INFORMATION TO USERS

This reproduction was made from a copy of a manuscript sent to us for publication and microfilming. While the most advanced technology has been used to photograph and reproduce this manuscript, the quality of the reproduction is heavily dependent upon the quality of the material submitted. Pages in any manuscript may have indistinct print. In all cases the best available copy has been filmed.

The following explanation of techniques is provided to help clarify notations which may appear on this reproduction.

1. Manuscripts may not always be complete. When it is not possible to obtain missing pages, a note appears to indicate this.

2. When copyrighted materials are removed from the manuscript, a note appears to indicate this.

3. Oversize materials (maps, drawings, and charts) are photographed by sectioning the original, beginning at the upper left hand corner and continuing from left to right in equal sections with small overlaps. Each oversize page is also filmed as one exposure and is available, for an additional charge, as a standard 35mm slide or in black and white paper format.*

4. Most photographs reproduce acceptably on positive microfilm or microfiche but lack clarity on xerographic copies made from the microfilm. For an additional charge, all photographs are available in black and white standard 35mm slide format.*

***For more information about black and white slides or enlarged paper reproductions, please contact the Dissertations Customer Services Department.**

U·M·I Dissertation Information Service

University Microfilms International
A Bell & Howell Information Company
300 N. Zeeb Road, Ann Arbor, Michigan 48106

PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark ✓.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages ✓
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) _____ lacking when material received, and not available from school or author.
12. Page(s) _____ seem to be missing in numbering only as text follows.
13. Two pages numbered _____. Text follows.
14. Curling and wrinkled pages _____
15. Dissertation contains pages with print at a slant, filmed as received ✓
16. Other _____

_____

_____

University
Microfilms
International

TOWARDS A THEORY OF BUDGETING
AN EXPLANATION AND EMPIRICAL TEST OF THE ELEMENTS OF STRATEGIC THINKING

By

Rebecca Martin Hendrick

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Political Science

1986

ABSTRACT

TOWARDS A THEORY OF BUDGETING:
AN EXPLANATION AND EMPIRICAL TEST OF THE
ELEMENTS OF STRATEGIC THINKING

By

Rebecca Martin Hendrick

The primary goal of this research is to test a model of budgetary decision making that represents budgeting officials' decision rules concerning requests and appropriations. The model is estimated on data obtained from the City of Lansing, Michigan between FY 1969-70 and FY 1984-85. Using "incremental budgeting theory" as a basis, the model focuses on how officials include the environment in their decision rules and its impact on budget levels. This study argues that previous incremental budgeting models inadequately represent environmental effects and that this indicates a fundamental deficiency with the underlying theory. Specifically, the theory does not specify how officials' decision rules change under varying environmental circumstances.

The model's form and content are also developed in response to various criticisms of incremental budgeting that target its inability to explain recent budgeting trends and some past budgeting outcomes. Underlying this theory is a set of assumptions that describe decision making as "intendedly rational." Many of the theory's critics argue that the unexplained behavior is not characteristic of intendedly rational decision making, and therefore, a new theory of budgeting should be developed. In contrast, this research claims that the underlying assumptions and major findings of incremental budgeting

theory are still very useful as a foundation for modeling budgeting, but some theoretical changes must be made to account for the unexplained behavior.

The model estimated here exhibits two major changes in the incremental theory of budgeting. First, two new sets of assumptions concerning the environment's structure and its effect on the budgeting process in general and budgeting decisions in particular are added to the theory's fundamental assumptions. Using these assumptions, a set of variables is proposed which represents the decision makers perceptions of the environment. The variables target the wealth and uncertainty of the government (as an indicator of the environment's stability, complexity and supply of resources) and its policy priorities (as an indicator of environmental demand). Second, the general form of the budgeting model is altered to represent the decision making process in two stages. The proposed model is then estimated using pooled cross-sectional time series analysis which allows budgeting behavior to be explained both across time and budgeting units.

In Memory of My Father
BERT EARL MARTIN

ACKNOWLEDGEMENTS

Although I take complete responsibility for the contents of this dissertation and its manner of presentation, no project of this size can ever be completed without the support and assistance of many people. The person who was most important to this project, and also to my graduate career, is Professor Charles Ostrom. I am very grateful for his guidance throughout my years in graduate school and especially for his thorough reading of earlier drafts. Because many important features of the model were based on his suggestions, the end product might have been very different without his help. I also want to thank Professor Jack Knott, Professor Gary Miller and Professor Phillip Marcus their advice and for enduring the confusion which accompanies such a research project. Professor Marcus and the Social Science Research Bureau were especially helpful in providing the facilities to do the research and writing.

This project also could not have been completed without the assistance of many people within Lansing city government. Herb Davidson and Ed Pilowske of the Internal Audit Department are quite knowledgeable about Lansing's finances and records, and I am grateful to them for sharing their knowledge and time with me. My conversations with Glen Sherman, head of the Microfilm section, were also very instructive regarding the the content of Lansing's financial records. He was more than patient in answering my questions, fixing the microfilm copier (which I often broke) and allowing me to spend hours in his office obtaining the data with which to test the research model. Bruce Stark, in the office of the City Council, facilitated the research greatly by allowing me to take many important documents home; and Larry Theisen, in the Budgeting Department, was very helpful in explaining the nuances of the Lansing budgeting process. I also want to thank Budget Director Jan Lazar for allowing me access to her personal records and the many anonymous interviewees who supplied pertinent substantive information about the city.

Finally, I cannot forget the help and encouragement of family and friends throughout this period in my life. Archie, my husband, was a good discussant for preliminary ideas. He also put up with many drafts, numerous anxiety attacks, and patiently listened to my frustrations. I want to thank my mother who instilled in me the tenacity to complete such a project, and I want to acknowledge my father's role in my graduate education. Although he may not have entirely understood what I was doing, he respected my goals and had faith in my ability to achieve them. Unfortunately, he died a month before the project was completed.. but I believe he knows that I have finished.

TABLE OF CONTENTS

1. INTRODUCTION 1

2. THE THEORETICAL FOUNDATIONS OF BUDGETING THEORY 9

Introduction 9
Intendedly Rational Decision Making 11
Summary 16
Adaptive Systems 17
General systems 17
Hierarchical systems 21
Summary and application to budgeting 26
Uncertainty, Complexity and the Environment 28
Payment and demand 28
Stability and complexity 31
Summary and Conclusions 34

3. EMPIRICAL RESEARCH ON BUDGETING 37

Introduction 37
Preliminary Empirical Research 39
The work of Davis, Dempster and Wildavsky 39
Budgeting research since Davis, Dempster and and Wildavsky 48
Scientific and nonscientific criticisms of the Davis, Dempster and Wildavsky theory 52
New Components of Strategic Thinking 56
The internal and external environment 56
The variables of the model 65
wealth and certainty 66
budgetary unit priorities 70
other aids to calculations 73
interactive effects 75
Summary 76
A Model of Request and Appropriation Decisions 78
Summary and Conclusions 85

4. THE RESEARCH SETTING 88

Introduction 88
The Culture and General Characteristics of the City of Lansing 89
Lansing Government and Its Changes Between 1970 and 1985 . 97
Lansing Budgeting and Finance 102
Conclusion 110

5. A MODEL OF STRATEGIC BUDGETARY DECISION MAKING 112

Introduction 112
Respecification of the Model 113
The first new variable 113
The second new variable 117
Operationalization of the Variables 119
Certainty-Wealth 119
Wealth: quantitative analysis 121
expected incoming resources 122
control over the output of resources 124
comparing expected incoming resources and control over the output of resources 126
slack or surplus resources 133
Certainty: quantitative analysis 134
Wealth-certainty: nonquantitative analysis 139
Operationalization of wealth-certainty 141
Operationalization of priorities 144
Other operationalizations 147
Statistical Hypotheses and Methods of Analysis 150
Data format and units of analysis 150
Statistical hypotheses 155
Testing procedures and methodological problems 160
Conclusion 162

6. THE EMPIRICAL TEST: PART ONE 164

Introduction..... 164
Testing the First Stage of the Model 166
The condition of heteroskedasticity 166
The estimation of the first stage of the heteroskedastic model 171
Outliers and reestimation of the first stage of the model 175
The condition of serial correlation 180
Testing the Second Stage of the Model 183
The request equation 189
The appropriation equation 195
Conclusion 199

7. THE EMPIRICAL TEST: PART TWO 203

Introduction 203
Model Estimates for Separate Line-item Categories 206
Review of stage one of the research model 206
Comparison of separate and total line-items in the second stage of the research model 209
Conclusion 219

8. SUMMARY AND CONCLUSIONS 223

Summary of the Research Model and Findings 223
Principal Conclusions and Their Implications 229
Future Research Directions 235

Notes N1
Appendix A A1
Appendix B A2
Bibliography B1

LIST OF TABLES

TABLE 4.1: Population and Percent Change in Population for Lansing and Michigan 94
TABLE 4.2: Various Demographic Statistics for Lansing, the the State of Michigan and the U.S. 95
TABLE 5.1: Expected Incoming Resources 127
TABLE 5.2: Control Over the Output of Resources 130
TABLE 5.3: Combined Input and Output Measures of Wealth and the Amount of Slack Resources 132
TABLE 5.4a: Certainty Measures for 16 Fiscal Years 137
TABLE 5.4b: Summary of the Method of Categorizing Each Year as Low, Medium and High Certainty..... 138
TABLE 5.5: Summary of the Analysis of Budget Documents for 16 Fiscal Years 140
TABLE 5.6: Operationalization of the Wealth-certainty Variable 143
TABLE 5.7: Operationalization of the Priority Variable 146
TABLE 5.8: Operationalization of Public Service, Budget Organization, Previous Decisions and the Dependent Variables 148
TABLE 5.9: Statistical Hypotheses for the Base 157
TABLE 5.10: Statistical Hypotheses for the Independent Variables of the Second Stage of the Research Model 158
TABLE 6.1: Goldfeld-Quandt Test For All Line-item Groups 169
TABLE 6.2: Stage One Coefficient Estimates for Weighted Least Squares: All Line-items 173
TABLE 6.3: Stage One Coefficient Estimates for Weighted Least Squares With Prominent Outliers Removed 178
TABLE 6.4: Tests for Serial Correlation: All Line-items 182
TABLE 6.5: Stage Two Coefficient Estimates for Weighted Least Squares: Total Line-items 186
TABLE 6.6: Specific Variable Effects on the Base and Previous Decisions 194
TABLE 7.1a: Stage Two Coefficient Estimates for Weighted Least Squares: Personnel Line-items 210
TABLE 7.1b: Stage Two Coefficient Estimates for Weighted Least Squares: Supplies and Services 211
TABLE 7.1c: Stage Two Coefficient Estimates for Weighted Least Squares: Equipment Line-items 212
TABLE 7.1d: Stage Two Coefficient Estimates for Weighted Least Squares: Maintenance Line-items 213

LIST OF FIGURES

FIGURE 2.1: Information Processing System 19
FIGURE 2.2: Nearly Decomposable Hierarchic System 23
FIGURE 3.1: Decision Rules From the Davis et al Models 47
FIGURE 3.2: Budgetary System and Its Environment 64
FIGURE 3.3: Diagram of the Lansing Budgeting System 79

LIST OF EQUATIONS

EQUATION 3.1: General Specification of the Model 82
EQUATION 5.1: Respecification of the Second Stage of the General Model 118
EQUATION 6.1: General Specification of Stage One of the Heteroskedastic Model 170
EQUATION 6.2: General Specification of Stage Two of the Model Using Weighted Least Squares 184

CHAPTER ONE

INTRODUCTION

In the field of political science, the politics of public policy making is a major topic. One subtopic of policy making, the study of budgeting, has gained separate importance within this field for a number of reasons. First, there are important methodological advantages to studying budgeting. The process is well defined and its outcomes are quantifiable. Second, within the more narrowly defined activities of budgeting, as opposed to those broadly interpreted as policy making, all the components of the politics of public policy making are present. If politics can be interpreted as "conflicts over whose preferences prevail in the determination of policy," then budgeting is a "window" to the political process (Wildavsky, 1975, 5). This study focuses on understanding the political properties of agency and departmental requests and council appropriations and applying this knowledge towards explaining budget levels across time and governmental departments in Lansing, Michigan.

There are many approaches to predicting and explaining budget and expenditure levels of governments. One of the methods is public finance which draws heavily from economic theory. It explains the rates of growth in expenditures as a function of costs and benefits of policies to governments and taxpayers and the environment's level of economic development. (See: Musgrave and Culberston, 1953; Brazer,

1959; Sacks and Hellmuth, 1961; Peacock and Wiseman, 1961; Gramlich, 1969). Another category of budgeting explanations are institutional analyses which are usually comparative studies. Like the public finance literature, comparative expenditure studies attribute budget levels to variables outside policy makers' direct influence. More specifically, these studies focus on the relationships between economic, social and political conditions of the environment and the levels of spending in various policy areas. (See: Dawson and Robinson, 1963; Hofferbert, 1966; Sharkansky, 1968b; Clark, 1968; Sharkansky and Hofferbert, 1969).

A third category of budgeting explanations, the decision making approach, focuses on decisions of persons directly involved in formulating requests and appropriations. (See: Fenno, 1966; Davis, Dempster and Wildavsky, 1966b; Crecine, 1969; Wildavsky, 1974; and Padgett, 1980). Underlying this approach is a theory of decision making that makes three assumptions about decision makers. The theory assumes that decision makers are: (1) uncertain, (2) limited in their ability to entirely comprehend observed complexity and process information, and (3) they engage in strategic behavior to achieve their goals. The theory also claims that, as a result of uncertainty and limited ability, decision makers use techniques that simplify calculations. In contrast to the economists' use of the term "rational" to describe decisions, meaning that decisions are comprehensive and maximize benefits, the theory of decision making describes the process as "intendedly rational" (Simon, 1955, 1976).

The results of budgeting studies using a decision making approach generally support the theory's assumptions. The most important finding

of this literature is this year's decisions (requests and appropriations) are a function of and, in most cases, not very different from last year's decisions (Davis, Dempster and Wildavsky, 1966b, 1974; Crecine, 1969; Wanat, 1974; Gist, 1974; Cowart et al., 1975; Gist, 1977, Padgett, 1980). The implications of these findings are that budgeting participants simplify their decisions by not examining all information. Instead, officials use last year's appropriation as a basis for this year's decisions. All other calculations then begin at the level of the base.

In contrast to this research, there is another set of findings in the budgeting literature claiming that the intendedly rational models cannot explain some past and many recent budgeting outcomes (Kanter, 1972; Bailey and O'Connor, 1975; Leloup, 1978; Bozeman and Straussman; 1982; Behn, 1985). Moreover, related research into the current fiscal stress of cities shows budgeting outcomes that are very different from the stable, increasing and conservative outcomes that are characteristics of intendedly rational budgeting (Wolman and Davis, 1980; Schick, 1980; Levine et al, 1981; Clark and Ferguson, 1983). As a result of this problem, some researchers are very quick to claim that a new theory of budgeting is needed and that the underlying process is not intendedly rational. However, relative to the previous success of the intendedly rational models, such conclusions are too hasty. A more prudent and scientific course of action is to explore ways of altering the theory to account for unexplained behavior rather than developing a new theory with different underlying assumptions.

Based on the criticisms and empirical failures of the decision making theory of budgeting, its problem appears to be its weak

representation of the politics of the process. The study presented here develops a model of budgeting that represents budgeting officials' decision calculus and contains decision making elements considered important to the politics of Lansing's budgeting process. Stated another way, this study determines what effects politics has on levels of requests and appropriations in the city's budget. The study also argues that the source of budgetary politics are the budgeting participants' strategies, and these strategies are greatly influenced by the participants' perceptions of environmental conditions and expectations of other participants' decisions. Other elements of strategies are values and goals, memory content, and techniques for coping with uncertainty and complexity. Within this framework, this study addresses the theory's fundamental deficiencies by analyzing the participants' perceptions of the environment

As a foundation for analyzing perceptions, a second set of assumptions related to intendedly rational decision making is used. One of the primary tenets of this second set is that there are two environments which correspond to the boundaries of the budgeting system. Budgeting official's perceive the environment that is external to Lansing city government differently than their immediate environment which includes everything within city government. The study also examines the effects of four sources of perceived information, on the strategies. Three of the sources, which are from the external environment, are the city's economic conditions, the complexity of its environment, and its demand for services. These sources are perceived respectively by budgeting officials as the government's wealth, a general uncertainty about conditions, and priorities among services.

The fourth source of information, which is from the internal environment, is previous changes in requests and appropriations and is perceived by budgeting officials as past budgeting behavior.

From inferences on the budgeting participants' use on the four sources of perceived information, the study proposes hypotheses of how these variables affect requests and appropriations. The most fundamental hypothesis regarding these variables is that they are incorporated into decision premises and therefore directly influence the participants' strategies. Such strategies, in turn constitute the politics of budgeting. Other decision making characteristics that are tested in the model are interactive affects of the internal and external environments and a hierarchical decision process. The hierarchical decision process is represented as a two-stage decision model. Finally, two other variables are added to the model which represent differences in yearly and departmental conditions. Although these variables are not strictly theoretical, a closer examination of Lansing's budgeting process and history shows that such conditions might have a significant impact on budget decisions.

The model is tested empirically using regression analysis on two different units of data for sixteen years of pooled, cross-sectional data. Similar to previous budgeting models, the first unit of analysis is total line-items. In most cases these models assume that the focus of budgeting officials' decision calculations are the departments' entire budget. Current criticisms raise the question of whether this is accurate. They state that one of the failures of budgeting theory is that it does not incorporate aggregate level decision making and that it is inherently incompatible with decision making at this level.

To test whether changes in the budgeting theory represented by the research model work at an aggregate or disaggregate level, and whether the general claims against the theory are accurate, the model is estimated on a second unit of data. This unit of analysis represents disaggregate level decision making and is defined as four separate groups of line-items: personnel, supplies and services, maintenance and equipment. Thus, one estimated model is compared to four estimated models on various subgroups of total line-items.

Underlying the development of this model is the goal of explaining how and why budgeting outcomes differ across time and departments better than previous models of budgeting behavior. Crucial to the achievement of this goal is that the theoretical analysis and the results of the empirical tests begin to address some of the criticisms of the previous models of budgeting behavior. In the end, the result should be a theory of budgeting that is more comprehensive and one that could also have implications for the more general theory of decision making.

This study begins its analysis by examining the research model's fundamental assumptions in Chapter Two. These assumptions include the tenets of intendedly rational decision making found in many previous models of budgeting and a new set of assumptions concerning hierarchical environments and adaptive systems. Also, a third set of assumptions pertaining to the types of information that are important to budgeting officials is proposed. In Chapter Three, past empirical work on budgeting and its criticisms are reviewed, and the model outlined in Chapter Two is more fully specified. The model's variables are defined and hypotheses about the general affects of the variables

on requests and appropriations are stated. As mentioned previously, these main variables are the city's wealth, budget officials' uncertainty, priorities among departments, previous budget decisions, and interactive effects of some of these variables.

Chapter Four presents an analysis of the city of Lansing, its government and its budgeting and financial processes. Because the model focuses on the effects of the environment and how the environment constrains decisions, understanding the environment both inside and outside the government is crucial. On the basis of information in this chapter, two events and one condition that are not theoretically related are identified as possible important factors in the budgeting participants' decision calculus. The events are a change in the city's charter and a change in the organization of the budget process, both of which could have significant impacts on budget levels. The condition is a difference in the treatment of one department's budget because of its unique financial accounting system.

In Chapter Five, the model of strategic budgetary decision making is operationalized and the new variables identified in Chapter Four are added to the model. All variables are operationalized according to quantitative and nonquantitative information about the general conditions of the city and its government. Statistical hypotheses concerning the variables' effects are presented and estimation procedures and possible methodological problems with the data are also discussed. Chapter Six and Chapter Seven presents the model estimates. In Chapter Six the model is estimated for total line-items and in Chapter Seven the model is estimated for the four separate groups of line-items. Finally, the results and the model's implications for the

theory of budgeting are discussed in Chapter Eight.

CHAPTER TWO

THE THEORETICAL FOUNDATIONS OF BUDGETING THEORY

INTRODUCTION

One of the most important epistemological theories developed recently is Imre Lakatos' (1970) theory of scientific progress. Its principal concept "the research program" not only describes how science may actually proceed, but has far-reaching implications for how scientists should conduct research. Thus, his theory provides a good framework for presenting the research model's theoretical and empirical foundations.

Lakatos uses the term "research program" to refer to a series of coherent theories exhibiting the same set of underlying assumptions. He called such assumptions the "hard core" of the research program. Surrounding the hard core is a "protective belt" of auxiliary assumptions, testable hypotheses, concepts and observational statements that are unique to the particular empirical application (Ostrom, 1978b). According to Lakatos, science proceeds rationally when criticisms and theoretical changes are directed away from the hard core and towards the protective belt. In this manner scientific progress is more orderly and efficient because scientists must not continually defend the primary assumptions or alter them to fit the discrepancies of empirical evidence. Only when the criticisms and evidence against the protective belt are overwhelming, and there is an alternative

research program available to take its place, is the first research program considered refuted (Ball, 1976).

The budgeting research program that is used here incorporates a hard core that is based on a theory of decision making developed by Simon (1955) and Cyert and March (1963). The protective belt of the research program is based on a theory of budgeting first presented by Davis, Dempster and Wildavsky (1966a). Since that time numerous authors have expanded, criticized, and altered this theory to create an extensive research program. In this chapter, the hard core assumptions and propositions of this research program are presented in light of Lakatos' theory of scientific progress.

There are two reasons for using Lakatos in this manner. First, it provides a grounding for the central argument that many of budgeting theory's criticisms are not scientifically progressive according to Lakatos' notion of rational science. Additionally, the problems with budgeting that these criticisms address are not necessarily solved by adopting a new theory of budgeting. A more scientifically progressive solution to these problems is to expand or alter the protective belt.

The second reason for presenting the premises in this manner is that it provides the reader with a more fundamental understanding of this study's changes to the theory. By including the assumptions and propositions of the theory of adaptive systems more directly into the protective belt, than has been done in previous research, a progressive shift in the theory is achieved. Currently, budgeting theory primarily uses the premises of intendedly rational decision making to explain budgeting. This study argues that the theory of adaptive systems potentially provide a more complete analysis of budgeting behavior.

The underlying assumptions that are the basis for these arguments are presented in three sections of this chapter. The second section of this chapter presents one set of assumptions, or theoretical premises, that pertains to the nature of human beings as decision makers. According to these premises, decision makers are viewed as limited in their ability to comprehend the complexity of the environment and thus make decisions in an "intendedly rational" manner. In the third section of this chapter, another set of theoretical premises is presented which is concerned with the structural and procedural characteristics of more general behavioral systems. According to these premises, decision makers and the components of the environment are conceptualized as open systems that interact with other open systems to adapt to the environment. In this research, the behavior of organizations, city governments, and individual departments and agencies will be described as adaptive systems. Finally, the fourth section of this chapter classifies the types of systems in the environment with which the budget system interacts.

INTENDEDLY RATIONAL DECISION MAKING

The assumptions and propositions that underly the Davis, Dempster and Wildavsky theory of budgeting are attributed primarily to Herbert Simon. One of the theory's most crucial premises is presented in the following excerpt from Simon's earlier work:

> "The capacity of the human mind for formulating and solving complex problems is very small compared to the size of the problems whose solution is required for objectively rational behavior in the real world..... (1979, 198)."

In this statement Simon presents his fundamental thesis about human

decision making by contrasting it with the more classical notion of decision making used in economics.

In general, economists assume that decision makers are "rational" in all situations. (See Simon, 1955 and Steinbruner, 1974 for a comparison of rational and "intendedly rational" decision making.) In contrast Simon argues that the ability of humans to gather, comprehend, and retrieve information from memory and make inferences is limited for a number of reasons. First, their environments are exceedingly complex. Second, their mental capabilities are very limited in comparison to the demands of a complex environment. And third, they are constrained by finite resources, such as time and money, from attempting to fully understand environmental complexities. As a result of these limitations, decision makers make decisions under conditions of extreme uncertainty most the time; and they make decisions only in an intendedly rational manner.

Using these assumptions Simon and his colleagues show how humans make decisions despite complexity and uncertainty. Rather than becoming frustrated by these seemingly overwhelming problems, humans develop ways of coping with them. Simon argues that these methods result directly from the decision maker's ability to adapt to a complex and uncertain environment (Simon, 1981). He begins his description of the these coping techniques by examining the fundamental elements of a decision.

In its most basic form, a decision is made from a set of premises. The premises can be divided into two types: value premises and factual premises. Although factual premises may contain value elements and vice versa, they generally can be thought of as descriptive statements about

the environment and how it functions. On the other hand, value premises define the decision maker's preferences and desires (Simon, 1976, xii, 49, 123). Using both types of premises, a decision maker infers what courses of action might solve a particular problem and what consequences each of these alternatives produces. In the final step, the decision maker chooses one course of action based on inferences from the two sets of premises.

The following sub-sections describe the techniques used by humans to simplify and facilitate the development of factual premises.

A. Factorization and Specialization

To reduce the complexity of a problem and make it more manageable, a decision maker divides the problem into a number of subproblems and then focuses on the subproblems sequentially. For instance, when performing a lengthy or complex task, a person will think about what has to be done first, second and third, and then attack each subtask separately. Likewise, Congress, as an example of group behavior, divides its activities into separate committees and subcommittees. Thus, committee members can give each bill more specialized attention (March and Simon, 1958, 191-193).

B. Past Experience: Perception

An intendedly rational decision maker relies on past experience and previously established premises to observe the environment and guide behavior. One way these factors are manifested in decision making is through perception which accounts for the difference between a decision maker's internal representation of the environment and the "objective"

description of that environment (Newell and Simon, 56-57). The source of differences in perceptions among decision makers is each person's unique experiences.

The accumulation of different past experiences by each decision maker leads to the formation of factual and value premises that are different for each person. In the process of perception, a person's unique set of premises act as filters for observation. When making decisions, a person then relies on perceptions to give observations meaning. As a result, observations are more quickly interpreted and more likely to make sense.

For instance, a person in a new job will not function as efficiently as one who has been employed in the same capacity for a long time. The factual and value premises of the new person, which help define problems and recognize needs, will not be as well oriented towards this occupation as the premises of the employee with the longer tenure. (March and Simon, 1958, 126-129, 151).

C. Past Experience: "Performance Programs" or Rules of Thumb

According to Simon, a performance program is an automatic response or an organized set of programmed responses to a familiar environmental stimulus. Rather than treating each problem or situation as unique by reexamining all alternatives and making the separate inferences from premises, intendedly rational decision makers simply react to a frequently encountered stimulus in a programmed manner. In addition to reducing decision time, use of performance programs greatly simplifies the decision process. As one might expect, these programs are used especially in routine environments (March and Simon, 1958, 141-142).

An example of performance programs is the standard operating procedures used by most organizations to handle frequently encountered situations (Cyert and March, 1963, 103-104). In the extreme, performance programs can be a highly complex set of responses to stimuli. For instance, a performance program could be a specific strategy or approach to solving math problems or writing a paper. Of course this example assumes that the person solving the math problem or writing the paper has had enough experience with these tasks to have developed such a performance program (Newell and Simon, 1972, chapter 7).

D. Directly Reducing Decision Calculations: Limiting Consideration of Alternatives and "Satisficing"

To reduce decision calculations, a decision maker will limit the number of alternative actions that are considered by examining only the first few alternatives that come to mind. Another means of reducing decision calculations is to devise rules for quickly excluding many of the alternatives that could be considered. (March and Simon, 1958, 83). For instance, in choosing a method of implementing a policy, a public administrator may decide that only those alternatives that benefit a certain group of people are acceptable.

In addition to limiting alternatives in some fashion, a decision maker will choose an alternative that "satisfices" rather than selecting the optimum alternative to solve a problem or fulfill a need (Simon, 1976, xxix). In other words, the decision maker will choose an action alternative that is only satisfactory or sufficient rather than the best alternative according to the relevant criteria.

E. Use of Cues and Selective Attention to the Environment

Because the environment contains more information and stimuli than anyone can possibly attend to at the same time, a decision maker focuses only on what is salient, familiar, or thought to be relevant to the problem (Simon, 1976, 284-285; Cyert and March, 123-125). In many instances, selective attention involves using bits of information that act as surrogates for "objective" information and therefore only approximate the actual information desired. For instance, rather than evaluating the specific merits of each election candidate, voters will make their choices on the basis of simple cues such as a candidate's method of dress or their political party affiliation.

Summary

To summarize the assumptions about decision making, intendedly rational decision makers avoid uncertainty and minimize the need for information by avoiding trying to correctly anticipate the future, research the past, or determine the present state of affairs. They use simple decision rules and short-run feedback techniques that reduce the time and intellectual demands of making choices in a complex and uncertain environment. (Simon calls these rules and techniques heuristics which are "any principle or device that contributes to the reduction in the average search for solutions." 1979, 152) Decision rules are temporally stable and are altered only in the long-run when the old rules no longer produce the desired or expected results. When the decision rules and techniques change to accommodate the demands of the environment, the decision maker is said to have "learned from" or

"adapted" to the environment (March and Simon, 1958, 99-103, 118-119). Without adapting to the complex and uncertain environment in some fashion, decision making would be unmanangeable if not impossible. The following section describes how decision makers adapt to complex environments.

ADAPTIVE SYSTEMS

General Systems

Thus far, the hard core assumptions and propositions concerning individual decision making have been presented as the basis of most budgeting research. There is, however, another set of assumptions that should be included in the hard core of budgeting theory which more directly link the decision maker to the environment. These theoretical premises view the decision maker, as well as organizations and the environment, as systems which have adaptive capabilities. More importantly, the premises say something about how systems interact and how their behavior is, to a certain extent, a function of the environment. Again, Simon is credited with developing many of these underlying assumptions and summarizes them in the following statement:

> "Man viewed as a behaving system is quite simple. The apparent complexity of his behavior over time is largely a reflection of the complexity of the environment in which he finds himself (1981, 65).

