then can the comprehensive model still be regarded as a desirable conception of the planning process?

One response to this question is to argue that although the model is at odds with reality, it "... can be regarded as normative, as an ideal construct ... as a yardstick."¹ If any adaption is required, then it is the limitations on rational action that should be eliminated. Until this occurs, it is argued, the comprehensive model should be retained as an ideal to be worked towards.²

This argument can be criticised on two grounds, the first being that it neglects the implications of the lack of technical capacity for rationality regarding the legitimacy of comprehensive planning. Whilst the application of expertise that is available to the analysis and evaluation of alternative plans may be preferable to relying on intuition, the standard of this expertise would not seem to be a strong basis for control of the means-

selection process by planners.

Similarly, the argument either ignores or does not acknowledge the value judgements that goal-formation involves. Whilst goal-formation can be retained, it can only be based on the ethical responsibility of the planner "... to promote his private vision of goodness over others"³ and not on the concept of rational determination. Thus Friedmann (1973a) argues that planning should see the public interest as consisting of the principles of political and social equality; the desired ends of social action should be defined not on utilitarian considerations but on the ethics of social justice.⁴ These goals cannot be legitimised by the procedure through which they are defined but only by appeal to their substantive nature. However, if equality is seen as a necessary condition for the existence of democracy and American society is seen as characterised by inequalities leading to differential responsiveness in its political systems, then such a substantive definition of the public interest can also draw on a form of democratic legitimation.⁵

Secondly, the comprehensive model can be regarded as being so far removed from the realities of the decision-making environment that it cannot provide any useful guide to action within that environment. Consequently, Etzioni (1968, p. 304) notes, attempts to apply the model in

practice will either lead to frustration and inactivity or else to modifications of the model. Thus, as McDougall (1973, p. 84) argues,

any theory of planning which evades the normative character of planning and emphasises, for example, the possibility of 'rationality' in goal-setting and better methods for the assessment of relative costs, will ... either result in professional inertia and non-action (because no decisions can be made) or be based on self-deception (because normative decisions are being made but not admitted).

Moreover, at the same time that it fails to provide a guide for planning practice, the comprehensive model may be used to legitimate the different procedures actually used. Thus, policies resulting from a process of bargaining and compromise may be justified as being rationally determined, whilst technical expertise may be used to give a false air of scientific exactitude to conclusions that are essentially extrapolations based on inadequate data.⁶

If comprehensive planning were adhered to in the practice of planning, then it could be regarded as "utopian" but unharmed. However, with the institutionalisation of planning over the past two decades, Friedmann and Hudson (1974, p. 11) argue, planning can no longer be regarded as "... a relatively harmless activity which just might possibly do some good," and the burden on planning theory to provide a realistic normative guide to practice has grown

heavier.⁷

As the functional model excludes goal-formation from the planning process and does not require planning to determine means to a comprehensive set of goals, it can be viewed as a partial modification of the comprehensive rational model to overcome the problems of the latter. By reducing the scope of the goals sought and by shortening the time horizon of the public agenda, planning can work at levels at which the preconditions for rational selection of means can be more closely approximated. Similarly, the exclusion of goal-formation is seen as both avoiding the value judgements that it involves, thus maintaining planning as a technical and apolitical procedure,⁸ and eliminating the conflict with the politician over goals, thus allowing implementation of plans to be obtained by serving the goals set by the city executive.⁹

By reducing the area to which rational procedures are to be applied, it is argued, the planning process can remain rational or technical in character, with the role of the planner as an apolitical expert retained, and still achieve implementation. However, only where power is centralised will functional planning be able to secure the implementation of rationally determined plans through serving the politician. In other environments, policy decisions will be the result of a bargaining process in

which the planner must participate if he or she is to influence such decisions; as Bolan (1969, p. 305) notes "... the prediction of consequences and the calculation of optima must yield to a primary emphasis on managing and manipulating the social processes intrinsic to collective decision-making." Functional planning is therefore only a partial modification that does not cope satisfactorily with one of the basic dilemmas of rational planning; that, in those American cities where planning is not involved in the political process it is irrelevant, and yet where it is involved it is non-rational.

Again, it could be argued that the functional model represents an ideal to be worked towards and that if the model is not congruent with the reality of the decision-making process, then such congruency should be obtained by greater centralisation of power in local government. Again, this would require acceptance of the legitimacy of rational planning and as Dyckman (1969, p. 299) notes, in the American environment the concept of reason is not particularly persuasive: "we operate with a ratification theory of democracy in which public initiatives must be endorsed in the market place of politics."¹⁰

If urban political systems cannot be changed sufficiently, then, whilst the results of those systems may be undesirable, rational planning will remain unaccepted.

And as Wildavsky (1973, p. 153) argues, continual failure cannot be rational: "to err is human; to sanctify the perpetuation of mistakes is something else." If the models that rational planning theory provides lead to decision-making that is unaffected by such planning, then they are not rational as means of securing "better" social decision-making. From this perspective, Warren (1971, p. 63) argues,

...the concept of rationality need not be confined to the substantive-technical aspects of a plan, but may be, and should be, extended to include the processual aspects of the planning-implementation sequence.

Thus, as George (1968, p. 1196) notes, some planning theorists have turned to approach the question of implementation from the opposite direction, accepting that the reduction of tension between planning and the political system necessitates adjustment of the former rather than the latter. The task of planning theory is thus "... to accommodate to this reality, rather than warp reality to the convenient theory";¹¹ an adequate theory of planning must include a strategy to cope with this reality in order to attain the values embodied in the theory.

In terms of "rational" planning, the nature of such a strategy must be defined by the effective means of achieving the purpose of planning, whether this is to increase the technical rationality of decision-making if the substantive

results of the political process are considered to be acceptable, or to change the substantive nature of the decisions of that process if they are not. Such a strategy, as already noted, will probably have little relationship to the analytic processes prescribed by the two rational models that have been examined. Indeed, as Brooks (1970, p. 43) argues, if the planner's concern is for substantive social change, then what is involved

... is not really a planning strategy at all. It is instead, a fundamental orientation towards the ills of society and a commitment to work towards their resolution by any and all means available. And typically the means which are most readily at hand are not those of planning ... but those of mobilization for political action, of social protest, of contention with government agencies.

Footnotes

¹Chadwick (1971, p. 336). However, see footnote six below.

²These limitations are to be eliminated through the continued development of analytic techniques and through changes in the political structure of American cities; on the advocacy of change in the latter see Boguslaw (1965, p. 46), Bolan (1967, p. 233), and Wilson (1964).

³Rittel and Webber (1972, p. 28).

⁴See also Rein (1969, p. 236).

⁵See Gans (1973, p. 10) and Fainstein and Fainstein (1971, p. 358). However Kaitz and Hyman (1970, p. 49) and Lindblom (1965, pp. 228-239) argue that equality is itself a substantive goal that is only valid if accepted by the "democratic" processes that exist in the United States. The relationship between ethical relativism, social decision-making, and democracy, appears to be an important one for planning theory, and it is unfortunate that this paper has not been able to explore, let alone resolve, the complex issues it entails.

⁶Indeed, Reade (1969, p. 1184) argues that the recent emphasis on systems tools stems from "... a desire to impart an aura of scientific respectability to what is essentially an arbitrary, subjective, or intuitive process." As Rabinovitz (1969, p. 159) and Beneviste (1972, p. 65) note, this reputation for expertise could be considered the major "resource" of rational planning: this would appear to be the basis of Chadwick's argument that whilst rationality should be maintained "... to preserve the normative appeal of planning as a decision process," planning must acknowledge the problems of the operational world if it is to be effective. See Chadwick (1971, p. 338).

⁷Dyckman (1969, p. 298).

⁸The exclusion may be motivated more by a desire that planning should be scientific than by a desire that it should be democratic. See Davidoff and Reiner (1962, p. 108), Friedmann (1973b, p. 74), Gutch (1970, p. 391) and Tabb (1972, p. 38).

⁹As Beckman (1964, p. 325) argues, "... influence on public policy is achieved within the bureaucracy through competence." See also Rabinovitz (1969, pp. 8-12).

¹⁰Reliance on the acceptance of the legitimacy of rational planning may help to explain why the latter has tended to identify methodological improvement with effectiveness (see page 31), continuing, in Bolan's words, "... in the blind faith that more elegant and more elaborate techniques are the answer in bringing together the political system and the planning system." See Bolan (1967, p. 241), Dyckman (1971, p. 328), and Healey (1974, p. 604).

¹¹Dyckman (1969, p. 299). See also Bolan (1967, p. 244) and Friedmann (1973b, p. 68).

VI. CONCLUSION

This essay has examined the functional and comprehensive models of rational planning in terms of their desirability and the technical and political difficulties that they involve. It has argued that the desirability of rational planning rests on an instrumental evaluation of the process of social decision-making and that whilst other values can be attached to the planning process, this conception of the desirable nature of planning is undermined by the lack of technical and political capacity for rational determination of the ends or means of social action.

Not only is rationality in means-selection difficult to achieve, but goal-formation cannot be undertaken rationally. If goal-formation is retained by the planning process, then the desirability of planning must rest on the substantive goals that it seeks to achieve rather than on the "method" by which they are defined. Moreover, as the two models do not cope with the problem of securing implementation in environments characterised by conflict and fragmented power, they will be ineffectual in the majority of American cities. However, a strategy that is effective in terms of achieving the values embodied in rational planning theory would appear to require non-rational processes and actions. Thus it may be concluded that, given the limitations on rational action, the process of planning

prescribed by rational theory can be considered undesirable even if its value criteria are accepted.

A further implication of this examination of rational planning theory is that it appears possible to view any theory of planning as consisting of three major elements; a normative conception of the nature of society which defines the desirable nature of both the process of social decision-making and its substantive ends, a conception of the existing state of the society within which planning must operate, and a conception of how any tension between these first two might be resolved. If this is valid, then differences in how the planning process in American society is conceived may be analysed in terms of variations in these three components, differences in the importance attached to social and political equality and in the choice of explanation of the inequality that exists being of particular importance.

Thus, the wider task of understanding the conflict and change within American urban planning thought, with its advocacy, criticism, and counter-criticism of alternative types of planning, may be most usefully approached through exploring the descriptive and normative interpretations of social reality that appear to underlie these changes and conflicts.

BIBLIOGRAPHY

- ALESHIRE, R.A. (1970), "Planning and citizen participation. Costs, benefits and approaches." Urban Affairs Quarterly, 5, (4), 369-93.
- ALLISON, L. (1971), "Politics, welfare, and conservation: a survey of meta-planning." British Journal of Political Science, 1, (4), 437-52.
- ALONSO, W. (1968), "Predicting the best with imperfect data." Journal of the American Institute of Planners, 34, (4), 248-55.
- ALTSHULER, A.A. (1965), The city planning process: a political analysis. Ithaca, N.Y.: Cornell University Press.
- _____ (1968), "New institutions to serve the individual." In Environment and policy: the next fifty years, Ewald, W.R., ed., Bloomington: Indiana University Press.
- _____ (1970), "Decision-making and the trend towards pluralistic planning." In Urban planning in transition, Erber, E., ed., N.Y.: Grossman.
- ARNOLD, J.L. (1973), "City planning in America." In The urban experience, Mohl, R.A., and Richardson, J.F., eds., Belmont, Calif.: Wadsworth.
- BANFIELD, E.C., and MEYERSON, M. (1955), Politics, planning, and the public interest. N.Y.: Free Press.
- BARR, D.A. (1972), "The professional urban planner." Journal of the American Institute of Planners, 38, (3), 155-59.
- BATTY, M. (1972), "Recent developments in land-use modelling." Urban Studies, 9, (2), 151-77
- BECKMANN, M. (1964), "The planner as bureaucrat." Journal of the American Institute of Planners, 30, (4), 323-27.
- BENVENISTE, G. (1972), The politics of expertise. Berkeley: Glendessary.
- BOGUSLAW, R. (1965), The new utopians. Englewood Cliffs, N.J.: Prentice-Hall.

- BOLAN, R.S. (1967), "Emerging views of planning." Journal of the American Institute of Planners, 33, (4), 233-45.
- _____ (1969), "Community decision-making: the culture of planning." Journal of the American Institute of Planners, 35, (5), 301-10.
- _____ (1971), "The social relations of the planner." Journal of the American Institute of Planners, 37, (6), 387-97.
- _____ (1972), "Journal editorial policy." Journal of the American Institute of Planners, 38, (1), 1-2.
- BRANCH, M.C. (1971), City planning and aerial information. Cambridge: Harvard University Press.
- BRAYBROOKE, D., and LINDBLOM, C.E. (1963), A strategy of decision. N.Y.: Free Press.
- BROOKS, M.P. (1970), Social planning and city planning. Chicago: American Society of Planning Officials.
- CARTER, A. (1973), Direct action and liberal democracy. London: Routledge and Kegan Paul.
- CARTWRIGHT, T.J. (1973), "Problems, solutions, and strategies: a contribution to the theory and practice of planning." Journal of the American Institute of Planners, 39, (3), 179-87.
- CATANESE, A.J., and STEISS, A.W. (1970), Systemic planning: theory and application. Lexington, Mass.: Lexington Books.
- CHADWICK, G.F. (1971), A systems view of planning: towards a theory of the urban and regional planning process. Oxford: Pergamon Press.
- CLAWSON, M., and HALL, P. (1973), Planning and urban growth: an Anglo-American comparison. Baltimore: John Hopkins Press.
- COLENUTT, R.J. (1970), "Building models of urban growth." In Progress in Geography, Volume 2, Chorley, R.J.; Haggett, P.; and Board, C., eds., London: Edward Arnold.
- CRICK, B. (1972), "The strange death of the American theory of consensus." Political Quarterly, 43, (1), 46-59.
- CULLINGWORTH, J.B. (1973), Problems of an urban society: the social context of planning. London: Allen and Unwin.

- DAVIDOFF, P., and REINER, R. (1962), "A choice theory of planning." Journal of the American Institute of Planners, 28, (2), 103-15.
- DIMITRIOU, B. (1973), "The interpenetration of politics and planning." Socio-Economic Planning Sciences, 7, (1), 55-65.
- DYCKMAN, J.W. (1961), "Planning and decision theory." Journal of the American Institute of Planners, 27, (4), 335-45.
- _____ (1966), "Social planning, social planners, and planned societies." Journal of the American Institute of Planners, 32, (2), 66-76.
- _____ (1969), "The practical uses of planning theory." Journal of the American Institute of Planners, 35, (2), 289-300.
- _____ (1971), "New normative styles in urban planning." Public Administration Review, 31, (3), 327-34.
- ETZIONI, A. (1968), The active society. N.Y.: Free Press.
- FAINSTEIN, S.S., and FAINSTEIN, N.T. (1971), "City planning and political values." Urban Affairs Quarterly, 6, (3), 341-62.
- FALUDI, A. (1970), "The planning environment and the meaning of planning." Regional Studies, 4, (1), 1-9.
- _____ (1971), "Towards a three-dimensional model of planning behaviour." Environment and Planning, 3, (3), 253-66.
- _____ (1973), "The 'systems view' and planning theory." Socio-Economic Planning Sciences, 7, (2), 57-77.
- FRIED, M. (1964), "Introduction to 'Value consensus among urban residents!'" Journal of the American Institute of Planners, 30, (4), 317-18.
- FRIEDMANN, J. (1966), "Planning as a vocation." Plan, 6, (3), 199-214.
- _____ (1969), "Notes on societal action." Journal of the American Institute of Planners, 35, (5), 311-18.
- _____ (1971), "The future of comprehensive urban planning: a critique." Public Administration Review, 31, (3), 315-26.

- _____ (1973a), "The public interest and community participation." Journal of the American Institute of Planners, 39, (1), 2-7.
- _____ (1973b), Retracking America: a theory of transactive planning. Garden City, N.J.: Anchor Press-Doubleday.
- FRIEDMANN, J., and HUDSON, B. (1974), "Knowledge and action: a guide to planning theory." Journal of the American Institute of Planners, 40, (1), 2-16.
- FROMM, E. (1972), "Humanistic planning." Journal of the American Institute of Planners, 38, (2), 67-71.
- GABROW, S., and HESKIN, A. (1973), "Foundations for a radical concept of planning." Journal of the American Institute of Planners, 39, (2), 106-14
- GANS, H.J. (1968), People and plans. N.Y.: Basic Books.
- _____ (1959), "Planning for people, not buildings." Environment and Planning, 1, (1), 33-46.
- _____ (1973), "Commentary." Journal of the American Institute of Planners, 39, (1), 3-12.
- GEORGE, A.L. (1968), "Political leadership and social change in American cities." Daedalus, 97, (4), 1197-217.
- GOODMAN, R. (1971), After the planners. N.Y.: Simon and Schuster.
- GOLDNER, N. (1971), "The Lowry model heritage." Journal of the American Institute of Planners, 37, (2), 100-10.
- GOULDNER, A.W. (1965), Enter Plato. N.Y.: Basic Books.
- GRAVES, C.W. (1971), "The planning agency and the black community." Planning, 1971, 331-37.
- GROSS, B.M. (1971), "Planning in an era of social revolution." Public Administration Review, 31, (3), 259-97.
- GUTCH, R. (1970), "Planning, philosophy, and logic." Journal of the Royal Town Planning Institute, 56, (9), 389-91.
- HAGUE, C., and McCOURT, A. (1974), "Comprehensive planning, public participation, and the public interest." Urban Studies, 11, (2), 143-55.

- HARRIS, B. (1965), "New tools for planning." Journal of the American Institute of Planners, 31, (2), 90-95.
- _____ (1967), "The new technology and urban planning." In Urban research and policy planning, Schnore, L.F., and Fagin, H., eds., Beverley Hills: Sage Publications.
- _____ (1972), "Foreword." In Decision-making in urban planning, Robinson, I.M, ed., Beverley Hills: Sage Publications.
- HEALEY, P. (1974), "The problem of ideology." The planner, 60, (8), 602-04.
- HEIKOFF, J.M. (1968), Justice, politics, and urban planning." Urban Affairs Quarterly, 3, (1), 46-61.
- HILL, M. (1968), "A goals-achievement matrix for evaluating alternative plans." Journal of the American Institute of Planners, 34, (1), 19-25.
- HUDSON, B.M., WACHS, M., and SCHOPFER, J.L. (1974), "Local impact evaluation in the design of large-scale urban systems." Journal of the American Institute of Planners, 40, (4), 255-65.
- HYMAN, H. (1969), "Planning with citizens: two styles." Journal of the American Institute of Planners, 35, (2), 105-12.
- KAHN, A.J. (1969), Theory and practice of social planning. N.Y.: Russell Sage Foundation.
- KAIN, J.F. (1970), "Rampant schizophrenia: the case of city and regional planning." Journal of the American Institute of Planners, 36, (4), 221-23.
- KAITZ, E.M., and HYMAN, H. (1970), Urban planning for social welfare. N.Y.: Praeger.
- KALRA, K. (1974), "Post-industrial planning: a review forwards." Journal of the American Institute of Planners, 40, (3), 147-55.
- KASPERSON, R.E., and BREITPART, M. (1974), Participation, decentralization, and advocacy planning. Resource paper no. 25, Commission on College Geography, Washington, D.C.: Association of American Geographers.

- KRAVITZ, A.S. (1968), "Advocacy and beyond." Planning, 1968, 38-46.
- KRIEGER, M.H. (1974), "Some new directions for planning theories." Journal of the American Institute of Planners, 40, (3), 156-63.
- LEE, C. (1970), "Models in planning - some observations and reservations." Planning Outlook, 8, 4-15.
- LEE, D.B. (1973), "Requiem for large-scale models." Journal of the American Institute of Planners, 39, (3), 163-78.
- LINDBLOM, C.E. (1965), The intelligence of democracy. N.Y.: Free Press.
- LINDSAY, L. (1973), "The pluralist persuasion in American democratic thought." Social and Economic Studies, 22, (4), 479-513.
- LITHWICK, N.H. (1970), Urban Canada: problems and prospects. Ottawa: Central Mortgage and Housing Corporation.
- LOEKS, C.D. (1968), "Underlying causes of the reconciliation problem." Planning, 1968, 52-55.
- LOWENSTEIN, L.K., and McGRATH, D.C. (1973), "The planning imperative in America's future." Annals of the American Academy of Political and Social Science, 405, 15-24.
- MANN, L. (1964), "Studies in community decision-making." Journal of the American Institute of Planners, 30, (1), 58-65.
- MAYER, R.R. (1972), Social planning and social change. Englewood Cliffs, N.J.: Prentice-Hall.
- McDOUGALL, C. (1973), "The systems approach to planning: a critique." Socio-Economic Planning Sciences, 7, (1), 79-90.
- McLOUGHEIN, J.B. (1969), Urban and regional planning. N.Y.: Praeger.
- McNBE, R.B. (1970), "Regional planning, bureaucracy, and geography." Economic Geography, 46, (2), 190-98.
- MEYERSON, M. (1968), "Urban policy: reforming reform." Daedalus, 97, (4), 1410-30.
- MEYNAUD, J. (1969), Technocracy, N.Y.: Free Press.