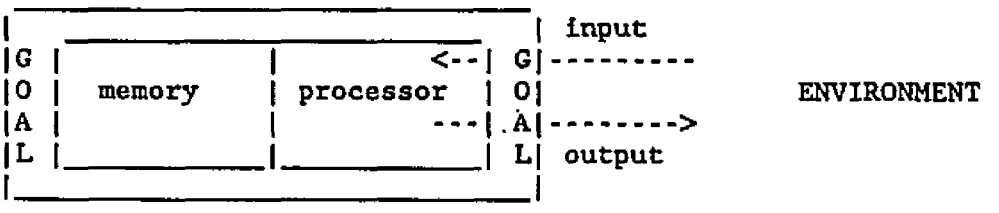
By the term "system", Simon is referring to objects or organisms that are open to input from the environment. Therefore, to understand how behavior is affected by input, one must understand something about the structure and process of systems.

In its most simple form, a system has three processes: input,

output and monitoring. After receiving input from the environment, a system monitors any changes in the environment and then transforms inputs into outputs. This cycle of input, monitoring and output is known as a feedback loop. In addition, a system has a purpose, intent or goal to achieve in which the environment determines the conditions for goal attainment. Because the environment can change, a system must constantly monitor it and make the necessary output alterations to be successful in reaching its goal under new conditions. If the system makes the correct changes, then the system has adapted to its environment (Simon, 1981, 12-17; see also Ashby, 1964).

Figure 2.1 shows an information processing system that represents human decision making in its most simplistic form. Like information processing, decision making requires a method of monitoring the environment through input. Once information is received, it must be processed by connecting it with previous information in memory, evaluating it according to factual and value premises and, most importantly, comparing it to the intended goal or purpose. The result of processing information is the choice of an appropriate output or behavior that will hopefully move the system closer to its intended goal. In Figure 2.1, the goal is visualized as the interface between the system and the environment because it is the decision making element that connects the system with its environment.

A slightly different representation of an information processing system is one in which there are two feedback loops. The first loop carries continual environmental input and represents the system's perception processes. In effect, this first loop is the system's method of constantly monitoring the environment and is responsible for



source: Newell and Simon, 1972, 20.

FIGURE 2.1

INFORMATION PROCESSING SYSTEM

minor, short-run behavioral adjustments in the system. The second feedback loop produces major, long-run changes in the behavior of the system such as when the system and the environment must be brought back into equilibrium. According to this "double-loop" conceptualization of systems, the process of the system moving towards a state of equilibrium with the environment is equated with a process of adaptation. (Steinbruner, 1974, 53-55)

One inference that can be made from this discussion of human decision makers as information processing systems is that their behavior is determined primarily by the environment. Yet, according to the theoretical premises of intendedly rational decision making, there should also be characteristics of the behavior of decision makers that are governed by the limits of the system itself (the inability to store and transform large quantities of input) (Simon, 1981, 16). By combining the premises of both viewpoints one can argue that if the environment is very complex, the information processing system will have trouble adapting to or reaching equilibrium with the environment. This inference seems contrary to Simon's theory of the ability of intendedly rational decision makers to adapt to environmental complexity by developing simplification techniques. But, the theory of adaptive systems supplies a solution to this paradox by claiming that there are very simple forms of open systems which are indeed capable of adapting to quite complex environments. These systems are known as hierarchical systems (Simon, 1981, 209).

Hierarchical Systems

It is with hierarchic systems that the assumptions and propositions of adaptive systems become very useful to budgeting theory and take the theory beyond what has been done in most previous research. As demonstrated later in this chapter, and more directly in the second chapter, the notion of hierarchical systems is easily incorporated with the notion of decision makers being intendedly rational. More importantly, however, it provides a framework with which to describe the environment and its effect on budgetary decision makers. The following discussion defines hierarchical systems and describes their properties and behavior principles.

Simon defines a hierarchical system as one that is composed of interrelated subsystems. In turn, each of these subsystems are also hierarchic until some lowest level of subsystem is reached (Simon, 1981, 196). Such systems have properties and dynamic qualities that make them amenable to adaptation. One such property of a hierarchic system is that relationships among elements within a system, as well as relationships among the systems themselves, are linear. Second, and of greater concern here, most hierarchic systems are "nearly decomposable." A system is nearly decomposable when interactions or relationships among elements of different systems are weak but not negligible, while the interactions among elements within the same system are strong.

Ando and Fisher have shown that these characteristics of nearly decomposable hierarchic systems suggest two principles of behavior: (cited in LaPorte, 1975, 16)

1. The short-run behavior of the subunits of a system is approximately independent of the short-run behavior of the subunits of other systems.

2. The long-run behavior of the subunits of a system effects the behavior of every other system only in an aggregate way.

These are powerful principles because they have profound implications for the analysis of systems whether they are organizational systems, budgeting systems, or information processing systems. The first principle implies that the relationship of the short-run behavior between subsystems of different systems is weak enough that an analysis of the short-run behavior of any subsystem can ignore these dependencies and be approximately valid. Such interdependecies will not have an effect for a long time. Therefore, as implied by the second principle, only long-run analyses must take these dependencies into account. Most important, however, the second principle also implies that the long-run effect of a subsystem from one system on all subsystems of a second system will be relatively the same. (Fisher and Ando, 1962). Figure 2.2 illustrates a nearly decomposable hierarchic system and its property of weak versus strong interactions between these systems.

Notice that the diagram consists of two major systems: system P and system Q. The subsystems within system P are labelled A,B, and C while the sub-subsystems within subsystems A are labelled A1,A2----A6. This pattern of subsystems within systems and sub-subsystems within subsystems is what is meant by hierarchic systems. Here, the property of near-decomposability is demonstrated by the pattern of interactions between the systems and subsystems. Strong interactions occur between all the subsystems in system A while weak interactions occur between

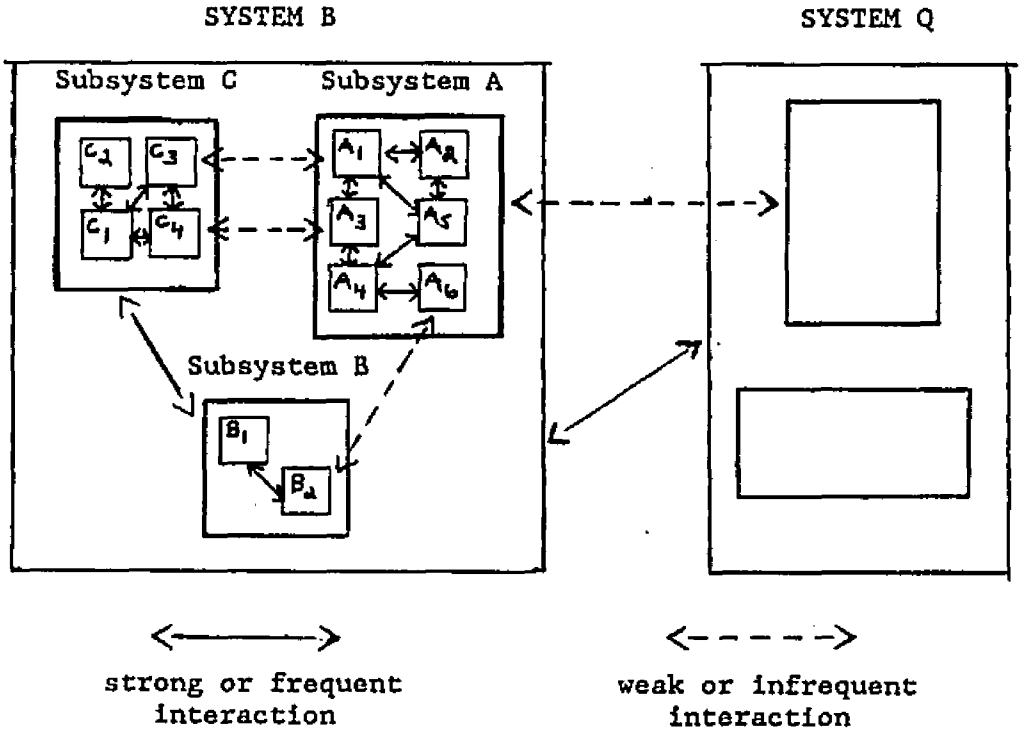


FIGURE 2.2

NEARLY DECOMPOSABLE HIERARCHIC SYSTEM

all the subsystems in system A while weak interactions occur between the subsystems of different systems. For instance, A3 has weak or infrequent interactions with C4 and A1 has weak or infrequent interactions with C1. This is shown by the dotted lines labelled 3 and 4. As a result of this property of weak versus strong interactions, subsystem C1 will affect system A only in the long-run. Likewise, subsystem C1 will have the same relative affect on each subsystem within system A.

The characteristics of nearly decomposable systems that allow them to easily adapt to their environment are their short-run stability, described by the first principle of nearly decomposable systems, and the separation of high-frequency interactions (or strong dependencies) from low-frequency interactions (weak dependencies). These characteristics are important for two reasons. First, short-run stability allows the system time to catch up with changes in an environment. The system is allowed to reach equilibrium before the process of attaining it disturbs that equilibrium (Ando and Fisher, 1963). Second, the hierarchical structure of the elements within the system means that not all elements need to be disturbed during internal changes or, in the case of an information processing system, the input process. For an information processing system, locating elements of memory or processing components is more efficient if these elements are organized hierarchically. Using human decison makers as an example of hierarchical information processing systems illustrates this point.

When solving a problem or trying to complete a difficult and complex task, it is much easier for someone to outline the problem or

task according to separate steps or components of the problem rather than simply beginning with the first step that comes to mind. By using the latter and more haphazard way of solving the problem, a person can become bogged down in their thinking and lose track of what was done previously and what needs to be done next. On the other hand, solving a problem using a hierarchical procedure is much easier. When remembering what must be done next or how a particular issue of one component of the problem relates to another issue in a different component of the problem, the decision maker need only think about the larger task or issue under which the component issue is placed. In this way, the decision maker must not remember how every subissue or subproblem is related to every other subissue or subproblem to solve the larger problem. If the task or problem is especially complex, then a more hierarchical outline is needed to determine the most efficient way of completing the task or solving the problem.

From this example it can be inferred that the more hierarchical and decomposable the system is, the more complexity it can handle. Although a more hierarchical or decomposable system may appear more complex because it has more parts, it is actually simpler because there are fewer and more efficient dependencies or relationships between the (sub)systems. A good example of how a hierarchical system is less complex is demonstrated by the ability of a grand master chess player. Compared to a novice's ability, a grand master's hierarchical choice mechanisms for playing chess are significantly more powerful. A novice must examine all possible alternative plays and conditions, before making a move. On the other hand, a grand master, who has spent much time learning and structuring the relationships between plays and

conditions, seems to intuitively know what to do. It would appear that the grand master has simply processed the same information more quickly when, in fact, the master has actually considered less individual pieces of information than the novice (Simon, 1981, 223-229).

Summary and Application to Budgeting

Thus far, the discussion has covered two primary points about decision making and adaptation. First, decision makers are uncertain about their complex environment and so develop simplifying techniques to help them make decisions. Second, the decision maker and the environment are made up of nearly decomposable systems which have particular properties and behavior principles governing their interactions. These properties and principles allow decision makers and other systems to adapt to the conditions of their surroundings. In fact, Simon argues that most of what is complex in the environment is organized through adaptation into hierarchical systems.

According to the hard core assumptions and propositions regarding decision making and systems that have just been discussed, a theory of decision making behavior, such as budgeting theory, should address at least two qualities of the participants to be comprehensive in its explanations. The first qualitiy is the decision makers' uncertainty, the second is the decision makers' interactions with the environment which include the environment outside the system as well as other decision makers within the system. Because bureaucracies and governments are good examples of systems with complex environments, and because the primary components of these systems are decision makers, any general theory of governmental or bureaucratic behavior should also

address these behavioral qualities.

Currently, the uncertainty aspects of decision making behavior are incorporated into the theory of budgeting; however, one cannot infer from this same theory how decision makers directly interact with the environment- especially the environment outside the government. The current theory's main premise is limited to the argument that complex environments result in boundedly rational decisions. In the past, budgeting theorists have worked to address some of these problems. (See Crecine 1969 and Ripley et al 1973). But, as Davis, Dempster and Wildavsky argue, there is no systematic method of choosing which environmental variables to include in a model of budgeting. Moreover, there is no analytical scheme which proposes how these environmental variables might affect budgeting decisions.

The purpose of this research is to begin to work towards the solution of some of these problems by focusing on how the environement affects budgeting requests and appropriations. Accomplishing this requires, among other tasks, extending the original assumptions of the budgeting theory to account for how the boundedly rational decision maker interacts with or is affected by the environment. The third section of this chapter presented one step towards the fulfillment of this task. Another objective of this research is to explain what it is about the environment that decision makers are reacting to. This requires a more complete explanation of the elements of uncertainty and complexity and a categorization of the environment into those basic elements that influence decisions either in the long-run or the short-run.

The two most basic elements that influence decisions are other

decision makers involved in the budget process and the external environment common to all decision makers. Because current budgeting theory has, to some extent, incorporated how budgetary decision makers react to each other in terms of their individual goals and roles in the budget process, this part of the environment will not be the focus of attention. Instead, this research will attend primarily to the effects and characteristics of the external environment. In the next section of this chapter, a categorization of this environment and its systems is proposed as well as a more complete explanation of uncertainty and complexity.

IV. UNCERTAINTY, COMPLEXITY AND THE ENVIRONMENT

Payment and Demand

Although budgeting serves more than one purpose, such as a being a method of policy-making as well as an executive management tool, it is above all a means of allocating scarce resources among competing demands. Restating this purpose according to the systems framework: budgeting is the process of converting payment and demand inputs into outputs in order to better achieve a set of goals. (Although the goals may be ambiguous and vague, the demands unrecognized, and the outputs the result of many decisions, at a basic level of observation, budgeting can be described in this fashion.) According to this perspective, the environment can be characterized as containing two primary factors that either directly or indirectly influence budgeting decisions. These factors are inputs in the form of payment of resources, and demand for the supply of goods and government resources.

Explaining behavior with respect to supply and demand is a common

technique that has been widely accepted among economists. One reason for this may be that many behavioral situations involve an exchange. One group supplies something that another group desires and vice versa, so an exchange of either goods or services takes place. In such instances, an analysis of what and how much was supplied, demanded and paid is crucial to understanding the exchange process. Similarly, budgeting can be viewed as an exchange process in which the outcome of the exhange is determined by the levels of the primary explanatory variables of the supply of goods by the government. For a city government, these explanatory variables are a direct function of the payment of revenues by taxpayers and other sources and the demand for expenditures. The popularity of such a view is evident in the explanatory models of governmental expenditure developed by economists. (See Horowitz, 1968 Morss et al, 1967 and Gramlich, 1978.)

In such studies, the payment of resources for government goods and services is determined by tax levels, intergovernmental aid, charges for services, interest income and any other form of expendable revenues. These inputs are relatively easy to measure. Not so easy to measure are resource demand inputs whose levels can only be obtained indirectly. For instance, to measure demand for welfare services, measures such as poverty, median age of population, unemployment and dominant party affiliations among other variables must be used in combination as a substitute for the actual level of demand.

Another difficulty with using an exchange approach to explain budgeting is that the exchange that occurs in budgeting is not as direct as the exchanges that occur in most other economic situations. For instance, in a market environment, the money of market buyers, as a

measure of demand, is directly exchanged for the goods of market suppliers. In budgeting however, demand and payment are separate processes. To further complicate matters, budget participants, as a third party in the exchange, are directly involved in the process and therefore may significantly affect the outcome. Both the payment of revenues and the public demand must be channeled through budgetary participants who have their own beliefs, goals and demands and whose decisions ultimately determine the distribution of allocations. Whatever control is available to the public is only indirect. In this case, payment and demand are not the only factors affecting the outcome of the exchange. The characteristics of budgeting participants and the budgeting process must also be an integral part of the explanation.

Despite these differences between budgeting and market situations, the concepts of payment and demand are useful tools for categorizing the plethora of social, economic and political variables used by policy and budget analysts to explain long-run variations in expenditures among different state and local governments. (See Hofferbert, 1972 and especially Fried, 1976, 325 for one economist's attempt at a comprehensive classification of environmental variables into those affecting demand and supply of public goods.) More importantly, the concepts of payment and demand broadly classify the nature of a budgeting system's interactions with its environment and the possible effects of environmental variables on budgeting participants' supply decisions. In effect, this classification categorizes the types of systems with which budgeting systems interact.

A more in-depth explanation of how resource payment and demand are included in budgetary participants decision calculi must be provided by

the auxilliary premises surrounding the hard core assumptions of budgeting. Such an explanation is the task of the next chapter. However, before proceeding, one more underlying factor that influences budgetary decisions in conjunction with payment and demand must be discussed. This factor is the decision makers' uncertainty as influenced by the complexity of the environment.

Stability and Complexity

In general, uncertainty is defined as a decision maker's inability to predict the chances of particular consequences occurring from specific decisions or actions (Luce and Raiffa, 1957). The cause of this uncertainty for intendedly rational decision makers is the complexity of the environment and their limited ability to comprehend such complexity. Independent of their calculation ability, the complexity of the environment can change, thereby increasing or decreasing their uncertainty. Thus, if we assume all decision makers' abilities are approximately equal, then the complexity of the environment rather than the decision makers' calculation abilities becomes the important variable that directly influences decisions. In this case, an understanding of the elements of complexity is necessary to determine what other environmental factors besides payment and demand can alter budget decisions.

According to LaPorte (1975), the complexity of an environment (an environment is made up of many systems) is a function of three elements. These elements are:

1. the number of components or subsystems in a system
2. the relative differentiation or variety of these components
3. the degree of interdependence of the components.

The greater any of these elements become, the greater the complexity of the environment. There is, however, another important factor contributing to a decision maker's comprehension of the environment and that is the stability or rate of change of these first three elements. As the number of possible states of complexity increases, predicting the future in terms of the sequence of states or the possibility of any one state ocurring becomes more difficult (Brewer, 1975). The effect of stability on decision makers becomes quite apparent when they are viewed as adaptive information processing systems.

It was mentioned previously that hierarchical systems will more easily adapt to complex environments because such systems have intermediate forms allowing short-run stability to occur within the components of a system. This stability makes it much simpler for the overall system to reach an equilibrium with the environment. But if the environment is changing quite rapidly, inputs to the system will change too quickly for an equilibrium to occur. By the time feedback is available, the environment may have already changed and intermediate stability is useless for achieving overall equilibrium (Starling, 1975). If this process of hierarchical systems is analogous to the processing of information by decision makers, then one can infer that decision makers will have more difficulty adapting to or developing simplifying techniques for an unstable environment than for a complex one. This argument is suppported empirically by Duncan (1972) who compared decision makers' responses to stability and complexity and found that individuals in administrative units with unstable

environments perceived a greater amount of uncertainty than those in complex ones.

Regardless of whether instability or complexity is a more significant contributor to uncertainty, the important point here is that the stability and complexity of variables affecting the payment of revenues and demand for public expenditures will also affect the uncertainty of the budgetary decision makers. For instance if payment of revenues is influenced by per capita income, unemployment, and the movement of businesses and industries, then the more these variables change from one year to the next, the less certain a budgetary participant will be of the levels of these variables in any one year. Likewise, the more variables that affect revenues, or the more interrelated they become, (e.g. unemployment without unemployment compensation more directly affects per capita income) the more difficult it is to calculate revenues. The more difficult it is to calculate revenues, the more uncertain the predictions. On the demand side, a similar argument can be made. The more heterogeneous the population, the harder it is to determine the level of needs or demands for services such as housing and recreation. Large fluctuations in population growth can make even basic urban planning and public service development impossible because of uncertainty about the future.

In summary, three general features about the environment have been identified as inputs into the budgeting system. These features are: the level of the payment of revenues, the level of demands for various allocations and the complexity and stability of the payment and demands. These features become the basis of the interactions between the budgeting system and its environment. In the next chapter, how

these variables enter the budget officials' decision calculi and influence their decisions about requests and appropriations will be examined.

SUMMARY AND CONCLUSIONS

In this chapter three sets of underlying assumptions and propositions of the budgeting model tested in this study were examined. The first set concerns the theoretical premises that apply to decision makers being intendedly rational. It is this set that the Davis, Dempster and Wildavsky theory of budgeting uses most often in its explanations of budgeting outcomes. The second set, which is used by some budgeting theorists, focuses on the decision maker as part of a larger hierarchical budgeting system. To this writer's knowledge there are no empirical studies within this research program which incorporate the first two sets of premises to satisfactorily explain the effects of the environment on budgeting decisions. Most studies assume that perceptions of information and uncertainty are the only intervening links between a decision maker and the environment. The third set of assumptions or propositions concerns elements of the environment outside the government or budgeting system that are major inputs to that system.

From these three sets of theoretical premises, six specific premises can be identified. These premises are summarized in the following outline.

THEORETICAL PREMISES

1. The environment is complex and unstable.

    A. Complexity is defined as the number of components of the environment, their differentiation and their interdependence.

    B. Stability is defined as the rate of change of the elements of complexity.

2. Decision makers are limited in their ability to perceive a complex and unstable environment, process information and make calculations. As a result:

    A. Decision makers are uncertain

    B. Coping with uncertainty is a major task and concern for decision makers

3. Because of the complexity of the environment and their own limited abilities, decision makers will use simplifying decision techniques: (This is called the intendedly rational premise)

    A. Factorization and specialization

    B. Use of past experience- perception

    C. Use of past experience- performance programs and rules of thumb

    D. Limiting consideration of alternatives and satisficing

    E. Use of cues and selective attention to the environment

    F. Decision rules change only when the old ones no longer work

4. A decision maker, organizations and governments can be understood as systems with input, output, goals and two feedback loops. The decision process is one of monitoring the environment and affecting changes in the state of the system to achieve goals.

    A. The first feedback loop is a short-run loop whose purpose is to monitor the environment and detect changes.

    B. The second feedback loop produces changes in the behavior of the system and in the long-run produces changes in the environment to achieve stability or equilibrium (the process of adaptation).

5. Most systems are hierarchical and nearly decomposable with the

following properties and principles of behavior:

A. The relationships among components within system are linear.

B. Interactions among components of different systems are weak but not negligible while the interactions among components within the same system are strong.

C. The short-run behavior of the subunits of a system is approximately independent of the short-run behavior of the subunits of other systems.

D. The long-run behavior of the subunits of a system affects the behavior of every other system only in an aggregate way.

6. There are three general features of the environment that are primary focal points for interaction between the environment and the budget system and therefore are the major inputs to the budget system. These features are:

A. Variables affecting the supply of resources or revenues

B Variables affecting the demand for services

C. The complexity and the stability of the supply of resources and demand for services.

In the next chapter these premises are used to derive a budgeting model which is tested in this study. This model represents the budgetary participants' decision rules. Given the previous analysis, the primary subsequent task is to show how these six premises affect decision rules. Specifically, premises three five, and six are the most directly useful in specifying the participants' calculations of requests and appropriations.

CHAPTER THREE

EMPIRICAL RESEARCH ON BUDGETING

INTRODUCTION

The second chapter of this study presented the underlying propositions and assumptions of the research model. In the introduction to this chapter, Lakatos' theory of scientific progress was discussed briefly. The remaining contents of the chapter were equated with his concept of the "hard core" of budgeting theory. In the third chapter, what Lakatos would call the "protective belt" of budgeting theory is examined. The protective belt, which is derived from the hard core and observations of the environment, is the set of auxiliary assumptions, testable hypotheses and statements applying specifically to the area of budgeting research. These statements and assumptions are called the protective belt because, according to Lakatos, they protect the hard core. He claims that scientific criticisms and theoretical changes should be directed at the protective belt rather than the hard core. Science then proceeds rationally by expanding the hard core or altering the protective belt to overcome the latter's deficiencies.

The initial development of budget theory's protective belt is attributed primarily to Wildavsky (1974) and Davis, Dempster and Wildavksy (1966a, 1966b, 1974). Using the set of hard core assumptions that relate most directly to intendedly rational decision making, they

propose a set of models of budgetary decision making. In these models, the budgetary participants' strategies, which represent the outcomes of participants' calculations, constitute the major elements of the politics of public policy making.

The second section of this chapter presents the work of Davis, Dempster and Wildavsky, other preliminary work in the theory of budgeting, and some of the more scientifically progressive changes that have occured since that time. Criticisms of the basic budgeting model are also discussed. In addition, the section argues that many of these criticisms are not scientific because they attack the hard core assumptions. By attacking the hard core, the critics suggest that the entire research program does not fit reality; yet few of them offer another program or theory to take its place. Although the criticisms point to some valid problems with the theory, it seems more reasonable to assume that the problems indicate deficiencies with the protective belt rather than with the underlying assumptions. In this case, the problems with the theory are not addressed by looking for a new set of underlying assumptions, but by altering the protective belt around these assumptions.

The third section of this chapter discusses the changes in the protective belt that are useful in developing the research model. These include changes proposed by authors such as Crecine and Padgett concerning how and what budgeting participants perceive about the environment and what they observe in it. The authors' suggestions rely heavily on the hard core assumptions about nearly decomposable systems (premise #5 in the conclusion of the first chapter). Other proposed changes in the protective belt that are used here are derived from the

hard core assumptions regarding the three features of the budgetary system's environment (premises # 6).

The fourth section of this chapter presents the general budgeting model that is actually tested. This section specifies the elements of the budgeting model and the form of the equations which, together, represent the budgeting participant's decision rules. The elements of the decision rules are three sets of variables that represent the information perceived by budgetary decision makers. This information consists of the budgetary system's wealth, the budgetary participant's uncertainty about current, future and past events, and the participant's sense of priorities among budget units that are requesting funds. This section argues that these three sets of variables directly affect the strategies of the decision makers. Other decision making elements such as goals and roles are represented by the direction of the association between the three sets of variables and the levels of requests and appropriations. The form of the variables and the manner in which they are entered into the model specify the decision maker's simplication techniques.

PRELIMINARY EMPIRICAL RESEARCH

The Work of Davis, Dempster and Wildavsky

That governmental budgeting is extraordinarily complex is something few people would deny, especially those who see the process firsthand. Wildavsky's seminal work on Federal budgeting, The Politics of the Budgeting Process (1974), presents numerous statements from both administrators and legislators on the complexity of budgetary decisions and the problems this creates for formulating requests and

appropriations. A more demonstrative and politically controversial statement on the complexity of the Federal Budget comes from David Stockman who is the Director of the Office of Management and Budgeting for the Reagan Administration. The following excerpt from an interview with him illustrates the problems that complexity poses for those who must make budgeting decisions.

> "'None of us really understand what's going on with all these numbers,..... You've got so many different budgets out and so many different baselines and such complexity now in the interactive parts of the budget between policy action and the economic environment and all the internal mysteries of the budget, and there are a lot of them. People are getting from A to B and its not clear how they are getting there. Its not clear how we got there, and its not clear how Jones is going to get there.'" (Greider, 1981)

One theme that is evident in many officials' spoken statements from this article and Wildavsky's book, is their feelings of extreme helplessness. They feel helpless because they do not understand much of the information and many of the issues with which they are faced, and they feel overburdened by the number of calculations they must make. Increasing the amount of time available for budgeting and the size of the staff may help solve some problems by increasing the knowledge that is brought bear on budget decisions; but it is evident from these comments that this type of assistance would not go very far in making decisions easier. The capacity of the human mind is simply too limited to handle problems that are very complex (Wildavsky, 1974, 8-10). Yet somehow, decisions are made (Steinbruner, 1974, 89).

The primary contribution of Wildavsky's work to budgeting theory is his documentation of decision mechanisms used by budget officials to help simplify the decision process and make meaningful decisions in spite of extreme complexity. He calls these mechanisms "aids to

calculations" and argues that their use supports the behavioral assumptions of the intendedly rational decision maker. The following is a list of aids to calculations that Wildavsky claims correspond to the simplification techniques of the intendedly rational decision maker. These simplification techniques were outlined in Chapter Two.

1. Budget makers selectively attend to their environment by using simple cues to gain information on very complex problems.
2. Budget officials satisfice
3. Rather than being comprehensive in their budget analysis, officials focus their decisions on the narrow range of increases or decreases beyond some baseline. The general baseline identified by Wildavsky, known simply as the base, is the current year's budget. The use of the base by all participants means that the greatest determinant of a current year's budget is the previous year's budget. This type of decision making is generally called "incremental decision making"[1] (Wildavsky, 1974, 11-17).
4. Solutions similar to those used in the past are applied to the present.
5. The budget is divided between committees and subcommittees by topics where specialists on these topics can focus on the more limited areas of their expertise.
6. Because budget officials know that they will encounter most budgeting problems again next year, they do not try to fully solve them. Instead they take a short-run, feedback approach.
7. Rather than working on all parts of the budget at once, budgeting is performed in an orderly fashion. For instance, lower level units formulate their budgets and transmit their decisions to higher level units which summarize and transmit the new decisions to even higher level units and so on until some highest level of request is made to the legislature (Wildavsky, 1974, 56-62).

In addition to a knowledge of participants' simplification techniques, Wildavsky argues that a knowledge of their goals and motivations is also important to explaining budgeting decisions. The two primary decisions in budgeting are agency requests and legislative

appropriations. With respect to agencies, their goal is to expand their administrative units by increasing the size of their base or appropriation over the previous year. The legislature's goal is to hold down overall spending by cutting agency's requests. However, the legislature does not want to cut requests so much that it jeopardizes programs valued by constituents.

Another component of budgetary decisions is the participants' roles in the budgeting process. Like simplification techniques, roles assist in reducing environmental uncertainty. Role perform this function by creating mutual expectations among participants concerning what levels of requests and appropriations will be chosen. For instance, the legislature expects agencies to request more than their individual bases because the role of the latter is to advocate the interests of their clients and programs. Likewise, the agencies expect the legislature to cut their requests because the legislature is considered the defender of the public purse (Wildavsky, 1974, 160-165).

In addition to aids to calculations, goals and roles, a fourth component of budgetary officials' decisions is their perception of the environment. Wildavsky recognized this element in his use of the term "strategy" to characterize budgetary decisions. Strategies, which are "the links between the intentions and perceptions of budget officials" (Wildavsky, 1974, 63), are also the choices officials make to achieve their goals under particular environmental circumstances. The types of strategies they use depend upon their perceptions of the feasibility of the success of their decisions in reaching their goals given the constraints and opportunities of their environment and the choices of other decision makers.