- NEEDHAM, B., and FALUDI, A. (1973), "Planning and the public interest." Royal Town Planning Institute Journal, 59, (4), 164-66.
- PAHL, R.E. (1970), Whose city? London: Longman.
- PETERSON, W. (1966), "On some meanings of planning." Journal of the American Institute of Planners, 32, (3), 130-42.
- POWER, J. (1970), "Town planning and politics." Royal Australian Planning Institute Journal, 8, (1), 33-37.
- RABINOVITZ, F.F. (1969), City planning and politics. N.Y.: Atherton Press.
- RAMO, S. (1969), Cure for chaos. N.Y.: David McKay.
- READE, E. (1968), "Some notes toward a sociology of planning." Journal of the Royal Town Planning Institute, 54, (5), 214-18.
- _____ (1969), "Contradictions in urban planning." Official Architecture and Planning, 32, (10), 1179-85.
- REIN, M. (1969), "Social planning: the search for legitimacy." Journal of the American Institute of Planners, 35, (4), 233-44.
- _____ (1971), "Social policy analysis as the interpretation of belief." Journal of the American Institute of Planners, 37, (5), 297-310.
- RITTEL, H.W.J., and WEBBER, M.M. (1972), Dilemmas in a general theory of planning. Working paper no. 194, Institute of Urban and Regional Development, Berkeley: University of California.
- ROBINSON, I.M., ed. (1972), Decision-making in urban planning. Beverley Hills: Sage Publications.
- RONDELLI, D.A. (1971), "Adjunctive planning and urban development policy." Urban Affairs Quarterly, 7, (1), 13-40.
- SEELEY, J.R. (1964), "Central planning: prologue to a critique." In Centrally planned change, Morris, R., ed., N.Y.: National Association of Social Welfare.
- SILVESTER, M.S. (1973), "The contribution of the systems approach to planning." Socio-Economic Planning Sciences, 7, (1), 91-103.

- SMITH, M.P. (1971), "Alienation and bureaucracy." Public Administration Review, 31, (5), 658-64.
- SMITH, R.W. (1973), "A theoretical basis for participatory Planning." Policy Sciences, 4 (3), 275-95.
- STEISS, A.W. (1973), "Fundamental trends in the planning process model in the United States. Planning Outlook, 13, 9-25.
- TAAFFE, E.J. (1974), "The spatial view in context." Annals of the Association of American Geographers, 64, (1), 1-16.
- TABB, W.K. (1972), "Alternative futures and distributional planning." Journal of the American Institute of Planners, 37, (1), 25-32.
- TRIBE, I.H. (1972), "Policy science: analysis of ideology?" Philosophy and Public Affairs, 2, (1), 66-110.
- WARD, S. (1972), "The ethics of planning." Royal Town Planning Institute Journal, 58, (8), 364-65.
- WARREN, R.L. (1969), "Model cities first round." Journal of the Institute of Planners, 35, (4), 245-52.
- _____ (1971), Truth, love, and social change. Chicago: Rand McNally.
- WATERSON, A. (1971), "Resolving the three-horned planning dilemma." Planning, 1971, 152-65.
- WEBBER, M.M. (1963), "Comprehensive planning and social responsibility." Journal of the American Institute of Planners, 29, (4), 232-41.
- _____ (1965), "The role of intelligence systems in urban planning." Journal of the American Institute of Planners, 31, (4), 289-96.
- _____ (1969), "Planning in an environment of change: permissive planning." Town Planning Review, 39, (4), 277-95.
- _____ (1973), On the techniques and politics of transportation planning. Working paper no. 219, Institute of Urban and Regional Development, Berkeley: University of California.
- WILDAVSKY, A. (1973), "If planning is everything, maybe its nothing." Policy Sciences, 4, (2), 127-53.

WILSON, A.G. (1964), "An overview of theories of planned change." In Centrally planned change, Morris, R. ed., N.Y.: National Association of Social Welfare.

YOUNG, R.C.(1965), "Goals and goal-setting." Journal of the American Institute of Planners, 32, (2), 76-85.

AN EVALUATION OF THE SHIFT-SHARE
TECHNIQUE

by

PAUL RAYNOR

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AN EXTENDED ESSAY SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
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APPROVAL

Name: Paul Raynor
Degree: Master of Arts
Title of Extended Essay: An Evaluation of the Shift-share
Technique

Examining Committee:

Chairman: R.B. Horsfall

G.P.F. Steed
Senior Supervisor

L.J. Evenden

S.T. Wong

J. Munro
External Examiner
Associate Professor
Department of Economics and Commerce
Simon Fraser University

Date Approved: July 19 1975

ABSTRACT

This essay attempts to review and critically evaluate the shift-share technique, a technique widely used in regional analysis. It examines the basis of the technique, the wide range of problems involved in its formulation, application and interpretation, and the uses to which it has been put. It finds conflicting evidence regarding the validity of the growth and compositional effects, whilst the conventional interpretation of the differential shift is found to lack suitable theoretical and empirical support. The essay concludes that the technique requires testing over a wide range of conditions and the development of an adequate theory of regional growth if it is to satisfactorily fulfill all of the functions for which it has been used.

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TABLE OF CONTENTS

	Page
TITLE PAGE	i
APPROVAL PAGE.	ii
ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS.	v
LIST OF TABLES	vi
LIST OF FIGURES	vii
INTRODUCTION	1
I. STANDARDISATION PROCEDURES AND THE SHIFT-SHARE TECHNIQUE.	3
II. THE CHOICE OF WEIGHTS.	12
III. OPERATIONAL PROBLEMS AND INTERPRETATIONS OF SHIFTS .	22
IV. APPLICATIONS OF THE TECHNIQUE.	49
V. SOME EMPIRICAL TESTS	60
VI. CONCLUSION	88
APPENDIX A	93
APPENDIX B	94
APPENDIX C	96
APPENDIX D	98
APPENDIX E	100
BIBLIOGRAPHY	102

LIST OF TABLES

	Page
I. Standard Equations for the Shift-share Technique.	4
II. Weighting Systems and their "Meanings".	13
III. Esteban-Marquillas' Reformulation of the Shift-share Technique	16
IV. Aggregated and Calculated Industry Group Shifts: Rank Correlation Coefficients	64
V. Interdependence of Proportional and Differential Shifts (Winnipeg): Rank Correlation Coefficients	73
VI. Interdependence of Proportional and Differential Shifts (Montreal): Rank Correlation Coefficients	73
VII. Stability of Industry Shifts: Chi-square Values	76
VIII. Stability of Industry and Industry Group Shifts (Winnipeg): Rank Correlation Coefficients.	76
IX. Stability of Industry and Industry Group Shifts (Montreal): Rank Correlation Coefficients.	77
X. Industry Group Shift-share Values (Winnipeg)	79
XI. Projected and Actual Employment Changes in Winnipeg Industry Groups and Industries over the Period 1956 - 1958, Using Various Estimates for the Differential Shift	81

LIST OF FIGURES

	Page
1. Graph of Two Year Shifts for Foods and Beverages (Winnipeg)	66
2. Graph of Two Year Shifts for Wood Products (Winnipeg).	67
3. Graph of Two Year Shifts for Miscellaneous Industries (Winnipeg)	68
4. Graph of Two Year Shifts for Foods and Beverages (Montreal)	69
5. Graph of Two Year Shifts for Wood Products (Montreal).	70
6. Graph of Two Year Shifts for Miscellaneous Industries (Montreal)	71

INTRODUCTION

Government planning in an increasing number of countries is incorporating a regional policy dimension that is concerned with the effects, now defined as problems, resulting from spatial disparities in the growth of economic activity. To be effective, this regional policy should be based on an understanding of the "forces" that generate this disparate growth, and it is within this area that certain interests of planners and academics coincide. Unfortunately our theoretical understanding is by no means adequate; existing regional growth theories are partial, conflicting, and often too crude or too complex to have any value in direct application. As Brown (1969, p. 784) notes, "... regional economics is not yet a coherent body of analysis applicable to the affairs of a country."

It is within this context that the technique known as shift-share analysis has evolved from a minor scholarly technique into a major official instrument becoming, as Lasuen (1971, p. 154) notes, "... a conventional world-wide tool." It is this paper's purpose to attempt to evaluate the shift-share technique as a method for aiding the understanding of regional growth and as a tool for regional planning, these two concerns overlapping.

The first four sections attempt to integrate and critically discuss aspects of the literature on the technique. The technique and its modifications are outlined and discussed in

relation to the problems involved in constructing or formulating a standardisation procedure. The problems involved in the application of the technique are then considered together with the interpretation problems that they give rise to. The theoretical basis of conventional interpretations of the shifts or components are examined, and empirical attempts to systematically evaluate the shifts are reviewed. The proposed and actual uses of the technique are then evaluated in the light of this discussion. The last section attempts to test some of the propositions examined in the previous chapters. Focussing on operational choice problems and shift stability, various hypotheses are tested using employment data for Winnipeg and Montreal.

I. STANDARDISATION PROCEDURES AND THE SHIFT-SHARE TECHNIQUE

The shift-share technique is basically concerned with regional changes in a variable between two points in time. The regional deviations of this variable from the performance of some base area are first identified, and then these deviations are decomposed into two components. Thus, as Stilwell (1970, p. 453) notes, shift-share analysis can be applied to "... any variable for which we have a matrix of information by region and by sector for two separate points in time."

In the following outline of the technique it will be assumed that employment is being used as the variable and national performance as the standard of reference. These choices are by no means obvious, nor are the equation forms given the only ones that have been proposed. The terminology used to describe the shift-share components varies between authors, and Appendix A lists equivalent terms for those used in the outline. The equation forms for each of the measures, together with definitions of terms used elsewhere in the paper, are given below in Table I.

Deviation of regional employment growth from national growth over the period of concern is identified by using the regional share component (RS). This measures the regional employment change expected had the region's industries grown at the overall national growth rate. It is the amount by which regional employment would have changed if the region had "behaved" like the nation, and thus maintained its proportionate

TABLE I

STANDARD EQUATIONS FOR THE SHIFT-SHARE TECHNIQUE

Definitions of terms used throughout the paper:

Let e_{ij} = number employed in the i th industry in the j th region

$\sum_i^m e_{ij}$ = number employed in the j th region

$\sum_j^n e_{ij}$ = number employed in the i th industry = N_i

$\sum_j^{mn} \sum_i e_{ij}$ = number employed in all regions and all industries = N

$rigr$ = regional growth rate

$nigr$ = national industry growth rate

$nogr$ = national overall growth rate

f_{ij} = structural fraction of the region =

$$\frac{e_{ij}^0}{\sum_i^m e_{ij}^0}$$

F_i = structural fraction of the nation =

$$\frac{N_i^0}{N^0}$$

where superscripts⁰ and ⁱ refer to the initial and terminal dates of the study period and n = the number of regions, m = the number of industries.

The following notation is based on calculating shifts for a region j :

1) growth in employment in j = $\sum_i e_{ij}^1 - \sum_i e_{ij}^0$

$$= RS + PS + DS,$$

where RS = regional share; PS = proportional shift;
and DS = differential shift.

$$2) \quad RS = \sum_i e_{ij}^0 \cdot \frac{N_i^1}{N^0} = \sum_i e_{ij}^0 \cdot nigr$$

$$3) \quad \text{Net shift} = \sum_i e_{ij}^1 - \sum_i e_{ij}^0 \cdot \frac{N_i^1}{N^0} = PS + DS$$

$$4) \quad PS = \sum_i e_{ij}^0 \left[\frac{N_i^1}{N_i^0} - \frac{N^1}{N^0} \right] = \sum_i e_{ij}^0 (nigr - nigr)$$

$$5a) \quad DS = \sum_i e_{ij}^1 - e_{ij}^0 \cdot \frac{N_i^1}{N_i^0} = \sum_i e_{ij}^1 - e_{ij}^0 \cdot nigr$$

$$5b) \quad DS = \sum_i e_{ij}^0 \left[\frac{e_{ij}^1}{e_{ij}^0} - \frac{N_i^1}{N_i^0} \right] = \sum_i e_{ij}^0 (rigr - nigr)$$

equations (a) and (b) are equivalent.

share of industry. The difference between this "expected" growth, and the actual regional employment change is termed the net shift of employment to or from the region. Regions with positive net shifts have increased their share of national employment relative to other regions; there has been a relative shift of employment into the region. This net shift is broken down into two components, here termed the proportional shift (PS) and the differential shift (DS).

The proportional shift measures the employment change expected if each industry in the region had grown at its national growth rate. It measures the amount of the shift in employment that can be attributed to differences in industry growth rates at the national level and in the industry mix of each region. For example, a positive proportional shift is regarded as indicating specialisation in those industries which are growing rapidly (relative to the overall national growth rate) at the national level.

The differential shift measures the employment change that can be attributed, as Paris (1970, p. 427) notes, "... to differences between regional and national growth rates in each sector, given the size of regional employment at the beginning of the period." As Fuchs (1962a, p. 19) argues, it can be regarded as an indication of the redistribution of industries over the study period.

The "... partial original conception" of the shift-share technique (Lasuen, 1971, p. 155) is usually attributed to Creamer (1943). Creamer's work is partial as he considered only what we have termed the DS, as did the subsequent studies

of Zelinsky (1958) and Isard (1960, p. 259).¹ The main development and refinement of the technique, it has been argued, was undertaken by Fuchs (1959b) and Perloff et al. (1960), who introduced other shift components and thus, according to Lasuen (1971, p. 170), transformed the technique from one of intraregional analysis to one of interregional analysis. However, this history does not consider the wide use of standardisation procedures in other fields, particularly that of regional income analysis, where similar problems have been approached using similar techniques. The wide literature that these efforts have produced has been relatively neglected by geographers.² Yet the shift-share technique is essentially a standardisation procedure. The following discussion of standardisation procedures should therefore not only clarify the basis of the shift-share technique and aid in the understanding of the literature, but should also identify the elements common to both the shift-share and regional income procedures. It will also aid later discussions of the economic interpretations that have been given to the components.³

Standardisation procedures have been widely used in regional economics, largely with the aim of facilitating the comparison of the effect of one factor on a variable without the disturbing influence of differences in other factors. Often, as Hanna (1959, p. 232) notes, such comparisons are accompanied by a desire to partition the differences between two observed figures among those factors.

With regard to employment, differences in employment growth between a region and an aggregate such as the nation⁴ can be regarded as the result of two factors: differences in their industrial structure and differences in the rates of growth of elements in those structures.⁵ If the region has the same growth rates and industrial structure as the aggregate unit, its overall growth will be the same, and there will be no difference to account for. Any difference between regional and aggregate change can be regarded as the summation of two "influences",⁶ and the standardisation problem is to separate out their differential effects. The procedure that this involves is succinctly summed up by Thirlwall (1969, p. 128):

... the general procedure for calculating the contribution of any factor to a total difference (e.g. between a region and the nation) is first to define the difference term of the factor (i.e. the difference between the regional value of the particular factor and the mean value of the factor), and then to decide on the weighting term which when multiplied by the difference term gives the total contribution of that factor to the total difference.

Thus, one calculates standardised figures for each factor which eliminate other possible causes of different performance by the use of weighting systems. The effect of differences in composition or industry mix, for example, can be appraised by calculating figures that reflect only those differences (i.e. that are rate-constant). The problems involved in the choice of weighting terms are dealt with in the following chapter. Here, the discussion will be limited to the definition of the total difference term (i.e. the difference between regional and

national change).

Employment change can be measured "absolutely" in terms of actual change or relatively as percentage growth rates, as Townroe (1969, p. 96) notes.⁷ This difference in the type of measurement of change leads to differences in the definition of the total difference term and hence to the formulation of the difference terms for each factor. When using "rates", one can compare regional and national performance directly, and the total difference term can be expressed as

$$\frac{de_{ij}^{1-0}}{e_{ij}} - \frac{dE_i^{1-0}}{E_i} = \Sigma (\text{rigr}.f_{ij}) - \Sigma (\text{nigr}.F_i)$$

Expansion of this total difference term using a mixed weighting system, gives

$$\begin{aligned} & \Sigma \text{rigr}.f_{ij} - \Sigma \text{rigr}.F_i + \Sigma \text{rigr}.F_i - \Sigma \text{nigr}.F_i \\ & = \Sigma [\text{rigr}(f_{ij} - F_i)] + \Sigma [F_i(\text{rigr}-\text{nigr})] \end{aligned}$$

The first term in the last equation is the rate-constant effect or proportional shift; the second term is the composition-constant effect or differential shift (the total difference has been set equal to the two effects).

However, if one is dealing with employment change figures, then regional and national performance are not directly comparable. A measure of national change (or average growth) has to be derived which is comparable to the region's employment change. This has usually be achieved by using the region's industrial structure and the national overall growth rate,⁸ so that the difference

between regional and national change can be defined as

$$\Sigma (\text{rigr}.e_{ij}) - \Sigma (\text{nogr}.e_{ij})$$

Expansion of this total difference term gives the shift-share equations:

$$\begin{aligned} & \Sigma(\text{rigr}.e_{ij}) - \Sigma(\text{nigr}.e_{ij}) + \Sigma(\text{nigr}.e_{ij}) - \Sigma(\text{nogr}.e_{ij}) \\ & = \Sigma[e_{ij}(\text{rigr} - \text{nigr})] + \Sigma [e_{ij}(\text{nigr}-\text{nogr})] \end{aligned}$$

There are therefore two possible formulations of the same procedure arising from modifications of that procedure to deal with absolute and relative employment change. The "rate" formulation is the type that has been used in regional income studies, though it has been used with employment as the variable.⁹ The shift-share technique differs from the "rate" formulation only in "content" and not in structure, in the forms of its equations but not in their logic.

Footnotes

¹Creamer classifies the "differential shift" into absolute and relative shifts, both sets being further divided into inward (when $rigr < nigr$) and outward (when $rigr > nigr$) shifts. Isard's shift ratio is likewise based on the differential shift.

²It is not proposed to explore this work further in this paper however. Good introductions to this literature can be found in Brown (1969, pp. 765 - 67), Hanna (1957), and National Bureau of Economic Research (1957).

³The preceding outline of the shift-share technique did not consider these interpretations. The basis for this implicit distinction between the components and their interpretation is outlined, together with the interpretations themselves, in Chapter III.

⁴The problem can also be formulated in terms of two regions: see, for example, Hanna (1959, p. 234) or Klaassen and Paelink (1972).

⁵Employment growth in a region can be expressed as the summation over all industries, of each industry's employment multiplied by its regional growth rate. Thus there are two possible sources of variation in employment growth: variations in growth rates and variations in industrial base, ignoring the problem of interdependence (see below, pp. 14-15, 29-30).

⁶See below, p. 16, however.

⁷That is, employment change can be expressed as $\sum_i rigr \cdot e_{ij}$
or $\sum_i rigr \cdot f_{ij}$.

⁸It is not possible to use the national industry growth rate as the size of the national element of change would be partly dependent on the industry mix of the region, nor can one use the nation's industry structure as the absolute numbers are greatly different. This rules out the following expressions of the total difference term:

$$\sum_i (rigr \cdot e_{ij}) - \sum_i (nigr \cdot e_{ij}) \text{ and } \sum_i (rigr \cdot e_{ij}) - \sum_i (rigr \cdot E_i)$$

However, Esteban-Marquillas (1972) has developed an alternative measure for the national change element which enables "rate" formulations of the other difference terms (see below, p.

⁹See Thirlwall (1969), Cunningham (1969), Beaud (1966, in Paris, 1970, p. 428), and Klaassen and Paelink (1972).

II. THE CHOICE OF WEIGHTS

As noted previously, the formulation of a standardisation technique requires not only the definition of the total difference term, but also the choice of weighting terms. The two basic weighting problems revolve around the "temporal" basis (whether to use initial or terminal period weights) and the "areal" basis (whether to use regional, national or mean weights) of the system.

Though the choice of "areal" basis applies to "rate" formulations and not to "shift-share" formulations (unless the latter is modified as by Esteban-Marquillas (1972)), the problem of shift interdependence involved in the choice is common to both types of formulation. These choice problems are significant in that there is no logical reason for preference between the many possible sets of weights, and the relative values of the standardised figures (shifts) are dependent on the particular weighting system chosen.

The regional income literature has long considered the problem of "areal" basis of weighting systems as Brown (1969, p. 767) notes, but the issue also has been raised recently in the context of regional employment change by those concerned with the "rate" formulation.¹ In short, the problem is that the rate-constant or proportional effect can be calculated by weighting the differences in industry mix with the growth rates of the nation (PS^N) or with those of the region (PS^R). The differential shift

can likewise be calculated by weighting the differences in growth rates with national or with regional industry structure figures. There are therefore two potential measures of each effect which will yield different estimates. The equation forms and "meanings" (non-economic interpretations) of each of these alternatives are given in Table II below. The problem is further complicated by the question of interdependence of the shifts.