For instance, a procurement agency of the defense department might use a cue such as the expected increase in Soviet defense spending as a basis for its analysis of how much money it should request. If it perceives that the Soviets are making large increases in their defense budget, then it might use the following strategy and reasoning to achieve its goal of increased appropriations: the agency requests an increase in its own budget comparable to the Soviets because it believes this, as opposed to other environmental cues, will convince the legislators to give them more money. An example of a nonstrategic decision might be one based on specific defense issues or national security objectives rather than purely a consideration of what arguments would convince the legislature to make higher appropriations (Ostrom, 1978a).

An agency may be even more strategic in its request if it also chooses its request on the basis of whether the request is satisfactorily close (in the sense of "satisficing") to some optimum increase in appropriations. For instance, the agency might modify its initial strategy or choice, which was based on the Soviet's defense budget, by considering a second cue such as the level of change in last year's appropriation from the previous year. If the agency received a relatively large increase last year, then it may realize that the legislature will notice this previous increase. Accordingly, the agency could infer that the legislature would cut the current request if it were also large. As a result, the agency may decide to pare down the request that was originally based on increases in Soviet defense expenditures (Leloup, 1973). On the other hand, the agency may face an unusual amount of uncertainty over what request to make because either

the cues the agency uses give little useful information, or the agency is new and it does not know which cues are most effective. In either case, it may take a less strategic and short-run approach of asking for some small increase simply to see how the legislature will react.

Although the previous example oversimplifies the officials' decision process (Crecine and Fisher, 1973), it demonstrates two of the many cues that participants may use and how cues are incorporated into a strategy. For an intendedly rational budgetary decision maker, a strategy is a choice that is made using aids to calculations to reach a particular appropriation goal that also takes into account the conditions of the environment. Defining a decision in this manner not only recognizes budgeting as essentially a political process, but also implicitly acknowledges the cognitive limitations on each political participant. More specifically, strategies are the fundamental elements of political behavior. They reify the actors' exploitation of opportunities to achieve particular goals, they embody the maneuvering aimed at overcoming environmental constraints, and they are directly influenced by the expectations of other actors' decisions (Schelling, 1960, 3-20).

If strategies are the fundamental elements of political behavior, then, according to the arguments made here, budgetary participants' decisions are a reflection of the conditions of the environment. At the same time, however, the theory of intendedly rational decision making dictates that strategies should not completely mirror the environment because of the actors' limited abilities. Based on both views, strategies reflect the conditions of budgetary participant's internal decision system as well as the external environment.

Using the theory of intendedly rational decision making as a foundation for a theory of budgeting, Davis, Dempster and Wildavsky (1966a, 1966b, 1974) develop three sets of models. Each set is comprised of two equations that represent the different possible decision algorithms used by Federal budgeting officials for non-defense budgets. The first equation models the agency's requests, and the second models the legislature's appropriations. Consistent with the assumption that linear models are good approximations of decisions, and therefore are a useful form with which to represent budgeting decisions, the equations are linear (Dawes and Corrigan, 1974).[2] These models then became the catalyst and prototype for much of the subsequent budgeting research.

The variables in the equations used by Davis, Demspter and Wildavsky represent decision making cues- the most important one being the base. (For appropriations, the base is this year's request; for requests, the base is last year's appropriation.) They hypothesize that budgeting officials use percentages, as represented by the coefficients of the equations, as aids to calculation in addition to the aids presented by Wildavsky's previous work. Each system of equations is empirically tested in a time series analysis of 56 non-defense agencies, and participants' decision rules are inferred according to which system of equations best fits the data. The error terms, or random disturbances, derived from this technique are considered special circumstances or deviant cases resulting from the participants' use of unusual decision rules. According to this theory and its method of testing, Davis, Dempster and Wildavsky assume that the decision makers have stable decision rules that do not change in

the short-run. Figure 3.1 presents their models and defines the strategies they tested. (The reader should note that these models are representative of many other decision rules tested by other authors using the Davis, Demspter and Wildavsky theory.)

According to the results obtained by Davis, Dempster and Wildavsky, their models track budgetary behavior quite well. In most cases, the percent of explained variation is in the 90's demonstrating that budget makers do indeed use simple decision rules and analyze very few decision alternatives. The fact that the simplest decision rules are usually the ones which best fit the data lends further support to claims that budgetary decision makers are intendedly rational. The levels of the coefficients for the bases were very close to a value of one indicating that budget makers' decisions do not often deviate from past decisions. However, the hypothesis that decision rules are always stable and that budgeting officials routinely use the same percentages is not supported by their findings. Specifically, Davis, Dempster and Wildavsky found that the percentages used by the agencies and Congress shifted at different points in time for different agencies. This brings into question the argument that budget makers behave like intendedly rational decision makers by using decision rules which only change in the long-run.

In an effort to explain the discrepancy between their initial findings and the primary assumptions, Davis, Dempster and Wildavksy reoperationalized their equations to account for what they argue "appear" to be abrupt shifts in the coefficients or actual changes in the decision rules. In the new models, the base coefficient is explained as a linear model of exogenous variables that represent

For any given year t, there is an agency request and a Congressional appropriation for each agency. Davis et al present three different equations, representing the different decision strategies, used by agencies and Congress.

Independent Variables or Information Cues Used By the Agency

Y_{t-1} Congressional appropriation for previous year
$Y_{t-1} - X_{t-1}$ Difference between Congress' previous appropriation and the agency's previous request (the amount Congress cut the agency's request last year)
X_{t-1} Agency request for previous year

Information Cues Used By Congress

X_t Agency request for current year
V_t A stochastic disturbance that is a linear function of the stochastic disturbance in the Congressional strategy of the previous year
D_t A dummy variable representing the agency decision rule used

Decision Rules or Strategies Used By the Agency

(1) $X_t = B_0 Y_{t-1} + e1_t$ Agency request for current year is some fixed percent of Congressional appropriation for the previous year plus an error term that represent deviant changes.

(2) $X_t = B_1 + B_2(Y_{t-1} - X_{t-1}) + e2_t$ Same as equation (1) but the original strategy is adjusted in an attempt by the agency to smooth out the stream of appropriations.

(3) $X_t = B_3 X_t + e3_t$ Agency request is a function of a fixed mean percent of the previous year's request. This is often referred to as the "naive" model.

Strategies Used By Congress

(4) $Y_t = A_0 X_t + e4_t$ Appropriation is a fixed mean percent of the request.

(5) $Y_t = A_1 X_t + V_t$
$V_t = A_2 V_{t-1} + e5_t$
Appropriation is a same as (4) but the original strategy is adjusted by some percent of the previous year's random disturbance

(6) $Y_t = A_3 X_t + A_4 D_t + e6_t$
$D_t = e1_t$
$D_t = B_2(Y_{t-1} - X_{t-1}) + e2_t$
$D_t = e3_t$
Appropriation is same as (4) but the original strategy is adjusted according to the strategy used by the agency. This is considered a true "gaming" strategy.

FIGURE 3.1

DECISION RULES FROM THE DAVIS, DEMPSTER AND WILDAVSKY MODELS

political, economic, social and administrative environmental conditions.[3] They hypothesize that decision makers gather information on conditions that are external to the budgeting system, and then use this information to adjust the percentage change in the base that is requested or appropriated. Some of the new systems of equations did not predict as well as the authors hoped, and they reasoned that the lack of an "unambiguous exogenous variable selection procedure" in the theory was responsible for the poorer results (Davis et al, 1974).

Budgeting Research Since Davis, Dempster and Wildavsky

Since Davis, Dempster and Wildavsky first developed their budgeting theory, many authors have applied it to other areas of budgeting. Sharkansky (1968a, 1969b) adapts it to state budgeting procedures and tests more cues and a different strategy of agency assertiveness. In addition, Anton (1967) examines a more specific use of roles and cues in state budgeting. Intendedly rational budgeting in Norwegian cities is studied by Cowart, et al (1975) who also test different cues and strategies. Another Norwegian study of budgeting is Olsen's (1970) who found that budgeting in small communities is especially uncertain. To function with such uncertainty, community leaders have a very short-run or "fire station" method of budgeting in which problems are managed as they appear. As a result, real budgeting takes place all year long in these communities, while the formal budgeting procedures are merely rituals with little meaningful decision content. Finally, Crecine (1969) presents an example of intendedly rational budgeting in U.S. cities.

The budgeting theory of Davis, Dempster and Wildavsky is also

applied to school districts by Gerwin (1969), the United Nations, World Health and the International Labor Organization by Hoole et al (1976), and British county boroughs by Danzinger (1978). Wildavsky himself presents a more comprehensive study of comparative budgeting in which he examines budgeting in states, cities., developed nations and developing nations. In a greatly modified form, the works of Salancik and Pfeffer (1974), Pfeffer and Salancik (1974), Pfeffer and Leong (1977), Peffer and Moore (1980) March and Olsen (1976), and Cohen et al (1972) apply this theory to university budgeting.

Beyond these studies, most additional work in budgeting that centers on the Davis, Dempster and Wildavsky theory directly criticize it. In general, such studies use empirical tests of defense or non-defense budgeting to support their criticisms. As argued previously, Lakatos would not consider many of these criticisms scientific for two reasons. First, they attack the underlying assumptions (hard core). Second, most of these studies do not offer a new theory with a different hard core to take the old theory's place; or they do not suggest progressive changes in the old theory which address these criticisms. There are, however, three studies which should be mentioned that establish progressive changes in the theory of budgeting and make, what Lakatos would describe as, "creative shifts" in the protective belt.

The earliest "creative shift" is Crecine's (1969) who expands the protective belt to more fully cover the hard core assumptions concerning adaptive systems. He criticizes Davis, Dempster and Wildavsky for oversimplifying the decision making process, and he especially criticizes their representation of the impact of the

environment on budgetary decisions. To remedy this problem, Crecine alters the content of the original decision rules, and adds some auxiliary propositions to better reflect the assumptions of a nearly decomposable system.

A second progressive change in the theory is made by Cohen, March and Olsen (1972). Labelled the "garbage can model" of organization choice, the authors direct their theory towards all types of intendedly rational decisions and not just budgeting. (See March and Olsen (1976) for an application of this theory to budgeting.) The major propositions that this theory adds to the Davis, Dempster and Wildavsky theory concern the ambiguity of goals and preferences and the allocation of attention to particular decisions. These are issues of uncertainty that the Davis, Dempster and Wildavksy theory does not acknowledge. Stated simply, the garbage can model views decision situations as organized anarchy in which problems, choices, issues, solutions and decision makers are flowing in and out of a decision process. For this model, the hierarchical structure of the environment is an even more important factor than it is for Crecine.

A third creative shift in the Davis, Dempster and Wildavsky theory is attributed to Padgett (1980a) who merges his changes in the protective belt with some of the changes proposed by Crecine. In addition, Padgett contributes to the development of the garbage can model in other works (1980b,1981). In his first article, he develops what he calls the theory of serial judgement which derives the probabilities of decision makers searching through proximate discrete decision alternatives. This process is closer to Simon's notion of how intendedly rational decision makers choose from among decision

alternatives than any method proposed previously. In this respect, Padgett's decision making strategies are more complex than those Davis,Dempster and Wildavksy develop; but they are not complex in a nonintendedly rational manner. The decision maker is still simplifying calculations by not examining all possible decision alternatives.

In a subsequent budgeting article, Padgett incorporates his serial judgement theory with the assumptions of decomposable systems which Crecine first applied to budgeting. Padgett develops this shift in the protective belt even further by defining how the external environment has indirect control over the underlying premises of serial judgement. In another article, he more firmly grounds the garbage can theory in a theory of hierarchies thereby making it easier to operationalize and closer to traditional theorists' formulation of organizational theory.

That these creative shifts may lead to the development of other theories of budgeting is evident from this discussion. That they may also lead to the development of theories of other types of phenomena, such as organizational leadership in the case of the garbage can model, is also evident. Yet, the one distinguishing characteristic of all such theories is that they are part of the same research program and share the same underlying assumptions. In this respect, the changes in the protective belt that this study suggests is not really a new theory, but a continuation of the creative shift begun by Crecine and Padgett. However, before presenting these suggested changes in the protective belt of the Davis, Dempster and Wildavsky theory, this chapter discusses various criticisms of their theory. Such criticisms indicate the need for changes and contribute to the formulation of the suggested changes.

Scientific and Nonscientific Criticisms of the Davis, Demspter and Wildavsky Theory

The inconsistencies between the Davis, Dempster and Wildavsky theory and their empirical results, in the form of parameter shifts in the equations, indicate some fundamental deficiencies in their theory. Evidence and arguments from other scholars, suggesting that the budgeting process is not as stable or "incremental" as Davis, Dempster and Wildavsky claim, are very numerous.

For instance, Bailey and O'Connor (1975) examine percentage changes in appropriations in three governments and find a broad range of levels of change. Leloup and Moreland (1978) also find a range of appropriation and request changes and attribute this to differences in an agency's use of "assertive strategies." (See also Sharkansky, 1968a for use of assertive strategy.) Contrary to the initial work of Davis, Dempster and Wildavsky, Leloup and Moreland claim that agencies do not pursue the same strategy all the time but alter their strategies. In his study of defense budgeting, Kanter (1972) shows that average between year and within year budget changes were much greater for some defense agencies than for others. This occurs, he argues, because Congress, for policy reasons, alters its decision strategies with particular defense agencies. Browning (1963) also found significant differences in the strategies used by the Department of Welfare and the Department of Labor.

Additional support for the argument that the Davis, Dempster and Wildavsky theory cannot account for unstable or non-incremental budgetary decisions caused by strategy shifts is supplied by many other

authors. Natchez and Bupp (1973) assert that budgetary decision making is much more competitive than Davis, Dempster and Wildavsky suggest. They support this argument by demonstrating that programmatic changes in requests and appropriations vary and are linked with decision maker's priorities. Cowart, Hansen and Brofoss (1975) claim their results show that the more complex the problem to be solved by budgetary decision makers, the more complex the strategy that they use. Separate studies by Moreland (1973) and Leloup (1973) found weak but cyclical relationships between past changes in requests and appropriations and current ones. They also found that these changes were more strongly related to agency size, managerial capacity, administrative experience, presidential support and congressional conflict than previously indicated. Finally, there is a series of indirectly related research on the effects of current fiscal stress showing that large changes in appropriations and requests result from many different strategies. (Levine et al, 1981; Danzinger and Smith, 1982; Schick, 1980; Clark and Ferguson 1983; McCaffery, 1981; Glassberg, 1978; Wolman and Davis, 1980)

With respect to the future of the Davis, Dempster and Wildavsky theory, most of these authors conclude that "incremental" budgeting is a myth (Leloup, 1978), that the theory does not accurately model budgetary decisions, and it should be replaced. Other authors, who argue that the concept of a base is inaccurately defined (Gist, 1977, 1982; Kamlet and Mowery, 1980) or the theory does not account for "top-down budgeting" (Bozeman and Straussman, 1982), also reach the same conclusion. But, according to Lakatos' notion of scientific progress, these authors' criticisms are not scientifically progressive

because they indirectly attack the assumptions of environmental complexity and human limitations. They do this by implying that environmental complexity and human limitations are not as important to behavior as the theory indicates. However, the authors' do not include constructive changes in the protective belt surrounding the theory's hard core in response to their own criticisms, and, as a result, lower the scientific value of their criticisms even further.

Although studies with the more scientific criticisms have arguments that are different from the unscientific criticisms, both seem to refer to the same underlying problem with the Davis, Dempster and Wildavsky theory. In effect one can argue that this underlying problem may account for the seemingly "non-incremental" behavior specified by the unscientific criticisms. Specifically, the scientific criticisms state, in general, that the Davis, Dempster and Wildavsky models do not draw enough from the underlying theory to explain decisions or the reasoning behind selected strategies. This does not mean that their theory is necessarily inaccurate, but that it needs to be expanded to account for these "non-incremental" outcomes.

For instance, Ostrom (1978b) notes that the justification used by Davis, Dempster and Wildavsky for presenting three different possible equations, each with potentially different coefficients, is not given. In other words, Davis, Dempster and Wildavksy present a number of potentially different decision making strategies; but, according to their presentation of the protective belt, there is no reason to expect agencies to choose one decision rule over another. Likewise, they do not suggest why a legislature uses alternative rules with different agencies. Moreover, there is nothing in the theory that indicates why

the same agency or legislature alters their strategies over time or under different environmental circumstances. The following comment by Danzinger concerning incremental models exemplifies this point.

> "They attempt to establish a change dynamic that is consistent from year to year. But they cannot determine whether the incremental constraint on change is a function of cognitive limits, political feasibility, the sum of standard operating procedures, limited revenue or some other phenomenon. The models do focus attention on deviations from initial patterns of allocations; but none have theoretical content that accounts for these anomalies (1978, 143)." (the term incremental used here refers to small change or stability)

In Simon's terms, the Davis, Dempster and Wildavsky theory does not incorporate enough environmental complexity. As a result, the contents of their models are not specified well enough according to their theory (Gist, 1982; Kamlet and Mowery, 1980), and the model seems apolitical or incapable of capturing the politics of the environment (Leloup, 1978). Additionally, the models do not address some of the most interesting and salient questions in the study of politics concerning who gets what, when and how (Laswell, 1936; Lineberry and Welch, 1974).

To mitigate these problems, the theoretical components of the models must be explicated more fully using the hard core or other supportive theories. As a result, the protective belt of budgeting theory cannot adequately explain the effects of the environment on decision makers' strategies. Specifically, one cannot determine from the protective belt, as it is currently specified, what environmental characteristics decision makers recognize and how these characteristics influence their choice. The next section of this chapter will present possible changes in the protective belt which begin to address some of these theoretical deficiencies. These changes are based on the work of Crecine and Padgett.

NEW COMPONENTS OF STRATEGIC THINKING

In this section, premises #4, #5 and #6, listed in the concluding section of the first chapter, are used to alter the protective belt of budgeting theory. The components of decision makers' strategies to which these assumptions relate are their perceptions of the environment. More specifically, the propositions and principles of nearly decomposable systems listed in premise #5 contrast decision makers' perceptions of information within the budget system (the government) with information generated outside the budget system. The last premise applies to decision makers' perceptions and use of information that is external to the budget system. This section initially applies the premises by examining the differences in budgetary participants' perceptions of the budget system's internal environment from the external environment as proposed by Crecine.

The Internal and External Environment

The criticisms Davis, Dempster and Wildavsky give about their own model, that there is no selection procedure to guide thinking on what exogenous variables to include in models of budgetary decision rules, is essentially accurate. However, their criticism suggests a requisite theoretical issue of how the environment should be included in the decision calculus. Developing the protective belt in the latter direction will help identify what environmental variables to include in a budget model.

An examination of Crecine's research on municipal budgeting demonstrates his progressive shift in the protective belt of the Davis,

Dempster and Wildavsky theory that begins to address this problem of environmental variables. Consistent with the principles and properties of near-decomposable systems outlined under premise # 5, Crecine specified the budgeting process as a hierarchical system in which interactions among organizational units within the system are greater and stronger than interactions between organizational units and the environment. Logically, then, it is the strength of interaction that distinguish the budget system's internal environment from its external environment.

With respect to municipalities, Crecine describes the internal environment as the city government and its subunits, and the external environment as everything else including citizens, businesses and other governments (Crecine, 1969, 166). Drawing from this conceptualization and the hard core assumptions, he proposes that allocations can be explained very well in the short-run without considering the effects of the external environment. As it applies to budget officials' decision rules, Crecine argues that information about the internal environment is directly included in the calculus while information about the external environment is not directly included in the calculus/strategy.

The changes made by Crecine to the Davis, Dempster and Wildavsky theory is contrary to the specification of their latter set of models. In these models, information about the external environment (i.e. GNP, unemployment, percent minorities, median age or percent democratic voters) directly affects the percentage changes from the base as calculated by budget officials (Davis et al, 1974; also see footnote 3). In contrast, Crecine's interviews of budgeting officials in three large American cities show little evidence that budgetary decision

makers in municipalities actually consider external information in this manner (Crecine, 1969, 167-68). Also, Sharkansky, who empirically tested the effects of a series of environmental variables on the strategies of budget officials, found weak and insignificant support for the hypothesis that officials examine conditions of the external environment when calculating requests and appropriations (1968a). That expenditures reflect the external environment, however, is documented by much comparative research. (See Fried, 1975 and Hofferbert, 1972 for a listing and summary of past research on variables explaining the range and diversity of policies in American and foreign cities.) According to Crecine's progressive shift and the principles of decomposable systems, the question then becomes how does the external environment influence decisions such that expenditures eventually adapt to that environment?

Crecine argues that budget officials perceive the external environment as a series of constraints and opportunities. A constraint imposes structure and conditions on the budgetary problem and its solution that limit the types and number of decision alternatives that are considered by the decision maker (Crecine, 1969, 52-53). As such, the constraint acts as a boundary on the decision makers' premises of choice; and, like an aid to calculation, it simplifies decision making. With respect to opportunities, their effect on decision rules is similar to constraints except opportunities reveal the potential types of alternatives that might be considered prior to choice. (Opportunities reveal alternatives, constraints limit alternatives.) Padgett specifies more clearly how the external environment might influence budget officials' strategies.

Padgett uses the term "ecological control" to characterize the effects of the environment on decision making. He defines the concept as "indirect control over the premises of choice (such as information, sets of alternatives, targets, and definition of issues deemed 'relevant') rather than direct control over the process of selection itself" (Padgett, 1981, 82). The source of this indirect control is the "culture" of the environment which is the "historical residues of past political struggles and structural relationships" (Padgett, 1981, 82). In the short-run, ecological controls "define the formats of compressed cybernetic inputs" (Padgett, 1981, 82). In the long-run, according to the principle of nearly decomposable systems, the internal environment reflects the culture of the environment. Padgett states that, "culture in this sense defines the window out of which one is looking rather than the detailed image one sees" (Padgett, 1981, 83). An example of government decision making demonstrates the use and effect of culture on budgeting officials' decisions and how decision makers include the environment in their calculus. (See Gramlich, 1969 for an economist's point of view of the important effect of constraint on budgeting outcomes.)

Imagine two cities, one with a large stable middle class population, the other with a large, transient lower class population. As a result of previous experience, budgeting officials in the first city expect few changes in the resources available to fund the government and its programs. One of its prominent families has just donated a large estate complete with buildings. Seeing an opportunity to obtain a larger appropriation, the city's parks and recreation department argues that the estate could be converted into a park with a

golf course, horse-back riding stable, lake, and facilities that can be rented for weddings and other group activities. The department claims that such an enterprise could bring the city much additional revenue, would serve the recreational needs of the city and would be an asset in attracting businesses and families to the city.

In the second city, which is always uncertain of the level of its revenues for any given year, a large local manufacturer has gone bankrupt and abandoned its offices and plant. The creditors cannot sell the property, which is expensive to maintain and police, so they give it to the city. The city does not want the expense and responsibility of maintaining it, and, after a fire that destroys one of the buildings, the city decides it must demolish the building because it is a health and safety hazard.

In this example the "cultures" of the two cities are quite different. First, it is unlikely that the second city would find itself with an estate similar to the one donated in the first city. But more importantly, the parks and recreation department of city number one views the donation of the estate as an opportunity to be exploited for its own and the city's advantage. This donation is the input from the environment that reflects the city's culture. The reason city officials consider the gift an opportunity is their expectation of stable resources and perception of the tastes of citizens which are also part of the culture of the environment.

These perceptions and expectations, which are developed in the long-run through individual interaction, free officials from interacting directly with the environment concerning what to do with the estate. Rather than searching for specific information in the

environment on what to do with the property, city officials let their experience guide them. In effect, the culture of the environment directs the budget officials to consider the input as an opportunity and to examine particular alternatives of action. These alternatives are the development of resources, the provision of recreation and services for its citizens, and the possibility of increasing one's budget. The fact that the participants in the first city would pursue these alternatives, rather than converting the estate to low income housing, doing nothing, or tearing the building down, is significant in this respect. Furthermore, the budget of the parks and recreation department will eventually reflect this culture as it acquires the personnel and equipment to operate this facility.

Contrasting the reaction of the first city to its budgetary input with the budgetary input received by the second city, the latter views its "gift" as a constraint on its activities. It is a constraint because maintaining or developing the abandoned property requires diverting very scarce resources from other activities. Its culture directs its officials towards a decision of doing nothing with the property or tearing it down because it expects limited and unstable resources and a population which is in greater need of life's necessities. Even if the resources were available to develop the property, the city would probably think in terms of low income housing, health clinics or even a corrections facility. Golf courses would not even be considered. In the long-run, this city's expenditures and policies will reflect its culture.

As the example of the two cities demonstrates, there are potentially many sources of external environmental control that

governmental officials may recognize as constraints or opportunities (e.g. state or federal laws, a nearby large body of water, age distribution, etc.). (See Pierce, 1974 for a typology of constraints on organizations.) The problem for budget theory is specifying what concepts or variables are useful in representing the decision maker's perceptions of the external environment. As suggested by Crecine and Padgett, future models should distinguish between external and internal environmental variables because decision makers perceive them differently. Assuming that the two environments are perceived differently, this is going to have an effect on the type and form of the variables chosen to represent these preceptions.

According to the principle of decomposable systems listed as D of premise # 5 in the conclusion of second chapter (the environment affects the system in an aggregate manner), the variables representing the external environment should constitute "aggregated" cultural inputs. In other words, decision makers in a budget system will recognize general characteristics about the environment rather than specific ones. This is, in fact, Crecine's (1969) position when he argues that the most important input from the external environment, which personifies that part of the environment's culture concerning aggregate resources, is level of revenues. As a measure of overall resources, level of revenues reflect the culture because it is affected directly by a number of economic variables, such as unemployment and business conditions, and demographic variables such as median income.

Level of revenues can constrain the budgeting alternatives that are considered, but it can also be recognized as opportunities such as when tax receipts increase or cities receive money from other governments in

the form of grants or revenue sharing. Moreover, budgeting officials pay close attention to revenues. Revenues, however, are only one type of short-run input into the budget system.

This study proposes three sources of input into the budget system. The first is level of revenues. Assuming that level of revenues is a reasonable measure of a decision maker's perception of the supply of resources, a comparable input into the budgeting system would be perceived external demand for services (see premise #6). One way in which this demand may be perceived by budgeting participants is as a set of general priorities among the various city services. A third source of input from the environment is suggested by premise #1 and #2. Premise #1 states that an environment is both complex and unstable. Using premise #2 one can then infer that the budgetary decision maker will perceive the environment's complexity and stability as uncertainty. This uncertainty is the third source of input into the budget system. All three inputs represent the combined effects of separate environmental components.

Figure 3.2 diagrams this budgeting system and the three possible "aggregate" characteristics that budget officials perceive about the external environment. According to the diagram, the "culture" of the external environment is composed of many elements which might be loosely classified into economic, political, social and infrastructure categories or some combination of these categories. In association with one another, these individual characteristics determine the demand for services and the supply of resources. Both of these inputs (resources and demand) act as a set of constraints or opportunities on the internal environment. The third aggregate characteristic of the

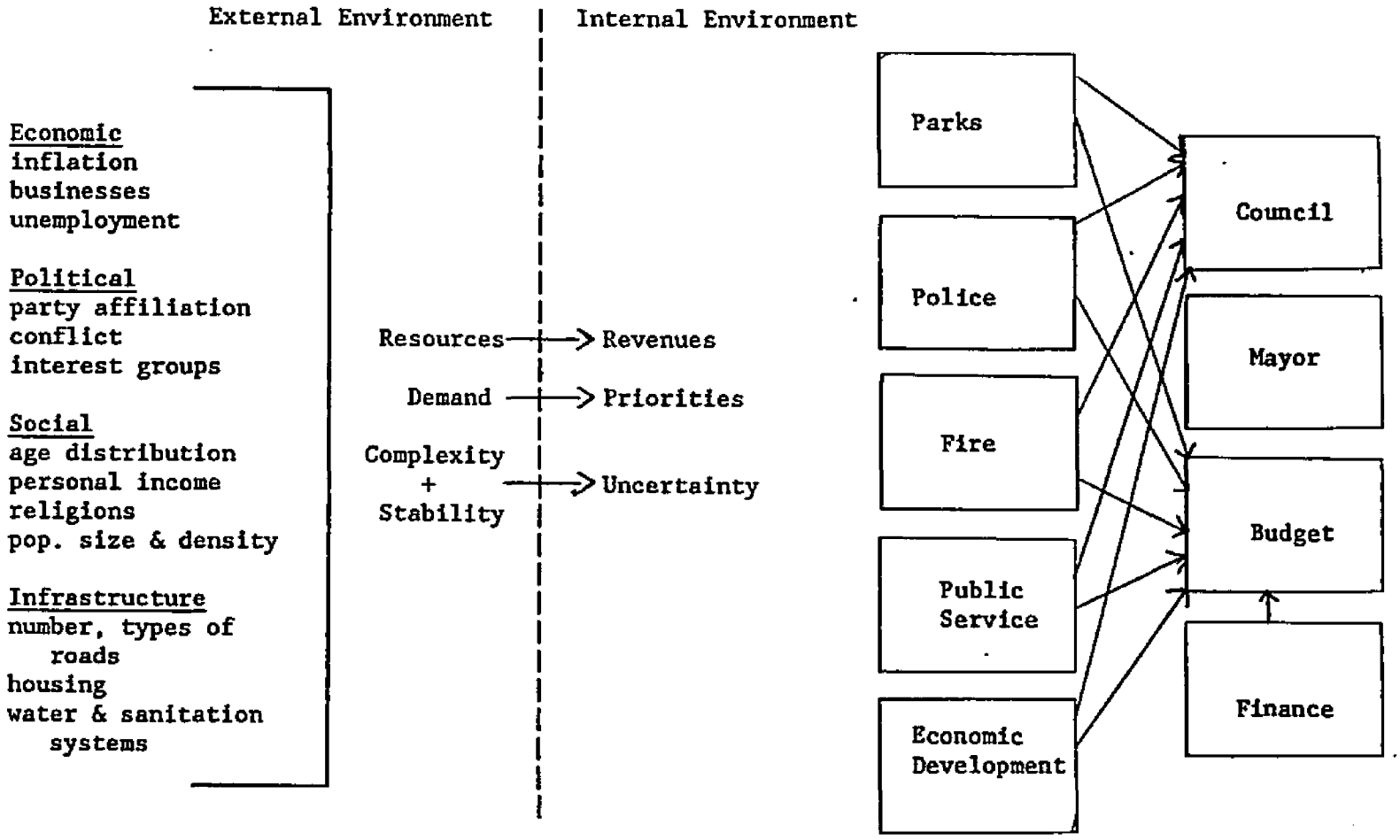


FIGURE 3.2

BUDGETARY SYSTEM AND ITS ENVIRONMENT

external environment, represented by complexity and stability, is also a constraint or opportunity for the internal environment. As defined here, complexity is a function of the number of variables in the environment, their differentiation, and their interdependence. Stability is defined as the rate of change in each of the three factors of complexity (Laporte, 1975). The horizontal dotted line in Figure 3.2 represents the decision makers' perceptions which recognize resources, demand, and complexity/stability as revenues, policy priorities (however vague) and uncertainty respectively. The budgeting system of the right contains the subunits of government whose output is a budget decision.