TABLE II

WEIGHTING SYSTEMS AND THEIR "MEANINGS"

Weighting system	"Meaning"
1) $PS^N = \Sigma[nigr(f_{ij} - F_i)]$... The difference between national growth and what it would have been if all the regional industries had grown at their national rates.
2) $PS^R = \Sigma[rigr(f_{ij} - F_i)]$... The difference between regional growth and what it would have been if the region had the national industry structure.
3) $DS^N = \Sigma[F_i(rigr - nigr)]$... The difference between national growth and what it would have been if the region had the national industry structure.
4) $DS^R = \Sigma[f_{ij}(rigr - nigr)]$... The difference between regional growth and what it would have been if all regional industries had yielded their national growth rates.

Usually, a mixed weighting system is used,² but it is possible to use a pure weighting system (i.e. where both difference terms are weighted by either regional or national weights). However

if the latter is used, the estimates of the two shifts will not sum up to the difference between the actual regional and national figures; there is a residual, or what Hanna (1959, p. 234) terms a joint particle. This residual can also be obtained as the difference between the effects calculated using regional and national weights (Cunningham, 1969).³

This choice problem between national and regional weights can be approached in two ways. Firstly the "residual" can be "divided up" between the two effects, by weighting the difference terms by the mean of national and regional weights:

$$\Sigma(\text{rigr}.f_{ij}) - \Sigma(\text{nigr}.f_{ij}) = \Sigma \frac{(F_i + f_{ij})(\text{rigr} - \text{nigr})}{2} + \Sigma \frac{(\text{nigr} + \text{rigr})(f_{ij} - F_i)}{2}$$

This procedure is termed "averaging out" by Klaassen and Paelinck (1972, p. 259) whilst Hanna (1959, p. 234) refers to it as the cross-weights method. It "solves" the problem of which weights to use but as with the mixed weighting system, this mean weighting system gives no measure of interdependence that may exist between the components; of the joint effects of growth rate and industry structure changes. As Brown (1969, p. 766) notes, one should expect interdependence as industries that are strongly represented in a region tend to show systematic tendencies to yield better or worse growth rates. Cunningham (1969, p. 124) argues that

... if the degree of specialisation does affect, or is affected by the performance of a particular industry, then this must in itself contribute to any explanation of differences in performance between the region and the nation.

Thus one must decompose the total difference into three instead of two components, unless one assumes independence of the components.⁴

The residual itself is therefore of interest, and can be retained and used as a measure indicating the interaction between structure and performance. The magnitude of this residual will not vary whether a pure regional or national weighting system is used, but the relationship between regional concentration and growth will be denoted by different signs.⁵ The measure of interaction can be used in combination with measures of the degree of specialisation of an industry, as Crowley (1971) shows. The latter's results also indicate that interaction accounts for quite a high percentage of the total difference, and thus failure to use a pure weighting system could lead to misleading results. However, the use of a pure system still involves a choice between the use of regional or national weights, each of which yielding divergent estimates of the effects (both in terms of different magnitudes and relative importance) as Crowley's results again illustrate. Thus, although the use of a pure weighting system yields independent estimates of the effects, it does not solve the problem of the different measures of each effect.

With the shift-share formulation, this question of weights does not arise, but interdependence between the effects exists not only "outside" of the procedure (in terms of interdependence of shifts within and between industries) but also arises from the formulation itself. Esteban-Marquillas (1972, p. 250) notes

that the differential shift is "... influenced and interwoven with the industry mix effect", as the values that the shift can take are not only due to the special dynamism of the sectors in that region, but also are due to the specialisation of the region in those activities. In other words, if we consider two regions where the total employment and the regional industry growth rates are the same, the respective differential shifts will be different if the sectoral distribution of employment is different. The shift-share formulation does not therefore obtain independent measures of growth and composition effects because of within-industry interaction between the effects.

His solution is to construct a new element which he terms the homothetic employment (e'_{ij}), defined as the employment a region would expect if its industrial structure was equivalent to that of the nation (see Table III below).

TABLE III

ESTEBAN-MARQUILLAS' REFORMULATION OF THE SHIFT-SHARE TECHNIQUE

- 1)
$$e'_{ij} = N_i \cdot \frac{\sum e_{ij}}{N}$$
- 2)
$$RS_{ij} = nigr \cdot e'_{ij}$$
- 3)
$$\text{net shift} = e_{ij} \cdot rigr - e'_{ij} \cdot nigr$$
- 4)
$$PS_{ij} = nigr (e_{ij} - e'_{ij})$$
- 5)
$$DS_{ij} = e'_{ij} (rigr - nigr)$$
- 6)
$$a_{ij} = (e_{ij} - e'_{ij})(rigr - nigr)$$

Notes: Equations 4) to 6) follow from expansion of equation 3)
e.g. $p_1q_1 - p_2q_2 = p_2(q_1 - q_2) + q_2(p_1 - p_2) + (q_1 - q_2)(p_1 - p_2)$. Again the interdependence term (a_{ij}) can take several forms (see Appendix B).

Using this element, he obtains a new formulation for the regional share and this in turn permits a reformulation of the proportional and differential shifts. This reformulation leaves the proportional effect without any effect on the differential shift and also leaves a residual, which he terms the allocation effect (a_{ij}), reflecting the interdependence between an industry's shifts.⁶ Whilst he correctly argues that this reformulation "... divides in a clearer way the different components of employment growth in each sector",⁷ it is not original in itself as it is essentially a "rate" formulation, using a pure national weighting system. Esteban-Marquillas' contribution is that his homothetic employment term enables the use of this formulation on absolute employment change data.⁸ It achieves this by reducing national employment figures to the scale of regional employment, enabling the regional share to be calculated using national industry growth rates and national industry structure. This type of formulation would seem to be superior to the conventional shift-share formulation, as the latter cannot allow for such interdependence, no residual being obtainable. However, although this and other "rate" formulations allow for intra-industry shift interdependence through the use of residual term, they do not appear to allow for inter-industry interdependence (if it is valid to distinguish the two types)⁹, nor is the

choice between regional and national pure weighting systems resolved.

The relative values of the shifts also vary depending on the "temporal" basis of the weighting system, as Fuchs (1962, p. 44) found. The usual formulation¹⁰ involves the use of initial period values, yet there will be changes in employment due to changes in the industrial mix of a region over the study period. This change will be subsumed in the differential shift even though it is due to structural changes and would therefore be more properly included in the proportional shift. The structural effect on growth is therefore underestimated.

The problem can be resolved by using measures based on an average of the results obtained using initial and terminal values¹¹, but it would also be useful to have a measure indicating whether the industry mix of a region is improving or deteriorating over the period. Stilwell (1969) attempts both to separate out the two shifts more accurately and to provide such a measure (which he terms the proportionality modified shift). He first calculates the reversed proportionality shift (RPS) which is the difference of the reciprocals of the overall national and national industry growth rates, weighted by the industry mix of the region at the terminal point of the study period. This measures the employment

$$RPS = \sum_i e_{ij}^1 \frac{N^0}{N^1} - \frac{N_i^0}{N_i^1}$$

growth that would be expected given the terminal industry mix.

To obtain a measure of employment change resulting from the change in mix over the period, he subtracts the proportional shift from the reversed proportionality shift to give the proportionality modified shift. The latter is subtracted from the differential shift to obtain the residual differential shift; the growth unaccounted for by industrial structure and by changes in that structure.¹²

This modification has not been widely used, and has itself been criticised. Ashby (1970, p. 299), while approving the objective of the modification, points out that it is more logical to change the employment base for all components, rather than just for the proportional shift with an offsetting adjustment in the differential shift. He suggests the comparison of shifts calculated using consistent sets of base weights, and the identification of the displacement vectors of the proportional and differential shifts associated with each set. However Chambers (1971, p. 289) points out that both modifications "... give perverse results under a broad range of conditions", largely because neither measures what is claimed for it. Both he and Bjonback (1971) found that a region can be increasing its specialisation in a nationally fast growing industry and yet the proportionality modified shift for that industry is negative, the reverse of what Stilwell (1969) claims it should be. Chambers attributes this inconsistency to a misconception regarding the nature of the technique, pointing out that whichever base is used, all the shifts calculated are measuring what is happening over the study

period interval, not what is happening at different points within that interval. Shifts calculated with initial and terminal weights are not measures of the structure at those points except under special circumstances. It is not valid to interpret the difference between the shifts calculated with these weights as the difference between employment change associated with the initial and terminal industry mixes.

Chambers proposes an alternative measure which he terms the relative mix modification (MM). This is basically the differential shift weighted by the difference between the national sectoral and overall national growth rates. Calculated for each industry in each region and summed into a regional total, it

$$MM = \sum_i DS_{ij} \frac{N_i^1}{N_i^0} - \frac{N^1}{N^0}$$

indicates whether there has been favourable change (if positive) or unfavourable change (if negative) in the industrial structure. In that the measure is concerned with structure and growth, it is related to the interdependence measures discussed earlier. However, it is not measuring interdependence, but change in the industrial structure. Whilst the measure may be an excellent indicator of the latter, it still leaves unresolved the problem of choice of "temporal" base for the weights, and the problem of a differential shift which includes an element of growth associated with structural change.

Footnotes

¹See Cunningham(1969), Thirlwall (1969), Klaassen and Paelink (1972). Those interested in pursuing the issue in greater depth should consult Hanna (1959) and the National Bureau of Economic Research (1957) volume. It should be stressed that the "areal" choice problem applies only to rate-type formulations, though shift-share terminology is used.

²Beaud, for example, uses a regionally weighted differential shift and a nationally weighted national shift. See Appendix B for the derivation of such mixed weighting systems. With a mixed weighting system, there is no residual; Crowley (1971, p. 15) is misleading in this respect.

³This residual can be expressed in a variety of forms, given in Appendix B. The two possible derivations are elaborated upon in Appendix C.

⁴This paper is distinguishing two types or sources of shift interdependence: intra-industry interdependence as discussed above, and inter-industry interdependence (see p. 29). This distinction would seem to be a reasonable one, but is open to question.

⁵See Appendix B. Hanna (1959, p. 234) states that the residual will have the same magnitude and sign, but this is because the total difference he uses with national weights is the regional growth rate minus the national growth rate, and that used with regional weights is the national growth rate minus the regional growth rate.

⁶He argues, in fact, that the allocation effect will show "... if the region is specialised in those sectors in which it enjoys better competitive advantages" (p. 252). However, this statement presumes that the differences in growth rates indicate competitive advantages.

⁷Esteban-Marquillas (1972, p. 252).

⁸See above, p.9.

⁹See above, p.14.

¹⁰As was described in Table I.

¹¹This is the strategy that Fuchs (1962 a, b) uses.

¹²Stilwell (1969, p. 169) incorrectly subtracts only the reversed proportionality shift from the differential shift in his equation eight.

III. OPERATIONAL PROBLEMS AND INTERPRETATION OF THE SHIFTS

The basic idea behind the shift-share technique, to recap, is that the difference between regional and national growth can be decomposed into two elements, one of which reflects that proportion of the difference that can be attributed to differences in industrial structure, whilst the other reflects differences in the rates of growth of each respective industry. The technique merely partitions the employment difference between the two possible sources of variation, leaving aside the problem of interdependence discussed in the previous chapter. The shifts are identities and not behavioural components. In this sense, Ashby (1964, p.13) is correct in stressing that the technique is essentially a descriptive tool which achieves a simplification of the data that can serve as a framework for further analysis. Stilwell (1970) and Chambers et al. (1971, p. 92) likewise agree that the technique has no intrinsic explanatory capacity. Chambers et al. argue that shift-share analysis "... can become a theory of regional growth only to the extent that a theory is proposed to explain the sectoral composition of net growth and the differential shift experienced by each region."¹ Thus regional growth is not explained by the shifts themselves, but by explanation of how and why the differences in industrial structure and growth rates occur.

Yet, although the shifts or effects are not behavioural components as such, they have been given behavioural interpreta-

tions, and it is because the components can be given such interpretations that they are worth distinguishing at all. As Brown (1969, p. 4) notes, in decomposing regional growth "... the analyst must be looking for some information which he can get from the components". Houston (1967, p. 578) likewise states that "... to be useful in explaining regional growth, there should be some theoretical basis for identifying the ... separate components". Although a distinction can and must be made between the shifts and their economic or theoretical interpretations, it is the latter that form the rationale for using the technique: distinguishing the components presumes that one can give them meaningful interpretations.

To some extent, the confusion between the components and their interpretations has resulted from an a priori interpretation of the shifts. The early formulators (and a large proportion of users) of the technique regard the differential shift as a measure of the competitive aspects of regional growth; as indicating the competitive position of a region. Changing "comparative advantages" are the result of changes in access to markets, or to basic inputs, relative to other regions engaged in the same activities. The proportional shift is interpreted, fairly straightforwardly (at least in terms of theory), as a measure of the employment growth due to structure. The two shifts are therefore regarded as being generated by distinct sources of change that require distinctly different types of analysis. For the proportional shift, analysis involves con-

sideration of national supply and demand relationships and the national forces acting on these. For the differential shift, it involves locational analysis and the study of forces operating at the regional level. However this analysis has usually been undertaken within a framework defined by the interpretation.²

This interpretation of the differential shift³ assumes that differences in industry growth rates are the result of changing locational advantages. If one accepts the distinction made between the shifts and their interpretations, then one must ask what the adequacy of such an assumption is. To this end, part of this chapter will attempt to evaluate this conventional interpretation, by examining its theoretical basis and the results of empirical investigation into the "causes", and the stability, of the shift. Before this is attempted, there is a set of problems which must first be considered. These problems, which Steed (1967, p. 266) terms "technical considerations" but which are termed "operational problems" here, are not directly concerned with interpretation, but they do have a considerable impact on the possibility of interpretation.⁴

A. Applying the shift-share technique

In any attempt to apply the technique, a large number of choices have to be made regarding the appropriate variable, base area, time period, level of industrial and spatial aggregation, and type of industrial and spatial classification system. Though

these choices are not specific to the technique and arise in the construction of any index number, they do raise serious questions as to whether the shifts can be "correct" estimates, in the sense of complete separation out of the structural and growth effects. Each of these "choice" problems will be reviewed in turn, the choice of appropriate base area and sub-base units being considered first.

In most applications, the base area used is that of the nation,⁵ and indeed some regard the technique's greatest virtue as the ability to place regional growth in a national perspective (Floyd, 1973, p. 2), to recognise that regional growth is a partial function of national economic forces.⁶ Ashby (1968) justifies the use of the nation as the geographical base for comparison on the grounds of using a common standard of reference, but as Brown (1969, p. 16) points out, it does not follow that any standard of reference is useful; convenience may be offset by subsequent interpretive difficulties. Indeed, Houston (1967, p. 579) argues that the use of the nation as a base implicitly assumes the market area of each industry to be national. This is valid criticism in that if it is wished to give the differential shift a clear interpretation as indicating competitive change, then "... the correct base of a regional industry is the area that encompasses the industries that supply the same market" (Brown, 1969, p. 16). As this is operationally infeasible, the shift will therefore reflect factors other than comparative advantage on this account alone.⁷

The choice of areal units to be compared to the base is

important in that the relative magnitude of the shifts are not independent of the boundaries chosen or its characteristics. This, as Stevens and Brackett (1967, p. 8) note, is a common problem in regional analysis and hence we will not delve too deeply into it. With regard to areal classification, Hanna (1957, p. 117) notes that "Without classification according to some economic criteria, area aggregates are likely to be so heterogeneous as to be uninterpretable". If one decides to use homogeneous units (as Lasuen, 1971, does), the problem becomes one of what criteria to use.⁸ Theoretically, the criteria should be determined by the purpose of the study, but in practice the choice is effectively constrained by data availability. However, Fuchs (1959a) has examined the suitability of different units by examining employment change within S. M. A.'s that cross state boundaries relative to that within the states themselves. Finding that areas within each S. M. A. more closely resembled the rest of the state than the rest of the S. M. A., he concluded that use of states as units was more meaningful "... in the sense that they are less an average of sharply divergent trends."⁹ The opportunities for this type of analysis are rare however.

The level of spatial aggregation is closely linked to the type of classification system chosen, but two points can be made regarding the former. If one wishes to use shift-share to make inter-regional comparisons, then the shifts must be adjusted or standardised for size variations by sector or region

as Whipple (1966, p. 181) and O'Farrell (1972, p. 63) note. A variety of "relative" measures have been proposed, and these are adequately reviewed by Paris (1970a, pp. 427 - 28). Secondly it is possible, as Buck (1970, p. 448) argues, that the larger the size of the region used the more probable is the cancelling out of random factors that can affect the shifts.

Many analysts have noted that the level of industrial aggregation used will affect the relative weightings of the two shifts. Dunn (1960, p. 108) argues that only when the data is as disaggregated as the actual activity sectors will all of the proportional shift be separated out from the differential shift. At gross levels of aggregation there may be as many structural differences within the classes as between them. The products of what is classified as the same industry in two different regions may not be affected by the same demand trend, because of regional product specialisation for example, and the differential shift will therefore contain some part of the industry mix effect.¹⁰ As the level of aggregation decreases, the value of the differential shift is reduced and that of the proportional shift increases. However, Houston (1967, p. 580) argues that not every step in the disaggregation process will lead to a greater proportional shift. If it results in assigning a large amount of a region's employment to a nationally slow growing industry, the effect of disaggregation may be to reduce the shift's value. Townroe (1969, p. 96) argues that the magnitude of the differences that arise when sector classification is disaggregated will depend on the strength of the "cancelling out" effect.

That empirical work which has concentrated on the effect of aggregation level on the shifts is conflicting on both the magnitude and direction of the effect. Both Townroe (1969, p. 96) and Buck (1970, p. 447) found marked differences in the relative weights of the shifts calculated at "S. I. C." and "Order" levels. Townroe found that the differential shift value increased with aggregation for manufacturing industry, yet for all other industry the reverse occurred. Buck found similarly conflicting results but for two different regions rather than types of industry. Fuchs (1962a, pp. 43 - 44) however, found no essential difference in shift pattern between different levels of aggregation for the majority of U. S. states (though he did note a tendency for the proportional shift to increase with disaggregation), and concluded that the shift values are more dependent on the choice of variable than on the choice of aggregation level. To some unspecifiable extent, it would appear that the causes of these conflicts may well lie in the different areal and time bases of the applications. Fuchs uses shifts calculated at state level for the period 1929 - 1954, Townroe's shifts are calculated over the period 1959 - 1966 for the West Midlands Conurbation, whilst Buck uses the period 1953 - 1966, and his two regions are the Northwest and Merseyside (i.e. at a comparable spatial scale to Townroe, but themselves differing greatly in size).

Even if the product homogeneity of the classes increases with disaggregation, another problem arises in the form of

increasing inter-industry interdependence. Whilst the problem of interdependence is not really an "operational" problem, it is convenient to examine it here. To obtain independent estimates of the effect of "growth" and "composition" on employment change, the technique must assume that the change in each regional industry is independent of change in any other industry in the same region, and that there is no interdependence between the effects within an industry. The latter assumption has been considered previously¹¹ and it was argued that the "rate" formulation could accommodate such intra-industry interdependence through the use of a residual term.¹² Neither formulation seems to be able to accommodate inter-industry interdependence however, yet it is clear that such interdependence must occur. Mackay (1968) notes that industries are linked technologically and through demand, and thus output and employment changes in one industry will be transmitted through the regional economy. These multiplier effects on employment will be subsumed in the differential shift, even though they are related to the industrial structure of a region. As the income multiplier effects will be especially important in those industries depending on local demand, the exclusion of the latter from an analysis would reduce the over-estimation of the differential shift. However, even if local demand industries could be defined adequately, they constitute a major and increasingly important element of a region's growth. Mackay (1969, p. 99) argues that "... interdependence of a region's industries renders invalid any claim that shift-share

analysis can precisely identify the growth and composition elements in regional growth." Stilwell (1970, p. 454) argues that the technique can be "salvaged" by regarding the proportional shift as the minimum estimate of the structural effect on growth, but this poses the problem of assessing the "significance" of shifts, and ignores the possibility that the extent and intensity (and therefore the effect) of linkage and multiplier effects may vary between regions, and with the scale of the region.

The effects of the base years and the length of study period used have received relatively little attention, except in the context of the base bias problem.¹³ The basic problem involved in the choice of time period is that whilst the technique must assume that the shifts calculated reflect the trends in employment over the period used, the time series from which the initial and terminal points are taken is comprised of random, cyclical, seasonal and trend elements. Fuchs (1962a, p. 46) puts this problem quite succinctly.

The changes between initial and terminal years are taken as representative of long-term trends. The question arises, however, as to the extent to which our conclusions may be influenced by the choice of a particular year. Do the results indicate long term trends or do they merely reflect the special, irregular circumstances of a fortuitously chosen year?

Those few who have considered these questions have come to varying conclusions. Both McCrone (1969, p. 174) and Perloff et al. (1960, p. 8) recognise that the choice of time period and base

years can make a considerable difference to the relative magnitude of the shifts obtained. Dunn (1962, p 56) also notes that the terminal year in his study of Southern economic development coincided with a sharp recession, thus depressing the growth rates "artificially". However, he argues that his time span (1939-1958) is long enough to absorb this cyclic distortion, and supports this argument by shifting the study's terminal date, and correlating the shifts produced for the period 1939-1954 with those obtained for his main time period. The shift patterns for both time periods are found not to be significantly different. Fuchs (1962a,b) approaches the problem in a similar fashion and similarly finds the shifts for both periods to be highly correlated.¹⁴ He argues that the choice of base years is of no significance if the time period used is long, but "... the shorter the time period, the more important becomes the choice of initial and terminal years, and the more likely it is that a change of one or two years would significantly alter the result."¹⁵

When long time periods are used, he argues, the fundamental trends come into focus and the role of cyclical and random elements tends to be minimised. Hanna (1959, p. 59) likewise argues that with a sufficiently long time period, "... a trend may be so pronounced that conclusions concerning it are little affected by ignoring the presence of cyclical forces". If this is a valid argument, one might expect shifts calculated over long periods to exhibit greater stability than those calculated over shorter periods.

Yet the shift-share technique has been commonly used over

much shorter time periods than those considered by Fuchs. For these periods at least, one cannot "... be confident that the rates of change in individual industries have long term significance" (Smith, 1969, p. 181). Neither can the cyclical effect be avoided by choosing years occupying roughly comparable positions with respect to the business cycle.¹⁶ Hanna (1959, p. 61) notes that where many industries are being considered simultaneously, selection of such years (and inter-industry comparison generally) is difficult because of the wide differences that occur in the timing and magnitude of cyclical responses between industries. If one adds to this the spatial variation in responses within industries which has been found to occur,¹⁷ then the strategy becomes unusable. Such variations between regional and national business cycles may have a considerable impact on shift values as Steed (1967, p. 266) suggests, and may make inter-regional comparison of any kind difficult.

Turning to the question of variables, it has previously been noted that the shift-share technique can be used on any regional variable. However, most applications have focussed on the volume of economic activity.¹⁸ A large range of variables are available as measures of the latter,¹⁹ but most studies have used employment as the indicator, despite the difficulties in interpretation that it can involve. Industries which have increased output by means that result in labour-saving will appear to be doing poorly in terms of employment growth. A negative or low proportional shift can therefore be the result of some types of output expan-

sion, as Stabler (1968) notes, when the growth of activity is being measured in terms of employment. The variable chosen affects both the value of the shifts and their interpretation, and should therefore be considered when interpreting the shifts obtained. Theoretically, the variable should be chosen on the basis of the study's objectives, but it would seem that the frequent use of employment may be the result of it often being the only variable available in a suitable form.

All the choices discussed above are, in practice, severely limited by the availability and consistency of data. Comparability of Canadian employment figures is, as Gilmour (1966) and Berlinguette (1967) note, limited not only by definitional and conceptual changes (those in 1949 and 1960 limit the length of the time period that can be considered) but also by confidentiality.²⁰ Data quality is also a problem in that one must assume that the ranges of error of the data estimates "... are not very great or at least that the size and direction of error is consistent with our base year's" (Steed, 1967, p. 267). For British data, this is not a sound assumption as the estimates are officially recognised as being subject to errors of two to four percent and are probably even higher (Buck, 1970, p. 447). Buck copes with this problem by excluding from his analysis all firms with less than one thousand employees.

There are therefore a large number of technical choices involved in the application of the shift-share technique, each of which may affect the relative values of the two shifts.

Despite the conflicting evidence and problems involved in ascertaining the exact effect of each of these choices on the shift values (due perhaps, to the problem of controlling each possible influence), it is safe to conclude that the differential shift for example, will reflect not only differences in growth rates between the region and the nation, but also the choice of aggregation level, data errors, and other technical factors. The most explicit illustration of this is found in the firm-by-firm investigation conducted by Buck (1970) in Merseyside. He found the differential shift to be "... invariably the consequence of factors unrelated to geographic location".²¹ Of the twenty-one firms he studied, five owed their differential growth to faulty classification, eight to a lack of product homogeneity, three to company reorganisation, and five to regional policy measures.

Equally serious is the shift interdependence which makes separation out of the growth element from the composition effect doubtful. Hence Mackay (1968, p. 142) regards the differential shift as a residual,

... a rag-bag category comprised of many factors after some minimum estimate has been made for the influence of industrial structure. The 'growth' component is itself influenced by differences in industrial structure which are not properly accounted for by techniques used to measure the composition effect.

These problems are extremely serious and, in themselves, cast considerable doubt on whether the shifts can be meaningfully interpreted in practice. However, even if one assumes that the differential shift reflects only differences in growth rates,

and that the two shifts are independent, there would still remain the problem of interpreting the shifts. It is to the interpretation problem and the adequacy of the "traditional" interpretation that we now turn.

B. Interpretation of the differential shift

In evaluating the usual interpretation given to the differential shift, we will examine both its theoretical basis and the empirical attempts that have been made to identify its characteristics and economic "causes".

The theory on which the "competitive" interpretation of the differential shift is based would seem to be classical or neo-classical location theory. Perloff et al. (1960, p. 71) argue that a high positive differential shift arises from "... greater locational advantages for the operation of a given activity" which is manifested in the efficiency of existing firms and in the attraction of new firms. The reasoning behind this argument can be put in the following way. Regions that exhibit above-average growth have achieved this by attracting new firms (or through the expansion of existing firms), and as firms locate to maximize profits, these regions are areas where profits are highest. A high positive differential shift therefore indicates such areas. The differential shift reflects the changing competitive position of regions, and its understanding must be based on an analysis of cost and revenue factors.²²

The critical assumption in this chain of reasoning is that of rational profit maximising behaviour on the part of firms, one of the basic tenets of classical location theory. For an illustration of this one can turn to Fuchs (1962b, p. 168), who argues that "... in a market economy, individual industries experience redistribution primarily because new locations are more profitable than the old". Even if entrepreneurs are not profit maximisers, he argues, the system will only adopt the optimally located. The differences in growth due to the redistribution of individual industries can therefore be explained in terms of the relative economic advantages of each area.

However, classical location theory and its variants have not been successful in explaining the location decisions of real firms, and they are increasingly being subjected to criticism directed mainly at the assumptions the theories involve. By assuming location behaviour to be rational and profit maximising, the approach has concentrated on economic factors, yet there is a mounting body of evidence²³ suggesting that non-economic factors play an important role in the location decision. The classical approach seems to have ignored rather than isolated the factors essential to explaining industrial location. The debate around these questions is far too complex to delve further into here, but it is clear that classical theory is uncomfortably distant from being an adequate explanatory theory of industrial location. As Klaus and Klaus (1971, p. 530) note,

the classical approach can be regarded as "... artificial or normative investigation of landscape phenomena without having considered all the relevant variables". The behavioural approach which focuses on the internal aspects and actual behaviour of decision-making units²⁴ would seem to promise more insight into industrial location, and thus into the micro-economic aspects of regional growth.

Thus regional growth does not have to be the result of relative locational advantages, but may be the result of the growth of firms whose expansion or relocation decisions are neither economically rational nor based mainly on locational costs and revenues. The theoretical base of the traditional interpretation of the differential shift is questionable, and the interpretation must (at least) be regarded as a hypothesis and therefore be subjected to testing, before being used as the basis for further analysis. Those attempts which have been made to evaluate the differential shift directly will now be examined. These studies fall into two categories; the first including those studies using multiple regression models to explain the differential shift, the second including those that examine the stability of the shift over time.

The use of regression analysis can be viewed as an attempt to test the conventional interpretation, though Smith (1969, p. 185) regards it as essential given "... the absence both of a suitable general model and of the capacity to derive one from existing theory". Both Smith and Brown (1969) use as indepen-

dent variables those variables suggested by Perloff et al. (1960). Fuchs (1962b) considers a slightly different set of variables as he argues that access to markets and inputs are unsuited to regression analysis. Using industry-calculated shift values for the dependent variable, Brown (1969) found that the independent variables accounted for very little of the variance in the differential shift (less than ten percent). Smith likewise found an extremely weak relationship between the variables and the shift. Perhaps the most comprehensive regression study is that of Fuchs (1962b) who attempts to explain shift values calculated in terms of value added for industry sectors in all of the U. S. states. He found, in contrast to the above studies, that he could account for 80% of the variance of the differential shift, but only with variables such as relative extent of unionization, temperature, and population density.

Brown concludes that as the variables attributed to the shift are not systematically associated with it, the shift should be at best regarded as a residual, a rag-bag category. Smith, on the other hand, attributes his poor results to the use of surrogates for the independent variables, and the high level of aggregation of his data. Fuchs' results would seem to contradict those of Brown, but as Chambers et al. (1971, p. 93) note somewhat plaintively "... variables like the weather seem to have more to do with explaining the annual differential shift than do variables like the regional distribution of development expenditures"; the shift is not reflecting the economic forces

postulated by the conventional interpretation. However, if Fuchs' findings are correct, an interesting question arises in that the shift should not exhibit the instability that it has been found to have.²⁵

It can be argued, however, that the linear regression model is a dubious procedure with which to analyse the differential shift. Smith's point regarding the use of surrogates for the independent variables is a sound one. Brown (1969, p. 15) also notes that the industries used might be very differently related to changes in the independent variables, and that more favourable results might be obtained if the shifts of one industry throughout the nation were used as the dependent variable (as the independent variables in all the above analyses have the same value for all industries). Fuchs rules out the use of access to markets and to raw materials as possible variables on these grounds, arguing that industries call on diverse raw material sources and supply widely differing markets (Fuchs, 1961, p. 112). Measurement problems also occur with the dependent variable, not only in that the use of differing levels of aggregation and length of time period makes comparison of results difficult, but also because of the problem of obtaining "true" estimates of the growth effect (this would seem to be a prerequisite for this type of analysis).

Additional problems arise from both the nature of the linear regression model and the difficulty of conceptualisation of relationships. The linear regression model was developed for use in experimental situations where its assumptions regarding

data and relationships are realistic. These assumptions are extremely difficult to meet when using observational data (see Gould, 1970), resulting in an increase in error in ways that are not specifiable at present. But even if these assumptions could be met, it would seem unlikely that the differential shift could be "explained" using non-lag linear relationships (over time and space), and without considering somewhat more complicated interrelationships between variables. If it is accepted that the results discussed above are doubtful partly because of the simplicity of conceptualisation of these relationships, then further research must and will inevitably be complex.

Tests of the stability of the shifts over time have important implications for their interpretation. Brown (1969, p. 10) notes that if the differential shift reflects the economic forces that determine a region's "comparative advantages", then it should exhibit stability over time. To test this, Brown calculated industry shifts at three levels of aggregation over three time periods ranging in length from four to eleven years. Using the chi-square technique to test for the independence of signs of the shift, he concluded that the sign of the shift over one period was independent of the sign of the shift calculated over the preceeding period. This conclusion was also supported by his analysis of the stability of the national and regional industry growth rates. In short, he found that the differential shift changed rapidly over time with no discernable pattern.

Paraskevopoulos (1971, p. 108) has criticised Brown's study

on the grounds that the latter's sample of industries was small, non-random and therefore not representative. Paraskevopoulos then proceeds to test for stability using shifts calculated for all industry by states over two ten year periods, and finds the differential shift to be stable in all cases. However, Brown (1971) points out that these results are not contradictory as Paraskevopoulos studied a different problem; Brown used individual industry values for the shift whereas Paraskevopoulos used regional totals. Hence though the differential shifts for regional totals might well be stable over time, those for particular industries are not.

Floyd and Sirman (1973, p. 115) also argue that more representative and complete data is needed for stability tests than that which Brown used. Using more comprehensive data, their chi-square results indicate that the sign of differential shift values over succeeding time periods are dependent, and they therefore argue that Brown's conclusions should be rejected. However, as Brown (1973) notes in reply, chi-square is an extremely weak test of association, and whilst it seems reasonable to conclude that the shift is unstable over time when the signs are judged to be independent, much more evidence than passing this weak test is needed to conclude that the shift is stable.

One interesting aspect of these studies is the increasing "stability" of the differential shift with greater levels of regional and industrial aggregation, as noted by Floyd and Sirman (1973, p. 119) (Brown's results in themselves seem to

show higher chi-square values at higher levels of aggregation). Assuming this to be an accurate observation, it could be explained partly by a "cancelling out" of random effects and also perhaps, by the increasing amount of the proportional component subsumed in the differential shift as aggregation increases.²⁶ As the proportional shift has been found to be stable over time (Brown, 1969, p. 10), this subsumption could be "injecting" stability into the differential shift. Given this possibility, the stability obtained by "high aggregation" calculations may be misleading, as one cannot assume that it indicates the operation of "economic forces". Though Paraskevopoulos' results indicate that on the basis of stability, differential shifts calculated at the regional total level could be used for projection purposes²⁷, there may be no gain in predictive accuracy. None of the above studies appear to specifically consider the effect of length of time period on shift stability, an exercise which was earlier suggested as being potentially productive.²⁸

It has been argued that although the components are essentially identities, to be worth distinguishing they must be capable of being given an interpretation. The usual interpretation of the differential shifts as the "competitive component" has been examined and it was argued that its theoretical basis is unsound. Regarding this interpretation as a hypothesis, we then turned to those studies that have directly examined the shift. The stability studies in general showed that it was un-

stable and tended to change rapidly over time without systematic pattern. Brown (1969, p. 13) argues that this can be explained by the shift either being associated with so many variables that the net effect is random or being associated with variables that are rapidly changing (and therefore unlikely to be the forces involved in "comparative advantage"). It is possible to argue, as Stilwell (1970, p. 457) and Davis and Goldberg (1972, p. 114) do, that it is the aggregation of many variables that causes the instability; yet their solution (disaggregation in the form of a regression model) is not encouraging in the light of the results of previous regression studies, which have found few economic variables to be associated with the differential shift. These stability and regression studies not only give no empirical support to the "competitive" interpretation, but also cast doubts on whether the shift has any meaning at all. Brown (1969, p. 16) argues, for example, that the differential shift is too broad and cannot be clearly interpreted; "... the economic behaviour underlying different values of the competitive component is not distinguishable".

Various reasons have been advanced for this failure to identify the determinants of the differential shift. Firstly, one can regard the shift as "... a measure of our ignorance of regional phenomena" (Chambers et al., 1971, p. 93), and the failure to identify it as the result of theoretical inadequacies. This would be a valid argument in that location theory is not well developed; classical location theory is increasingly being

regarded as inadequate, while there is no systematic body of thought that could be termed behavioural location theory. Even if there were a satisfactory body of location theory to draw on, it seems doubtful that a purely micro-economic approach could explain regional growth and differential growth rates. Richardson (1972, p. 305) notes that the most pressing need in regional economics is to integrate macro and micro approaches, to produce a "... theoretical framework that simultaneously explains the operation of the interregional system including the long-term growth process in each region and the dynamics of individual location decisions."

However, it could be argued that the conventional interpretation of the shift is correct, but that internal operational factors, the interdependence of the shifts, and the difficulties of applying the regression model, confound the analysis: empirical attempts to identify the shift have failed because of operational problems. Whilst this would be a theoretically comforting argument, it would not ease or alter the problem of interpreting the shift. The operational problems must confound the analysis to some extent, and this casts doubts on any attempt to use the components descriptively. It would also tend to remove the hope to interpreting the shift eventually (by increased theoretical sophistication, or by elaborate regression modelling).

In short, the utility of the shift-share technique is dependent on whether the shifts can be given meaningful

interpretations. This, in turn, requires the fulfilment of two conditions. Firstly, to give any interpretation to the components, unambiguous and independent estimates of the shifts are required. Secondly, there must be an interpretation that will explain the differential shift; an adequate theory is needed to explain the shift, and an adequate method of testing this explanation must exist (however, if such a theory existed, would the technique be used?). Both conditions appear to be unfulfilled at present, though evidence concerning the first is to some extent conflicting and inadequate (both on the nature and the extent of the effect of different operational factors). If one accepts the more unfavourable evidence and views expressed, then the differential shift can be regarded as the residual left after some minimum estimate has been made for the impact of industry structure on growth. If one argues that the operational problems are not so serious, then one can argue that all that is needed is an adequate interpretation or, at best, "... extreme care in the interpretation of the results" (Stilwell, 1970, p. 458).

Footnotes

¹However, this statement contradicts a previous statement of theirs that the differential shift, when calculated as a whole, "... indicates whether the region has comparative advantages over other regions." (Chambers et al., 1971, p. 85).

²See p. 53.

³Any study which terms the differential shift the "competitive shift" is assuming the "traditional" interpretation.

⁴The distinction that Houston (1967, p. 578) makes between the technique's theoretical and empirical limitations is being followed here.

⁵Smith (1969) uses North West England as his base area, and the employment exchange areas within it as the sub-base units, although the latter tend to be small and vary greatly in size and nature. Crowley (1971), in studying the growth of Canadian urban areas, uses their aggregate performance as his base. The use of the technique at an international scale would be interesting, although there would probably be considerable data comparability problems.

⁶See Davis and Goldberg (1972, p. 109), and Dunn (1962, p. 53).

⁷Stewart (1967, p. 429) argues in a similar way that shift-share analysis is only pertinent to export industries (whose market area is extensive).

⁸See Zelinsky (1959, pp. 99 - 101) and N. B. E. R. (1957, pp. 87 - 118). The same problem arises in the choice of criteria for industrial class homogeneity. Paris (1970b, p. 441) notes that there are many ways of grouping industrial employment categories, "... each as valid as the next", each of which may yield different results (see also Stilwell, 1970, p. 455).

⁹Fuchs (1962b, p. 349). However Fuchs (1962a, p. 4) also notes that an analysis based on counties at S. M. A.'s would contribute to an understanding of locational change: presumably the unknown averaging out effect would have to be tolerated. Creamer (1969) has approached locational change at the county level using a simpler technique than shift-share.

¹⁰However, the problem of product inhomogeneity in industry classes reappears with increasing disaggregation as it becomes increasingly difficult to classify multi-product firms.

¹¹See p. 15.

¹²Whether it allows for, or whether it is important to allow for, the serial correlation of the two shifts is unclear. The shifts must be serially correlated however, as it is through differential growth that a region changes its industrial mix (see Ashby, 1964, p. 19).

¹³See p. 18. The longer the time period used, the greater the possible bias resulting from changing industry mix.

¹⁴However, his shifts are calculated at high levels of sectoral and spatial aggregation. Townroe (1969, p. 98) notes that Fuchs used state totals for his tests, and argues that trade cycle swings may well be important for individual industries.

¹⁵Fuchs (1962a, p. 47).

¹⁶So that employment change can be regarded as being independent of the cyclical movement over the period. This strategy is used by Borts and Stein (1964, p. 51).

¹⁷See Haggett (1971); King, Cassetti, and Jeffrey (1969); and Webber and Daly (1971).

¹⁸Although Paris (1970) has used the technique on population data, with some modifications.

¹⁹See Zelinsky (1958, pp. 95 - 98). The volume of economic activity can be measured in terms of facilities or activities. The latter includes variables such as employment, cost of materials, value added by manufacture, value by shipment, and others.

²⁰The confidentiality clause "... forbids the publication of data when any establishment in any areal unit or any industry accounts for 75% of the total value of shipments in that areal unit or industry, or where two establishments account for 90% of the total value of shipments" (Gilmour, 1966, p. 41). However, certain adjustments are possible which increase the potential time period (see Crowley, 1971, p. 8).

²¹Buck (1970, p. 448).

²²Perloff et al. (1960) have an extensive section devoted to location factors, all which relate to costs or revenues.

²³See Loasby (1967) for example.

²⁴The firm is viewed as "... a complex adaptive system, operating within and interacting with a continually changing external environment" (Dicken, 1971, p. 435). Costs and revenues are viewed as part of this environment. See also Eliot-Hurst (1972).

²⁵See p. 40.

²⁶See p. 27.

²⁷See p. 54.

²⁸See p. 31.

II. APPLICATIONS OF THE TECHNIQUE

The concern of this chapter is with the evaluation of the uses of the shift-share technique, to ascertain how the preceding criticisms reflect on the uses to which it has been put and for which it has been proposed. Given the somewhat qualified nature of the conclusions of the previous chapter, some of the comments must necessarily reflect this ambivalence, though if any stance is taken, it is that the onus is on the user to prove that the "operational" problems are not serious. Following Stilwell (1970, p. 451) it is possible to distinguish three types of uses; theoretical, analysis of historical data, and the forecasting of regional growth.

With regard to possible theoretical application, Stilwell (1970, p. 453) argues that the technique may be of use in testing hypotheses derived from the various regional growth theories. However, a necessary precondition for such attempts would be that the technique itself is sound, in order to give the shifts any interpretation. The technique's operational problems are not encouraging in this respect, as they may rule out any independent estimates of the shifts which could serve as the base for such attempts.