The Variables of the Model

Thus far, the manner in which the concept of budgeting systems, conceptualized as nearly decomposable, is incorporated into the protective belt of budgeting theory has been explained. Based on this addition to the theory, which can be attributed to Crecine and Padgett, the fundamental question addressed by this research can now be presented. This question is:

> What are the aggregate cultural inputs (constraints and opportunities) into the decision calculus from the external environment as perceived by the budgetary decision maker?

The fourth section of this chapter proposes, a model of the request and appropriation decision strategies incorporating these perceived cultural inputs. This section also argues that this model better reflects the types of external information budgetary decision makers

use and the manner in which they use it. However, before the model is presented, the nature of these inputs is explained more fully.

A. Perception of the external environment- wealth and uncertainty

Two of the budgeting system's aggregate external environmental inputs, representing the "culture" of that environment, that are proposed and tested by this research, are supply of resources and the stability and complexity of the external environment. The budgetary decision maker perceives these inputs respectively as the budget system's wealth (level of revenues) and the budget system's uncertainty. Because this research tests a model of the budgetary participants' decision calculus which is directly affected by their perceptions, the latter set of variables are included in the model and tested empirically.

Although, conceptually, wealth and uncertainty are separate variables, the two cannot be tested separately because they are too interrelated. High wealth reduces uncertainty through the absorption of "a substantial share of the variability in the system's environment", and low wealth makes uncertainty more acute (Cyert and March, 1963, 38). In this case it is easy to judge the effects of the extremes of low wealth-low certainty and high wealth-high certainty, but the relative effects of the middle levels of high wealth-low certainty and low wealth-high certainty is difficult to determine. For this reason, wealth and uncertainty are measured as one variable where low wealth and low certainty is a worse condition for the budget system than low wealth and high certainty or high wealth and low certainty. The best condition for the budget system is high certainty and high

wealth.

Wealth is defined here as the resources that the system can potentially mobilize for spending at any particular time (Wildavsky, 1975). This conceptualization of expenditure constraints, spending opportunities and economic conditions is more general than the simple variable of level of revenues used by Crecine. Here, the measure of wealth includes expected incoming resources, the amount of "slack" or surplus resources currently available to the city (Cyert and March, 1963, 36-38), and the city's ability to control its output of resources. The reason for including level of revenues as a measure of economic conditions and spending opportunities is self-evident. The reasons for including surplus resources and control over resources require further explanation.

Surplus resources are essentially the amount of dollars a city has saved from years in which revenues were higher than than expenditures. Because the city highly values surplus funds, from which it can draw money to offset low levels of incoming revenues, these revenues are usually available. As a result, some notion of surplus resources should be included in the concept of wealth. With respect to the control over the output of resources, diminishing control of expenditures, as may occur with the presence of strong city unions or high inflation, may reduce the relative level of revenues available for appropriation. In effect, the city's spending ability becomes constrained by a loss of control over expenditures. Moreover, factors contributing to the loss of control over spending represent important elements of the city's economic environment.

The second cultural input, uncertainty of the environment,

approximates the complexity and stability of the resource and demand sources in the external environment (Wildavsky, 1975). Rather than determining whether each source of resources or demands is complex or stable, budget makers, who recognize only aggregate characteristics about the environment, might simply perceive a general uncertainty about environmental conditions. Much has already been said about the importance of the effect of uncertainty on the behavior of intendedly rational decision makers. In this instance, uncertainty was defined according to the two dimensions of simplicity-complexity and stability-instability. It was also argued that hierarchical systems more readily adapt to complexity than stability. As a result, instability should have a more apparent affect on the behavior of systems. Therefore, this research uses measures of environmental change or stability to represent the budgetary participant's perceived uncertainty of the external environment.

Conceptualizing the external environment along the two dimensions of poverty-wealth and uncertainty-certainty is supported by Wildavsky (1975). He found that these dimensions were crucial in distinguishing the budgetary behavior of different budgeting systems. Although he did not propose how these variables should be included in the decision calculus, his observations can be stated in terms of the progressive shift proposed by Crecine and Padgett. In general, Wildavsky found that poor budgeting systems are more constrained in their actions than those that are wealthy; and systems that are certain are less constrained than those that are uncertain. In other words, one would expect poor and uncertain systems, such as those in developing nations, to engage in more short-run feedback types of strategies than those

that are wealthy and certain. Wildavsky found that very poor and uncertain nations use "fire station" methods of budgeting unlike the U.S. and other Western nations whose budgets are more predictable.

From Wildavsky's observations, the hard core assumptions and the protective belt, two hypotheses can be derived concerning the effects of both the wealth-poverty and the certainty-uncertainty variables on budgetary decisions. Recall the conclusions from arguments made previously concerning decision making:

1. External environmental inputs act as boundaries or organizers of premises rather than determinants particular strategies
2. Strategies are choices whose elements are goals, aids to calculations, and considerations of the conditions of the environment and other persons decisions.

As such, strategies are the fundamental features of political behavior. Using these assumptions, this research hypothsizes that wealth and certainty influence the direction of search for requests and appropriations and the degree to which choices are strategies (the degree of strategic thinking or the degree to which certain elements are important in strategic thinking). In other words, these variables influence whether large cuts in appropriations and large increases in requests are considered more seriously than small ones. They also influence the degree to which choices are political.

The following two hypotheses state the general predicted effect of wealth and uncertainty on decisions.

1. Budgeting systems in poor and uncertain external environmental conditions tend to show smaller increases in requests over last year's appropriations and larger cuts in appropriations from requests than budgeting systems in wealthy and certain external

environmental conditions.

2. Budgeting officials in poor and uncertain external environmental conditions tend to use more aids to calculations and engage in more strategic thinking than budgeting officials in wealthy and certain environments.

B. Perception of the external environment- budgetary unit priorities

A third aggregate external environmental input into the budget system is demand for services. With respect to this variable, Crecine argues that municipal agencies and appropriating units take account of demands for services in the short-run by changing "attention rules" within fixed budget levels rather than by varying budget levels. For instance, if a winter is unusually hard and requires greater than average street maintenance, budgeting participants should respond to this problem by altering the number or quality of repairs or the efficiency of the repair process rather than increasing the department's budget. In this case, the department will fix only the worst streets leaving the other streets to be fixed the following year. The department may even look for a similar but less expensive means of repairing roads.

Crecine also argues that budgeting participants will not directly interpret the types of demands generated by the environment as budget issues. The participant's response to citizens' demands for parks is not how many new parks to construct, but in which neighborhood the parks should be placed. He claims that the departmental budget levels are affected by these types of inputs only in the long-run, and only in response to a large number of such demands (Crecine, 1969, 187-190).

Crecine's assertion concerning short-run versus long-run impacts of external demands is consistent with the budgeting model that is

presented here. This model assumes that the external environment (the demands in this case) directly affects budget levels only in the long-run. As with revenues and environmental resources, however, Crecine does not state how demands in general are represented in the budgetary decision calculus in the short-run such that budget levels will come to reflect these demands in the long-run.

For instance, his systems budgeting model, similar to the one presented here, represents budgetary decision makers as having little direct and infrequent contact with the environment concerning the supply of resources. Instead, budget makers rely on whatever aggregate input is available to them. With respect to resources, the relevant input is simply the level of revenues, which is an aggregate measure of the amount of resources that the environment is willing to exchange for public goods and services. The level of revenues has a direct, short-run impact on the budget levels which, only in the long-run, adequately resemble the entire resource structure of the external environment. Similarly, one can show that environmental demands may also have a short-run impact on budget levels that is consistent with this specification of system's budgeting behavior.

Like revenues, which affect budget levels indirectly by providing opportunities or constraints on requests, demands may also affect budget levels indirectly and aggregately through historically determined priorities for the services supplied by the various agencies. Such priorities are the results of long-run constituency and environmental demands. In effect, priorities, like revenues, reflect the "culture" of the environment. The demands also produce a set of long-term relationships among the budgeting participants that establish

certain precedents for budgeting behavior and relative funding levels.

An agency may view its level of funding relative to other agencies, which is based on priorities for an agency's services, as a precedent that presents opportunities or constraints for subsequent budgeting decisions. Viewed as an aid to calculation by the agency, this precedent can be a very practicable element of any budgeting decision strategy (Cyert and March, 1963, 102-3; Crecine, 1969, 42). For instance, an agency who perceives itself as having a high priority relative to other agencies because of previous funding levels, would view this as an opportunity to increase its appropriation. Using precedents in this manner is consistent with the concept of budgeting as a historically determined activity in which previous solutions provide guides for future decisions (Wildavsky, 1974, 13).

One logical hypothesis regarding the effect of priorities on funding levels can be stated as follows:

> Higher priority budgeting units will tend to have greater increases in requests over the previous years' appropriations and their requests will be cut less than lower priority budgeting units.

This hypothesis seems intuitively reasonable but empirical evidence shows that other conditions in the external environment may alter participant's decision strategies (Peterson, 1981; Brecher and Horton, 1985; Menchik et al, 1982; Glassberg, 1978). For instance, if wealth and certainty are low (bad times), the relationship identified by the hypothesis may be intensified. However, in good times, the relationship between priority and decisions may not be as clear. The reason why this might occur is that in good times, lower priority units perceive that their chances of getting higher appropriations are better

and, likewise, the appropriating units feel that they are under less constraint to cut these requests. Although the empirical evidence for such logic is inconclusive (see especially Menchik et al, 1982), the following hypotheses derived from this thinking seem the most reasonable.

1. During economically "bad times", the higher priority budget units tend to have greater increases in requests over the previous years' appropriations than lower priority budget units, and their requests will not be cut as much as lower priority budget units.

2. During economically "good times", there is less distinction between the higher and lower priority budget units for changes in requests and appropriations than during economically "bad times"

C. Perception of the internal environment: other aids to calculations

One of the most important aids to budgetary calculations identified by Wildavsky (1974), Davis, Dempster and Wildavsky (1966b,1974), Cowart et al (1975) and others is previous changes in budget levels or previous strategies used by the budgetary participants. For instance, if an agency received a large increase in appropriations last year, because of new equipment or a new program, it may think that asking for a large increase this year is useless and may even appear irresponsible to the other budgeting participants. Likewise, the appropriating units may tend to cut an agency's request more if the agency had a large increase in requests last year or if its request is large relative to last year's appropriation. On the other hand, if last year's appropriation is small, a agency might feel more justified in asking for a larger request; or, if the request itself is small relative to the previous appropriation, the appropriating unit may not feel the need to cut as much from the request.

One reason why previous changes in appropriations and requests may be such a useful aid to calculation is that it provides the participants with a readily available set of figures to gauge what occured last year and what might be attempted this year. At the same time it offers participants an easy means of compensating for past action. Davis, Dempster and Wildavsky (1966b, 533) describe this strategy as a method of smoothing out the stream of appropriations in Federal budgeting, while Cowart et al (1975, 546 & 548) describe it as compensative behavior in municipal budgeting.

Because this strategy seems very important at a number of different levels of government, some measure of previous actions will be included as an aid to calculation in the model of budgeting proposed here. For appropriation decisions, previous actions are defined as the change in the budget level from the previous year's appropriation that the agencies request. For request decisions, previous actions are modeled as the change in the budget level that occured last year from the previous year's appropriation. Based on the relevant evidence, the following hypotheses are proposed concerning the effects of these two variables on budgeting decisions.

1. The larger the increase in last year's appropriation from the previous year, the smaller the requests relative to last year's appropriation.

2. The smaller the increase in last year's appropriation from the previous year, the larger the requests relative to last year's appropriation.

3. The larger the request relative to last year's appropriation, the greater the cut in requests by the appropriating units.

4. The smaller the request relative to last year's appropriation, the smaller the cut in requests by the appropriating units.

D. Interactive effects

Relying on previous theoretical premises and Crecine's findings that the internal environment is more important than the external environment in shaping the decision makers' own premises about requests and appropriations, additional hypotheses concerning all three variables can be presented. Assuming that information from the internal environment acts as a basis or framework for the assimilation of information from the external environment, a set of interactive effects between the internal and external environmental information is hypothesized. One would expect that both priorities and wealth-certainty will alter the magnitude of the effects of previous decisions on requests and appropriations. The following hypotheses present these proposed interactive effects.

1. During high wealth-certainty years, previous decisions affect requests and appropriations less than during low wealth-certainty years.

    -high wealth-certainty: an increase in last year's appropriation from the previous year will not result in as small an increase in requests.

    -high wealth-certainty: an increase in this year's request from the previous appropriation will not be cut as much.

2. During high priority years, previous decisions will affect requests and appropriations less than during low priority years.

    - high priority: an increase in last year's appropriation from the previous year will not result in as small an increase in requests.

    - high priority: an increase in this year's request from the previous year will not result in as small an increase in requests.

The reason for the different effects of high and low priorities and

high and low wealth-certainty is that under the more favorable conditions, departmental units are not as constrained as under the less favorable conditions. Because the units are less constrained, a large increase in last year's appropriation from the previous year or a large increase in requests from the previous year, will not affect the dependent variable as greatly as when budget units are more constrained.

Summary

Before presenting the general model of request and appropriation decisions, a summary of the proposed changes made in the current budget theory is necessary. Assuming that the original budgeting theory presented by Davis, Dempster and Wildavsky is inaccurate or incomplete because it cannot account for "nonincremental" changes in the levels of requests and appropriations, one recourse is to change or expand the theory. Rather than developing an entirely new theory, as some critics suggest, a more scientific process is to ground previously suggested theoretical changes more firmly into the assumptions and propositions of the protective belt and supplement the theory's underlying assumptions with assumptions about the external environment. The suggested theoretical changes, as developed by Crecine and Padgett, conceptualize the budgeting system as part of a larger environment. The assumptions used to supplement the hard core of budgeting theory specify what features of this external environment are important to budget decisions.

The following is a list of the important points covered in this Chapter with regards to the changes and supplements made in budgeting

theory.

1. The budget system has an internal and an external environment. The internal environment consists of the agencies and departments of the government (the subunits of the system). The external environment is everything outside the government such as economic and political institutions and the city population. This observation is based on the assumption that budgeting systems are nearly decomposable- that the interactions between subunits within the budget system are much stronger and more frequent than the interactions between the subunits and elements of the environment.

2. Budget allocations can be explained very well in the short-run without considering the external environment. This means that the perceived information about the internal environment is directly included in the budgetary participant's decision calculus. The justification for this assumption is premise #5: the short run behavior of the subunits of a system is approximately independent of the short-run behavior of the subunits of other systems.

3. Budgetary participants perceive the external environment as a series of constraints and opportunities on internal decisions. In other words, they perceive the external environment indirectly by recognizing only aggregate indicators of specific characteristics. This point is derived from the hard core assumption that the long-run behavior of the subunits of a system affects the behavior of every other system only in an aggregate way. This aggregated input is a reflection of the "culture" of the environment.

4. The features of the external environment that are recognized as opportunities or constraints are the supply of resources, the demand for resources, and the complexity and stability of the environment. Respectively, these three features are perceived by the participants as the wealth of the government, the priorities among budgetary units and the uncertainty of the environment. One other aid to calculation is included in this budgeting model as an indicator of conditions in the internal environment This is the change in the levels of the budget reflected in the previous budgetary decision.

Each of the points listed above applies to how budgetary decision makers perceive the environment and what elements of this environment they consider when devising strategies to achieve their respective goals. Two possible aggregated "cultural" inputs into budget official's decision calculi are proposed. These are: the budget

system's wealth combined with the participant's uncertainty about the external environment and the agency's relative funding priority. With respect to the internal environment, another input into the decision calculi was proposed: the previous decisions made by budget officials. Participants use all three inputs to determine what level of requests or appropriations would best achieve their goals. The next section of this chapter presents the mathematical form of the this model of budgeting.

A MODEL OF REQUEST AND APPROPRIATION DECISIONS

The model of budgetary decision making presented here represents the strategies of budgetary participants in the city of Lansing. There are a total of 48 participants or units of analysis to test this model. All 48 units are agencies or sub-agencies of the government who are making requests while one of the 48th also represents the decisions of persons making appropriations. The latter decisions are the results of both the "Mayor's Recommendations" and the "Council's Appropriations." The reason for combining both decisions into one is that there is very little difference between the two. Other scholars of city budgeting have noted that in strong-mayor forms of government, such as Lansing, the council's appropriation makes only minor changes in the mayor's recommended appropriation (Crecine, 1969; Meltsner, 1971). In effect, the council's decision is a rubber stamp on the mayor's decisions. Also, preliminary statistical analysis of the Lansing data supports these claims.

The diagram in Figure 3.3 illustrates the model of the Lansing budget system, its elements and their affect on strategies according to

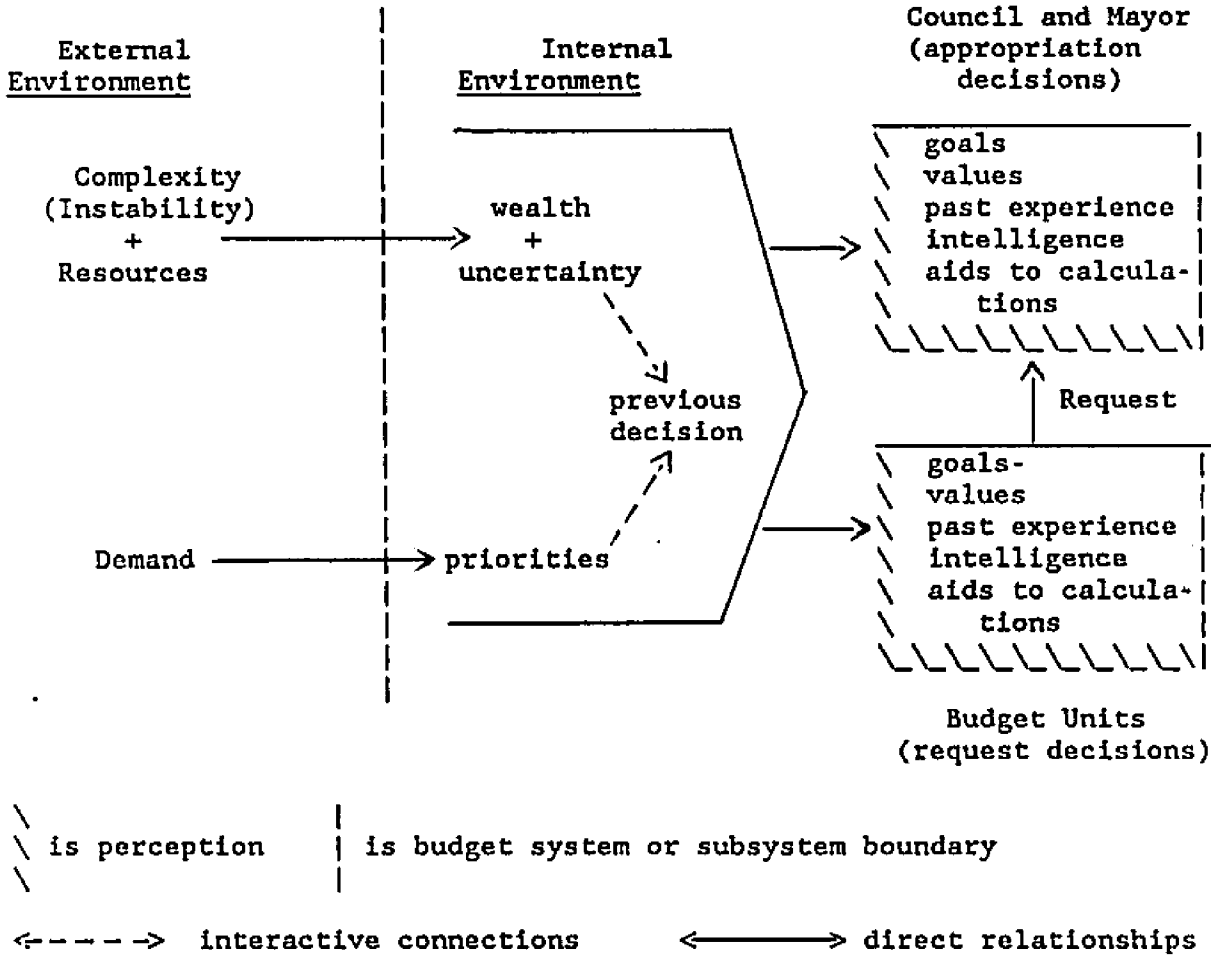


FIGURE 3.3

DIAGRAM OF THE LANSING BUDGET SYSTEM

the issues raised in the previous section of this chapter. The external environment of this system consists of resources, demand and complexity components that the departmental units perceive respectively as wealth, uncertainty and funding priorities. The effects of the internal environment consists of compensation for the changes that occurred in the previous budgetary decision. As the diagram indicates, priorities and certainty-wealth have an interactive relationship with previous decisions. This means that the magnitude of the effects of previous decision on requests and appropriations can change depending upon the levels of the external variables.

To formulate a request, the budgetary unit uses goals, values, aids to calculation etc. in light of the environmental components and chooses a request that it thinks will come close to achieving its goal. The goal for the agencies is to increase appropriations, and the goal for the council-mayor unit is to cut costs wherever possible without jeopardizing favored services. The agency formulates its request, which is the first decision in the budgeting process, using last year's appropriation as the base. This base is another form of input into the decision calculus. The council-mayor unit formulates its appropriation, which is the second decision in the process, using this year's request as a base.

This study's empirical analysis tests the effects of the hypothesized elements of strategic thinking (uncertainty, wealthy, priorities and changes represented in previous decisions) on the budgetary subunits' choices of levels of requests and appropriations for 16 fiscal years. From now on, the unit of analysis will be referred to as the budgetary unit and is defined as: the lowest level

bureau or agency in the administration receiving appropriations not included in the appropriations of other units. To be consistent with the hard core assumption that the interactions between one system or subsystem and other systems or subsystems are linear, and the Dawes and Corrigan (1974) findings that linear models better represent decision processes, the model of Lansing city budgeting is also additive.

The general form of the model, including the relationships between the independent and dependent variables and between the internal and external variables, is displayed in Equation 3.1. The parameters estimated from this analysis will help determine whether the model accurately represents the budgetary decision calculus in the Lansing city government and what impact each variable has on decisions.

The model specified in Equation 3.1 is estimated both across time and budgetary units. It also shows a two-stage decision process for both requests and appropriations. In the first stage, only the effects of the base are estimated. As specified in the equation, the model assumes that all budget units have the same base at all time periods. The second stage of the model, which accounts for the differences in the treatment of budget units across time and across different units, estimates the effects of the external and internal variables and their interactions. Here, the dependent variables for the second stage are the residuals from the first stage. The reason for estimating the full model in two stages is based on theoretical considerations in association with some of the criticisms of the linear form of the budgeting models given by Pagdett and Wanat.

Both authors argue that one source of the problems with the Davis, Dempster and Wildavsky model is that the independent variable of the

EQUATION 3.1

GENERAL SPECIFICATION OF THE MODEL

REQUEST DECISIONS

1ST STAGE

$$R_{ti} = a_0 + a_1 A_{t-1i} + ER_{ti}$$

2ND STAGE

$$ER_{ti} = a_2 + a_3(WC*PD)_{ti} + a_4(P*PD)_{ti} + a_5 PD_{ti} + a_6 WC_{ti} + a_7 P_{ti} + er_{ti}$$

APPROPRIATIONS DECISIONS

1ST STAGE

$$A_{ti} = b_0 + b_1 R_{ti} + EA_{ti}$$

2ND STAGE

$$EA_{ti} = b_2 + b_3(WC*PD)_{ti} + b_4(P*PD)_{ti} + b_5 PD_{ti} + b_6 WC_{ti} + b_7 P_{ti} + ea_{ti}$$

VARIABLES AND OTHER EQUATION ELEMENTS

R- Requests
A- Appropriations
WC- Wealth and certainty
PD- Previous decision
P- Priority
t- time
i- budget units
a- coefficients for request decisions
b- coefficients for appropriation decisions
er- error term for request equations.
ea- error term for appropriation equations

base (the base is R_t for the appropriation equations and A_{t-1} for the request equations) dominates every value of the dependent variable. As a result the R^2's are artificially high and the linear form of the models are open to a number of different interpretations because models of different decision processes can generate comparable outcomes with equally high percentages of explained variance (Wanat, 1974; Padgett, 1980). Wanat demonstrates this problem by fitting linear models similar to those used by Davis, Dempster and Wildavsky to randomly generated data. He found that 80 percent of the models tested have R2's greater than or equal to .97. He then concludes that, as a result of this problem, the models are "peculiarly insensitive to making 'critical test' empirical distinctions among competing decision process theories" (Wanat, 1974, 1221-4).

Both Padgett and Wanat conclude that this problem can be addressed by respecifying the model. They suggest that one way to respecify the model and maintain the linearity of the decision rules is to use some function of increment change from the decision base as a dependent variable. This alteration in the dependent variable does not remove the base from the equation. The base, which is one of the primary variables of the decision calculus as specified by the hard core assumptions, has simply been moved from one side of the equation to the other. Another way of respecifying the model, which is more consistent with the budgeting theory proposed here, is to represent the decision process in two stages.

There are two reasons why a two-stage decision process is more consistent with this theory of budgeting than a single stage process. First, it better represents the decision process as a boundedly

rational one. One of the main tenets of the underlying assumptions is that humans are limited in their ability to comprehend and process information, so they develop simplification techniques to help them. If this is true, then it is unlikely that such decision makers could process all pieces of information at the same time. Representing the budgetary decision calculus in a single equation implies that decision makers can indeed handle all factors at once.

In contrast, it seems more likely that boundedly rational decision makers would process the information more systematically and in a manner that would allow them to manage more complexity. One of the primary tools for managing complexity that is proposed here is the hierarchical process or structure. In such a process some information is considered first, while other information is considered second, third and so on. In this case, an equation that estimates the effects of different pieces of information in stages seems more appropriate.

A second reason for estimating the model in two stages is related to the important findings that the content of the base is not directly analyzed by budget officials. Most scientists of budgeting agree that the base only provides a point from which the directly relevant budget calculations proceed. By representing the decision process in two stages, in which the effects of the base are estimated first and the effects of the rest of the variables are estimated next, the model also becomes more consistent with these findings. In stage one, the first criteria considered by the decision makers is the base. However, the criteria is considered only in the sense that it is removed from the decision calculus so that the meaningful budget calculations are made on what differences remain from this base. In stage two, the effects

of what are considered the more directly relevant variables to the immediate budget calculations are estimated. As a result of these changes, the focus of the analysis is now on the more pertinent budgetary decisions as conceptualized by this theory and as originally intended by Davis, Dempster and Wildavsky.

SUMMARY AND CONCLUSIONS

The first chapter of this study began by laying out the underlying assumptions of the intendedly rational theory of budgeting. This theory is the foundation of the budgeting model presented here. From this theory and related works, three sets of assumptions that apply to this model were derived. The first assumption is that decision making environments are very complex. The second is that humans have limited computational abilities which lead to high uncertainty, difficulty in understanding the environment and difficulty in making calculations. As a result of this uncertainty, decision makers develop techniques to cope with it and help them make decisions in an intendedly rational manner. In the second chapter the third assumption was presented which is that complexity is organized as a hierarchical system, which behaves according to two principles of decomposable systems. The principles are as follows:

1. The short-run behavior of the subunits of a system is independent of the short-run behavior of the subunits of other systems.

2. The long-run behavior of the subunits of a system affects the behavior of every other system only in an aggregate way.

Following the presentation of these assumptions, the current state of budgeting theory was examined beginning with the seminal work of

Davis, Dempster and Wildavsky who used the assumptions of intendedly rational decision making to develop their models of the decision calculus. Their models were criticized for their inability to account for many types of budget decisions. This problem was attributed to the models' incomplete representation of the environment according to an expanded set of hard core assumptions. This chapter criticized other budget researchers addressing the work of Davis, Dempster and Wildavsky for too quickly dismissing the theory underlying the Davis, Dempster and Wildavsky models. It also criticized these authors for not developing the theory according to its underlying assumptions in a way that would address the models' main problems.

Based on these observations, a model of budgetary decision making in a municipal government was presented. This model essentially integrates the progressive changes in the theory made by previous authors and adds a new element to the protective belt. This element is the hierarchical features of the external and internal environments. More important to the direct estimation of the model is the types of inputs into the budget process that a hierarchical structure dictates. Although previous models of budgeting have included some aspects of environmental hierarchy, most have not incorporated both intended rationality (as an explanation of the characteristics of decision makers) and nearly decomposable systems (as an explanation of the characteristics of the environment) directly into the decision calculus. As a result, these models are not comprehensive enough in their explanation of budget decisions. Moreover, by using both a cross-sectional and time-series method of analysis, rather than simply the time series method used by most budgeting models, the model tested

here should help answer questions that previous models have ignored. Such questions are at the core of the study of politics. They concern distribution of the allocation of resources or "who gets what." The next chapters continue to answer these questions by examining the budgeting process in the City of Lansing and operationalizing the model.