The major use to which shift-share has been put has been the analysis of historical data, in various forms and for several purposes. The technique was used initially to aid in the understanding of locational factors through historical analysis, its

use in the regional policy field being a later derivative development. This use of the technique as a tool for regional policy has two aspects. One type of application has been to use the relative weights of the shifts to assess the impact of regional policy measures on regional performance.

Thirlwall (1967), for example, has examined the time trend of the shifts, whilst Stilwell's¹ approach involved the use of the proportionality modified shift. The problems involved in the technique itself, the multiplicity of measures (which potentially allow only an assessment of the overall impact rather than the effect of individual measures), and the myriad uncontrollable disturbing influences, make this kind of application extremely difficult and perhaps unfruitful.

The use of shift-share as a "prescriptive" tool for regional policy can be traced back to the work of Hemmings (1963), and is usually based upon the examination of two alternative hypotheses concerning the nature of regional growth.² The traditional structural hypothesis, which has been the basis for much of British regional policy, is that slow growth is the result of an unfavourable industrial structure. The locational hypothesis, on the other hand, argues that the slow growth regions do not provide a satisfactory environment for modern industry, that those regions have locational disadvantages for industry. The usual procedure is to "test" these hypotheses by using the relative weightings of the two components. A region whose positive differential shift is less than its negative

proportional shift is interpreted as having slow growth due to unfavourable industry mix, whereas if the negative differential shift is greater than the proportional shift, slow growth is attributed to locational disadvantages.³ Each hypothesis is viewed as having policy applications. If slow growth is primarily due to mix, then the policy of moving jobs (work to the workers) will not result in a loss of efficiency. If it is due to locational disadvantages, however, then (depending on one's ideological position or assumptions regarding the operation of a market economy) a policy of moving bodies (workers to the work) or a policy of improving infrastructure is required. The debate between moving bodies and moving jobs is a little sterile "... as long as political and social considerations justify the need to rectify regional economic imbalances by encouraging development in the underdeveloped regions themselves", as Hart (1972, p. 88) notes. The use of the technique would therefore seem to be in aiding the decision of what type of development is required in the regions themselves.

However, the use of shift-share would seem to provide a misleading and inadequate base for regional policy decisions. Firstly it is not possible to distinguish all of the structural nature of growth. Buck (1970, p. 45) argues that the technique has few policy applications in the U. K. because of data definition problems alone. Even if the differential shift does reflect comparative advantage, it also reflects index choice and other factors. Secondly, even if the shift were an unbiased

estimator of the growth effect, this direct use of the technique's results rests upon an interpretation of the shift as reflecting comparative advantages. The technique is being used as a method of indirectly inferring growth potential by observing trends and patterns of employment, rather than the more direct attempts such as those of Cameron and Reid (1966), and Hart and McBean (1961). The differential shift is being used as a surrogate for efficiency. Leaving aside the argument that if one is concerned with profits or efficiency, then employment is not a suitable variable (Foster, 1972, p. 83), this use of the shift is based on an assumed cause-effect relationship between the "growth effect" and locational disadvantage. It is, at best, naive to make direct inferences about regional policy without establishing the nature of the forces determining the magnitude of the growth effect. As the previous chapter showed, the conventional interpretation is theoretically unsound and empirically unproven. The use of the technique for policy prescription based on this assumed understanding of the differential shift must be rejected. At best, the contribution of the technique to regional policy "... is in no sense mechanical and relies on its role in the organisation of information as a prelude to more detailed study"⁴. Whilst this view rejects the a priori identification of the differential shift (and points to the need for further study), the less optimistic view would be that shift-share has no policy applications because of the effects of the operational problems and shift interdependence.

However, assuming that these effects are not serious, what has the "more detailed study" consisted of?

In this further analysis or study, the technique is attractive in that it provides "... a delightful wedding of the horizontal and vertical dimensions of regional analysis" (Dunn, 1960, p. 106). It can be used vertically to compare one region to another, or horizontally to compare the growth of sectors between regions. The procedure usually followed in these studies⁵ is concisely summed up by Lasuen (1971, p. 180):

In order to identify the factors responsible for the positive and negative competitive effects ... the normal procedure consists ... of identifying the input and output markets of the component industries, their location and other characteristics relevant to evaluating the linkages between them and the industries. The analysis then proceeds to estimate which changes in inputs and outputs and/or in their linkages are responsible for the recorded competitive shifts of the industries.

Thus, the framework for detailed analysis has predetermined the factors that will be examined.⁶ The assumption is made that the differential shift is the "competitive" component, and therefore its understanding requires examination of the factors that determine competitive position; a sector by sector study of relative access to markets and inputs. This is somewhat tautological; the shift is assumed to indicate competitive position, and therefore competitive position is examined and related to the shift, with no "outside" confirmation of the original assumption. As noted previously, this assumption is dubious and it would seem reasonable to argue that this type of analysis should be orientated to examination of the causes of the shift.

in a more systematic and less pre-determined manner, though attempts to do this using the linear regression model have not been successful. In any study where the interpretation of the differential shift is assumed,⁷ there is a danger that "... in many cases the information from the competitive component ... would lead in exactly the wrong direction" (Brown, 1969, p. 17).

Any study of the past behaviour of a system has some forecasting potential in so far as description, explanation, and prediction are related processes. Identification of the past behaviour makes some type of forecasting analysis possible. Floyd (1973, p. 1) notes that if the model could produce reasonable forecasts, it would fulfill the need for "... a projective model of intermediate sophistication between the simple extrapolation models and more costly techniques such as input-output."

The use of shift-share for forecasting requires the exogenous projection of national industry growth rates, and assumptions regarding the future behaviour of the differential shift. A simple forecasting model involves the straightforward extrapolation of employment at national industry projected rates of increase. The shift-share technique, used as a forecasting device, is essentially this simple model, with the addition of a regional industry "correction" device in the form of the differential shift. The latter is a modification to allow for regional-historical factors, thus avoiding the assumption that the regional performance of an industry will equal its national performance.

However the assumption usually used for the future differential shift is that it will be equal that of the historical period (the period preceeding the forecast period), with a scalar to adjust for differences in the lengths of the historical and projection periods. Both Brown (1969) and Floyd (1973)⁸ agree that this simple extrapolation of the historical shift is not a satisfactory assumption as it results in predictions with less accuracy than the simpler models; the incorporation of the differential shift increases the prediction error. This inferiority of shift-share to trend extrapolation as a forecasting tool can be attributed to the instability of the differential shift.

Various strategies have been proposed to cope with this problem. Floyd (1973) successfully attempts to modify the method by two adjustments. Firstly he allows for convergence in the regional industry growth rates by using an index of redistribution which reduces the proportional shift's value for the projection period. Secondly, he substitutes a multiplier projection assumption for local service industries, and sets to zero the differential shift for those industries which cannot be expected to be projected adequately.

Other proposals fall roughly within one category of opinion, though the stances within it differ. Brown (1969) argues for greater identification of the components, and appears to reject the use of the technique until some economic meaning can be given to the components. Chambers et al. (1971, p. 93) likewise note that failure to identify the differential

shift may make meaningful analysis and projection impossible, but argues that if the proportional shift dominates, then the shift-share framework can be used to project regional change, despite the absence of an explicit theory of the differential shift.

Davis and Goldberg (1972, p. 114) and Stilwell (1970, p. 457) both argue that more sophistication is needed in the projection of the differential shift. The former argue that it is the aggregation of various variables that results in the shift's instability and their "solution" is to overcome this by disaggregating the shift into forces related to intra-regional externalities such as congestion and agglomeration factors. This is essentially what Stilwell argues when he suggests the use of linear regression models to construct prediction equations with the differential shift as the dependent variable and with causally related independent variables. Having obtained the predicted values for the latter (a considerable task in itself), estimated values for the shift could be obtained. In principle, these arguments are sound and would apply to any forecasting situation, in that the consideration of the causal processes or internal structure underlying a trend will lead to greater potential predictive accuracy than simple projection of that trend. The question here though is whether such an approach is feasible, and Stilwell's optimism would seem to be based on fragile foundations on this account. There are many problems involved in the use of the regression model,¹⁰ valid estimates of the shifts may

be unobtainable, and there is no firm theory on which to base an interpretation. On these grounds, Davis' and Goldberg's attempt to synthesize intersectoral flow and shift-share analyses to obtain a dynamic forecasting technique could also be dismissed as premature.

Footnotes

¹Stilwell (1969).

²See McCrone (1969, pp. 169 - 180).

³However, Foster (1972, p. 82) has noted divergent interpretations of shift results by Holmans (1964) and Brown et al. (1967). The former interprets a high differential shift for South East England as indicating locational advantages, whilst the latter reaches the same conclusion regarding a high proportional shift for the same region (different time periods were used). It is hard to conclude that either is wrong, as industry mix must be the result of differential growth.

⁴Stilwell (1970, p. 455). One of the soundest applications of the technique to the regional policy field is that of Crowley (1971). Deriving policy implications from the balance of the two effects, he argues that if the proportional shift dominates, the analysis suggests measures to improve the structure of the region, but if the differential shift dominates, effective regional policy will require the isolation of the causes of differential growth rates. He does not assume that the differential shift indicates locational advantage. However, as has been pointed out, even this use requires independent estimates of the two shifts, but his study does demonstrate considerably more sophistication than others in using a pure weighting system (thus allowing for interdependence) and in exploring the consequences of using other weighting systems (see p.15).

⁵Such as those by Perloff et al. (1960) and Bjonback (1971).

⁶Thus the conventional interpretation prematurely closes the system within which to search for the causes of differential growth. It is the prematureness of the closure and not the closure itself that is objected to, as any causal analysis must, at some point, close its system of concern. Perhaps one could also argue that the same type of closure has occurred more generally in some types of regional study, in that they have tended to assume that the causes of regional disparities do not lie in the socio-economic system itself. Marxist theories of growth and underdevelopment (see Gurley, 1971; Frank, 1967) argue that regional disparities are not temporary malfunctions or aberrations of the system but are rather an integral and inevitable part of capitalist development. Yet there is a refusal to consider these theories seriously, to take them as being "... intellectually responsible" as Gough (1968, p. 21) notes, and this refusal is not based on systematic comparison of these theories with those that are considered more "objective". Warren (1971) provides an excellent exploration of these "diagnostic paradigms" in the context of the urban poverty problem.

⁷See, for example, Garrett (1968) and Marcus (1965).

⁸See also Floyd and Sirman (1973).

⁹The index of redistribution =

$$\frac{\sum_i DS^{1-2} / E^2}{\sum_i DS^{0-1} / E^1}$$

¹⁰See p. 39.

V. SOME EMPIRICAL TESTS

It has been argued that the utility of the shift-share technique depends on whether the shifts can be given meaningful interpretations, and that this requires the fulfillment of two conditions: unambiguous and independent estimates of the shifts must be obtainable, and an adequate theory must exist to interpret each shift. The extent to which the first condition is fulfilled is related to the technique's operational problems, but empirical evidence regarding the latter is partial and contradictory. Clarification of the nature and extent of the effects of these problems is required. With this purpose in mind, several hypotheses relating to the effects of the level of industrial aggregation and length of time period on shift magnitudes and stability were investigated, using employment data for two Canadian metropolitan areas.

With regard to the effect of the level of industrial aggregation on shift magnitudes, a number of hypotheses suggested by the previous review were examined. These are as follows:

1. That shifts calculated at different levels of aggregation differ significantly.
2. That the proportional and differential shifts are interdependent and significantly correlated.
3. Following the argument that the proportional shift is increasingly subsumed in the differential shift as the level of

aggregation is increased (Dunn, 1962, p. 108), one could expect (a) that shifts calculated at higher levels of aggregation are more highly correlated, and (b) that the differential shifts calculated at high levels of aggregation are greater than those calculated at low levels of aggregation (vice-versa for the proportional shifts).

With regard to stability of the shifts over time, the previous discussions suggest two hypotheses:

4. That shift stability increases with the level of industrial aggregation (due perhaps to the increasing subsumption of the proportional shift or to the cancelling out of random movements).

5. That shift stability increases with the length of time period used (if the longer period shifts do reflect the trend in employment better as Fuchs (1962a) argues).²

The effect of the length of time period on shift magnitudes is much harder to examine than the above, and had to be approached more circuitously. The questions examined were whether shifts calculated over different time period lengths differ significantly, and whether the value of the terminal and initial years chosen greatly influenced the magnitude of the shifts obtained.

The main problem that arises in attempting to examine these effects would seem to be that of separating out or controlling each possible influence. This problem has been previously referred to as a possible cause of the conflicting empirical

results regarding the effects. For this study, which examined only aggregation by "time" and sector, the approach taken was to calculate shift values over various time periods and at various levels of aggregation. It is difficult to conceive of an alternative approach, but it does cause problems in interpreting the results, and any conclusion must be couched in terms of tendencies. It is not possible to test the hypotheses themselves conclusively and unambiguously using this approach.

The choice of areas and time periods on which to calculate the basic shift values was difficult, and sharply constrained by data³ and resource limitations. Small scale areal units and short time periods were decided on, largely to contrast with the most comprehensive previous testing of the technique by Fuchs (1962). The two areas finally chosen were Winnipeg and Montreal metropolitan areas; the former because of the availability of some previous calculations,⁴ and the latter because the size of its total employment ensured a fine division of industry groups into component industries.⁵ The variable used was manufacturing employment for the period 1948 to 1956 and 1949 to 1959, for Winnipeg and Montreal respectively. The 1949 change in the D. B. S. classification system seems to affect only the grouping of industries into two-digit industry groups and not the definition of the industries themselves. This change was allowed for in the Winnipeg data by obtaining industry group values through the addition of the employment of member industries (based on the 1949 classification) of each group, rather

than the use of the 1948 industry group census figures. For both areas, the problem of the changing breakdown of industries reported was allowed for by considering only those industries for which statistical information was available for the whole period, making appropriate adjustments in the industry group figures.⁶

Shifts were calculated for both areas at industry and industry group levels for three sets of time period: the latter, however, differed between the two areas. Shifts were calculated for Winnipeg over two year, four year and eight year periods, but for Montreal two year, five year and ten year periods were used. In addition to the industry group shifts calculated on group totals (henceforth termed industry group "calculated" shifts), another industry group measure was obtained by summing the shifts for all member industries of each group. This measure, henceforth termed the industry group "aggregated" shift, enables a somewhat crude comparison of the two levels of aggregation. Shift-share analysis of the employment data therefore produced a large number of shift values for varying time periods, levels of industrial aggregation, and areas. These values were then used to examine the hypotheses.

The first hypothesis was tested by comparing aggregated and calculated industry group proportional and differential shifts using Spearman's rank correlation coefficient (R_s); the null hypothesis being that industry group shifts calculated

on different bases are uncorrelated.⁷ The coefficients obtained by this analysis are presented in Table IV. It should be remembered that the number of industry groups used for each city varies, and therefore that the rank correlation coefficients cannot be compared directly between the cities.

TABLE IV
AGGREGATED AND CALCULATED INDUSTRY GROUP SHIFTS:
RANK CORRELATION COEFFICIENTS

Time Period	Differential Shift	Proportional Shift
Winnipeg (n=8)		
1948 - 1950	0.98	0.90
1950 - 1952	0.73	0.97
1952 - 1954	0.55*	0.97
1954 - 1956	0.90	0.89
1948 - 1952	0.95	0.95
1952 - 1956	0.98	0.90
1948 - 1956	0.95	0.97
Montreal (n=11)		
1949 - 1951	0.70	0.75
1951 - 1953	0.94	0.77
1953 - 1955	0.92	0.75
1955 - 1957	0.59**	0.91
1957 - 1959	0.85	0.87
1949 - 1954	0.73	0.91
1954 - 1959	0.69	0.75
1949 - 1959	0.75	0.92

* Not significant at .05 coincidence level.

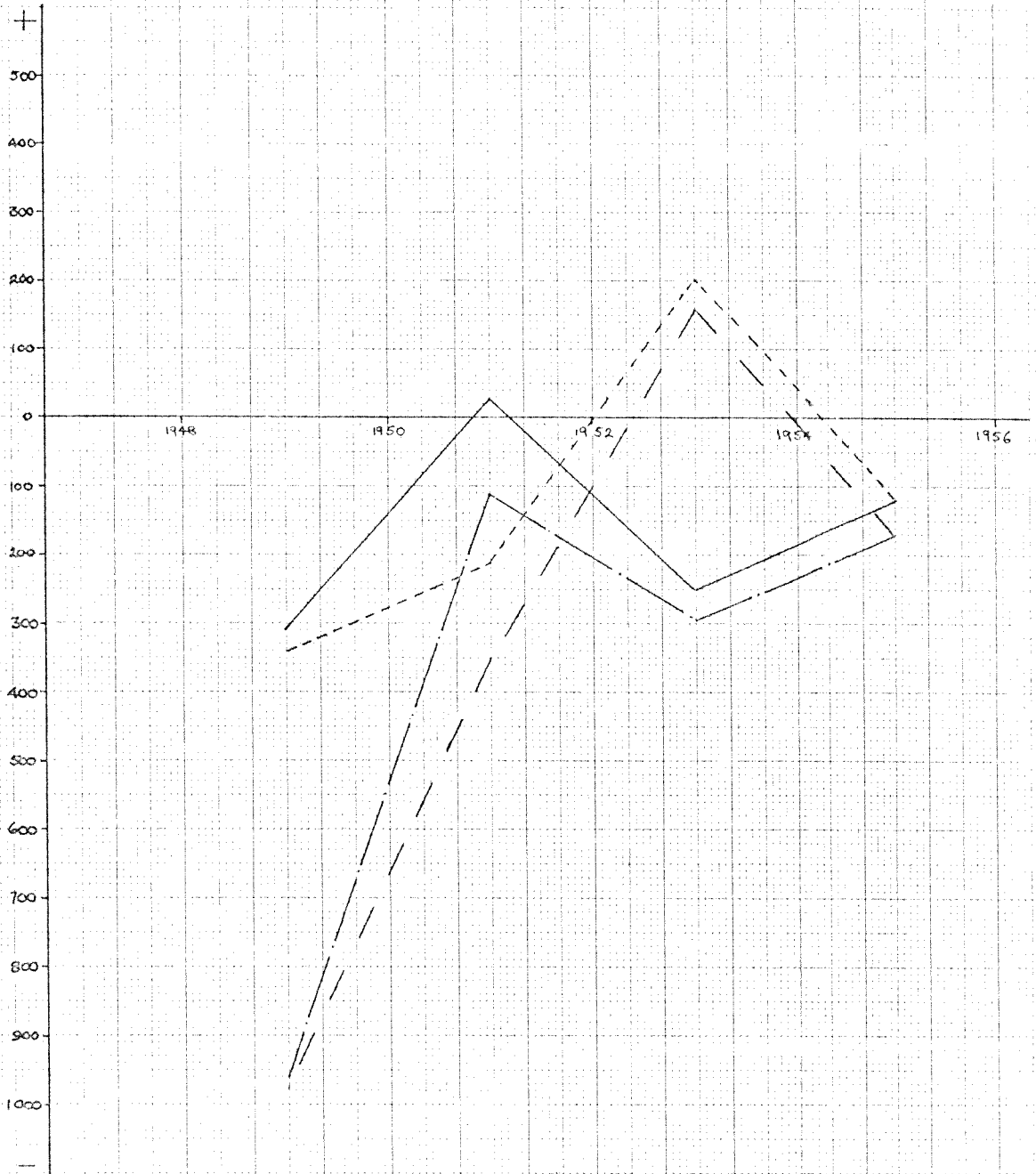
** Significant at .05 coincidence level.

All other coefficients significant at .01 confidence level.