CHAPTER FOUR

THE RESEARCH SETTING

INTRODUCTION

In the previous two chapters the theoretical underpinnings of the budgeting model were presented. Some of the fundamental components discussed were the model's underlying assumptions and the theoretical arguments and empirical evidence supporting its structure. With respect to its assumptions, the model is derived basically from two sets of theoretical premises. The first set pertains to budgetary participants being intendedly rational decision makers. The second set pertains to governments and their environments being organized hierarchically. The goal of this research is to use these assumptions, arguments and evidence to develop a model that represents a budgetary participant's decision making calculus. The specific structure and content of the model was presented in the last chapter along with the types of variables to be tested by the analysis. In this chapter, the Lansing budgeting process, rather than budgeting theory, becomes the focus. The intent is to examine the City of Lansing, its government and the conditions under which budgeting takes place as supplementary information for operationalizing the variables, interpreting the analysis, and generally understanding budgetary decision making.

According to the theory presented in the first two chapters, information about the city, its government and environment supplies not

only background knowledge for the formal analysis; but, more importantly, it describes the content of a fundamental component of the decision making calculus. Specifically, this information describes some of the major constraints and opportunities under which budgetary decision making takes place. Based on the assumptions and evidence presented in the last chapter, this study argues that the "culture" of a government's environment determines the values of the various aggregate level "external" variables recognized by budgetary participants as constraints and opportunities. In this chapter, Lansing's "culture" is described according to a cursory analysis of its past and current political, economic and social characteristics. In addition, a brief history of the city and its government is presented. Other important characteristics of Lansing that are discussed are the organization of the budget document, the steps of the budget process and how the government finances its activities.

THE CULTURE AND GENERAL CHARACTERISTICS OF THE CITY OF LANSING

In Chapter 3, Crecine's argument concerning the difference between the internal and external environment of a municipal government was discussed. How this dichotomy affects the government's behavior and its relationship with the external environment is an important factor in the model's structure. To briefly summarize this argument, Crecine claims that the relationship between a government and its environment is hierarchical and therefore governed by the principles of decomposable systems (See Figure 2.2). He further claims that the nature of budgeting participants' perceptions reify these principles. More specifically, budgeting officials perceive the external

environment as a series of constraints and opportunities on behavior rather than observing this environment as a series of unique bits of information that are included directly in their decisions.

Padgett describes the source of the constraints and opportunities (operationalized as aggregate level variables) as the environment's "culture" that is the "historical residue of past political struggles and structural relationships" (Padgett, 1981, 82). Because this concept of culture is so important to understanding how decision makers perceive constraints and opportunities, the City of Lansing's own culture must be examined in light of its unique inputs.

Culturally, the most prominent characteristic of Lansing, and one that has remained unchanged for 100 years, is the dominance of three large but separate enterprises. These enterprises are the transportation industry, government (Lansing is the capital of the State of Michigan) and, although technically in East Lansing, Michigan State University. Since the 1880's all have been major forces behind the city's economy, social life and politics; and all have grown to the point where their individual influence reaches far beyond the borders of this city of approximately 130,000.

With respect to its transportation industry, Lansing began producing nationally recognized transportation equipment in the form of carriages, wagons and engines in the 1880's. These firms later began producing automobiles in the early 1900's (Kestenbaum, 1981, 68-69). Like other industrial cities, Lansing's population growth after the turn of the century was tied to its economic development. From 1900 to 1930, Lansing's population increased by 376%. During the depression it increased by less than 1%; and from 1940 to 1970, after most of the

rapid industrialization had ended, the population grew by only 67% (Population Abstract of the U.S., 1983, 379).

Currently, most of Lansing's industry is connected in some way to automobile production. Until recently, it was also the major location for the manufacture of Diamond Reo trucks, but this company folded in the recession of the mid-70's. The main industrial employers surviving the 70's recession are Oldsmobile and Fisher Body. Both have large plants in Lansing, and both are General Motors affiliates. Because these companies are actually part of the GM corporation, the principal decisions regarding most aspects of production and finance are made in Detroit rather than Lansing. As a result, accountability for many decisions in Oldsmobile and Fisher Body does not lie with the on-sight executives of either company. The city also contains many smaller, but by no means insignificant, corporations that produce support materials for the auto industry.

If it were not for the fact that Lansing is the state capital of one of the largest manufacturing states in the nation and home of one of the largest single campus universities in the nation, Lansing would be characterized as primarily a blue collar city. It became the state capital in 1847 and has since assumed a role of larger importance to the entire state. Shortly after, Michigan State University, then known as Michigan Agricultural College, was established. Michigan State University has its own unique history and tradition surrounding its land grant status. The College has since grown into a major University of over 40,000 students and instructors specializing in many areas of study.

Unlike its industrial neighbor Flint, Lansing is more diversified

both economically and socially because it has other prominent features besides auto production. However, precisely because Lansing has three independent and unique centers of activity, whose obligations frequently lay beyond the borders of the city, none have become dominant in controlling the city's affairs or even contributing directly to its development.

Lansing's political, economic and social power is disorganized and fragmented. Because each of the city's main enterprises are very large and autonomous, no person or group can control it politically or economically or dictate its social and cultural traits. Likewise, the size of the enterprises and their wide scope of activities outside of the Lansing area mean that no one, either individually or cooperatively, is willing to invest significant amounts of resources in the city (Falls, 1980,). The cities of Flint, Grand Rapids, Battle Creek, and Ann Arbor all have their industrial or academic patrons who contribute their time and money to the cultural and economic institutions of their city. Lansing, however, lost their patron when R.E. Olds died shortly after WWII.

Another effect of these conditions is that Lansing's political, economic and social groups are alienated from one another and the city has little cultural or economic growth. What growth does occur, occurs slowly. (In fact, a remark by Lansing's fourth mayor that "Lansing is without distinction" seems to apply today (Kestenbaum, 1981, 91)). As a result, Lansing as a whole has few of the cosmopolitan characteristics that one might expect from a city of such diverse elements.

Also, the alienation makes the city difficult to govern because

mobilizing resources or motivating groups to assist in municipal affairs is difficult, and, administratively, the government is relatively large (approximately 2800 employees in 1980). Encouraging cooperation among the groups is even more difficult for the mayor than motivating any one of them to actively contribute to the welfare of the city. However, scientifically, the absence of any one group participating in its affairs, and the absence of great conflict among the groups, makes analysis of the budget process easier. Analysis is simpler because there are fewer significant confounding elements to consider when interpreting results.

To better understand the current culture of Lansing during the fiscal years of budgeting that are analyzed here, various demographic and social statistics are compared for Lansing, the State of Michigan and the U.S. Sixteen years of budgeting data from FY 1969-70 to FY 84-85 are analyzed. Table 4.1 and 4.2 display these descriptive statistics.

Table 4.1 shows population changes for the City of Lansing and Michigan between 1970 and 1983. Compared to Michigan, Lansing's population changed very little during the period of study. This is probably the result of Lansing's diversified economic base moderating the effects of economic conditions. Lansing, which is the fifth largest city in the state, simply has not experienced the same changes in population as Detroit or some of the other large automobile producing cities whose welfare rises and falls with the booms and busts of the auto industry. Other differences between Lansing and Michigan can be seen in Table 4.2. that presents a more ambiguous picture of Lansing culture.

TABLE 4.1

POPULATION AND PERCENT CHANGE IN POPULATION
FOR LANSING AND MICHIGAN

	1970	1980	% change	1983	% change
Lansing	131638	130414	-.9	130414	.38
Michigan	8875083	9262078	4.4	9155480	-1.2

Michigan Statistical Abstracts, 1984, 11

TABLE 4.2

VARIOUS DEMOGRAPHIC STATISTICS FOR LANSING, THE STATE OF MICHIGAN AND THE U.S.

	Lansing		Michigan		U.S.	
	1970	1980	1970	1980	1970	1980
Black[1]	9.3	13.9	11.2	12.9	11.0	11.7
Non-white[1]	10	19	11.6	15	12.3	16.5
> age 65[1]	8.4	8.7	8.5	9.8	9.9	11.3
< age 5[1]	10.5	8.6	9.1	7.4	8.4	7.2
> 16 years of school[1]	9.8	17.3	9.4	14.3	10.7	16.2
family income < $10000		28.1		25.5		29.1
med. fam. inc.	10839	20184	11029	19223	9586	16841
index crime per 1000	60.5	70.7	30.7	60.7	20.7	50.7
new prvt house permits	2.0	1.2	2.5	.54	2.0	1.1
vacant housing[2]	5.8	4.6	7.4	7.3	6.3	7.3
owner occupied[2]	66.7	57.3	74.4	72.7	62.9	64.4
built prior to 1939[2]		31.1		27.6		25.8
med. value single fam. house	16356	33300	17590	39000	17130	47300
manufacturing[3]	26.5	19.8	35.9	30.3	25.9	22.4
professional[3]	20.3	24.5	21.2	21.5	23.2	20.3
government[3]	23.4	29.3	13.7	15.9	16.1	17.1

1- figure is % of total population
2- figure is % of total housing
3- figure is % of total work force

County and City Data Book, 1983, 730-739; 1977, 684-695

One prominent difference between Lansing, the State of Michigan and the U.S. that is revealed by these figures is the lower ratio of minorities in Lansing in 1970 relative to Michigan and the U.S. but the higher ratio of minorities in 1980. Another obvious difference is the lower increase in serious crimes in Lansing compared to Michigan and the U.S., with a much higher overall crime rate for Lansing in 1970. (These figures were checked against the actual FBI crime reports for these years). A third obvious difference is a much higher percent of government employees in Lansing which, of course, demonstrates its status as the state capital. A less visable difference in trends displayed here is the city's increase in professional workers between 1970 and 1980 that is supported by its relatively higher increase in college educated persons. Similar the rest of Michigan and the nation, Lansing lost many manufacturing jobs. Unlike the rest of the nation, Lansing seems to have replaced some of these lost jobs with professional occupations.

The remainder of the statistics, in conjunction with those mentioned previously, paint a picture of a city that is family oriented (fewer people over 65 and more children under 5), yet possibly more transient as fewer of the city's families owned their own homes in 1980 as in Michigan or the rest U.S. The city also has a relatively high median income, but the percentage of people with incomes less than $10000 is also greater than one would expect. It may be that the increase in minorities and the greater number of low income families accounts for the lack of home ownership. Additionally, the increase in minorities and low income families, in combination with the increase in the professionals, accounts for the larger discrepancy in incomes.

These characteristics, as well as the decline of Lansing's downtown, indicates that the city is, or will, face problems similar to those of larger declining midwestern cities. Currently, many midwestern cities are facing poor economic development, declining, unstable neighborhoods, and difficulties with maintaining their infrastructure. Lansing is no different. That it is facing the types of problems, usually reserved for larger cities, further complicates the problems of a fragmented social, economic and political base.

LANSING CITY GOVERNMENT AND ITS CHANGES BETWEEN 1970 AND 1985

To comprehend the city's budgeting process and budgetary decision making, the fundamental features and operation of its governing body must be understood. Similar to the external environment, these factors act as constraints and opportunities on decisions. Additionally, there were some important changes that occurred in the city government between 1970 and 1985 that may have a significant impact on the findings of this study. In this section, these events and important governmental characteristics are examined briefly.

In 1909, Michigan passed the Home Rule Act which allowed municipalities to write their own charters. The act gave Michigan cities great flexibility in taxation matters, governmental structure, and laws and ordinances (League of Women Voters, 1979, 86). In 1979 Lansing adopted a new charter to replace the old one that was originally adopted in 1955. Because the new charter changed the roles of governing officials during the period of study, it is important to examine these changes and determine what effects, if any, they had on the budget process.

The 1955 Charter established what might be called a "weak mayor" form of government. Actually, the mayor had more power and responsibility than is usually ascribed to executives in weak mayoral systems. According to this charter, the mayor is a full-time official elected on a non-partisan basis. He appoints, with council approval, a cabinet of administrative officials and board chairpersons to coordinate all administrative functions of the government. He also has full responsibility for the preparation of the budget, he can veto council ordinances and resolutions, he presides at council meetings, and he may vote in the council in case of ties (Charter of the City of Lansing Michigan, 1955).

Under the old and new charters, the part-time council has eight members that are also elected in non-partisan elections. Four of these members are elected at-large and the remaining four are elected by their respective wards. However, according to the old charter the council had administrative functions in addition to its current legislative duties. The body was organized into committees that corresponded to administrative activities; and it is evident from descriptions in the old charter that many departmental actions had to be cleared with the council. The council also had a significant say in budget preparation, where the money was spent and how it was spent once it was appropriated (Charter for the City of Lansing Michigan, 1955).

In addition to the council and the mayor, other ruling units that influence the direction of the government are the administrative boards. Under both charters, the members are appointed by the mayor and each board is made up of 8 members, four at-large and one from each ward. Under the old charter, the boards' repsonsibilities included

appointment of their respective departmental heads and influence of administrative functions. Although the boards were ultimately responsible to the mayor and the council for their decisions (Charter of the City of Lansing Michigan, 1955), they made recognized contributions to running the separate agencies. Under the current charter, the power of most boards was decreased drastically.

The 1979 Charter did not change the basic structure of the government as much as it clarified and separated the roles and authority of the governing units. As a result, current activities and responsibilities of the separate branches do not overlap as much as in the previous charter. The new charter has the effect of limiting the council to legislative, policy-making activities. It increases the mayor's administrative power, and reduces most board's role to that of advisory groups. The exceptions to this are the police and fire boards whose administrative authority is actually increased (Charter of the City of Lansing Michigan, 1979).

Under the new charter, the mayor is now solely responsible for the implementation and administration of city policy and has full authority to supervise, coordinate and direct the departments' activities. He can now veto separate line-items on the budget and is free to vary spending within the amount appropriated by the council. However, he is no longer a member of the council.

In contrast to the Office of the Mayor, the council lost much of its previous administrative power under the new charter. Members are limited to investigating departmental activities rather than actually directing some of them, and their committees are no longer organized according to administrative units. Instead, the committees are

organized according to policy issues. With respect to budgeting, the council now establishes a set of budget priorities and guidelines for city spending to which the mayor and the departments must adhere when formulating the budget (Charter of the City of Lansing Michigan, 1979). Appendix A presents an organizational chart of the City of Lansing. Appendix B describes the duties of the agencies and sub-agencies as units of analysis in the empirical study.

Although the new charter significantly alters the roles and authority of the separate governing bodies, many officials involved with the budgeting process feel that this did not really affect budgetary decisions. Although the council may have had more influence on specific items under the old charter, under both charters the mayor has the major repsonsibility for the preparation of the budget. An event that probably had a greater effect on the budget and its outcome than the new charter was the gradual changes in the organization of the budget process that occurred between 1976 and 1980.

Some officials have identified 1977 as the year in which the most profound change in the process occurred because it was the year that the Budget Department formally came into existence and took full control of budget preparation. Another event that was felt by some officials to have an equally important effect on the budget process was an amendment to the State of Michigan's Uniform Budgeting and Accounting Act in 1978. These two events are discussed in the following section on Lansing Budgeting and Finance. In the remainder of this section, two other events that might have major impacts on the budget are discussed.

The first of these events is a change in mayors that occurred in

1982. Prior to that time, Lansing had the same mayor since 1969. Given the evidence on the opposing styles and backgrounds of the two mayors it seems likely that budget decisions might also vary quite considerably under each mayor. The first mayor was, at one time, treasurer of the City of Lansing and had had previous formal training in accounting and finance. His style was described as "abrasive, crass and shrewd," and he was considered and "obstruction rather than an asset" to the business community that continually found itself trying to "calculate how they could get around him" (Falls, 1980, 26). Although one prominent official in Lansing noted that the previous mayor would have worked well with the new budget procedures because he was an independent and dominant leader, an examination of council proceedings, budget messages and State of the City Addresses suggests that he tended to exaggerate the financial conditions and needs of the city to the point that other officials no longer followed his advice.

In contrast, the current mayor was a high school teacher and member of the council. He has been accused of not being a strong enough leader, being weak administratively and not having enough contact with the community (State Journal, 1985). However, the radical difference in the new mayor's style does not seem to have had much effect on the budget process. By the time the current mayor came into office, the role of the Budget Department as the executive unit responsible for budget preparation was well established. At this time, the council and other officials were interacting primarily with the budget office with respect to any budget problem or issue.

A second event that could have possibly had an effect on budget decisions is a major change in the unionization of city employees that

occurred in 1978. Currently, Lansing has four unions: the Fraternal Order of Police (FOP), the International Association of Fire Fighters (IAFF), the Teamsters, and the Lansing Independent Employees Union (LIEU). Both the FOP and the IAFF were formed approximately 40 years ago, but they did not become viable as unions until the 1969 Michigan Compulsory Arbitration Law. The Law provided for binding arbitration for public police and fire employees. Shortly after the Law was enacted, the American Federation of State and Municipal Employees (AFSME) came into existance in Lansing as the organization representing labor and skilled trades. However, the Union was not bound by compulsory arbitration and therefore employees could be required to work without contracts.

A second major change in unionization occurred in 1978 when AFSME disbanded and became the LIEU. The only real substantive change that occurred was that the new union added a few new types of workers to the organiztion. The fourth union formed by city employees, the Teamsters, came into existence at the same time as LIEU. This second new union represented clerical, technical and supervisory personnel. Like LIEU, the Teamsters is not bound by compulsory arbitration, and the opinion of many city officials is that the addition of this Union has had little effect on wages, salaries or the benefits of its members.

LANSING BUDGETING AND FINANCE

In this section, the factors that either directly affect the current budget process or have altered it in the past are examined. These factors include the limitations on budgeting and revenues placed on the city by its own charter and the State of Michigan. The

organization of the budget and its accounts are briefly described as are the steps of the budget process. Also discussed is the development of the Budget Department and the amendment to the Uniform Budget and Accounting Act that was mentioned previously. Finally, a history of Lansing's financing is discussed in some depth since this has direct bearing on the wealth and uncertainty of the city.

For Lansing, as for most other municipal and state governments, the fiscal year begins July 1st. In early February of the previous year, the finance director submits an itemized estimate of expected city income for the coming year to the mayor even though individual departments begin preparing their budgets a few months before this. The mayor then submits his budget to the council in early March with his formal "Budget Message." Within this Budget Message, the mayor must show detailed estimates and supporting explanations of proposed expenditures, expenditures and appropriations for the previous fiscal year, statements of all indebtedness, anticipated revenue from all sources for this year and last year, and the current level of all surplus fund balances. The council reviews the budget through April and early May. The budget, which must be balanced, is then voted on at the end of May after a public hearing. This basic process has been the same since 1969- the first year of the data collection period. What has changed since 1969 are the details of the process, the form of the budget, the source of control of budget decisions, and the types of issues that are given priority by budgeting participants.

In 1975, a commitment was made by the mayor and other city officials to gain more direct control over the budget process and make it more accountable to the policies of the city. At that point a

budget director was hired whose plan was to implement a series of gradual changes in the budget process and its documents. The eventual effect of these changes is a more centralized budgeting process and a budget which is more policy and programmatically oriented. Rather than each individual department having the main responsibility for preparing its own budget as in the past, departments now prepare their budget with members of the Budget Department.

Informally, the budget process begins in October of the previous year with the Council Budget Resolution and a letter written by the Mayor's Office and the Budget Department. This letter contains departmental instructions for budget preparation. Some of the larger departments like Police and Fire must begin preparing their budgets earlier than October. In either case, the role of the members of the Budget Department is to insure that the budget guidelines set forth by the council and the mayor are followed. As a result of the change to a more centralized process, many persons felt that both the mayor and the Budget Department could control the budgets of the individual departments more easily, and they could better coordinate and evaluate the budgets according to the larger goals of the city.

A second major difference between the previous budget process and the current one is that, in the words of one budget official, "There was no budget process." In this person's opinion, the old budget process consisted mostly of arguments about pens and pencils, and most people forgot what policies and programs they were talking about. The new process, however, attempts to place the focus of budgetary analysis on the programs, polices and priorities of the departments. The source of these changes is a different budget format that contains new types

of information than that presented in the old document format. The current document contains all the estimates and figures used previously but adds additional summaries of departmental goals, descriptions of departmental programs, priorities among these programs and detailed explanations of changes in equipment, personnel, and services. Although departmental officials claim that the preparation of such a budget is a tedious and complex task, many of them concede that the process forces them to think about the truly important issues and to organize their department's affairs in relation to these issues.

Most departmental officials interviewed felt that the previous method of budgeting was adequate for the problems and needs of the city in the early 70's; however, in their opinion, events that have occurred since that time have only reinforced the inadequacies of the prior system. For instance, the 1978 amendment to the Uniform Budgeting and Accounting Act required that municipalities institute an accounting system that is consistent with the standards set forth in the publications of the Municipal Finance Officers Association of U.S and Canada. More importantly, the Law prohibits deficit spending by cities- a common method of operation prior to the implementation of the new budget process (Michigan Compiled Laws, 1985, 99-100). In the past, city departments requested dollar amounts for accounts without carefully considering their actual need for expenditures or resources. As a result, some accounts would be overdrawn while others contained surplus funds. Officials relied on end of the year audits and last minute transfers to straighten out the accounts. The Budgeting and Accounting Act prevented this type of operating while the new budget process presented the means with which to deal with such problems.

In addition to the Budgeting and Accounting Act, departmental officials have also cited Lansing's rapidly changing financial affairs as reasons for altering budgeting methods and justifying the methods implemented by the Budget Department. Like other municipalities around the nation, Lansing has experienced radically different trends in financing and financial stability throughout the 70's and early 80's than in the past. Beginning in the late 60's and early 70's, most cities began receiving significantly more federal money than they had in the past (Sbragia, 1983, 9-31). Lansing was no different. It is difficult to estimate, but during the 70's and early 80's, the City of Lansing probably received over 200 million dollars in federal aid in the form of grants (Model Cities, CDBG, EDA, urban renewal, and other miscellaneous grants), Federal Revenue Sharing, CETA and loans. In addition, Lansing's status an an automotive town means that it was hit harder than many midwestern cities during the 75-76 recession and the particularly difficult recession of the early 80's. Unlike many other midwestern municipalities, however, Lansing was not as "fiscally stressed" during these years which has been partially attributed to the sound and conservative fiscal management techniques built into the new budgeting system.

Yet there were other reasons why Lansing did not experience the dramatic decline of the early 80's that seemed to plague many other cities during this time. First, even though much of Lansing's welfare is tied to the auto industry, the diversity of the its economy and the fact that Oldsmobile is one of the more successful automobiles helped maintain the stability of local revenues. Second, the previous mayor, having a background in municipal accounting, was not opposed to raising

property taxes in anticipation of difficult times and lowering them when the economy recovered. As a result, a larger cushion of surplus funds was established to add to the revenues during these difficult times and few services including debt repayment had to be cut. Third, the City of Lansing used 1970 federal funds to pay for most of its development and capital improvement. As a result, it did not have to borrow a great deal of money and was able to maintain a high credit rating and low level of debt and interest payments.

Before explaining the remaining factor in Lansing's fiscal stability, it would be useful to first explain the organization and accounts of the Lansing budget. The most familiar accounting fund to the public is the general fund budget. It supports most of the line and staff departments of the city. But it also supports special administrative units and services such as human service and cultural agencies, some capital improvements, a general administrative account containing items such as fringe benefits that are not charged directly to the department, and it includes various miscellaneous accounts for emergencies and legal claims.

In addition to the general fund, the budget also includes various enterprise funds which are used to operate whole divisions or portions of departmental operations that receive funding from charges and users fees for services. These accounts are operated more like a private business than the general fund. The Operations and Maintenance Division of the Public Service Department has the largest amount of separate enterprise funds that support parking, sewage disposal, refuse collection, the service garage, and an asphalt plant. A third type of account is special revenue funds which are established because the

expenditure of this money is legally restricted by the state, the federal government or the city charter for specific purposes. Once again, the public service budget unit is a major holder of these accounts; but, in this case, the Planning and Municipal Development Department or any other department with major federal funding is also responsible for special revenue funds. Finally, one might consider the six-year Capital Improvement Plan, which is similar to a six year budget with recommendations for appropriations for each year, a separate type of account. But this plan is not binding and is simply a management tool. In most cases, capital improvements are funded on a project by project basis.

Returning to the discussion of the final factor in the city of Lansing's fiscal stability, this factor is its sound and conservative fiscal management techniques. With respect to general fund revenue sources, Lansing relies on multiple sources in order to assure greater stability. Between 55 and 60% of the general fund total comes from both property tax and income tax. Another 13 to 25 % is obtained from intergovernmental funds, while another 6-10% comes from contributions by the city's own public utilities company. State law allows municipalities to acquire, own and operate public service facilities for water, light, heat, power, sewage disposal and transportation (League of Women Voters, 1979, 86). In 1883, Lansing decided to take advantage of this law and created the Board of Water and Light which is one of the most lucrative and viable public utility companies in the state. The remaining percentage of general funds come from interest income, city fees for licenses and permits and the surplus fund balance.

Lansing's other sources of income include general obligation debt and revenue bonds. General obligation debt, which is used primarily to fund capital improvement projects, is guaranteed debt backed by the taxing powers of the city (Sbragia, 1981, 72). The current city charter limits net bonded indebtedness to 10% of assessed value of real and personal property. Yet because of the city's judicious use of its borrowing power and its reliance on federal funding, its debt has never exceeded 2 % of assessed valuation during the period of this study and actually decreased from 2% during the 70's. Only recently, now that much of the federal funding is gone, has Lansing again increased its general obligation debt. As a result of its debt policy, Lansing was one of the few cities in the midwest to maintain an AAA bond rating. This is the highest rating possible, and it maintained this rating until recently when it dropped to AA. Another source of income, revenue bonds, are not guaranteed but are backed by expected income from projects or services and therefore yield higher interest rates than general obligation bonds (Sbragia, 1981, 72). Lansing uses most of these revenues for enterprise fund projects.

In general, Lansing has also used sound methods to support its capital improvement projects. It has used all three recommeded methods of funding: pay-as-you-go, borrowing and set aside monies. Use of all three methods helps ameliorate the common cyclical pattern of increased spending during boom times and contraction during depressed times that seems to have caused financial problems for so many other midwestern cities (Steiss, 1975, 78-79). In addition, Lansing has done little short-term borrowing to meet general obligation expenditures because finance officials have ensured that taxes and other payments are

received prior to the need for expenditures.

As a final note, Lansing and the rest of Michigan's municipalities have escaped many of the tax limitation initiatives that have threatened the fiscal solvency of other cities. Currently, state law limits city property taxes to 20 mills and income tax to 1% of personal income for residents and .5% for non-residents. Only one out of eight proposed state tax limitation laws gained voter approval. The one that was approved requires voter approval only for any new general obligation debt. Moreover, the current mayor has promised not to raise property taxes. Yet in the midst of these expenditure constraints and public sentiment, Lansing and other Michigan municipalities have not been limited in establishing separate spending authorities which can issue revenue bonds of their own. Lansing currently has four such authorities, in addition to its public utility company, that fund its mass transit system, public housing and economic development.

CONCLUSION

The importance of presenting such a chapter as this is that it provides the reader and the researcher with information that will help define variables and anticipate analytical results. By examining the unique characteristics of Lansing that distinguish it from other cities, this information becomes part of the overall analysis of the budgeting process. More importantly, it provides a basis from which subsequent inferences about the model and the testing of this model are made. Such inferences are the focus of the next chapter. From this chapter, however, a number of salient events and characteristics can be immediately identified as important to the analysis of the model.

First, Lansing's three large and autonomous economic enterprises is a primary factor in the city's external environment. Although these enterprises do not directly affect budget decision, according to the theory used here, they will significantly influence the variables of wealth, certainty and departmental priorities. Specifically, Lansing will tend to be more certain and wealthier yet more alienated from its constituents than other cities of similar size in Michigan.

Secondly, the change in Lansing's budget process and charter may also have a significant affect on decisions and therefore should be examined more closely in the formal analysis. Testing may show the budgeting models should include these changes. Finally, an important third factor is Lansing's conservative financial management techniques. It is obvious from the information presented in this chapter and discussions with city officials, that these conservative techniques are a tradition to which everyone adheres. Although decisions about finance are different from budgeting decisions, and are performed by different people, they indirectly influence the budget process. This occurs because financial decisions supply many of the constraints and opportunities for the people making the budgeting decisions. Such constraints and opportunities are discussed in more detail in the next chapter.

CHAPTER FIVE

A MODEL OF STRATEGIC BUDGETARY DECISION MAKING

INTRODUCTION

Using the general specification of the model from Equation 3.1, together with information about the culture, budgeting process and financial history of Lansing presented in the previous chapter, the research model and its hypotheses are operationalized in this chapter. Also, a slightly different specification of the model, based on empirical rather than theoretical concerns, is presented. This new specification adds two variables to the model: the change in the organization of the budget process and the O&M Division of the Public Service Department. The decision to include these variables directly result from the analysis of Lansing budgeting and government presented in Chapter Four. In this chapter, these two conditions were identified as potentially very important to the outcomes of the City's budget decisions. However, the variables of greatest concern to the overall analysis are still wealth, uncertainty and priorities among budgetary units.

All three principal variables and the two special variables are operationalized as binary variables. To determine which of the 16 fiscal budgeting years can be considered "bad" years with respect to certainty and wealth and which can be considered "good" years, both quantitative and non-quantitative information is used. The

quantitative information is obtained from Lansing budgeting documents as well as federal statistical sources. However, because this data has many deficiencies, this analysis relies primarily on the non-quantitative information obtained from budget messages, financial memos and mayoral addresses to determine how budgeting officials perceive their fiscal environment. To determine which budget units are considered high priority units and which are low priority, only non-quantitative information from similar sources and interviews is used.

The new specification of the model is presented in the second section of this chapter. The third section operationalizes the variables of wealth-certainty and the priorities among the budget units as well as the two new variables. Finally, the fourth section of this chapter presents the statistical hypotheses of the effects of these variables on requests and appropriations. In addition, this section briefly discusses the general organization of the data base, the plans for both steps of testing the model, as well as any methodological problems that might be encountered.