Examination of the coefficients reveals no systematic differences between the coefficients for the differential and proportional shifts, nor does the length of time period appear to affect the values of the coefficients. All except one of the coefficients are significantly correlated, mainly at the .01 confidence level. The null hypothesis must therefore be rejected, and one must conclude that there is no statistically significant difference in the patterns of magnitude of shifts calculated at different levels of aggregation (a high rank correlation coefficient indicating similarity in the relative, not absolute, magnitudes of each set of shifts). However, the absolute magnitudes of the shifts are of interest in relation to hypothesis 3(a) and from the point of view of interpretation. As examination of the results for Montreal (presented in Appendices D and E) shows, differences in shift magnitude do occur, and are considerable in some cases. To explore these differences further, the aggregated and calculated shifts for the two year periods were graphed for both cities, a selection of these graphs being presented in Figures 1 to 6.⁸

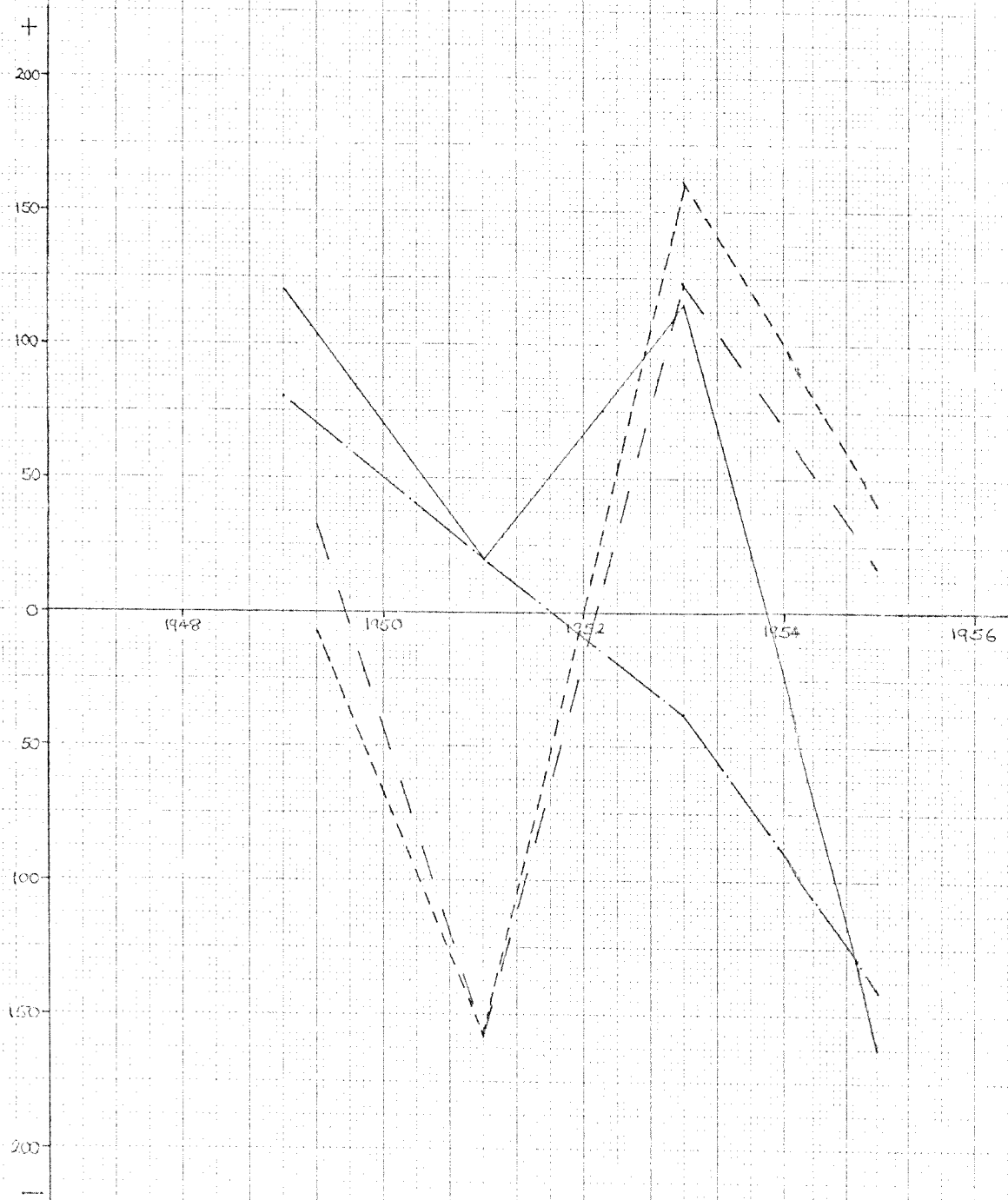
Though systematic differences are hard to detect, the graphs indicate that there is a tendency for the aggregated differential shift to be lower in magnitude than the calculated shift, whilst values of the aggregated proportional shift tend to be higher than the calculated values. The longer period shifts were also plotted, but no systematic pattern could be discerned in the differences in magnitude and the graphs are

FIG 1 - GRAPH OF TWO YEAR SHIFTS FOR FOODS AND BEVERAGES (WINNIPEG)



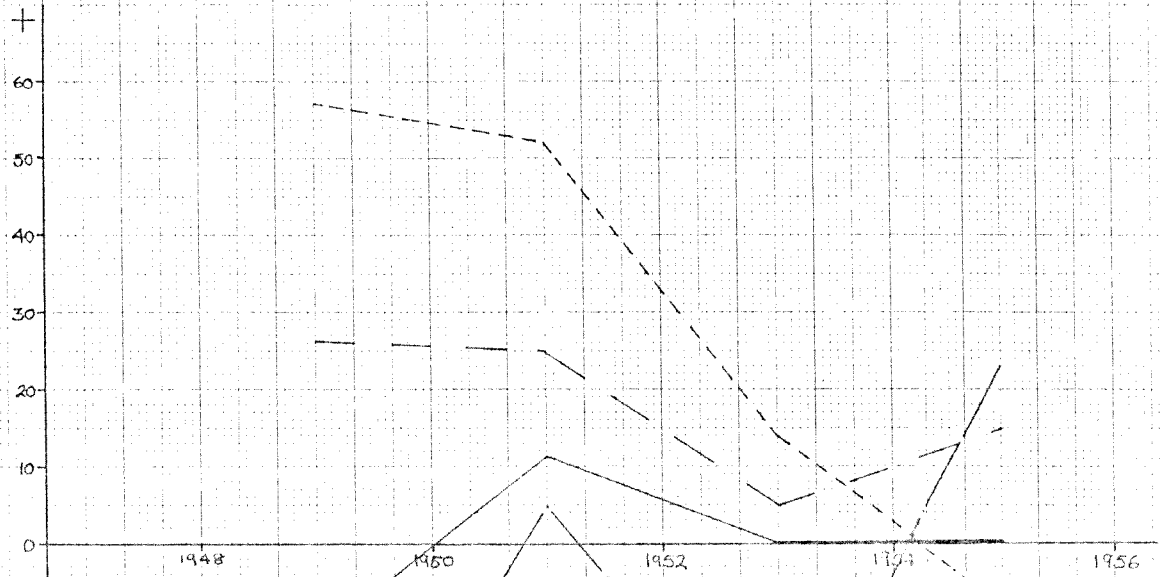
— DIFFERENTIAL SHIFT (CALCULATED)
- - - DIFFERENTIAL SHIFT (AGGREGATED)
- - - PROPORTIONAL SHIFT (CALCULATED)
- - - PROPORTIONAL SHIFT (AGGREGATED)

FIG. 2 - GRAPH OF TWO YEAR SHIFTS FOR WOOD PRODUCTS (WINNIPEG)



DIFFERENTIAL SHIFT (CALCULATED)
DIFFERENTIAL SHIFT (AGGREGATED)
PROPORTIONAL SHIFT (CALCULATED)
PROPORTIONAL SHIFT (AGGREGATED)

FIG. 3. --- GRAPH OF TWO YEAR SHIFTS FOR MISCELLANEOUS INDUSTRIES (WINNIPEG)



— DIFFERENTIAL SHIFT (CALCULATED)
--- DIFFERENTIAL SHIFT (AGGREGATED)
- · - · - PROPORTIONAL SHIFT (CALCULATED)
- - - - - PROPORTIONAL SHIFT (AGGREGATED)

FIG. 4. GRAPH OF TWO YEAR SHIFTS FOR FOODS AND BEVERAGES (MONTREAL)

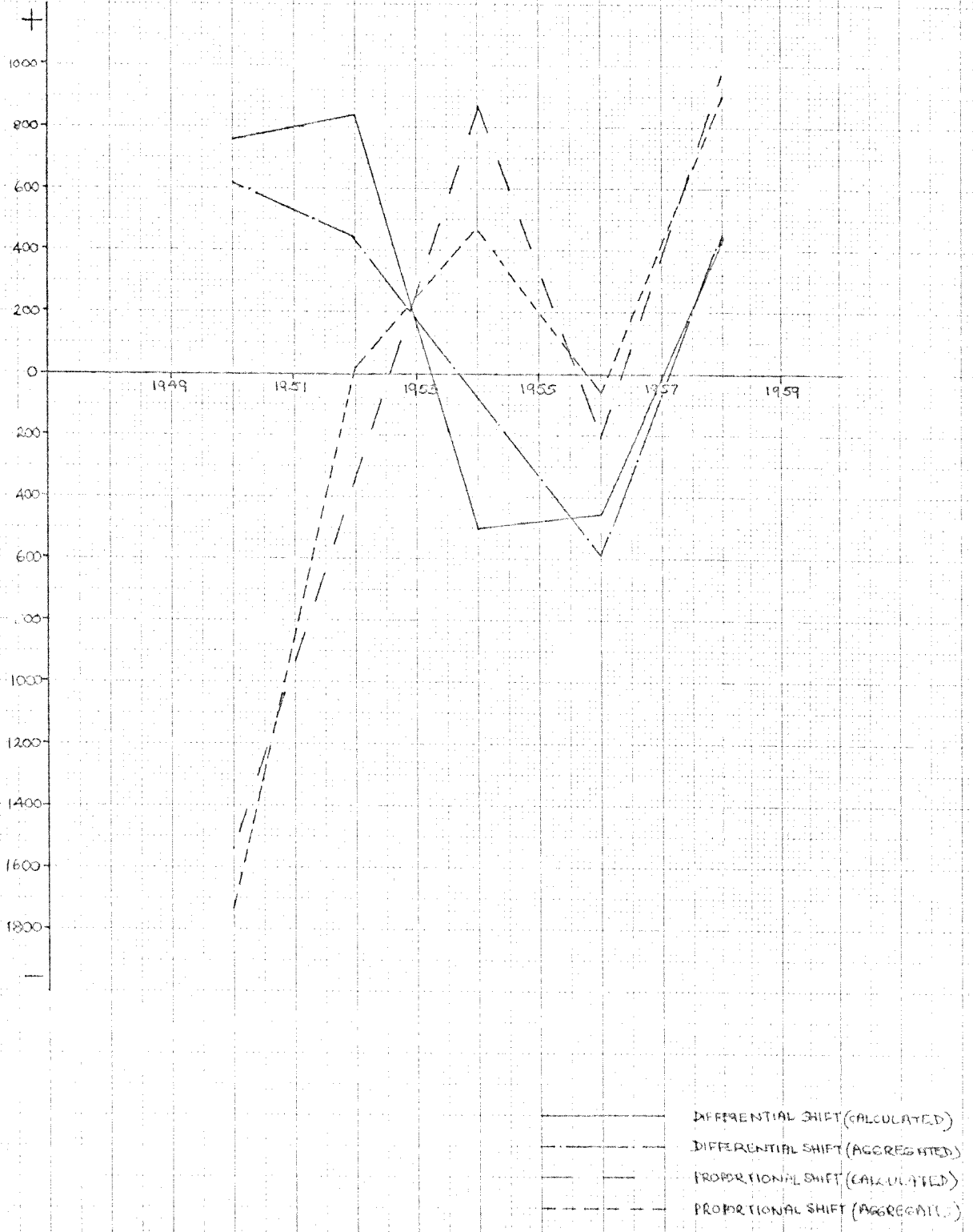
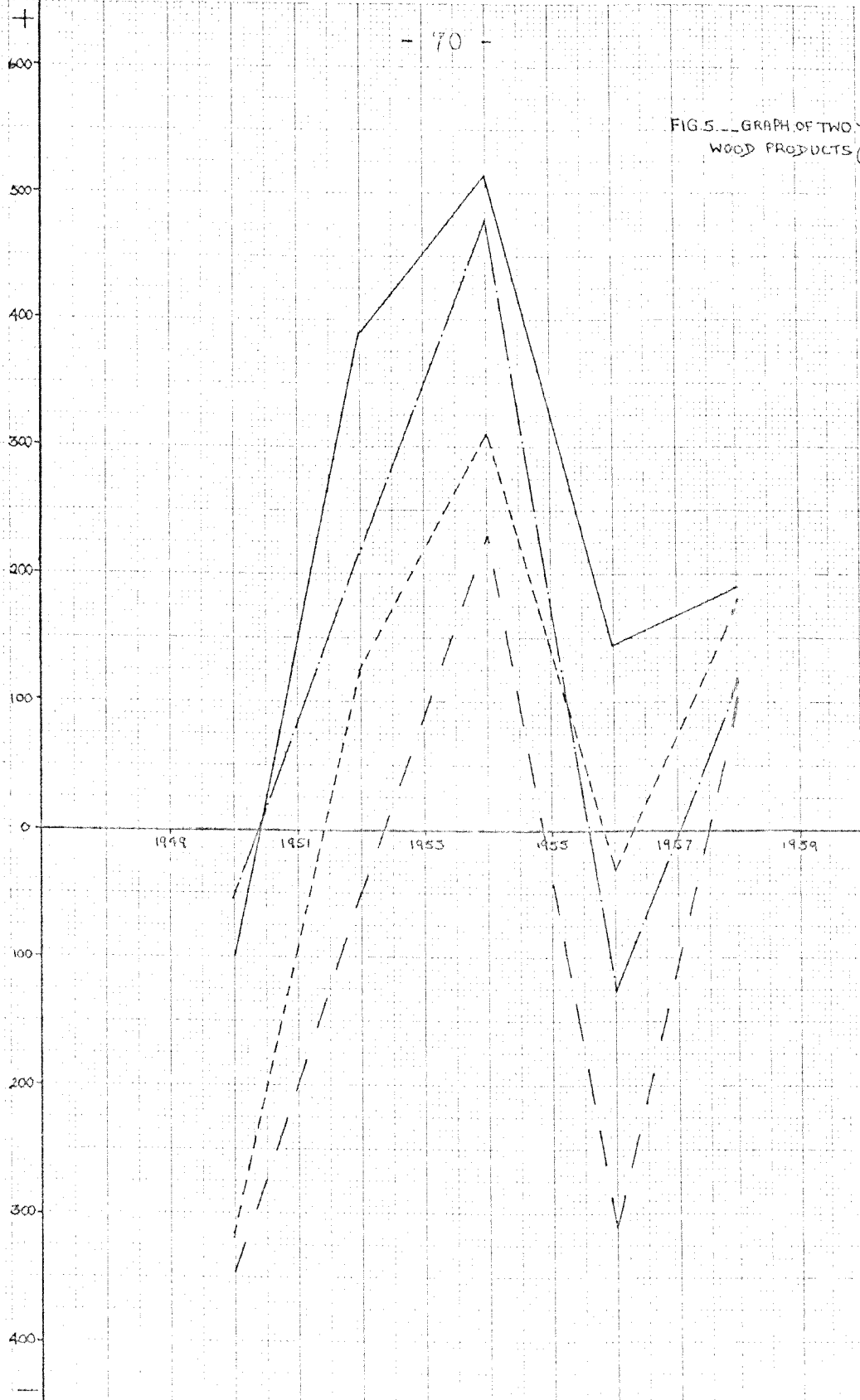
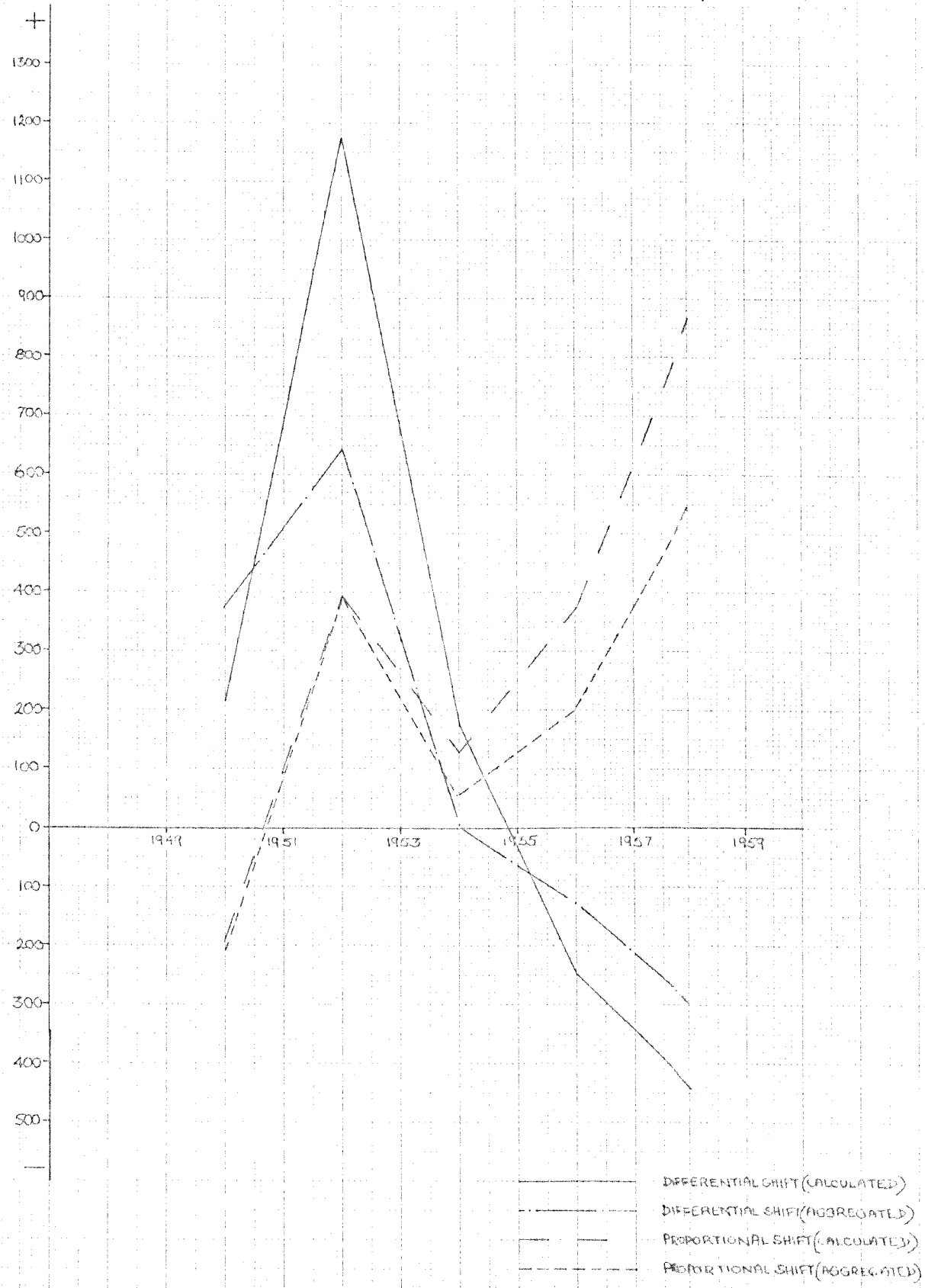


FIG. 5. GRAPH OF TWO YEAR SHIFTS FOR WOOD PRODUCTS (MONTREAL)



DIFFERENTIAL SHIFT (CALCULATED)
DIFFERENTIAL SHIFT (AGGREGATED)
PROPORTIONAL SHIFT (CALCULATED)
PROPORTIONAL SHIFT (AGGREGATED)

FIG. 6... GRAPH OF TWO YEAR SHIFTS FOR
MISCELLANEOUS INDUSTRIES
(MONTREAL)



not presented here.

Thus it would seem that although the patterns of shifts calculated at different levels of aggregation are highly correlated, there is a tendency for the value of the differential shift to increase with aggregation and for the proportional shift to decrease. This tendency is compatible with the increasing subsumption of the proportional shift in the differential shift as the level of aggregation increases, and provides support for hypothesis 3(b). These conclusions are identical in most respects to those of Fuchs (1962b), though based on examination of shift values for much shorter time periods and at a much lower level of spatial aggregation. Fuchs, however, argues that the differences in magnitude were insignificant, whereas some of the differences found for Montreal might affect interpretation considerably.

To test for interdependence of the differential and proportional shifts (hypotheses 2 and 3(a)), these shifts were correlated using the rank correlation coefficient (corrected for ties in the case of Montreal industries) over all time periods and for industries and industry groups (both calculated and aggregated). The correlation coefficients obtained are presented in Tables V and VI.