RESPECIFICATION OF THE MODEL

The First New Variable: A Difference in Procedures Over Time

In addition to the variables already included in the model, two events that could significantly impact the budgetary decision making process were identified in Chapter Four. These events are the change in the City Charter in FY 1979-80 and the change in the organization of the budget process from an administratively decentralized process to an administratively centralized one. Because these events may alter

budgeting strategies, their potential effects on requests and appropriations should be examined and included in the research model.

As discussed in Chapter Four, the new charter could have affected the relationships between the appropriating units (Mayor's office and the Budget Department) and the budget units by increasing the influence of the appropriating units on the budget. As a result, the budget units might be more constrained in their decisions and would request less money while the appropriating units would cut a greater percentage of the request. Defining a binary variable to represent this change in conditions is relatively easy- the variable is zero for all years prior to FY 1979-80 and it is 1 for all years after and including 1979-80. However, this variable proposes some significant problems for interpreting the results of the analysis.

The problem is that the change in the Charter coincides directly with the severest recession of the 16 year testing period. Prior to the FY 1979-80 budget being formulated, this recession had been predicted; and, according to the City's budget messages, its finances had not yet fully recovered by as late as FY 1984-85, which is the last year of available data. The result of both events occurring in tandem is that the effects of the new charter could be confounded with the effects of the recession. If the effects of these events cannot be separated, then the new charter's impact cannot be tested and this variable should not included in the model.

The other special event that should be included in the model, the change in the organization of the budget process, is more difficult to define but easier to interpret. It is easier to interpret because the time of the budget change did not coincide with other significant

wealth-certainty events; but it is more difficult to define because the change in the budget process occurred over several years. Some budgeting officials have identified FY 1977-78 as the year in which most process changes occurred, while other officials have noted that the change occurred gradually between FY 1975-76 and FY 1978-79. To confuse the issue even further, the new charter year is sometimes designated as the year in which the change in the budget process was formally accepted because of the supporting structural changes in the government that occurred as a result of the new charter. According to the latter view, the new charter was the definitive event in establishing the new budget process.

Because of the controversy surrounding the exact time of the budget change, defining the variable in the most conservative manner possible seems to be the most reasonable course of action. As stated previously, the form of the variable used to represent the effects of a change in the budget process is binary. Given this requirement, the most prudent dividing point between zero and one is the first budget year that the person in charge of changing the process began implementing the initial stages of change. The reason this dividing point seems more judicious than others is because it is the only year among all potential years that one can assume a change in participants perceptions and expectations actually occurred. This year is FY 1975-76.

With respect to the effect of this variable on requests and appropriations, one can expect both the budget units and appropriating units to be less strategic and more "rational" regarding their decisions after the organizational change. For instance,

wealth-certainty and priorities, which represent sources of constraints and opportunities that facilitate strategic decision making, should not have as great an impact after the organizational change. This occurs because, theoretically, there is more central control over the budget process giving budget units less opportunity to be strategic and greater opportunity to base decisions on their needs or some other nonstrategic criteria.

A related hypothesis is that, on average, requests decrease after the change while appropriations increase. This occurs because departments are less likely to ask for items they do not need as part of an overall strategy, and therefore, appropriating units feel less compelled to cut as much from the requests. On the other hand, if neither of these hypotheses are confirmed, then the interpretation of whatever effects this special variable has on appropriations and requests becomes problematic. There is always the chance that the effects of this variable may also be confounded with the effects of wealth-certainty or another across time phenomena.

Despite the problems of interpreting the results, the variable 'change in the organization of the budgeting process' is included in the model as previously defined. The general hypotheses of the direct effects of this variable on requests and appropriations is summarized as follows:

1. Budget units request less relative to last year's appropriation after the budget change than prior to the budget change.

2. Budget units are appropriated more relative to their requests after the budget change than prior to the budget change.

The Second New Variable: A Difference Among Budget Units

A second variable that should be added to both the request and appropriation equations is a recognition of the Operations and Maintenance Division of the Public Service Department as very different from other budget units. Chapter Four mentions that much of the financial support for this budget unit comes from not only the general fund account, but also various enterprise and revenue fund accounts. Because officials in this budget unit must make large requests from more than one account, their strategies may be very different than those used by budgeting participants in other departments. Specifically, the participants in the O&M Division can obtain funds elsewhere because they have many more funding options to choose from than the general fund alone. As a result, these officials are more likely to request less relative to the previous year's appropriation and cut more from this year's request. The following hypotheses state these influences on request and appropriation decisions.

1. The Operations and Maintenance Division of the Public Service Department requests less relative to last year's appropriation than other budget units.

2. The Operations and Maintenance Division of the Public Service Department experiences greater cuts in their appropriations relative to their requests than other budget units.

The addition of these two new variables to the budgeting model means that its general specification is somewhat different from the one presented in Equation 3.1. Equation 5.1 presents these changes to the research model. Notice, however, that only the second stage of the model is presented in Equation 5.1 because the addition of the two new

EQUATION 5.1

RESPECIFICATION OF THE SECOND STAGE OF THE GENERAL MODEL

REQUEST DECISIONS

$$ER_{ti} = a_2 + a_3(WC*PD)_{ti} + a_4(P*PD)_{ti} + a_5PD_{ti} + a_6WC_{ti} + a_7P_{ti} + a_8OR_{ti} + a_9PS_{ti} + er_{ti}$$

APPROPRIATION DECISIONS

$$EA_{ti} = b_2 + b_3(WC*PD)_{ti} + b_4(P*PD)_{ti} + b_5PD_{ti} + b_6WC_{ti} + b_7P_{ti} + b_8OR_{ti} + b_9PS_{ti} + ea_{ti}$$

VARIABLES AND OTHER EQUATION ELEMENTS

WC- wealth-certainty
PD- previous decision
P- priority
OR- budget organization change
PS- Public Service budget unit
ea- error term for requests
er- error term for appropriations
t- time
i- budget unit
a,b- coefficients of the independent variables

variables affects only the second stage. Stage one of the model for both request and appropriation decisions remains the same.

OPERATIONALIZATION OF THE VARIABLES

Certainty-Wealth

Recall that the second and third chapters argued that uncertainty and wealth should be measured as one variable because they are too interrelated to be considered separately. Although they are distinct analytical concepts, human perception of these two conditions may be difficult to separate from one another. For instance, high wealth can mitigate the effects of uncertainty caused by complexity or instability in the environment by creating enough surplus resources to mediate any of these latter environmental conditions. As a result, a person may perceive less uncertainty than if there were not enough surplus resources to act as a cushion against environmental changes and complexity (Cyert and March, 1963, 38). Based on the content of some of the Mayor's Budget Messages, State of the City Addresses and the Finance Director's city finance memos, there appears to be empirical support for this claim.

These documents demonstrate that uncertainty and low wealth are frequently equated, although they also demonstrate that budgeting officials occassionally perceive them as unique entities. Comments made by the two mayors in different budget messages reveal this dual set of perceptions. In his budget message for FY 1974-75, one mayor stated that current times were "trying" because high inflation and unemployment were creating one of the "most economically unstable periods in this generation" (City Council Proceedings, 1974, 217). He

goes on to mention that this instability creates a lot of uncertainty for the city. In contrast, during his FY 1983-84 budget message, a different mayor stated that this year was a period of extreme economic uncertainty because of factors primarily associated with wealth such as lower Federal Revenue Sharing and income tax revenues (City Council Proceedings, 1983, xxx-xxx). Previously, instability has been defined as factor of uncertainty rather than wealth, but this demonstrates how the two concepts are perceived similarly.

Because the effects of uncertainty and wealth on the perceptions of budgeting officials is difficult to separate, these variables are measured as one variable in which the two conditions contribute equally to identifying "good" years and "bad" years. To measure this variable, all 16 years of data (FY 1969-1970 to FY 1984-1985) are examined according to separate quantitative indicators and common non-quantitative indicators of both certainty and wealth. The quantitative indicators include inflation, unemployment and assessed valuation. The non-quantitative indicators are assessments of City Budget Messages, State of the City Addresses and miscellaneous financial memos for the same years. The common certainty-wealth variable that results from considering both quantitative and non-quantitative indicators is binary with a value of zero indicating a "bad" year and a value of 1 indicating a "good" year.

The use of dichotomous indicators in decision-making, and especially budgeting, is acceptable in many instances. Davis, Dempster and Wildavsky sacrificed information by using binary variables rather than continuous variables as measures of the external environment. Their argument in favor of this relies on scientific evidence

indicating that the budget process responds to discrete shocks which are best modelled by binary variables (Davis, Demspter and Wildavsky, 1974, 428).

A more compelling argument in favor of binary variables is that discrete measures of the environment are more consistent with the theory of bounded rational decision making. Decision makers' use of categorization or factorization of information, their consideration of limited alternatives, and the technique of satisficing imply that they are not likely to consider a continuous range of alternatives (March amd Simon, 1958, 38, 83). A discrete or binary choice of alternatives is more likely. This argument is also supported by Padgett who modelled budgetary search as a binary choice between two alternative sets of possible decisions. For reasons similar to those presented here, he claims that budgeting is a process of making choices among "discrete salient alternatives" (Padgett, 1980, 364). On the basis of these arguments, wealth-certainty, as well as many of the other variables in the research model, are measured as binary variables.

In the following subsections, separate quantitative measures of wealth and certainty are examined. The method of combining these measures with the non-quantitative measures to obtain a binary indicator of wealth-certainty for each year is also explained. Finally, the priority variable and the other remaining variables in the model are operationalized.

Wealth: Quantitative Analysis

In Chapter 3, Wildavsky's definition of wealth was presented. Recall that he defines wealth as the amount of resources that a system

can potentially mobilize for spending at any particular time (Wildavsky, 1975, 10-11). Wealth was then further defined according to three principal elements: the amount of expected incoming resources, the system's ability to control its output of resources, and the amount of "slack" or surplus resources commanded by the system. To measure the first element, the amount of expected incoming resources to the City of Lansing, three quantitative indicators are used: the City's equalized assessed valuation (as a measure of property tax), the City's expected income tax revenue, and either the expected or actual intergovernmental revenues for both general and special funds (revenue or enterprise). Element number one for wealth is discussed first.

A. Expected incoming resources

The reason for choosing three separate indicators of revenue, rather than simply the overall expected revenue, is that total revenue is controlled, to a certain extent, by governmental decision makers. As a result of being able to control the level of these incoming resources, using total revenue as a measure of wealth records officials' abilities to mitigate the effects of changes in available resources as much as it measures their perceptions and reactions to available resources. Because officials can alter property tax levels and charges for services and fines, the variable 'total revenue' actually confounds the measures of wealth and the officials' reactions to wealth. An added problem concerns the city's fund balance (surplus funds) which officials can also add to total revenue to offset any decrease in these collected resources. For these reasons, only measures of revenue over which officials have little control are used to measure

expected incoming resources.

To measure one of the most important sources of income, property tax, the City's equalized assessed valuation is used rather than the total amount of property taxes received. Because the City can increase or decrease the amount of revenue obtained from property taxes by changing the property tax levy within the bounds set by the State, total revenues from property tax is not an acceptable variable. On the other hand, city officials have little control over the assessed valuation which is a measure of the potential taxing power and revenues received from property.

The other large source of operating revenues for the City is income taxes. Because the rate of income tax levied is mandated by state law, and not entirely a matter of the City's discretion, the level of revenues from income taxes is the second measure of incoming resources used here. The last measure of incoming resources, which is intergovernmental revenues (special and general funds) that are not controlled by the City, requires some explanation.

Special funds, in addition to general funds, from intergovernmental sources should be considered for two reasons. First, the revenues and expenditures of both funds are not independent of one another; and, second, special funds from intergovernmental, nongeneral fund sources constitute a large portion of all revenues received and expenditures made by the City during the 1970's. During this time, special funds became, in effect, an uncontrollable surplus fund for the general fund. Programs and personnel that were not be covered by the general fund were financed through special funds. Similarly, there are some projects such as highway repair that if not totally funded by special

funds, were subsidized by the general fund. As a result of the integral role of special and general fund intergovernmental revenues in the City's finances, an increase or a decrease in their level could significantly affect officials' perceptions of wealth or poverty.

Because it is difficult to determine exactly how much money from all sources of intergovernmental revenues was received by the City each year, only the continuous yearly intergovernmental revenues are considered in this third measure of incoming resources. These funds represent revenues that participants expected to receive each year. These funds also tended to be the largest sources of intergovernmental revenues in any year. The specific items used in this third measure are: Enterprise Account 51, CETA, state shared revenues, Federal Revenue Sharing, Model Cities, Community Development Block Grants, Single Business Tax as well as any interest from the fund balances that was counted as usable revenue for a particular fiscal year. With the exception of CETA funds, in which actual expenditures for a fiscal year are the measures used, all other intergovernmental funds are measured as the expected funds for the coming fiscal year. In other words, every effort was made to obtain expected values at the time the budget was prepared rather than the actual values that were received at the end of the fiscal year.

B. Control over the output of resources

The second element of wealth, the system's ability to control the output of resources, is also measured by three separate variables. These variables are: the average increase in wage levels among workers in three of the City's four unions, the level of fringe benefits paid

by the City to its employees, and the annual rate of inflation. Generally, if the City is to control its output of resources, it must maintain some discretion over three important expenditure items. These items are wages, benefits, and the costs of supplies and services. One factor that can greatly reduce the City's control over wages and benefits are the unions which can significantly increase expenditures for these two items. For this reason, levels of wages and benefits are considered as part of the measure of the City's capacity to control outputs. As expenditures for wages and benefits increase, relative to all other expenditures, the City has less discretionary money available. (Between 1968 and 1985 the proportion of total expenditures for fringe benefits increased from approximately 10% to 23% making fringe benefits almost a third of all current personnel expenditures.)

To measure levels of wages, an average wage rate for each of the 16 fiscal years was calculated. This average was computed by first taking a non-random sample of wages for various types of personnel from three of the four city unions. This same sample was then used each year. Thus, the same types of personnel were chosen for all 16 years.[4] The unions examined were the FOP (police), the IAFF (fire fighters) and the AFSME/LEIU (skilled, semi-skilled and general laborers). Wage levels for the City's fourth union, the Teamsters, could not be obtained. Within the FOP the wage for the lowest level of a policeman I was chosen. For the IAFF, the wage for the lowest level of a Fireman I was chosen. And for the LEIU, the lowest level of 10 different occupations was chosen. The wage rate increases for the 10 LEIU occupations were then averaged to obtain three separate wage rate increase measures.

To obtain one indicator of increases in wages among all city

workers, as a measure of the loss of control over expenditures, all three union wage rate increases were averaged. To measure level of benefits, as a second indicator of loss of control over expenditures, the levels of benefits for all occupations was used. The third factor identified as a potential influence on discretionary spending is increased spending for supplies and services due to inflation. This last indicator of control over the outpur of resources was measured with two variables.

Although the City has greater control over expenditures for supplies and services than for wages and benefits, the influence of inflation on spending is still very great. A city can mitigate the effects of inflation by buying different products or brands or simply doing without the product, but eventually increased inflation will result in increased overall costs. To measure inflation, the average of the Consumer's Price Index and the Producer's Price Index, each computed on a 1967 base, was calculated. Because the City buys both consumer and producer goods, both indices must be considered. Examples of consumer goods that the City may buy are automobiles, furniture and fuels while the City also buys paper, hardware, metal products and tools which the federal government recognizes as producer goods.

C. Comparing expected incoming resources and control over the output of resources

To compare all three input and output variables of each indicator, each variable was computed as a percentage increase or decrease from the previous year. Tables 5.1 and 5.2 show these computed values as well as the percent change in overall revenues and expenditures. While

TABLE 5.1

EXPECTED INCOMING RESOURCES:
INPUT OR REVENUE MEASURES OF WEALTH
AS PERCENT CHANGE FROM THE PREVIOUS YEAR

Fiscal year	inter-government	assessed valuation	income tax	all revenues [1]
1969-70	8.4	4.3	26.8	14.3
1970-71	47.9	46.1	5.8	8.1
1971-72	58.5	2.2	1.8	9.0
1972-73	47.2	2.0	1.8	2.7
1973-74	-35.5	4.0	8.8	12.4
1974-75	21.5	5.5	0.0	7.0
1975-76	49.3	4.6	3.0	4.7
1976-77	5.0	-8.9	9.4	8.9
1977-78	15.2	3.3	25.7	8.8
1978-79	-3.4	10.7	39.2	19.8
1979-80	-6.4	6.0	2.0	9.0
1980-81	-6.4	14.4	12.0	13.1
1981-82	5.3	8.2	0.0	1.3
1982-83	-14.9	10.1	5.7	.26
1983-84	17.3	2.7	-5.2	6.5
1984-85	7.4	1.3	15.1	4.4
mean	13.5	7.3	9.5	8.1
stnd. dev.	26.1	11.5	11.9	5.1

source: City of Lansing annual budget summaries

1- These values do not include the general fund, fund balance contribution

these latter values are not included in the wealth measure, they are presented here for comparison and later referral. Also, the means and the standard deviations of the percent changes for each variable are presented. This data was obtained from budget summaries that the City publishes anually.

The input values in Table 5.1 present an ambiguous picture of available revenues. They portray the dramatic increase in intergovernmental funds from 1970-1976 and the overall decline of these same revenues from 1978-1983. Assessed valuation showed an extremely large increase in the 1970-71 fiscal year which can be attributed to a change in state law in which assessed value was altered from 40% to the state norm of 50% of actual market value. Other than this salient feature, the only noticeable change in input values occurs between 1978 and 1983 when the assessed value increased more than its average. First impressions might indicate that this greater than average change in assessed value offsets the decline in intergovernmental funds, but this is not the case. The late 70's was the height of the public's tax cutback efforts when many tax limitation referendums were placed on the ballots for voter approval. As a result, property tax levy's were reduced by the City which minimized the effect of an increase in assessed value.

A further indication of a trend toward depressed revenues in the late 70's and early 80's can be seen in income tax revenues. Between 1979 and 1984, these revenues were lower than average. In fact, income tax revenues in FY 1983-84 actually decreased by 5.2%. Prior to this trend of depressed revenues, there were two years of large increases in income tax revenues. The remaining early to mid 70's figures display

the effects of a long automotive worker's strike and the recession brought on by the energy crisis. The strike began in 1970, lasted until late 1971, and affected almost every industry in Lansing. As a result, income tax revenues for FY 1971-1972 and FY 1972-1973 were much lower than average. Additionally, the effects of the mid 70's recession are seen in the lower than average income tax revenues for FY 1974-75 and FY 1975-76.

Table 5.2 presents the computed values for the control over the output of resources. For the Producer Price Index (PPI) and the Consumer Price Index (CPI), the data was obtained from the Monthly Labor Review (March 1984 and 1985), and the Handbook of Labor Statistics (1983). The figures on union wages were obtained from individual departmental files and records from the City's Personnel Department. The values of the fringe benefits were obtained from the yearly published budget books.

Like the revenue figures, the output values presented in Table 5.2 do not give a clear picture of trends in wealth. Inflation was relatively low from 1970 to 1973 and relatively high from 1974 to 1981. It then decreased for the remainder of the data collection period. Union wages had the most stable values of all input and output variables as indicated by the low value of its standard deviation. In contrast, fringe benefits had one of the least stable 16 year trends in which the values were predominately high. The exceptions to this are two declining fringe benefit values in the late 70's, which appear to be deviant cases, and the low values in FY 1982-83 and FY 1983-84. These low values follow the trend of the recession of the early 80's.

Because there appears to be no easy method of comparing the input

TABLE 5.2

CONTROL OVER THE OUTPUT OF RESOURCES:
THE OUTPUT OR EXPENDITURE MEASURES OF WEALTH
AS A PERCENT CHANGE FROM THE PREVIOUS YEAR

Fiscal Year	avg. PPI and CPI [1]	union wages	fringe benefits	all expenditures
1969-70	4.6	6.1	7.7	14.4
1970-71	5.0	2.5	23.5	6.8
1971-72	3.6	1.4	23.0	7.9
1972-73	3.8	5.7	40.3	3.6
1973-74	9.3	6.8	18.0	22.5
1974-75	15.2	9.4	14.3	9.7
1975-76	9.2	7.3	36.3	1.9
1976-77	4.8	6.9	7.5	8.0
1977-78	6.3	5.9	-19.8	9.3
1978-79	7.7	9.7	21.1	16.3
1979-80	11.9	6.8	-1.1	10.3
1980-81	13.8	10.7	10.6	10.7
1981-82	9.7	5.8	27.6	6.1
1982-83	4.0	4.2	2.7	-6.5
1983-84	2.1	3.8	.39	6.1
1984-85	3.5	6.8	27.9	4.8
mean	7.1	6.2	15.0	8.2
stnd. dev.	4.0	2.5	15.4	6.4

source: PPI and CPI- Monthly Labor Review (March 1985 and 1985), Handbook of Labor Statistics (1983)
union wages- Personnel Departmental files
fringe benefits and all expenditures- City of Lansing annual budget summaries

1- These values are for non-fiscal years i.e. the values for FY 1969-1970 are actually values for all of 1969. This includes the first 6 months of 1969 which is part of the previous fiscal year.

(incoming resources- Table 5.1) and output (out-going resources- Table 5.2) values to ascertain the government's overall ability to mobilize resources, the three input and output figures are averaged separately and then subtracted from one another. The benefits of combining these figures into one value are, first, it provides a single figure with which to gauge the overall effects of resources and demand which can then be compared to the other wealth and certainty variables. Second, averaging is a method of combining and recognizing the effects of extreme and moderate values.

The methodological problems with this procedure are that it assumes all variables can be treated alike in the measurement of wealth. For instance, it may be that intergovernmental funds are more important in determining a budgetary participant's perceptions of wealth than is assessed valuation. However, solving this problem is difficult because any method of gauging the contribution of each variable to budgeting officials' perceptions would be equally problematic and very time consuming. But there is one factor that helps ameliorate the impact of these problems on the overall analysis of wealth-certainty. By using the other quantitative and non-quantitative measures in conjunction with the measures in Tables 5.1 and 5.2, the absolute effect of such bias on the measure of wealth is reduced. Yet, despite this partial solution, the quantitative measures of wealth-certainty must be interpreted cautiously.

In Table 5.3, the data comparing the input and output averages for wealth are presented. These measures were computed by subtracting the input average from the output average for each year. The higher the value obtained from the subtraction, the wealthier the government at

TABLE 5.3

COMBINED INPUT AND OUTPUT MEASURES OF WEALTH AND THE AMOUNT OF SLACK RESOURCES (FUND BALANCE)

Fiscal Year	avg. input-avg. output	fund balance
1969-70	7.1	mod.
1970-71	23.0	mod.
1971-72	10.7	mod.
1972-73	.4	high
1973-74	-19.0	high
1974-75	-4.0	high
1975-76	1.4	high
1976-77	-4.6	high
1977-78	9.1	mod.
1978-79	2.7	mod.
1979-80	-5.4	mod.
1980-81	-5.0	low
1981-82	-9.9	low
1982-83	-3.3	low
1983-84	2.1	low
1984-85	-4.8	low
mean	.03	-
stnd. dev.	9.6	-

source: average input-output- Table 5.1 and 5.2
fund balance- conversation with Finance Department and Internal Audit Department employees

that time. Examining the combined input-output figures, it is evident that the early 70's and late 70's were relatively good years, while the early 80's were relatively bad years. Also, the effects of the recession years FY 1973-74 and FY 1974-75 are apparent in these figures.

D. Slack or surplus resources

The third element of wealth, the amount of slack or surplus resources resources owned by the system, is measured by the level of the fund balance for the general fund. Unfortunately, the actual dollar value of the level for all years could not be obtained because the level fluctuates greatly throughout the year, and accounting procedures have altered enough to make the dollar comparisons meaningless. Instead, the Mayor's Budget Messages and statements from finance and internal audit personnel who were employed during the data collection period, are used to determine the general level of the fund balance for each year. This level was categorized as low, medium and high.

Table 5.3 displays the levels of the fund balance for the data collection period. Notice that the fund balance was evaluated as moderate during the early 70's when the large influx of intergovernmental funds was beginning; and it was categorized as very high during the middle 70's as the intergovernmental funds continued. The high level of the fund balance helped mitigate the effects of the mid 70's recession, the long automotive strike, the high inflation and rapid increase in fringe benefits occurring during this period. But, as intergovernmental funding declined, and the previously mentioned

fiscal problems drained the fund balance, there was no surplus or slack to help the City during the early 80's recession. As a result, the fund balance hit its lowest point of the 16 year period during this time, and it has not fully recovered to this date.

Certainty: Quantitative Analysis

In addition to wealth and poverty influencing the budgeting participants' perceptions of "good" and "bad" years, certainty or uncertainty caused by stable or unstable economic conditions is an important consideration. Chapter Three argued that the stability of both resource and demand elements in the environment affect budgeting officials' perceptions. These demand and resource variables are expected incoming resources, control over the output of resources, and slack or surplus resources (as presented in Tables 5.1, 5.2 and 5.3). One way of measuring the stability of these variables is to calculate them as a percent change from the previous year. This has already been done for the quantitative analysis of wealth. However, instead of examining the variables as a group, as was done with the yearly combined averages of the wealth measures, these same variables will be evaluated separately and then compiled to determine trends in stability-certainty or instability-uncertainty for the data collection period.

To evaluate whether governmental officials perceive a year as stable or unstable, an indication of overall yearly trends in relation to some norm must be obtained. Because intendedly rational decision makers develop their calculation techniques in response to past experiences, their own evaluation of certainty or stability also

depends upon past experiences with a changing environment. As a result of these experiences, governmental officials develop expectations about what is a normal or moderate stable year. Each year is then evaluated relative to this expectation: a year that is perceived as more stable than normal is evaluated as very stable, and a year that is less stable than normal is evaluated as unstable. To approximate officials' thinking about stability and unstability, the mean percent change of each input-output variable is calculated and operationalized as their perception of normal stability. The standard deviation of each variable is then used as a measure of stability or instability relative to the norm.

Notice that Tables 5.1 and 5.2 display the means and standard deviations for each of the six input-output variables. Accordingly, each year can be classified as high change, moderate change or low change. Any value that is more than one standard deviation above or below the mean is classified as low certainty (high change). A value that is within one-half of the standard deviation above or below the mean is classified as high certainty (low change). Values between one-half standard deviation and one standard deviation are classified as moderate certainty.

In addition to the six variables in Tables 5.1 and 5.2, one more was added to the overall evaluation of uncertainty. This variable is the percent change in unemployment. According to the Mayoral Budget Messages, unemployment is very important in current budget considerations. To maintain consistency with the other variables and evaluate the stability of this measure, percent change in unemployment is used rather than the absolute level of unemployment. The values of

this variable are taken directly from the Michigan Employment Security Commission and are presented in Table 5.4a.

After determining whether each yearly value of each of the seven resource-demand variables could be classified as low, medium or high, the number of high's, medium's and low's were tabulated. The results of the tabulation are displayed in Table 5.4a. The asterisk by one of the figures for each year indicates the overall evaluation of that year according to the number of low, medium and high evaluations. For instance, Fy 1969-70 is considered a high certainty year as noted by the asterisk in the high column by the number "6." Fiscal year 1980-81 is considered a low certainty year. Table 5.4b summarizes the method of arriving at the overall evaluation of each year.

The final variable included in the overall analysis of certainty, which is also presented in Table 5.4a, is the absolute percent of the work force unemployed. Although percent change in unemployment is already considered in the separate 7 variable analysis of certainty, it is different from the absolute level of unemployment. When unemployment is high, certainty is low regardless of whether the change in unemployment from the previous year is high or low. Likewise, officials may not consider an unemployment level of 6.7 high by current standards, but they may consider it a serious problem if this represents a change of 131% from the previous year. Again, because of the importance of the unemployment variable in the budget messages, and the difference in phenomena represented by the absolute level of unemployment and the percent change in unemployment, both variables are included in the analysis of certainty.

The methodological problems associated with this technique of

TABLE 5.4a.

CERTAINTY MEASURES FOR 16 FISCAL YEARS:
THE CATEGORIZATION OF SEVEN DIFFERENT MEASURES, % CHANGE
IN UNEMPLOYMENT AND PERCENT UNEMPLOYED

Fiscal Year	certainty: 7 variables combined low	med.	high	% pop unemployed[1]	% change pop unemployed[1]
1969-70	1	0	*6	2.9	-17.1
1970-71	3	*1	3	6.7	131.0
1971-72	1	1	*5	6.7	0.0
1972-73	2	0	*5	6.4	4.4
1973-74	1	3	*3	5.2	-18.8
1974-75	3	*2	2	7.9	51.9
1975-76	3	*2	2	11.9	50.6
1976-77	1	2	*4	8.8	-26.1
1977-78	1	2	*4	8.0	-9.1
1978-79	3	*2	2	6.5	-18.8
1979-80	1	1	*5	6.7	3.1
1980-81	*4	1	2	10.3	53.7
1981-82	1	3	*3	12.5	21.4
1982-83	1	1	*5	14.2	13.6
1983-84	0	2	*5	11.0	-22.5
1984-85	1	3	*3	8.7	-21.9
mean				8.4	12.0
stnd dev.				2.9	41.9

* Indicates the overall evaluation for the year according to the 7 certainty measures

1- These values are for non-fiscal years, i.e., the values for FY 1969-70 are actually values for all of 1969. This includes the first 6 months of 1969 which is part of the previous fiscal year.

source: Unemployment- Michigan Employment Security Commission documents and Tables 5.1, 5.2.

TABLE 5.4b

SUMMARY OF THE METHOD OF CATEGORIZING EACH YEAR AS LOW, MEDIUM AND HIGH CERTAINTY

The Seven Variables Categorized as Low, Medium and High Certainty

Variable	Source
1. Intergovernmental	Table 5.1
2. Assessed Valuation	Table 5.1
3. Income Tax	Table 5.1
4. Avg. PPI and CPI	Table 5.2
5. Union Wages	Table 5.2
6. Fringe Benefits	Table 5.2
7. % Change Population Unemployed	Table 5.4

The Method of Categorizing Each Variable as Low, Medium and High Certainty

Criteria: If the value of the variable is:	Decision
more than 1 st. dev. above or below mean of the wealth measure	LOW
between 1/2 and 1 st. dev. above or below mean of the wealth measure	MEDIUM
between 1/2 and 0 st. dev. above or below mean of the wealth measure	HIGH

evaluating certainty are similar to the ones with the method of averaging that was used to construct the wealth variable. These problems are, first, combining the seven certainty variables in the manner indicated assumes that each of the variables are perceived in the same way by budgeting officials. Secondly, it assumes that all the variables contribute equally to the official's perceptions of the certainty of the environment. Although both of these problems are a serious threat to the validity of the final evaluation of certainty and wealth, this certainty variable is only one factor among both quantitative and non-quantitative variables that are used to distinguish between high and low wealth-certainty years. Because certainty and wealth are determined by multiple measures, the effects of these methodological problems are somewhat mitigated in the final evaluation. However, the analysis of both quantitative measures of certainty and wealth should be used and interpreted very carefully.

Wealth-Certainty: Non-quantitative Analysis

To analyze "good" and "bad" years non-quantitatively, the Mayor's Budget Messages, his State of the City addresses and other financial documents were generally evaluated. The results of this non-quantitative analysis, in the form of summaries of the documents, are displayed for each fiscal year in Table 5.5. The summaries are brief descriptions of the main theme or tone of each document with respect to the City's financial condition in that year. In many cases, the same words that were found in the documents or paraphrases of parts of the documents are used in the summaries.

In evaluating the statements in Table 5.5, it is important to

TABLE 5.5

SUMMARY OF THE ANALYSIS OF BUDGET DOCUMENTS FOR 16 FISCAL YEARS

Fiscal Year	Summary
1969-70	Economic conditions are seen as "comfortable." Much discussion of the expansion of services and programs.
1970-71	Mayor calling for "drastic" reductions in spending due to uncertainty and "soft economy." However, some new departments were created and others expanded.
1971-72	Have an uncontrollable situation due to revenue loss and expenditure increase. "Soft economy" but hopeful progress
1972-73	The situation is tenuous but under control
1973-74	Nothing of significance mentioned about the economy. A situation of calm progression.
1974-75	Recession!!! These are "trying times" because of the energy crisis and unemployment. "The most economically unstable period in this generation."
1975-76	"Tight economy" because of fiscal problems. There is little progress on new programs.
1976-77	These messages seem to present a mixed set of conditions: Federal grants are closing out, economy is much better but there are budget problems and new grants.
1977-78	Economy on the "upswing." Many capital improvement projects. Lansing is fiscally very sound and there is a surplus of funds.
1978-79	Economic upswing has levelled off. There are reductions in Federal funds and fund balance.
1979-80	Need to "retrench" because of predicted recession. CDBG and CETA drastically reduced. Need careful planning for the future. Will have progress but at a slower rate.
1980-81	"Most difficult financial problems" of the previous Mayor's 10 year administration. The fund balance is gone.
1981-82	"We are lucky to be financially solvent." The deep recession has causd much uncertainty and require across the board cuts.
1982-83	"The worst economic conditions since the 1930's!!! First budget in memory where in grip of "real financial crisis."
1983-84	Signs of growth and prosperity but much economic uncertainty. Have seen worst of recession. Some economic optimism.
1984-85	Optimism with uncertainty. Economy is expanding but revenues are still low.

source: Mayor's budget messages, State of the City addresses, other financial documents

remember that they reflect the perceptions of executive level officials. This is especially important when considering FY 1969-70 to FY 1981-82 because of the previous mayor's reputation of not being entirely believable about the true financial status of the City. Some officials felt that he tended to evaluate conditions as being worse than they actually were; and therefore, these statements may not reflect the average perceptions of other budgeting officials. Despite these problems, the brief summaries are very revealing for their depictions of some of the perceptions of the City's condition over 16 fiscal years. Together with the quantitative analysis the summaries are used to classify each of the years as high or low wealth-certainty.

Operationalization of Wealth-Certainty

The years which are economically bad are relatively easy to identify both quantitatively and non-quantitatively. The poorest economic conditions are from FY 1980-81 to FY 1982-83 with FY 1982-83 being the worst of the three. Although certainty, in terms of absolute change, is high for all three years, the average input-output values are negative, fund balances are low, and unemployment is high. Moreover, these years received some of the worst evaluations in Table 5.5. The reason for labelling FY 1982-83 as the worst of the three is that it is the first budget for the first new mayor in 12 years. This is a condition which, in itself, creates a lot of uncertainty. Furthermore, the year is the lowest point in the recession. If few budgeting officials doubted the existence and effects of the recession in its initial stages, their minds would have changed by 1982.

Other low wealth-certainty years are FY 74-75 and FY 75-76 which

are identified in the summaries as the worst years of the energy crisis. In both cases, relative input-output averages are low, unemployment is high and certainty is moderate. Although somewhat questionable, two other years that might be considered bad years are FY 1970-71 and FY 1973-74. Fiscal year 1970-71 could be a low wealth-certainty year based on the analysis in the summaries while FY 1973-74 is the year with the lowest input-output average.

The best fiscal years are FY 1978-79, FY 1969-70 and FY 1977-78. The analysis of these years in the summary was very upbeat, and the other wealth-certainty figures tended towards high wealth and high certainty. Other good years are FY 1984-85, FY 1971-72 and FY 1972-73 based upon quantitative and non-quantitative analyses. The indicators for the three remaining years, FY 76-77, FY 1979-80 and FY 83-84, are very ambiguous for both types of analyses. Therefore, it is difficult to determine how budgeting officials perceive these years.

Table 5.6 displays the operationalization of the wealth-certainty variable based on the analyses of the quantitative and non-quantitative indicators. The years are grouped according low, high and mixed categories with the mixed column representing the years with ambiguous indicators. All low and mixed years are assigned a value of 0 for the binary wealth-uncertainty variable, and all high years are assigned a value of 1. Notice also that the years are grouped within the columns of low and high. The first group are the years hypothesized to be the most extreme in their category of low or high, while the last groups are those hypothesized to be the least extreme cases in their respective category.

TABLE 5.6

OPERATIONALIZATION OF THE WEALTH-CERTAINTY VARIABLE (WC)

Low (WC = 0)	High (WC = 1)	Mixed (WC = 0)
FY 82-83 (very low)	FY 71-72	FY 76-77
	FY 73-73 (lowest	FY 83-84
FY 74-75	FY 84-85 high)	FY 79-80
FY 75-76 (moderate		
FY 80-81 low)	FY 69-70	
FY 81-82	FY 77-78 (very high)	
	FY 78-79	
FY 70-71 (highest		
FY 73-74 low)		

Operationalization of Priorities Among Budget Units

As with the wealth-certainty variable, budget unit priorities is operationalized as a binary variable. To identify high and low levels of priorities among budget units, information obtained from interviews and city budgeting documents was used to estimate the perceptions of budgeting officials regarding the external or "cultural" demands of the environment. As expected, the city seems to value its visible public services such as police, fire and street maintenance the most, while placing a lesser value on its other line and staff services.

This was evident throughout the budget and other city documents which, in general, emphasizes public services more than other types of services. In fact, despite its "small town" characteristics, it seems that Lansing's governmental officials take their public services very seriously. The City has a relatively low national insurance rating because of the quality of fire and police services, and its paramedic units have won national awards. It also has an extensive park service in comparison to other cities of similar size.

The operationalization of the priority variable is based on 48 basic budget units. However, the actual number of cases of analysis is different because four of these units altered their organizational structure at one time or another during the 16 year period. As a result, these units are not the same for all 16 years. In such instances where the budget unit's structure changed during the period of analysis, the unit was divided into two separate units in which the second unit came into existence the year after the original unit's organizational structure changed. This creates two cases of analysis out of one budget unit. It also means that 52 budget units are

analyzed rather than 48 (48 + 4). All 52 units and descriptions of their services are listed in Appendix B.

Table 5.7 presents the division of the 48 units into low, high and moderate priority categories. The low and moderate budget units are assigned a value of zero for the binary priority variable, while the high budget units are assigned a value of one. The reason for initially dividing the budget units into three rather than two categories is a suspicion that budgeting officials may perceive a greater distinction among the budget units than simply low and high. Although the initial priority variable is binary, the three categories are presented for later reference and possible testing.

For the high priority category, the budget units are the basic service units within the Police and Fire departments. Also, the division within the Public Service Department that handles street maintenance is included in this category; but it is separated from the other high priority units because of its special status with nongeneral funds that was discussed previously. Specifically, the large number of nongeneral funds received by the Operations and Maintenance Division may mean that it is treated more like a low priority unit or even a step lower than the low priority units. This should not indicate that this unit is a low priority unit according to environmental demands. It does mean that budgeting officials perceive this unit differently than the other high priority units because of its special circumstances. The moderate category contains the visible public services that are not considered as important by the budget officials as the high priority categories, while all other budget units have a low priority.

TABLE 5.7

OPERATIONALIZATION OF THE PRIORITY VARIABLE (P)

High (P = 1)	Low (P = 0)	Moderate (P = 0)
Fire- Suppression	All Others	Parks and Rec- Parks
Fire- Ambulance		Parks and Rec- Recreat
Police- Uniform		Public Service- Trans-portation
Police- Investigation		Community and Economic Development- Planning
Public Service- Operations and Maintenance		Community and Economic Development- Devlpmnt
		Community and Economic Development- Building and Safety
		Emergency Services

source: Interviews with city officials and budgeting documents

Other Operationalizations: Previous Decisions, Public Service, Budget Organization, the Dependent Variables and the Base

Table 5.8 operationalizes the two variables of the Operations and Maintenance Division of the Public Service Department and the change in the budget process from a decentralized to a centralized one. For the Public Service division, a value of one is assigned to that budget unit while all other budget units are given a value of zero. For the variable budget organization, all years prior to FY 1975-76 are assigned a value of zero and the years after are given a value of one.

Another variable that is operationalized in this year is the cue of the previous budget decision. Chapter Three argues that previous changes in appropriations and requests are important elements of budget calculations for budgeting officials in many types of governments. The chapter then argues that this variable should be included in the model. The manner in which this variable is defined depends upon which

For the equations modelling request decisions, the variable of previous decision is defined as the difference between the previous year's appropriation and the appropriation of two years ago ($Appropriation_{t-1}$ - $Appropriation_{t-2}$). The proposed model assumes that the officials making requests examine the change in appropriations they received last year over the previous year. For the equations modelling the appropriation decisions, the variable of previous decision is defined as the difference between this year's request and last year's appropriations ($Request_t$ - $Appropriation_{t-1}$). This definition assumes that the officials making appropriations examine the increase or decrease in the requests from last year's appropriation.

Two more sets of variables defined here are the dependent variables

TABLE 5.8

OPERATIONALIZATION OF PUBLIC SERVICE (PS), BUDGET ORGANIZATION (OR), PREVIOUS DECISIONS (PD), AND THE DEPENDENT VARIABLES (R, A, ER, EA)

VARIABLE	DEFINITION	OPERATIONALIZATION
Public Service-Operatns & Maintnce (PS)	distinction between the O&M Division and the other budget units because of funding from non-general fund sources	1- this budget unit 0- all other budget units
Budget Organization (OR)	change in the budget process from centralized to decentralized	1- all fiscal years > FY 1975-76 0- all fiscal years < FY 1975-76
Previous Decision (PD)	compensation for previous decisions or strategies	requests: $approp_{t-1}$ - $approp_{t-2}$ appropriations: $approp_t$ - req_t
Dependent Variables		
Stage 1 (R) (A)	budget units requests and the appropriating units appropriations	total requests and appropriations at time t
Stage 2 (ER) (EA)	the base removed from the request and appropriation calculations	the residuals from stage one request and appropriations equations
Base (R_t) (A_{t-1})	the portion of the requests and appropriations which everyone expects to remain in the appropriation	requests: $approp_{t-1}$ appropriations: req_t

source: City of Lansing Annual budget summaries

and the base. Recall that Chapter Three argueS that a two-stage decision model would better represent the actual decision process of the budgeting participants. The first stage of this model consists of the removal of the base from the decision calculus and the second stage represents the budgetary participant's direct calculations of requests and appropriations. (For request decisions, the base is last year's appropriation. For appropriation decisions, the base is this year's request.) One of the most significant findings of budgeting research, past and present, and one of the most important tenets of budgeting theory in that budgetary decisions on requests and appropriations do not directly include the base but use the base as a point from which all yearly calculations proceed.

According to these tenets, the research model is a two- stage regression analysis. The purpose of the first stage is to calculate the residuals from an equation in which the base is regressed against its proper dependent variable which is either the absolute dollar value of requests or the absolute dollar value of appropriations (See Equation 3.1). The residuals are then used as dependent variables for the second stage equations which model that part of the decision calculus in which cues and the external environmental variables enter into the budgetary participant's calculations. By using such a two-stage process, the emphasis of the analysis is placed on that part of the decision calculus that is the most relevant to the future development of budgeting theory.

STATISTICAL HYPOTHESES AND METHODS OF ANALYSIS

In its most rudimentary form, the major goal of this research is to determine the reasons why appropriations and requests change yearly and by department. Toward this end, a general model of budgetary decision making is proposed which is tested using two types of units of analysis. The primary unit of analysis, and the one that is examined first, is the sum of all line-items. The proposed model is then accepted or rejected on the basis of tests using aggregate line-item data. To explore how the general decision calculus can be improved or, if necessary, why it does not work, this same model is tested on separate line-item categories. Unlike the first set of analyses, there are fewer expectations about the outcomes of this second set of analyses. However, this latter series of tests becomes very useful because inferences about the theory's criticisms and other variables that should be included in a general model of budgeting can be made based on test results.

This third section presents the statistical hypotheses to be tested in the first step of analysis. It also discusses the methods of testing employed in both steps as well as some of the problems and issues associated with these methods. However, before this is done, a brief general description of the format of the data and the reasons for testing two sets of units of analysis will be useful for these subsequent discussions.

Data Format and Units of Analysis

A total of 52 budget units or cases are analyzed in each step. For each of these budget units, six categories of request and appropriation

line-items were identified. These categories are as follows:

1. Personnel Line-Items- Includes all wages, salaries, overtime and any listed vacation and sick leave payments. Fringe benefits for all employees are calculated and compiled into a separate, special account and are therefore not included in the calculation of personnel requests and appropriations or total requests and appropriations (item # 6).

2. Supplies and Services Line-Items- Somewhat of a miscellaneous category that includes departmental expenses and supplies, utilities, equipment rental, education and training, community promotion, etc.

3. Equipment Line-Items- Equipment and automobiles.

4. Maintenance Line-Items- Maintenance, repair, and remodelling.

5. Contributions- large subsidy or programmatic line-items.

6. Total Appropriations or Requests- sum of categories 1 through 5.

The first series of analyses are performed on category six while a second series of individual tests are performed on the separate categories of personnel, supplies and services, equipment and maintenance (categories one through four). Category five (contributions) is not a real substative line-item and therefore is used only to complete the line-item totals.

There are a number of reasons for performing two sets of analyses on different units of analysis. First, although most previous budgeting models use aggregate line-item data, discussions with budgeting officials in Lansing and an examination of its budget documents shows that officials seem to think in terms of separate, disaggregate categories. Also, in his study of municipal budgeting, Crecine discusses the importance of such line-items in budgeting officials' perceptions (Crecine, 1969, 36, 231). If it is indeed true

that officials perceive the budgeting process on an aggregate rather than a disaggregate level, then this has important implications for the theory of budgeting.

The most important implication of perception level for budgeting theory concerns the broader issue of whether budgeting is a centralized or decentralized process. Some of those who criticize current budgeting theory (often labelled the incremental theory of budgeting) because of its inability to explain recent fiscal stress and "nonincremental" behavior argue that the theory does not consider the centralized characteristics of many budgeting processes (Behn, 1985; Bozeman and Straussman, 1982). These authors claim that, by definition, incremental budgeting must be decentralized in which the direction and initiative for the allocation levels come from the lower levels of the bureaucracy. One set of authors describes this type of budgeting process as "bottom-up" budgeting (Kamlet, Mowery and Crecine, 1980). On the other hand, to implement large changes in budget levels, or decrease them from previous years, the budget process must be centralized or "top-down. Based on this distinction, these authors claim that whether budgeting is incremental or nonincremental depends upon whether budgeting is a top-down or a bottom-up process.

In a top-down budgeting process the majority of calculations concerning expenditure distribution are made at the departmental or executive level. Given an initial departmental appropriation, budgeting participants negotiate levels of expenditures for the separate line-items within the department or the executive branch. This initial departmental appropriation then acts as the boundary or constraint for the sum of all separate line-items. It is only through

the use of such externally imposed constraints that the disaggregate levels of the department can be persuaded to make non incremental or decreasing changes in their budgets. In contrast, initial budget decisions in a bottom-up budget process are made at the disaggregate level. In this case, the total departmental budget is simply the sum of separate decisions for each line-item category. Because the aggregate level chooses to exert little direct influence on budget outcomes, the allocation levels are free to rise in an incremental fashion.

To test whether Lansing uses a bottom-up or a top-down budgeting procedure, the model estimated for the aggregate line-item category is compared to the model estimated for each disaggregate line-item category. If Lansing city budgeting is indeed a bottom-up process, then one would expect the model for the separate line-item analyses to have more significance and explanatory power than the model for the aggregate line-item analysis. In this case, the model's variables, such as departmental priority or wealth-certainty, should not explain aggregate level budgeting because these variables are derived from the incremental budgeting theory proposed by Davis, Dempster and Wildavsky. If, on the other hand, Lansing city budgeting is a top-down process, then, according to the logic of authors who argue against incremental budgeting because it does not consider centralized process, the proposed model should not work for either unit of analysis.

A third possible outcome of testing both units of analysis is that the model explains requests and appropriations better at the aggregate level than the disaggregate level. In this case, one would conclude that budgeting is a top-down process that fits the Davis, Dempster and

Wildavsky theory of budgeting. According to criticisms of their theory that claim top-down budgeting is an inherently different process from the one Davis, Dempster and Wildavsky propose, an aggregate level outcome is incompatible with the critics claims. However, if this outcome occurs, it But this outcome demonstrates the unscientific character of these criticisms. By not exploring various methods of changing the theory to account for non-incremental and decreasing budgets in a manner that is consistent with its underlying assumptions, the authors have overlooked important factors explaining such events.

The second reason for performing two sets of analyses on different units of analysis is to determine if the disaggregate line-item categories are perceived differently by budgeting officials. Crecine suspected that they were perceived differently and his suspicions are supported by more recent evidence from research on the effects of "fiscal stress" on municipal decisions (Levine, Rubin, and Wolohojian, 1981; Levin and Rubin, 1980) Specifically, this research shows that during times of fiscal stress, cities tend to forego equipment expenditures and protect their personnel from layoffs. The theoretical implication of this second possible trend is that it may help reveal other important variables in budgeting officials' decision calculus.

For instance, if the evidence is strong for aggregate budgeting, and if a variable has varying explanatory power among the different disaggregate categories, then it may be the case that this variable interacts with one of the categories at the aggregate level. Under these circumstances, a new variable should be included in the model that represents the effects of budgeting officials considering disaggregate characteristics at different times in a top-down budgeting

process.

For each type of unit of analysis, data was collected for all 52 cases and 16 fiscal years. As a result, the data base is both a time-series and cross-sectional one in which either type of analysis can be performed separately. Additionally, the data can be pooled to perform a pooled cross-sectional, time series analysis with 832 cases. Because this theory assumes that, with respect to the base, every department for every year is treated equally, pooled cross-sectional time series regression analysis is the method chosen. The various independent variables at stage two of the general model account for whatever differences exist in requests and appropriations over time and departments.

Statistical Hypotheses

The statistical hypotheses presented here apply to the independent variables tested in the analysis of total line-items. According to the model presented in Equation 3.1, there are two equations which must be tested in two stages. In both stages, the first equation models request decisions and the second equation models appropriation decisions. In the first stage of the estimation of request decisions, previous year's appropriations (the base) is regressed against the dependent variable of the absolute dollar level of requests for all years and budget units. For the first stage of the estimation of appropriation decisions, this year's requests (the base) is regressed against the absolute dollar level of appropriations for all years and budget units. The coefficients for each base of both equations should follow a basic pattern.

For request decisions, the coefficient of the base should be greater than one. A coefficient with a value greater than one means that the budget unit requests an amount that is greater than the base (the amount appropriated last year). This agrees with the goals of the budgetary units which are to enhance their own units and with their role which is that of advocate of the units' programs and policies. Additionally, a coefficient value greater than one can be interpreted as a percent increase. For instance, if the coefficient for this first stage of the request equation is 1.09, this can be interpreted as the budget unit requesting a 9 percent increase over last year's appropriation.

Like the request equation, the coefficient for the base of the appropriation equation is also interpreted as a percent, but its value should be less than one. Because the appropriating units' goals are to hold down expenditures, and their role is usually considered that of protector of public funds, they tend to cut whatever amount the budget unit request. If the coefficient for this equation is .98, then this value is interpreted as the appropriating unit decreasing the request (the base in this equation) by 2 percent. Table 5.9 presents these hypotheses for stage one of the model. Once these coefficients are estimated and the residuals for each equation calculated, the second stage of the budgeting model is tested.

In the second stage of the model, the residuals from the first stage are used as dependent variables. The residuals from the first request equations are used to estimate the request decisions of stage two, while the residuals from the first appropriation equation are used to estimate the appropriation decisions of stage two. The independent

TABLE 5.9

STATISTICAL HYPOTHESES FOR THE BASE:
STAGE ONE OF THE MODEL

Variable	Coefficients		Interpretation
	Request	Approp	
Base Request: A_t Approp: R_t^{t-1}	$a_1 > 1$	$b_1 < 1$	Budget units should request more than last yr's approp and the approp. units should cut the the budget unit's request.

TABLE 5.10

STATISTICAL HYPOTHESES FOR THE INDEPENDENT VARIABLES OF THE SECOND STAGE OF THE BUDGETING MODEL

Variable	Coefficients: Request	Coefficients: Approp	Interpretation
1. Wlth-crtnty (1 = high, 0 = low) WC	$a_6 > 0$	$b_6 > 0$	During high W-C years, budgetary units will request a greater % of their base and the appropriating unit will grant a greater % of this year's request.
2. Dept priority (1 = high, 0 = low) P	$a_7 > 0$	$b_7 > 0$	Departments with higher priorities will request a greater % of their base and the appropriating unit will grant a greater % of this year's request.
3. Prev decsns (non-binary) PD	$a_5 < 0$	$b_5 < 0$	The greater the increase in the base from the previous decision, the less % increase in the request from its base and the less % of the request that is appropriated.

TABLE 5.10 (cont'd)

Variable	Coefficients Request	Coefficients Approp	Interpretation
4. Budget organ change (1 = yrs after chnge, 0 = yrs bfr chnge)	$a_8 < 0$	$b_8 > 0$	In the years after the budget change, budget units request a smaller % increase over last year's appropriation while appropriating units grant a greater % of the request
OR			
5. O&M Division (1 = O&M Div, 0 = all other units)	$a_9 < 0$	$b_9 < 0$	The O&M Division requests a smaller % increase over last year's appropriation and is granted less % of its request by the appropriating units
PS			
6. Wlth-crtnty & prev decsn interactive term	$a_3 > 0$	$b_3 > 0$	During years of high W-C, the less negative the effect of previous decisions on the % change in the requests or appropriations from its respective base.
WC * PD			
7. Dept priority & prev decsn interactive term	$a_4 > 0$	$b_4 > 0$	For departments with a high priority, the less negative the effects of previous decisions on the % change in requests or appropriations from its respective base.
P * PD			

variables tested in stage two represent wealth-certainty, department priorities, previous decisions, budget organization change and the O&M Division. All variables, with the exception of previous decisions and interactions with previous decisions, will be multiplied by either total requests or appropriations depending upon which equation is being tested. The purpose of making this transformation is to interpret the coefficients in this second stage as a percentage change of the base (from stage one). Such an interpretation is easier to comprehend and the effects of the variables are easier to compare. Table 5.10 presents the statistical hypotheses for the basic binary independent variables and their interactive terms. The general hypotheses and explanations for these variable's effects are given in Chapter Three.

Testing Procedures and Methodological Problems

In the initial analysis of the budgeting model, the emphasis is on testing the model using total line-item data to see how it performs at this unit of analysis before estimating it for the separate line-item categories. Beginning with the first stage of the budgeting model- that of removing the base from the calculations- the problems of heteroskedasticity and serial correlation must be considered. Because the data is both time-series and cross-sectional, the existence of both conditions is a reasonable assumption (Kmenta, 1971, 509). With respect to heteroskedasticity, one might expect that the error variances of this first stage will vary directly with the base of the model. In other words, as the magnitude of the base increases, so does the variation in the request and appropriation decisions. This occurs because the larger budget units are more flexible concerning variations

in their spending than smaller budget units. (This is especially true for equipment and maintenance expenditures which are very cyclical.) On the other hand, serial correlation usually occurs with time series data because actions in one year tend to be related in some way to actions in another year (Ostrom, 1978c, 13). A third problem that can exist with pooled cross-sectional data is that the error variances may also be correlated across cross-sectional units (Kmenta, 1971, 512). However, there is no reason to assume a priori that this latter problem exists because the likelihood of requests or appropriations of one department affecting another seem minimal.

The first step in the analysis of the general budgeting model is to test for the existence of heteroskedasticity and serial correlation in the total line- item data. The test for heteroskedasticity that is performed is the Goldfeld-Quandt test (Pindyck and Rubinfeld, 1976, 104-106). If the error variances are not homoskedastic, then "weighted least squares" is used to correct for this condition. The test for serial correlation that is used is the resulting R^2's from a regression model in which lagged error terms are regressed on the current error terms. If serial correlation is also present, then a form of generalized least squares is performed to obtain the correct estimates of the coefficients.

After the proper corrections in the model are made, and the accurate coefficients are estimated for all line-items, the residuals are then calculated. The residuals which should be used, however, are the residuals of the uncorrected model. Consequently, any corrections made at the first stage, must also be made at the second stage. After making the proper corrections in stage two of the model, the analysis

of this second stage will begin with the testing of the statistical hypotheses that were presented in Table 5.10.

The final stage of the analysis of this data is to test this model at the separate line-item or disaggregated level of decision making. All tests for serial correlation and heteroskedasticity that were performed during the previous step of the analysis must also be performed here. Once the proper corrections are made for these conditions, then the second stage of the model is tested on the separate line-items. From these tests, inferences are made regarding the true nature of the Lansing budgeting process (top-down or bottom-up) and the importance of these line-items in decision making.

CONCLUSION

The purpose of this chapter is to present the operationalization of the variables, the hypotheses of their effects, and the plans for testing them. Three main variables were operationalized based on quantitative and non-quantitative information. These variables are wealth-certainty, priorities among departments and compensation for the previous decision. In addition to these primary variables, two special variables were also proposed that are not directly derived from the changes in the theory proposed by this research, but are based on the knowledge gained about specific conditions in Lansing. These variables, which are simple binary ones, represent the conditions of a change in the city's budgeting process from an administratively decentralized process to an administratively centralized one and the different expenditure circumstances of the Operations and Maintenance division of the Public Service Department.

With respect to the testing of these variables, a two-stage process using pooled cross-section time series analysis for 16 years and 52 budgetary units was proposed. The first stage estimates the effect of the base on request and appropriation decisions. Once the effect of the base is established, the primary and the special variables are tested on the residuals of this first stage equation. Both stage one and stage two variables are estimated using two sets of units of analysis. The first set consists of total line-items. The second set consists of the separate line-item categories within total line-items.

In the following chapter, the first stage of the analysis is presented. This consists of testing and applying corrections for heteroskedasticity and serial correlation, removing the base from the model, and testing all independent variables for total line-item data. The last substantive chapter presents the second step of the analysis which estimates the model for the separate line-item categories.

CHAPTER SIX

THE EMPIRICAL TEST: PART ONE

INTRODUCTION

The primary focus of this chapter is to test the model presented in Equation 3.1, and respecified in Equation 5.1, using total line-items. However, the first stage of the equation is estimated for all five line-item categories (total, personnel, supplies and services, maintenance, and equipment) rather than only total line-items. Also, the chapter presents tests for the problems of heteroskedasticity and serial correlation for all line-items. Because computer runs for the first stage and tests of the model assumptions were relatively easy to perform at the same time for all line-item, it is easier to present their results in this chapter. After concluding the discussion of the first stage, the second stage of the research model is estimated using total line-items only. The second stage of the model is estimated for each separate line-item category in the following chapter.

In general, the purpose of testing this model is to determine if there is any evidence that the proposed variables have the expected effect and explain an acceptable amount of variance beyond what is already explained by each budget unit's base. If the research model performs well, then changes in the theory of budgeting proposed here are supported. If, on the other hand, the alternative hypotheses cannot be accepted, then, at the very least, this research should say

something about whether and how budgetary decision rules change over time or across budget units. Moreover, if acceptable reasons can be found for the discrepancy between the suggested theoretical changes and the data, progress is still made towards extending the original budgeting theory beyond its current boundaries. In either case, the ultimate goal of amending the theory in a manner that addresses its problems of incompleteness and unstable decision rules is achieved.

The reason for estimating the model using separate line-items as well as total line-items is to determine whether decision rules operate on an aggregate or a disaggregate level. Based on the results of this comparison, inferences are made regarding the level of budget decisions and whether new variables should be added to the original model. These new variables represent separate line-items considered by budgetary participants when choosing an aggregate decision rule.

The second section of this chapter presents the tests for conditions of heteroskedasticity and serial correlation for all line-item categories. It also presents estimates of the first stage of the model for these same categories. The estimates provide an analysis of how budgeting participants utilize the base in their decisions. Additionally, an altered general model that incorporates the corrections for heteroskedasticity and serial correlation is given. In the third section, the second stage of the model for total line-items is tested. It is at this stage that the remaining binary and continuous level variables are entered into the model.