Overall, only six of the forty-five coefficients are significant, and in all these cases the relationship between the shifts is an inverse one. Whilst no systematic differences can be discerned in the coefficients for Winnipeg, it could be

TABLE V

INTERDEPENDENCE OF PROPORTIONAL AND DIFFERENTIAL SHIFTS
(WINNIPEG): RANK CORRELATION COEFFICIENTS

Time Period	Industries (n=33)	Industry Group (n=9)	
		Aggregated	Calculated
1948 - 1959	-0.24	-0.17	-0.14
1950 - 1952	-0.25	-0.34	+0.02
1952 - 1954	-0.17	-0.48	-0.53
1954 - 1956	-0.08	+0.03	+0.07
1948 - 1952	-0.04	+0.25	+0.03
1952 - 1956	-0.21	-0.33	-0.27
1948 - 1956	-0.16	-0.43	-0.60**

TABLE VI

INTERDEPENDENCE OF PROPORTIONAL AND DIFFERENTIAL SHIFTS
(MONTREAL): RANK CORRELATION COEFFICIENTS

Time Period	Industries (n=81)	Industry Group (n=11)	
		Aggregated	Calculated
1949 - 1951	-0.08	-0.12	-0.62**
1951 - 1953	+0.09	+0.13	-0.35
1953 - 1955	-0.16	-0.04	-0.33
1955 - 1957	-0.08	+0.05	+0.37
1957 - 1959	+0.02	+0.24	-0.06
1949 - 1954	-0.17	-0.60	-0.66**
1954 - 1959	-0.09	-0.49	-0.67**
1949 - 1959	-0.12	-0.48	-0.72*

* Significant at .01 confidence level

** Significant at .05 confidence level

argued that those for Montreal exhibit a tendency to increase with level of industrial aggregation and with length of time period used. Conclusions regarding the two hypotheses are difficult to make owing to these conflicting results. The hypothesis that the proportional and differential shifts are significantly correlated and interdependent is not supported by these results, although there is evidence that for some time periods and areas at least, the shifts are significantly and inversely related. Likewise the hypothesis that shifts calculated at higher levels of aggregation are more highly correlated must be rejected on the overall results, though the results for Montreal can be interpreted as lending support to the hypothesis, and also as indicating that the length of time period may affect the degree of shift independence. The latter possibility is interesting as it has been argued that the use of initial period "temporal" weights also leads to the increasing subsumption of some of the proportional shift in the differential shift.⁹

Two measures were used to test for the stability of the differential and proportional shifts over time (hypotheses 4 and 5). A chi-square test was performed on all shifts calculated at the industry level, whilst rank correlation coefficients were calculated for shifts at industry, and industry group (aggregated and calculated) levels.¹⁰ The chi-square test was carried out on the signs of the components, examining the change in sign of the shifts from one period to the next, using a two by

two contingency table. The rank correlation coefficient was used to correlate the shifts of one period with those of the succeeding period. The results of these tests are presented in Tables VII, VIII, and IX. These two measures give broadly identical results, though the chi-square indicates more shift stability than the rank correlation coefficient. As the latter uses "more" of the data, the results are discussed solely in terms of correlation coefficients.

Again the results for the two areas are conflicting. Obviously the different size and character of the employment bases must be factors, but their effect cannot be specified. All but one of the Winnipeg coefficients are insignificant, the shifts over succeeding periods being insignificantly correlated. For Montreal, there are much higher proportions of significant and positive coefficients. The Montreal results show a distinct tendency for the proportional shift to be more highly correlated over time than the differential shift. For Winnipeg not only is this tendency absent, but there is also no pattern in the differences of either shift's coefficients between different levels of aggregation. The proportional shift coefficients for Montreal however, tend to increase in value with decreasing industrial aggregation: the proportional shifts for industries are nearly all highly correlated, whilst two coefficients are significant at the industry group (aggregated level), and none at the industry group (calculated) level. As regards stability and the length of time period, comparison is limited in that

TABLE VII
STABILITY OF INDUSTRY SHIFTS:
CHI-SQUARE VALUES

Winnipeg (n=9)			Montreal (n=11)		
Time Periods	DS	PS	Time Periods	DS	PS
1948-50 / 1950-52	0.06	0.12	1949-51 / 1951-53	+0.001	7.05*
1950-52 / 1952-54	2.40***	0.003	1951-53 / 1953-55	2.42	2.27
1952-54 / 1954-56	1.42***	1.60	1953-55 / 1955-57	0.52	2.52
1948-52 / 1952-56	0.07***	5.43	1955-57 / 1957-59	-1.49***	0.55
			1949-54 / 1954-59	0.03	17.96*

TABLE VIII
STABILITY OF INDUSTRY AND INDUSTRY GROUP SHIFTS
(WINNIPEG): RANK CORRELATION COEFFICIENTS

Time Periods	Industries (n=33)		Industry Group (n=9)			
			Aggregated		Calculated	
	DS	PS	DS	PS	DS	PS
1948-50 / 1950-52	+0.23	-0.49	-0.01	+0.27	-0.50	+0.31
1950-52 / 1952-54	-0.06	-0.22	+0.03	-0.42	-0.08	-0.57
1952-54 / 1954-56	-0.14	+0.26	+0.33	+0.25	+0.40	+0.25
1948-52 / 1952-56	+0.02	+0.28**	+0.15	-0.10	+0.16	+0.07

* Significant at .01 confidence level

** Significant at .05 confidence level

*** Change of sign more frequent

TABLE IX

STABILITY OF INDUSTRY AND INDUSTRY GROUP SHIFTS
(MONTREAL): RANK CORRELATION COEFFICIENTS

Time Periods	Industries (n=81)		Industry Groups (n=11)			
			Aggregated		Calculated	
	DS	PS	DS	PS	DS	PS
1949-51 / 1951-53	+0.01	+0.26*	+0.18	+0.29	+0.68*	+0.42
1951-53 / 1953-55	+0.24**	+0.24**	+0.12	+0.30	+0.07	+0.31
1953-55 / 1955-57	+0.08	+0.36*	-0.40	+0.80*	-0.03	+0.47
1955-57 / 1957-59	-0.15	-0.001	-0.13	-0.27	-0.21	+0.18
1949-54 / 1954-59	+0.01	+0.51*	-0.20	+0.89*	-0.30	+0.36

* Significant at .01 confidence level

** Significant at .05 confidence level

the coefficients correlating the two year period shifts can only be compared to those correlating one set of four or five year period shifts. No systematic variation in the coefficients by length of time period can be observed for either Winnipeg or Montreal, although one could argue that there is a weak tendency for the stability of the proportional shift to increase with length of time period.

Conclusions regarding hypotheses four and five are again difficult to make. Overall, both shifts tend to be unstable over time, though Montreal's proportional shifts are more stable than the differential shifts, and this stability seems to be inversely related to the level of aggregation. Hypothesis four is therefore unsupported by the data which indicate that if a relationship between shift stability and level of industrial aggregation exists, it tends to be an inverse one. The evidence here is insufficient to justify a conclusion regarding hypothesis five.

The effect of choice of time period (both length and choice of base points) on shift magnitudes is extremely difficult to examine. For example, one cannot compare aggregated two year shifts with longer time period shifts. Shift-share values are comparisons between two points in time, and if different points are used, then one would expect different answers as one is addressing different questions.¹¹ The questions posed earlier therefore have had to be approached in an even more circuitous fashion than were the previous hypotheses. Three approaches

were attempted, using only the Winnipeg shift values.

The first approach followed that of Dunn (1962) and Fuchs (1962a) in shifting the base years of the shift analysis. Shifts were calculated for Winnipeg industry groups over the period 1947 - 1955, and correlated (using Spearman's rank correlation coefficient) with the values of the industry group (calculated) shifts for the period 1948 - 1956, yielding a rank correlation coefficient of 0.97 for both the differential and proportional shifts (see Table X).

TABLE X
INDUSTRY GROUP SHIFT-SHARE VALUES (WINNIPEG)

Industry Group (calculated)	PS		DS	
	1947-1955	1948-1956	1947-1955	1948-1956
Foods and bev.	- 454	- 769	-2219	-1432
Leather products	- 86	- 100	+ 135	+ 114
Clothing	- 776	-1436	+ 864	+ 579
Wood products.	+ 156	+ 8	+ 4	- 61
Printing and publ.	+ 366	+ 180	- 582	- 733
Iron and steel prod.	- 169	- 395	+ 387	+ 443
Transportation equip.	- 516	- 466	+ 829	+ 759
Chemical inds.	- 18	- 47	- 46	- 84
Misc. industries	+ 68	+ 80	- 30	- 6
Total.	- 658	-2954	-1629	- 421

Thus movement of initial and terminal dates by one year yields shifts which are significantly and highly correlated with the shifts calculated for the original time period. However, though the same pattern of relative magnitudes are displayed within each

set of shifts, the absolute differences are quite large. If one examines the total (added) shifts for each period, interpretation regarding the relative magnitudes of the proportional and differential shifts would lead to sharply conflicting conclusions, depending on which period was chosen.

The second "test" involved the projection of some Winnipeg employment figures over the period 1956 - 1958, using the shift-share technique as a forecasting device. The latter essentially involves the extrapolation of employment at national industry projected rates with some adjustments made through the "historical" differential shifts,¹² themselves adjusted by scalars to take into account differences in length between the projection and the historical periods. The regional share and proportional shift were calculated using actual rather than projected national growth rates, whilst four different historical differential shifts (calculated over various historical periods) were used as estimates for the differential shift over the projection period. These estimates and the results of the projections are given in Table XI.

Overall, comparing the projected with the actual employment changes, the results were highly unsatisfactory. The wide differences between the actual and projected changes can be related to the instability of the differential shift, yet, if shifts calculated over longer periods do tend to reflect the trend of change better than those calculated over shorter periods, one would expect the projections using the longer period differential

TABLE XI

PROJECTED AND ACTUAL EMPLOYMENT CHANGES IN WINNIPEG INDUSTRY GROUPS AND INDUSTRIES
OVER THE PERIOD 1956 - 1958, USING VARIOUS ESTIMATES FOR THE
DIFFERENTIAL SHIFT

	Actual change in employment		Predicted change in employment			
			DS ¹	DS ²	DS ³	DS ⁴
<u>Industry Groups (aggregated)</u>						
Foods and beverages	+ 24	-	325	162	157	138
Leather products	- 48	-	20	0	0	64
Clothing	- 11	-	65	87	88	110
Wood products	+ 70	-	172	245	245	319
Printing and publishing	+ 86	-	146	174	168	171
Iron and steel products	- 25	+	90	200	196	69
Transportation equipment	- 415	-	617	1319	1147	1450
Chemical industries	+ 16	-	10	15	18	15
Miscellaneous industries	+ 12	+	17	18	18	41
<u>Industries</u>						
Boxes and baskets	- 25	-	65	35	33	31
Furniture	+ 90	+	9	77	79	133
Sash, door and planing mills	+ 5	-	79	130	32	122
Printing and bookbinding	+ 90	-	121	30	30	136
Machine shops	+ 46	-	68	22	102	251
Sheet metal products	- 107	-	1	50	45	11

Notes: The estimates of the future differential shift used were: (1) the DS for 1948-1956 (DS¹); (2) the DS for 1952-1956 (DS²); (3) the mean of the shifts for 1952-1954 and 1954-1956 (DS³); (4) the DS for 1954-1956 (DS⁴).

shift to be more accurate than the other estimates. Longer period shifts should be more stable, but no conclusion was possible regarding this.¹³ For industry groups, the projections using differential shifts for the eight year period (DS¹) were indeed more accurate than the others, though no such tendency can be observed in the projections for the industries. However, the ranges of error involved were still large enough as to cast doubt on whether the longer period shifts reflect the trend in the employment series.

The third approach was a little more quixotic in attempting to fit a trend line to the two year differential shifts, using a linear regression model.¹⁴ Having obtained a regression equation, this was used to estimate each industry group's differential shift over the projection period. The estimates obtained had greater ranges of error than the simpler projections above, and are not presented here. Again, these results could be regarded as a partial manifestation of the differential shift's instability, but are not promising from the viewpoint of giving the shift an economic interpretation. It would be interesting to filter the employment series itself to extract the trend factor, and to use the shift-share technique on the resulting figures.

In short, no conclusive results have been produced regarding the effect of time period choice. Though change of study period dates by one year does not significantly alter the pattern of relative shift magnitude between industry groups, it does

affect the absolute magnitudes of the shifts and hence may cause interpretative differences. The two projection "tests" demonstrated the instability of the differential shift and the disutility of the shift-share technique (in this form) for forecasting purposes, but failed to provide any other information.

The results of these tests are, in general, indicative rather than conclusive. Ideally, a representative sample of areas should have been studied, under a much wider range of conditions, in order to be able to generalise the results with confidence. The problem of conflicting interpretations of the findings for the two areas used here is an illustration of this. However, to some extent there is no need for a representative sample in that unfavourable results even for one area cast doubt on the technique.

The conflicting tendencies of the two areas make the summing up of the results difficult. The level of aggregation was found not to affect significantly the relative patterns of the shifts but did affect the absolute values, quite considerably in some cases. Dunn's argument that the proportional shift is subsumed in the differential shift as the level of aggregation increases received some support in that the value of the differential shift did tend to increase with aggregation, and there was a weak tendency for shifts calculated at higher levels to exhibit a lesser degree of independence. However, in gener-

al, the proportional and differential shifts were found to be uncorrelated and independent. As regards stability, both shifts tended to be uncorrelated, and therefore unstable, over time. The proportional shift did show a strong tendency to be more stable than the differential shift however, and some evidence indicated that this stability decreased with increasing aggregation. The latter tendency is contrary to previous findings.¹⁵ No conclusions were arrived at regarding stability and length of time period, owing to insufficient evidence. As regards the effect on shift values of the time period chosen, the above has achieved relatively little. The results did illustrate the differential shift's instability and forecasting inability, and there was very weak evidence indicating that the use of longer period differential shift estimates gave more accurate projections. Changing the initial and terminal points of the study period did lead to large absolute changes in shift values, but no significant change in the pattern of magnitudes between industry groups occurred. The questions regarding the effect of temporal choice were extremely difficult to answer, and more extended and elaborate testing would be required to answer them.

These results do not permit any sort of definitive answer regarding the seriousness of the effects of the operational problems. The latter do affect the relative weightings of the shifts and, at best, one cannot assume the estimates produced by the technique to be "valid" and unambiguous. As Brown

(1971, p. 113) notes, "... before tools of analysis like shift-share are used for planning, they need to be and can be tested." Smith (1969, p. 189) correctly notes that it "... requires many more experiments with shift-share analysis at different levels of aggregation before this increasingly popular technique can be applied with confidence." Even if this testing could produce correct estimates of the shifts, in the sense of separating out the "composition" and "growth" effects, the problem of interpretation would remain. As the results of the stability and projection tests indicate, this is a serious problem.

Footnotes

¹See Chapter II.

²See above, p. 31.

³For example, the D. B. S. definition changes in 1960 effectively truncates the available time series, and those changes in 1949 can be troublesome.

⁴Provided by Harold Repko.

⁵Buck's comments regarding the importance of "random" changes in small areas is relevant (see above, p. 27). If one was concerned with interpretation of the shift values then the area definition would be of considerable interest. For Montreal at least, the metropolitan census area appears to include all of Montreal's important industrial areas (Perks, 1965, p. 38).

⁶For some sectors, particularly in Winnipeg, this reduced employment breakdown to very low levels, and such sectors were omitted from the analysis.

⁷The rank correlation coefficient was used rather than the more powerful Pearson's because of the assumptions regarding the data that the latter involves. However the efficiency of R_s compared to r is 91% (Siegel, 1956, p. 213).

⁸It should be remembered that the shifts are not continuous variables as the graphs imply. Care should also be taken when comparing the graphs as the vertical scale (employment) varies between industries, and the horizontal scale (time) varies between the two areas.

⁹See above, p. 18.

¹⁰As the number of observations for the industry group shifts is less than twenty, a chi-square test using a two by two contingency table would require the use of Yate's correction factor. Alternatively, Fisher's exact probability test could be used.

¹¹To some extent, this point also applies to calculating shifts at the industry level and summing them to obtain industry group (aggregated) figures. However, all users of shift-share analysis do this to obtain regional or national industry totals, and the same time base is used.

¹²See above, p. 54.

¹³See above, p. 31 and p. 61.

¹⁴As only four data points are available for each industry,

this regression exercise is of very dubious validity and should be regarded as illustrative.

VI. CONCLUSION

It has been argued that the utility of the shift-share technique depends on whether its components can be given meaningful interpretations. This requires not only the existence of an adequate theory regarding the causes of differential growth but also unambiguous and "correct" (in the sense of separating out the differential and proportional effects or components) estimates of the shifts in order for the possibility of meaningful interpretation to exist at all.

Examination of the usual interpretation given to the differential shift found it to be both theoretically questionable and empirically unsupported. Its theoretical basis seems to lie in classical location theory, an approach which is increasingly being regarded as unsatisfactory and which has failed to produce adequate explanations of industrial location decisions.

Stability and regression studies indicate that not only are the factors usually attributed to differential shift unrelated to it, but also that the shift appears to be unrelated to any economic factor. This failure to explain the differential shift may be regarded partially as a manifestation of the failure to fulfill the second condition required for meaningful interpretation of the shifts, but at present there appears to be no adequate theory available with which to give the shift an interpretation. Use of the technique for regional policy prescription has assumed that the differential shift indicates relative

locational advantage and can therefore be regarded, at best, as misleading. Similarly, those studies which have used the technique as the framework for further analysis, and which have made the same assumption regarding the differential shift, have proceeded to search for the causes of differential growth within a prematurely closed system. Interpretations should be proven and not assumed.

For the shift-share technique to be used "descriptively", for summary purposes or as the basis for further analysis (in the search for, or testing of, theory), the condition regarding the character of the shift estimates must first be fulfilled. Yet the first and second chapters showed that there are a variety of formulations that can be used, each of which will provide different estimates. Decisions regarding which procedure and weighting system to use not only affect shift magnitudes but there is also no clear basis for choice. Interdependence of an industry's shifts, arising not only in theory but also from the shift-share procedure itself, can and should be allowed for by reformulating the procedure into a "pure" weighted "rate" procedure, using either regional or national weights. However, this would not seem to allow for the interdependence of shifts between industries, which therefore has to be assumed non-existent.

The degree to which the second condition can be regarded as fulfilled also depends on the seriousness of the effects on relative shift magnitudes of the many decisions that have to be

made in applying the technique. The evidence regarding the effects of these operational problems is conflicting and inadequate however, and therefore the extent to which the second condition is satisfied is in doubt. Several interpretations are possible, each having different implications for the technique's uses and utility.

At one extreme, one could regard the effects of the operational problems as slight and argue that the technique does provide valid estimates of each effect. Paris (1970b, p. 491) would seem to take this position, arguing that the technique's facility and economy outweigh the level of accuracy that it achieves. The technique could therefore be used safely, and the factors which might affect the differential shift investigated (either in testing or attempting to generate theory). At the other extreme, one could regard the effects as severe, the second condition as unfulfilled, and the technique as producing, at best, a proportional shift which represents some minimum estimate of the "composition" effect, and a differential shift which represents the residual.

The paper attempted to clarify this situation by examining various hypotheses concerning the effects of several operational choices. Unfortunately these tests were not as illuminating as was hoped; any conclusive statement regarding the effects would seem to require more extensive testing over a wider range of conditions and areas. Yet the results do indicate that such testing is required in that one cannot regard the effects as

negligible. It is important to note that whilst many of the operational problems are encountered by other empirical techniques, it is the sensitivity of the shift-share technique to these choices that such testing is concerned with.

If one rejected the shift-share technique, what alternative tools are available? Mackay (1968, p. 142) argues that there is nothing to put in its place, at least with currently available data. However, both Stilwell (1969, p. 165) and Brown (1969, p. 765) have noted the possibility of the use of analysis of variance. If growth rates were classified by industry group and region, the amount of variance accounted for by inter-industry and inter-regional differences (together with their interaction) could be determined in a more rigorous but less simple fashion. However, many of the operational problems would remain, and additional problems would arise from the technique's assumptions about the nature of the data.

In short, one must conclude that the shift-share technique does not yield "... measures which are conceptually simple, easily interpreted and easily compared" (Fuchs, 1962a, p. 38). It faces many problems which have been unresolved or unnoticed, leading to what might be termed a "premature" quality in many of its applications. The technique requires testing over a wide range of conditions and the development of an adequate theory of regional growth in order to fulfill the functions for which it has been used with any degree of confidence. It would seem to be the generation of an adequate theory of regional

growth that is the more pressing need in regional studies.

APPENDIX A
SHIFT-SHARE TERMINOLOGY

	Proportional Shift	Differential Shift	Net Shift
Lunn, Lasuen and others	composition shift	competitive shift	total shift
D. E. S., Ashby, Floyd	industry-mix effect	regional share	net relative change
Fuchs ^a	industry differential	area differential	employment differential
Hanna ^b	rate-constant earnings	composition-constant earnings	
Beaud	structural effect	regional effect	total difference
Klassen and Paerlink	structural effect	growth effect	
Hemmings, Thirlwall	composition effect	growth effect	

^a Fuchs's terminology changes when using the average of initial and terminal year weights (see above, p. 18): the shifts become "comparative industrial structure" and "comparative gain/loss adjusted for structure".

^b The last four entries represent terminology associated with the "rate" procedure (see p. 9).

APPENDIX B

PURE AND MIXED WEIGHTING SYSTEMS

FOR THE "RATE" FORMULATION

1. Mixed weighting systems: derivation

a) Nationally weighted DS; regionally weighted PS:

$$\begin{aligned} \text{overall difference} &= \sum \text{rigr} \cdot f_{ij} - \sum \text{nigr} \cdot F_i \\ &= \sum \text{rigr} \cdot f_{ij} - \sum \text{rigr} \cdot F_i + \sum \text{rigr} \cdot F_i \\ &\quad - \sum \text{nigr} \cdot F_i \\ &= \sum \text{rigr} (f_{ij} - F_i) + \sum P_i (\text{rigr} - \text{nigr}) \end{aligned}$$

b) Regionally weighted DS; nationally weighted PS:

$$\begin{aligned} \text{overall difference} &= \sum \text{rigr} \cdot f_{ij} - \sum \text{nigr} \cdot F_i \\ &= \sum \text{rigr} \cdot f_{ij} - \sum \text{nigr} \cdot f_{ij} + \sum \text{nigr} \cdot f_{ij} \\ &\quad - \sum \text{nigr} \cdot F_i \\ &= \sum f_{ij} (\text{rigr} - \text{nigr}) + \sum \text{nigr} (f_{ij} - F_i) \end{aligned}$$

2. Pure weighting systems.

a) National:

$$\text{PS} = \sum \text{nigr} (f_{ij} - F_i) \quad \text{DS} = \sum P_i (\text{rigr} - \text{nigr})$$

$$\text{Interdependence term} = (f_{ij} - F_i)(\text{rigr} - \text{nigr}) \quad (\text{i})$$

$$= (F_i - f_{ij})(\text{nigr} - \text{rigr}) \quad (\text{ii})$$

$$= -(f_{ij} - F_i)(\text{nigr} - \text{rigr}) \quad (\text{iii})$$

$$= -(F_i - f_{ij})(\text{rigr} - \text{nigr}) \quad (\text{iv})$$

expressions (i) - (iv) are equivalent.

b) Regional:

$$PS = \sum r_{igr}(f_{ij} - F_i) \quad DS = \sum f_{ij}(r_{igr} - n_{igr})$$

the interdependence term for a pure regional weighting system can take any of the expressions (i) - (iv), but (i) and (ii) become negative, and (iii) and (iv) become positive.

APPENDIX C

TWO METHODS OF OBTAINING THE RESIDUAL TERM (I)

1. Balancing equations.^a

example: using national weights

$$PS^N = \text{nigr}(f_{ij} - F_i)$$

$$DS^N = F_i(\text{rigr} - \text{nigr})$$

$$\text{Overall Difference} = \text{rigr}.f_{ij} - \text{nigr}.F_i$$

However,

$$PS^N + DS^N = \text{nigr}.f_{ij} - F_i.\text{nigr} + F_i.\text{rigr} - F_i.\text{nigr}$$

An additional term (I) has to be introduced:

$$\begin{aligned} I &= (\text{rigr} - \text{nigr})(f_{ij} - F_i)^b \\ &= \text{rigr}.f_{ij} - \text{rigr}.F_i - \text{nigr}.f_{ij} + \text{nigr}.F_i^c \end{aligned}$$

$$\begin{aligned} \therefore PS^N + DS^N + I &= \text{nigr}.f_{ij} - F_i.\text{nigr} + F_i.\text{rigr} - F_i.\text{nigr} \\ &\quad - \text{rigr}.f_{ij} - \text{rigr}.F_i - \text{nigr}.f_{ij} + \text{nigr}.F_i \\ &= \text{rigr}.f_{ij} - \text{nigr}.F_i \end{aligned}$$

2. Difference method.

Obtaining the differences of effects calculated using regional and national bases (per Cunningham, 1969).^d

$$\text{Overall Difference} = PS^N + DS^R = PS^R + DS^N$$

For national weights:

$$\begin{aligned} I &= PS^R - PS^N = DS^R - DS^N \\ &= \text{rigr}(f_{ij} - F_i) - \text{nigr}(f_{ij} - F_i) \\ &= \text{rigr}.f_{ij} - F_i.\text{rigr} - \text{nigr}.f_{ij} + \text{nigr}.F_i \end{aligned}$$

For regional weights:

$$\begin{aligned} I &= PS^N - PS^R = DS^N - DS^R \\ &= \text{nigr}(f_{ij} - F_i) - \text{rigr}(f_{ij} - F_i) \\ &= \text{nigr}.f_{ij} - \text{nigr}.F_i - \text{rigr}.f_{ij} + \text{rigr}.F_i \end{aligned}$$

From the above, it can be shown that net change equals

$PS^N + DS^N + I$, using a pure national weight system
and $PS^R + DS^R - I$, using a pure regional weight system

Footnotes

^aSummation signs have been omitted.

^bSee notes to Table III (p. 17).

^cExpressions (i) - (iv) in Appendix B can be fitted to this equation.

^dThe expressions here use the difference between proportional shifts calculated using different bases. Expansion of the difference between the differential shifts would yield the same final equations.

APPENDIX D

DIFFERENTIAL SHIFT VALUES FOR MONTREAL INDUSTRY GROUPS
(CALCULATED AND AGGREGATED)

Industry Group	1949-51	1951-53	1953-55	1955-57	1957-59	1949-54	1954-59	1949-59
Foods and Beverages	+ 760 + 625	+ 841 + 439	- 499 - 106	+ 477 - 595	+ 417 + 466	+1666 +1840	- 589 - 418	+1176 +1264
Leather products	- 582 - 553	+ 411 + 289	- 283 - 307	- 252 - 235	- 187 - 164	- 404 - 408	- 504 - 465	- 912 - 900
Textiles	+ 190 + 180	+ 249 - 202	- 44 - 298	- 155 - 58	+ 286 + 132	+ 425 - 427	+ 56 + 145	+ 462 - 235
Clothing	+1504 + 852	+ 819 + 491	+1377 + 707	- 290 - 391	+4177 + 796	+3968 +2130	+3519 + 295	+7395 +1902
Wood products	- 103 - 52	+ 391 + 219	+ 516 + 478	+ 143 - 126	+ 188 + 119	+ 533 + 359	+ 572 + 321	+1112 + 720
Printing Publish.	-2619 - 52	+ 246 + 211	+ 454 + 271	- 50 - 219	- 27 2	-2389 + 238	+ 260 + 117	-2315 + 384
Iron and steel prod.	+ 165 - 296	- 365 - 100	+ 856 + 109	+ 28 -1089	-1935 -1287	+ 541 - 559	-1800 -2403	-1201 -2953
Electrical apparatus	- 896 + 235	- 775 -1829	- 676 -1452	+1582 +1011	+ 245 - 857	-1923 -1175	+ 875 - 617	-1018 -1723
Non-metal. mineral products	+ 277 + 92	+ 358 + 82	- 157 - 31	- 28 - 74	+ 292 - 356	+ 62 - 256	+ 38 - 61	+ 119 - 147

APPENDIX D -- Continued

Industry Group	1949-51	1951-53	1953-55	1955-57	1957-59	1949-54	1954-59	1949-59
Basis								
Cal	-1217	- 940	+ 68	+ 500	+ 333	-2588	+1160	-1562
Agg	- 542	- 404	+ 98	+ 462	+ 178	-1182	+ 838	- 237
Misc. Industries								
Cal	+ 218	+1184	+ 179	- 247	- 438	+1408	- 503	+1272
Agg	+ 376	+ 645	+ 5	- 123	- 295	+1162	+ 46	+1444

Note: "Cal" represents calculated, "Agg" represents aggregated.

APPENDIX E

PROPORTIONAL SHIFT VALUES FOR MONTREAL INDUSTRY GROUPS
(CALCULATED AND AGGREGATED)

Industry Group	1949-51	1951-53	1953-55	1955-57	1957-59	1949-54	1954-59	1949-59
Foods and Beverages	Cal -1540 Agg -1730	- 348 + 15	+ 863 + 470	- 210 - 52	+ 968 + 925	+ 960 -1134	+ 660 + 492	- 373 - 468
Leather products	Cal -1850 Agg -1949	- 72 - 8	- 543 - 534	- 269 - 305	- 339 + 393	-2199 -2135	- 182 - 177	-2451 -2356
Textiles	Cal - 33 Agg - 32	-1353 - 900	- 355 - 89	- 534 - 643	- 351 - 174	-1887 -1057	- 599 - 649	-2508 -1787
Clothing	Cal -4044 Agg -3393	- 683 - 355	-2517 -1591	-1518 -1443	+ 154 + 530	-6043 -4204	-2427 -2202	-8434 -5942
Wood products	Cal - 341 Agg - 392	- 48 + 123	+ 231 - 310	- 308 - 28	+ 105 + 181	- 247 - 73	- 105 + 145	- 350 + 43
Printing publishing	Cal +2186 Agg - 379	- 342 - 311	+ 932 +1115	+ 362 + 415	+ 505 + 479	+3034 + 406	+ 699 + 843	+3938 +1240
Iron and steel prod.	Cal +1249 Agg +1394	+ 173 - 107	+ 73 + 820	+1677 +2144	- 131 - 144	+ 438 +1537	+2237 +2839	+2645 +4397
Electrical apparatus	Cal +1992 Agg +1054	+ 988 +2043	+ 313 +1088	+ 369 + 939	-1049 + 53	+3837 +3284	- 793 + 723	+3070 +3974
Non-metal. mineral products	Cal - 21 Agg + 164	+ 222 + 494	+ 817 + 689	- 109 - 64	+ 846 + 943	+ 694 + 844	+1106 +1203	+1802 +2069

100

APPENDIX E -- Continued

Industry Group	Basis	1949-51	1951-53	1953-55	1955-57	1957-59	1949-54	1954-59	1949-59
Chemical products	Cal	+ 361	+ 424	+ 407	+ 63	+ 440	+1573	+ 279	+1959
	Agg	- 285	- 50	+ 520	+ 135	+ 461	+ 248	+ 558	+ 671
Misc. industries	Cal	- 185	+ 392	+ 129	+ 372	+ 866	+ 237	+1252	+1167
	Agg	- 192	+ 393	+ 57	+ 204	+ 548	+ 213	+ 672	+ 687

Note: "Cal" represents calculated, "Agg" represents aggregated.

BIBLIOGRAPHY

- ASHBY, L.D. (1964), "The geographical redistribution of employment." Survey of Current Business, 44, (10), 12-20.
- _____(1965), Growth patterns in employment by county, 1940-1950 and 1950-1960. Washington: U.S. Department of Commerce.
- _____(1968), "Shift and share analysis: a reply." Southern Economic Journal, 34, (3), 423-25.
- _____(1970), "Changes in regional structure: a comment." Urban Studies, 7, (3), 298-304.
- BEAUD, M. (1966), "Analyse regionale - structurelle et planification regionale." Revue Economique, 12, (4), 254-87.
- BERLINGUETTE, V.R. (1967), "Classifications, concepts, confidentiality and the use of statistics on the manufacturing industries by geographers." Canadian Geographer, 11, (1), 1-15.
- BJONPICK, R.D. (1971), Factors in the growth in manufacturing employment in metropolitan Vancouver, 1949-1958. M.A. extended essay, Department of Economics and Commerce, Simon Fraser University.
- BORTS, G.H., and STEIN, J.L. (1966), Economic growth in a free market. N.Y.: Columbia University Press.
- BROWN, A.J. (1967), "The 'Green Paper' on the development areas." National Institute Economic Review, 40, 26-33.
- _____(1969), "Surveys of applied economics: regional economics with special reference to the U.K." Economic Journal, 79, (4), 759-96.
- BROWN, H.J. (1969), "Shift and share projection of regional economic growth: an empirical test." Journal of Regional Science, 9, (1), 1-18.
- _____(1971), "The stability of the regional-share component: a reply." Journal of Regional Science, 11, (1), 113-14.
- _____(1973), "Shift and share projections revisited: a reply." Journal of Regional Science, 13, (1), 121.

- BUCK, T.W. (1970), "Shift and share analysis: a guide to regional policy?" Regional Studies, 4, (4), 445-50.
- CAMERON, G.C., and REID, G.L. (1966), Scottish economic planning and the attraction of industry. Edinburgh: Oliver and Boyd.
- CHAMBERS, J.A. (1971), "Measuring changes in regional industrial structure: a comment on Stilwell and Ashby." Urban Studies, 8, (3), 289-92.
- _____, et al. (1971), "Regional economic growth in Thailand." Annals of Regional Science, 5, (2), 86-101.
- CREAMER, D.B. (1943), "Shifts of manufacturing industries." In Industrial location and natural resources, National Resources Planning Board, Washington: U.S. Government Printing Office.
- _____. (1969), Manufacturing employment by type of location: an examination of recent trends. N.Y.: National Industrial Conference Board.
- CROWLEY, R.W. (1971), Labour force growth and specialization in Canadian cities. Ottawa: Ministry of State for Urban Affairs.
- CUNNINGHAM, N.J. (1969), "A note on the 'Proper distribution of industry'." Oxford Economic Papers, 21, (1), 122-27.
- DAVIS, H.C., and GOLDBERG, M.A. (1972), "Combining intersectorial flows and shift-share techniques: a hybrid regional forecasting model." Annals of Regional Science, 6, (1), 106-15.
- DICKEN, P. (1971), "Some aspects of the decision-making behaviour of business organizations." Economic Geography, 47, (4), 426-37.
- DUNN, E.S. (1960), "A statistical and analytical technique for regional analysis." Papers of the Regional Science Association, 6, 97-112.
- _____. (1962), Recent southern economic development as revealed by the changing structure of employment. Gainesville: University of Florida Press.
- ELLIOT HURST, M.E. (1972), A geography of economic behaviour. Boston: Duxbury Press.
- ESTEPAN-MARQUILLAS, J.M. (1972), "A re-interpretation of shift-share analysis." Regional and Urban Economics, 2, (3), 240-55.

- FISHER, J. (1962), "Further calculations of regional differences in profitability and growth." Scottish Journal of Political Economy, 9, (2), 141-58.
- FLOYD, C.F. (1973), "Shift and share projection models: a reformulation." Paper presented to the Western Regional Science Association Conference, San Diego, February 1973.
- FLOYD, C.F., and SIRMANS, C.F. (1973), "Shift and share projections revisited." Journal of Regional Science, 13, (1), 115-20.
- FOSTER, C.D. (1972), "Public finance aspects of national settlement patterns." Urban Studies, 9, (1), 79-97.
- FRANK, A.G. (1967), Capitalism and underdevelopment in Latin America: historical studies of Chile and Brazil. N.Y.: Monthly Review Press.
- FUCHS, V.R. (1959), "States or SMA's when studying the location of manufacturing?" Southern Economic Journal, 25, (3), 349-55.
- _____ (1961), "Statistical explanation of the relative shift of manufacturing among regions of the U.S.A." Papers of the Regional Science Association, 8, 105-26.
- _____ (1962a), Changes in the location of manufacturing in the U.S. since 1929. New Haven: Yale University Press.
- _____ (1962b), "Determinants of the redistribution of manufacturing in the U.S. since 1929." Review of Economics and Statistics, 44, 167-77.
- GARRETT, M.A. (1968), "Growth of manufacturing in the south, 1947-1958: a study in regional industrial development." Southern Economic Journal, 34, (3), 352-64.
- GILMOUR, J.M. (1966), "The joint anarchy of 'confidentiality' and definitional change." Canadian Geographer, 10, (1), 40-48.
- GOULD, P. (1970), "Is statistix inferens the geographical name for a wild goose?" Economic Geography, 6, (2), 439-48.
- GOUGH, K. (1968), "Anthropology and imperialism." Monthly Review, 19, (11), 12-27.
- GURLEY, J.G. (1971), "Capitalist and Maoist economic development." Monthly Review, 22, (9), 15-35.

- HAGGETT, P. (1971), "Leads and lags in inter-regional systems." In Spatial policy problems of the British economy, Chisholm, M., and Manners, G., eds., Cambridge: Cambridge University Press.
- HANNA, F.A. (1959), State income differentials 1919-1954. Durham, N.C.: Duke University Press.
- HART, P.E., and MacBEAN, A.I. (1961), "Regional differences in productivity, profitability, and growth." Scottish Journal of Political Economy, 8, (1), 1-12.
- HART, R.A. (1972), "The regional growth in employment in the manufacturing and service sectors 1960-1975." Tijdschrift Voor Economische en Sociale Geografie, 63, (2), 88-93.
- HEMMINGS, M.F.W. (1963), "The regional problem." National Institute Economic Review, 25, 40-57.
- HOLMANS, A.E. (1964), "Restriction of industrial expansion in S.E. England - a reappraisal." Oxford Economic Papers, 16, (2), 235-61.
- HOUSTON, D.B. (1967), "The shift and share analysis of regional growth: a critique." Southern Economic Journal, 33, (4), 577-81.
- ISARD, W. (1960), Methods of regional analysis. Cambridge: MIT Press.
- KING, L., CASSETTI, E., and JEFFREY, D. (1969), "Economic impulses in a regional system of cities: a study of spatial interaction." Regional Studies, 3, (3), 213-18.
- KIAASSEN, L., and PAELINK, J.H.P. (1972), "Asymmetry in shift and share analysis." Regional and Urban Economics, 2, (3), 256-61.
- KLAUS, R.J., and KLAUS, K.E. (1971), "Behavioural location theory." The Australian Geographer, 11, (5), 522-30.
- LASUEN, J.R. (1971), "Venezuela: an industrial shift and share analysis." Regional and Urban Economics, 1, (2), 153-220.
- LOASBY, R.J. (1967), "Making locational policy work." Lloyds Bank Review, 33, 34-47.
- MACKAY, D.T. (1968), "Industrial structure and regional growth." Scottish Journal of Political Economy, 15, (2), 129-143.

- _____ (1969), "Industrial structure and regional growth: a methodological problem." Scottish Journal of Political Economy, 16, (1), 99.
- MACRONE, G. (1969), Regional policy in Britain. London: Allen and Unwin.
- MARCUS, M. (1965), "Agglomeration economics - a suggested approach." Land Economics, 41, (3), 279-84.
- NATIONAL BUREAU OF ECONOMIC RESEARCH (1957), Regional income. Studies in income and wealth, volume twenty-one. Princeton: Princeton University Press.
- O'FARRELL, P.N. (1972), "A shift and share analysis of regional employment change in Ireland, 1951-1966." Economic and Social Review, 4, (1), 59-86.
- PARASKEVOPOULOS, C.C. (1971), "The stability of the regional-share component: an empirical test." Journal of Regional Science, 11, (1), 107-12.
- PARIS, J.D. (1970a), "Regional-structural analysis of population changes." Regional Studies, 4, (4), 425-43.
- _____ (1970b), "Comments on 'Further thoughts on the shift and share approach,' by F.J.B. Stilwell." Regional Studies, 4, (4), 491.
- PERKS, W.T. (1965), "The Montreal metropolitan region." Town Planning Review, 36, (1), 29-48.
- PERLOFF, H.S., et al. (1960), Regions, resources and economic growth. Baltimore: John Hopkins Press.
- RICHARDSON, H.W. (1972), "Regional economics: a review article." Scottish Journal of Political Economy, 19, (3), 297-305.
- SEIFRIED, N.R. (1968), "An analysis of recent changes in manufacturing in Alberta." The Albertan Geographer, 5, 55-60.
- STEGEL, S. (1956), Nonparametric statistics for the behavioural sciences. Tokyo: McGraw-Hill.
- SMITH, D.M. (1969), "Industrial location and regional development: some recent trends in N.W. England." Environment and Planning, 1, (2), 173-91.
- STABLER, J.C. (1968), Prairie regional development and prospects. Ottawa: Royal Commission on Consumer Problems and Inflation.

- STEED, G.P.F. (1967), "Location changes: a shift and share analysis of Northern Ireland's manufacturing mix, 1950-1954." Tijdschrift Voor Economische en Sociale Geografie, 58, (5), 265-70.
- STEVENS, B.J., and BRACKETT, C.A. (1967), Industrial location: a review and annotated bibliography. Philadelphia: Regional Science Research Institute.
- STEWART, C.T. (1967), "Regional allocation of public funds for economic development." Land Economics, 43, (4), 421-33.
- STILWELL, F.J.B. (1969), "Regional growth and structural adaptation." Urban Studies, 6, (2), 162-78.
- _____ (1970), "Further thoughts on the shift and share approach." Regional Studies, 4, (4), 451-58.
- THIRLWALL, A.P. (1967), "A measure of the proper distribution of industry." Oxford Economic Papers, 19, (1), 46-58.
- _____ (1969), "Weighting systems and regional analysis: a reply to Mr. Cunningham." Oxford Economic Papers, 21, (1), 128-33.
- THOMAS, M.D. (1969), "Regional economic growth: some conceptual aspects." Land Economics, 45, (1), 43-51.
- TOWNROE, P.M. (1969), "Industrial structure and regional economic growth - a comment." Scottish Journal of Political Economy, 16, (1), 95-98.
- WARREN, R.L. (1971), "The sociology of knowledge and the problems of the inner city." Social Science Quarterly, 52, (3), 469-91.
- WEBBER, M.J., and DALY, M.T. (1971), "Spatial and regional variations in short term industrial change within cities." Australian Geographical Studies, 9, (1), 15-32.
- WHIFFLE, R.F.M. (1966), "Regional differentials and economic planning." Royal Australian Planning Institute Journal, 4, (4), 180-87.
- ZELINSKY, W. (1958), "A method for measuring change in the distribution of manufacturing activity: the U.S. 1939-1947." Economic Geography, 32, (2), 95-125.