TESTING THE FIRST STAGE OF THE MODEL- THE ROLE OF THE BASE IN STRATEGIC CALCULATIONS

The Condition of Heteroskedasticity

Before estimating the effects of the base on requests and appropriations, the existence of heteroskedasticity and serial correlation must be tested. Beginning with heteroskedasticity, a Goldfeld-Quandt test of equal error variances for all budgetary units at all time periods should determine whether this condition is present (See Pindyck and Rubinfeld, 1976, 104-106.) If the variances are heteroskedastic, then the assumption that error variances vary directly with the independent variable of the base is adopted. As discussed in Chapter Five, this assumption seems reasonable because larger budget units have greater flexibility in their budgets. If increased flexibility in spending patterns increases, as the base of a budget unit increases, then the overall budget decisions should also show greater variation. In other words, the variance of the error term is likely to be correlated with the size of the budget. To determine whether this correlation exists, the null hypothesis of homoskedasticity in both requests and appropriations is tested against the alternatives of: $Var(er_{ti}) = C*A_{t-1}{}^{2}{}_{i}$ and $Var(ea_{ti}) = C*R_{t}{}^{2}{}_{i}$ where C is a nonzero constant.

The first step in performing the Goldfeld-Quandt test is to order the independent variables R_t and A_{t-1} for each equation and remove some amount (d) of middle observations. Separate regression lines containing the bases are their fit to each portion of remaining data. The first portion of data (indicated by subscript 1) represents low values of the base, and the second portion of the data (indicated by a

subscript 2) represents the high base values. The second step in performing the test is to calculate the error sums of squares (ESS) for each regression and divide ESS_2 by ESS_1. According to the value of this ratio, which is distributed as an F statistic with (N-d-2k)/2 degrees of freedom, the null hypothesis of homoskedasticity is either accepted or rejected.

Of the 832 cases available for analysis, approximately 200 are missing for each of the 10 equations that are tested. The number of middle observations (d) removed from the request and appropriation equations for total, personnel, and supplies and services line-items is 200 leaving a little more than 200 cases for the high and low value regressions. However, because a large number of the bases for equipment and maintenance line-items are zero (meaning that the budget units requested nothing or were appropriated nothing for the previous year), a different scheme of separating cases is used to avoid the problem of the variances being too low in the regressions on the lower base values.

For both the equipment request and appropriation equations, 150 cases (d) were removed leaving 300 cases at the low base level and 150 cases at the high base level. Of the 300 cases at the low base level, about 200 have values of zero for the request equation and 150 have values of zero for the appropriation equation. For both request and appropriation equations for maintenance, only 70 cases (d) were removed leaving approximately 450 cases at the low base level and 150 cases at the high base level. However, of the 450 cases at the low base level, almost 400 have values of zero for both the request and appropriation equations. Given the large number of zero values for both of these

line-item groups, it seems almost certain that the null hypothesis of homoskedasticity will be rejected for all the maintenance and equipment equations.

Table 6.1 presents the results of the Goldfeld-Quandt test for all groups of line-items. Based on these tests, all null hypotheses are rejected and the alternatives accepted. In other words, any further analysis of the research model must assume that the error variances of all first stage equations are not equal and are proportional to the base squared. Although estimators of the regression coefficients with heteroskedastic residuals are unbiased and consistent, they are not the "best linear unbiased estimates" of the coefficients. As a result, the estimators are not efficient and it is more difficult to show statistical significance than if the problem were corrected. Superseding this problem is the fact that the estimated variances of these coefficients are also biased. This means that any tests of significance are invalid and the confidence intervals are also incorrect (Kmenta, 1971, 250-256).

To solve this problem, weighted least squares estimation is used. This estimation technique transforms the equation to account for the expected relationship between the error variances and the base by dividing all variables and intercepts in each equation by their respective base. Whatever, correlation exists between the error variance and the base is then removed from the model by placing all equation elements into the scale of the base. Because the second stage of the model is simply an extension of the first, all variables and intercepts of the second stage must be transformed in the same manner. Equation 6.1 presents the general specification of the first stage of

TABLE 6.1

GOLDFELD-QUANDT TEST FOR ALL LINE ITEM GROUPS

	TOTAL		PERSONNEL	
	REQ	APP	REQ	APP
ESS_2	.394183E+13	.935088E+12	.312292E+13	.760466E+12
ESS_1	.126297E+12	.145956E+11	.213145E+11	.594283E+10
F	31.2	64.1	146.5	128.0
prob.	< .01	< .01	< .01	< .01

	SUPPLIES AND SERVICES		EQUIPMENT	
	REQ	APP	REQ	APP
ESS_2	.279809E+12	.814592E+11	.854602E+11	.784108E+11
ESS_1	.307963E+10	.283463E+11	.795542E+10	.224891E+10
F	90.9	2.87	10.7	34.9
prob.	< .01	< .01	< .01	< .01

	MAINTENANCE	
	REQ	APP
EES_2	.406413E+11	.456900E+11
ESS_1	.360037E+10	.802384E+10
F	11.3	5.69
prob.	< .01	< .01

EQUATION 6.1

GENERAL SPECIFICATION OF THE FIRST STAGE
OF THE HETEROSKEDASTIC MODEL

REQUEST EQUATIONS

$$\frac{R_{ti}}{A_{t-1i}} = a_0 \frac{1}{A_{t-1i}} + a_1 \frac{ER_{ti}}{A_{t-1i}}$$

APPROPRIATION EQUATIONS

$$\frac{A_{ti}}{R_{ti}} = b_0 \frac{1}{R_{ti}} + b_1 \frac{EA_{ti}}{R_{ti}}$$

VARIABLES AND OTHER EQUATION ELEMENTS

A- Appropriations
R- Requests
ER- Request residuals
EA- Appropriation residuals
t- time
i- budget unit

the model, from Equation 3.1, which is corrected for the condition of heteroskedasticity. Using Kmenta (1971, 259), it can be shown that estimates of coefficients obtained from the corrected equations are now "best linear unbiased estimates" with unbiased variances.

The Estimation of the First Stage of the Heteroskedastic Model

After transforming the data in the first stage in the manner indicated, ordinary least squares regression was run for all line-item groups using SPSS Version 9 (Hull and Nie, 1981; Nie, et al., 1975). The results of the regression runs are shown in Table 6.2. The only values listed in this table that were not obtained directly from the regression runs are the R^2's. Because of the way SPSS calculates R^2, the reported values for this statistic are inaccurate with weighted least squares. Consequently, the R^2's must be calculated separately. One way of doing this is to first calculate the uncorrected estimated dependent variable by entering the corrected coefficients into the equation, multiplying through by the base, and then allowing SPSS to perform all calculations on the data. Once the results of the calculations are obtained for each case, then a Pearson correlation of the uncorrected estimated dependent variable and the measured dependent variable will give the proper R^2 value. The significance of this measure can be tested with an F statistic using the following equation: $F = (R^2/k-1)/((1-R^2)/(N-k))$ with k degrees of freedom in the numerator and N-k degrees of freedom in the denominator (Kmenta, 1971, 367).

Examining the results in Table 6.2, the coefficients and explained variance for total and personnel line-items is very similar to what most researchers using the Davis, Dempster and Wildavsky models have

found in their own research. In both instances, the hypothesis that the base has no effect on budgetary decisions can be rejected. As should be the case, the null hypothesis that the intercept is equal to zero cannot be rejected for the appropriation equations. However, the same null hypothesis cannot be rejected for requests. This means that even when the base is very low or zero, budget units request some dollar amount that is significantly different from zero. Although this finding is somewhat nonsensical, it may demonstrate the tendency of budget units to inflate their requests, thereby obtaining a larger appropriation than the previous year.

The remaining results for these two line-items are what was predicted. The confidence intervals for the request equations show that budget units tend to ask for more than they were appropriated last year. According to the slope estimates, budgetary participants request an average of almost 10% more for total line-items and 6% more for personnel line-items. The appropriating unit cuts this request by an average of 4 % for total line-items and 2 % for personnel line-items. In comparison, the two sets of equations demonstrate that personnel line-item decisions are relatively stable and that larger changes in decisions from the base occur in the other three line-item categories. One could infer from this that there is not as much flexibility in personnel expenditure decisions as with other line-items combined.

Examining the results for the last three line-item groups, they are highly inconsistent with the budgeting model proposed by Davis, Dempster and Wildavsky and other researchers. First, the R^2's are lower, and the values of the slope estimates are either extreme in the expected direction or are in a direction that is contrary to the

TABLE 6.2

STAGE ONE COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES:
ALL LINE-ITEM GROUPS

EQUATION	BASE				INTERCEPT			
	a^1	t	prob.	95% C.I.	a^0	t	prob.	R^2
TOTAL LINE-ITEMS								
REQ	1.096	29.8	<.01	1.02 - 1.17	12136	4.1	<.01	.98*
APP	.958	115.5	<.01	.94 - .97	1250	1.7	.09	.99*
PERSONNEL LINE-ITEMS								
REQ	1.06	76.2	<.01	1.03 - 1.09	5802	6.9	<.01	.99*
APP	.98	153.1	<.01	.97 - .99	598	1.5	.14	.99*
SUPPLIES AND SERVICES LINE-ITEMS								
REQ	1.27	22.0	<.01	1.16 - 1.38	596	14.1	<.01	.88*
APP	.998	12.6	<.01	.84 - 1.15	258	2.2	.03	.95*
EQUIPMENT LINE-ITEMS								
REQ	.30	.32	.75	-1.56 - 2.16	4664	10.2	<.01	.60
APP	.51	11.4	<.01	.42 - .60	43	1.8	.07	.87*
MAINTENANCE LINE-ITEMS								
REQ	.93	4.4	<.01	.52 - 1.34	37	1.0	.32	.82*
APP	.49	-.6	<.01	.27 - .71	-3	-.2	.82	.84*

*significant at the .05 level

statistical hypotheses in Table 5.1. According to the confidence intervals, the base coefficient for supplies and services could have a value anywhere within the range of 1.16 to 1.38. This means that budget officials could request as much as 16 or even 38 percent more than last year's appropriation. According to the confidence interval for the base in the appropriation equations, budgeting officials could cut as much as 16% or add as much as 15 % to this year's request. For the equipment equations, last year's appropriation is not even a significant variable explaining this year's requests while the appropriating unit can decrease the request by as much 40 to 60 percent. Lastly, the maintenance equations show that requests can actually be as much as 50% lower than last year's appropriation or as much as 34% greater. The appropriating unit can cut this request by a whopping 80% or by 30 percent.

From this analysis it seems that the base is not as good a predictor of decisions for the last three line-items as it is for the first two line-items. Moreover, the relationship of the base to request and appropriation decisions may indicate other disagreements with the current theory of budgeting. First, the participants goals do not seem as clear for the last three line-items as demonstrated by extreme coefficient values and values that are contrary to the statistical hypotheses. This is especially true for maintenance requests which show that these requests, on average, are less than last year's appropriation. Secondly, the magnitudes of these coefficients, in terms of percent change, indicate that the decisions may not be as incremental according to the size of the changes and the use of bounded rational decision techniques (See footnote #1).

With reference to the size of the coefficients, one could interpret this as demonstrating the participants capacity to significantly alter their behavior from last year. In other words, budget outcomes are not as dependent on past behavior or as stable for some line-items. Additionally, the coefficients may indicate that participants are using different decision techniques than those originally hypothesized by Davis, Dempster and Wildavsky. Whether or not these techniques produce strategic outcomes or are consistent with the underlying assumptions of the Davis, Dempster and Wildavsky models requires further testing. A third possible interpretation of these preliminary results is that budgeting is really a top-down process, In such a process, the totals for each department are decided according to previously hypothesized bounded rational principles before funding for all line-items within this total are determined. However, before delving too much into such explanations, simpler ones should be examined.

Outliers and Re-estimation of the First Stage of the Model

Before seriously considering whether budgeting is a top-down or a bottom-up process, or whether the incremental theory of budgeting is invalid, the presence of outliers that may significantly affect estimates should be considered. Here, an outlier is defined as any observation that appears to be inconsistent with remaining data. If any case has extreme measurement error, or if the case is not representative of the same population, then the case will likely be an outlier (Barnett and Lewis, 1978, 4-15). Although this research does not draw a sample from a population, it may be that the principles of behavior governing the outliers are not the same as for the rest of the

data. In such instances, outliers may have their own intrinsic value for the analysis.

To determine what constitutes an outlying observation, Cook's Distance statistic and studentized residuals is used. Cook himself recommends using both sets of figures when analyzing residuals because outliers can exist on more than one dimension. The first method used here, Cook's D, is computed for all residuals. It is essentially a measure of the distance between the estimated slopes using all observations and the estimated slopes with the targeted observation removed. SPSS performs a significance test on each Cook's statistic and then displays the ten highest Cook's values along with the probability of each test statistic. The other method of locating outliers, examining studentized residuals, relies on identifying extreme studentized residuals.

Using both techniques, outliers are located, they are removed from the data base, and then the model is re-estimated. If the value of the new slopes change by more than a minimum amount, i.e. .05, from the original estimates, then the new estimates are reported. The final step in the analysis of outliers is to examine the targeted outlier more closely to determine if different principles govern its behavior in relation to other cases in the data set. If there is enough evidence to support this claim, the re-estimated coefficients are used in the final analysis of the model. With respect to the question of whether to use the R^2 which contains the target case or the one with the case removed, it seems more reasonable and conservative to use the original measure of R^2 than the new one to gauge the true fit of the model.

Using these methods, outliers were found in four of the original equations. Their removal made enough of a difference in the estimates to be reported here. Table 6.3 displays the new estimates for all four equations and identifies their respective outliers. Notice that, with the exception of the appropriation equation for maintenance line-items, the R^2's have not changed. For the supplies and services appropriation equation, the slope for the base has also changed very little from the original estimate in Table 6.2. However, it has changed in the expected direction and its confidence intervals now show little chance of participants appropriating more than what was requested. Likewise, the new request equation for equipment line-items is also more reasonable. Rather than participants requesting less than the previous year, the estimate now shows that, on average, participants will request 50% more than last year. Although this estimate is still as inefficient as the original, as evidenced by the new confidence intervals, its value at least agrees with the statistical hypotheses in Table 5.9. The last two reestimated equations display estimates that have changed in the opposite expected direction. The new coefficient for maintenance requests shows that requests are 46% (1-.54) less than the previous year; and the new appropriation equation shows that requests are cut by as much as 61% (1-.39).

Closely examining each case that contains an outlier, it seems that only half of the identified outliers should be removed from their equations. The outlier from the Police Department shows a drastic increase in the supplies and services appropriations from what was requested. The source of this increase is money that was available from Federal Revenue Sharing that was then appropriated to the Police

TABLE 6.3

STAGE ONE COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES
WITH PROMINENT OUTLIERS REMOVED:
SELECTED LINE ITEM GROUPS

EQUATION	BASE				INTERCEPT			
	a^1	t	prob.	95% C.I.	a^0	t	prob.	R^2
SUPPLIES AND SERVICES LINE ITEMS								
OUTLIERS- 1. Police: Uniform and Park Security for 1975 2. Internal Audit for 1972								
APP	.910	16.8	<.01	.80 - 1.02	444	4.4	<.01	.95*
**	.943	17.6	<.01	.84 - 1.05	258	3.2	<.01	.95*
EQUIPMENT LINE ITEMS								
OUTLIERS- 1. Administrative Services: Operational Services for 1979								
REQ	1.56	3.04	<.01	.56 - 2.56	254	8.1	<.01	.60*
MAINTENANCE LINE ITEMS								
OUTLIERS- 1. Community and Economic Development: Administration for 1978 2. Public Service: Transportation for 1978								
REQ	.54	2.6	<.01	.13 - .95	1640	7.6	<.01	.82*
OUTLIERS- 1. Administrative Services- Property Management for 1980								
APP	.39	12.4	<.01	.33 - .45	-2	-.5	.63	.93*

** estimated model including the Internal Audit observation
* significance at the .05 level

Department. In this instance, the cause of such a discrepancy is probably a change in accounting procedures that moved the Federal Revenue Sharing money from a special account to the general fund. The outlier for Property Management displays a similar pattern of a large increase in appropriations which may also indicate an unusual event. The large increase in equipment requests by the Operational Services Division is unique because this was about the time when this division was expanded greatly and purchased unusually expensive equipment.

The other outliers for the Internal Audit department, the Transportation Division and the Administrative Unit of Community Development point to nothing unreasonable or out of the ordinary from other observations in the data. Under these circumstances, the original request estimate for maintenance line-items should be used, and the supplies and services appropriation equation should be reestimated with the observation for Internal Audit included in the data. This newest equation is also presented in Table 6.3 as designated by the row of figures with the two asterisks.

In comparison to the original estimates, the reestimated equations fit the Davis, Dempster and Wildavsky model better. The goals displayed by the Lansing budgetary participants in these latest set of figures for the first stage agree more closely with budgetary participants' goals as hypothesized by incremental budgeting theory. However, the magnitudes of some coefficients still demonstrate that Lansing's budgeting process may not fit all the theory's inferences. As explained previously, some of these estimated figures produce a different and contrary set of outcomes than what one might expect if incremental budgeting were operating at the disaggregate level. This

could indicate that participants may not use the same bounded rational principles of behavior as hypothesized by previous models of incremental budgeting. Conversely, the results could indicate that budgeting in Lansing is a top-down process.

One means of determining whether either explanation is potentially valid is to estimate the second stage of the model for both total and separate group line-items. This better reveals whether incremental budgeting operates at the aggregate or disaggregate level and whether it is a top-down or bottom-up process. This also determines if some of the new bounded-rational decision elements proposed at this stage better explain request and appropriation decisions. Because the most important objective of this research is to improve the explanation of budgetary behavior with the second stage variables, the outliers that were removed from the first stage are returned to the data base for estimating the second stage. However, before any of these problems can be addressed, the tests for serial correlation are presented.

The Condition of Serial Correlation

The problem of serial correlation is one in which error values for one case are correlated with error values of another case. This usually occurs with time series data because, frequently, actions at one time period influence actions at another time period. As a result, the least square estimates are still unbiased and consistent, but they are not the best linear unbiased estimates that could be obtained and their variances are biased. Thus, determining whether the residuals are correlated across time is important.

One means of testing whether serial correlation exists is to use

the uncorrected estimated dependent variable computed previously. These values were originally computed to calculate corrected R^2's for the heteroskedastic model. Using these uncorrected estimates, the uncorrected residuals for the same equations are computed and lagged by one year. The R^2 and significance tests derived from a regression of the lagged uncorrected error on the normal uncorrected error gives an estimate of the amount of serial correlation present in the data.

Table 6.4 presents the findings from this serial correlation test. The test was performed by estimating separate equations and coefficients for each budget unit. This means that 52 separate time series analyses were calculated. The two sets of figures presented for each request and appropriation equation are the proportion of 52 budget unit equations with R^2's greater than .3 and the proportion of statistically significant equations. The purpose of running separate time series analyses on each budget unit is to identify which departments have greater serially correlated errors than others.

The results of this test show that all line-items display very little serial correlation for either requests or appropriations. The percentage of budget unit equations with significant independent variables is, in most cases, less than 10, and the percentage of R^2's greater than .3 is less than twenty. Of the budget units that had significant independent variables or high R^2's, there was no consistent pattern among the separate groups of line-items. In other words, where serial correlation does occur, it appears to be random. For these reasons, none of the equations will be corrected for serial correlation because it does not seem to present a serious problem of error or bias for the combined model estimates in any line-item group

TABLE 6.4

TESTS FOR SERIAL CORRELATION:
ALL LINE ITEM GROUPS

	% pr. < .05	% R^2 > .3	% pr. < .05	% R^2 > .3
TOTAL LINE ITEMS			SUPPLIES AND SERVICES LINE ITEMS	
REQ	.08	.15	.10	.17
APP	.08	.15	.04	.12
PERSONNEL LINE ITEMS			EQUIPMENT LINE ITEMS	
REQ	.08	.12	.12	.13
APP	.02	.06	.06	.06
MAINTENANCE LINE ITEMS				
REQ	.04	.08		
APP	.13	.15		

TESTING THE SECOND STAGE OF THE MODEL: THE ROLE OF THE OTHER VARIABLE IN STRATEGIC CALCULATIONS

In this section, the effects of the theoretical variables of previous decisions, wealth-certainty, and priority and the specially defined variables of organizational change and Public Service (the Operations and Maintenance Division), are tested using only total line-item groups. As was mentioned previously, some of these variables are multiplied by the base to obtain coefficients that are interpreted as percent changes in the base. The only variables that are not transformed in this manner are previous decision variables and any interactive terms containing this variable. The reason for not multiplying these variables by the base is that their mathematical form already contain the base which makes their multiplication by the base meaningless.

For the appropriation equations, previous decision is define as "Request$_t$ - Appropriation$_{t-1}$." For the request equations, previous decision is defined as "Appropriation$_{t-1}$ - Appropriation$_{t-2}$." One can see that multiplying previous decision by the base of Request for the appropriation equation and previous decision by the base of Appropriation$_{t-1}$ for the request equation is undesireable. The coefficient for previous decision, by itself, is already interpreted as percent change, but it is a precent change of the previous decision rather than a percent change of the base.

Equation 6.2 presents the exact form of the second stage of the general model that is tested here. This form includes corrections for heteroskedasticity and multiplication of the appropriate variables by the base. Notice that the coefficients a_{10} and b_{10} are now present in

EQUATION 6.2

GENERAL SPECIFICATION OF THE SECOND STAGE
OF THE MODEL USING WEIGHTED LEAST SQUARES

REQUEST EQUATIONS

$$\frac{ER_{ti}}{A_{t-1i}} = a_{10} + a_2\frac{1}{A_{t-1i}} + a_3\frac{(WC*PD)_{ti}}{A_{t-1i}} + a_4\frac{(P*PD)_{ti}}{A_{t-1i}} + a_5\frac{PD_{ti}}{A_{t-1i}} + a_6\frac{WC_{ti}*A_{t-1i}}{A_{t-1i}} + a_7\frac{P_{ti}*A_{t-1i}}{A_{t-1i}} + a_8\frac{OR_{ti}*A_{t-1i}}{A_{t-1i}} + a_9\frac{PS_{ti}*A_{t-1i}}{A_{t-1i}} + \frac{er_{ti}}{A_{t-1i}}$$

APPROPRIATION EQUATIONS

$$\frac{EA_{ti}}{R_{ti}} = b_{10} + b_2\frac{1}{R_{ti}} + b_3\frac{(WC*PD)_{ti}}{R_{ti}} + b_4\frac{(P*PD)_{ti}}{R_{ti}} + b_5\frac{PD_{ti}}{R_{ti}} + b_6\frac{(WC*R)_{ti}}{R_{ti}} + b_7\frac{(P*R)_{ti}}{R_{ti}} + b_8\frac{(OR*R)_{ti}}{R_{ti}} + b_9\frac{(PS*R)_{ti}}{R_{ti}} + \frac{ea_{ti}}{R_{ti}}$$

VARIABLES AND OTHER EQUATION ELEMENTS

R- requests
A- Appropriations
WC- wealth-certainty
PD- previous decision
P- Priorit
OR- Organizational Change
i- budget unit
t- time
ER- error term for request equations
EA- error term for appropriation equation
PS- Public Service (Operations & Maint.)

the equations because the base, which was not included in the model specification in Equation 5.1, must now be added to the second stage of the model. This is necessary given the type of transformation for heteroskedasticity which is made and the structure of the original equations. The new coefficients, as estimated by the corrected form of the model, represent the null conditions for the binary variables in the model. However, the coefficients a_2 and b_2 are still the constant terms for the equations.

The reason for this discrepancy between the null condition of the binary variables and the constant term is that the binary variables, which are both multiplied and divided by the base, are entered in the equation in their original form, (i.e, $(WC_{ti}*R_t)/R_t = WC_{ti}$). As a result, the regression program continues to recognize a_{10} and b_{10} as the null conditions for these variables. Despite the problem created by the correction for heteroskedasticity, the coefficients for all variables are still interpreted as percent changes from the base or the previous decision, depending upon which variable is the focus of attention.

Table 6.5 presents the estimated coefficients for the second stage of the model from Equation 6.2. Notice that there are two sets of estimates for the appropriation equation. The first set represents coefficient estimates with no outliers removed, and the second set represents coefficient estimates with outliers removed. The techniques and criteria used to identify outliers for the second stage of the model are the same ones that are used in the first stage. However, only two outliers are identified in the appropriation equations using these methods. These are the Public Service Division for years 1976 and

TABLE 6.5

STAGE TWO COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES: TOTAL LINE ITEMS GROUPS

	REQUEST DECISIONS			
VARIABLE	COEFF.	BETA	t/F	prob.
a_{10} BASE	.007		.30	.77
a_2 C	-6809	-	-6.1	<.001
a_3 WC*PD	.16	.07	1.4	.16
a_4 P*PD	.11	.08	1.3	.21
a_5 PD	-.41	-.39	-5.8	<.001
a_6 WC	.05	.09	2.1	.03
a_7 P	-.03	-.04	-.89	.38
a_8 OR	.02	.03	.79	.43
a_9 PS	.19	.08	2.0	.04
R^2	.38	-	38.4	<.01

TABLE 6.5 (CON'T)

APPROPRIATION DECISIONS

	WITH OUTLIERS				WITHOUT OUTLIERS			
VARIABLE	COEFF.	BETA	t/F	prob.	COEFF.	BETA	t/F	prob.
b_{10} BASE	-.001		.01	.99	-.001		-.05	.96
b_2 C	-657	-	-.95	.34	-679	-	-1.0	.30
b_3 WC*PD	-.15	-.13	-2.6	.01	-.15	-.14	-2.7	<.01
b_4 P*PD	.26	.31	5.4	<.01	.28	.10	2.4	.02
b_5 PD	-.31	-.54	-8.1	<.01	-.31	-.41	-8.5	<.001
b_6 WC	.04	.12	2.9	<.01	.04	.13	3.2	<.01
b_7 P	-.003	-.006	-.15	.88	-.004	-.008	-.20	.84
b_8 OR	.04	.11	2.7	<.01	.04	.11	.30	<.01
b_9 PS	.03	.03	.65	.52	-.06	-.05	-1.2	.25
R^2	.50	-	62.6	<.01	.50	-	62.6	<.01

PD- previous decision: requests $(App_{t-1} - App_{t-2})$;
appropriations $(Req_t - App_{t-1})$
(See Table 5.8)

WC- wealth-certainty: 1 = high wealth-certainty; 0 = low wealth -certainty
(See Table 5.6)

P- priority: 1 = high priority; 0 = low priority
(See Table 5.7)

PS- Public Service Division: 1= Public Service division;
0= remainder of budget units
(See Table 5.8)

OR- budget centralization: 1 = years after budget process centralized;
0 = years before budget process centralized
(See Table 5.8)

BASE- decision base for request or appropriation decisions, also the null condition for the binary variables

C- constant or intercept term

1980.

Examining the outlier for 1976, it appears that a drastic decrease in funding for all line-items of the Operations and Maintenance Division occurred from 1975 to 1976. The explanation of this decrease could be a change in accounting. However, closer inspection shows that the decrease more likely represents effects of unusual changes in levels of special and enterprise fund accounts that are part of this unit's overall funding. It appears that an increase in revenues, because of major changes in intergovernmental assistance or charges in these non-general fund accounts, allowed this unit to radically decrease the amount of money that it drew from the general fund account. The cause of the outlier for 1980 is that the Division received a rather large subsidy in its general fund account from one of its enterprise fund accounts. The fact that the money was not requested indicates that the subsidy may haved been caused by one of the following: an accounting error which accumulated over time and was corrected during the 1980 budget, or the discovery of an important project in need of immediate funding between the time of the requests and the time of appropriations. In either case, the source of the 1980 outlier is a circumstance that is unique relative to the experience of other budget units.

Assuming, then, that both outliers represent special circumstances, the cases are removed from the analysis. As expected, the only changes that occur by removing these cases is in the coefficient of the variable representing the Operations and Maintenance Division. Notice that the coefficient for this variable (b_9) changes from positive to negative after the removal of the two cases. Although neither

coefficient is significant at the .05 level, it may be that these outliers will have a different impact on a subsequent model using total line-item groups or on the models tested using separate line-item groups. For this reason, all other models should be estimated with and without the two outliers in the appropriation equation. However, for this step of the analysis, the estimated coefficients with the two outliers removed are the ones discussed here.

The Request Equation

The coefficient estimate from weighted least squares analysis of the request equation shows that some statistical hypotheses from Table 5.11 are supported. For instance, hypothesis #3 pertaining to the variable previous decision (PD) is supported by the results. The coefficient for the variable, which is significant at the .05 level, indicates that as previous decisions increase, requests decrease by 41 percent. In other words, budgeting officials decrease requests by 41% of $(App_{t-1} - App_t)$. Another way of saying this is that requests are increased, or decreased, by 41% of the difference between last year's appropriation and the previous year's appropriation. This figure demonstrates the budget unit's attempt to compensate for whatever increases or decreases occurred in the previous years' appropriations. If the budget unit received a increase in appropriations the previous year, then it is likely to request less than last year's increase. Likewise, if the budget unit's appropriation for the previous year represents a decrease from two years ago, then the unit will likely ask for some of that money back in the current year's request.

Another hypothesis that is supported is hypothesis #1 from Table

5.11. The results show that during wealthy-certain years (WC), there is a tendency to increase the absolute amount of requests by an average of 5 percent (a_6). Also during wealthy-certain years the previous decision coefficient (WC*PD) is modified by 16 percent (a_3). This agrees with hypothesis #6 of Table 5.11. What this latter coefficient means is that during wealthy years, the coefficient for previous decisions is -.25 rather than -.41. Substantively this means that if the budget unit received an increase in appropriation last year, then, during wealthy and certain years, it will decrease its current request by less of a percent of last year's increase than it would during nonwealthy and uncertain years. Although the direction and magnitude of the latter coefficient is what was predicted, the confidence in this effect is less than ideal. Specifically, the probability of the interactive variable being different than zero is only .16, and therefore, it is not statistically significant.

A fourth hypothesis that is supported by these results is hypothesis #7 from Table 5.11. The coefficient for the interactive variable of priority (P) and previous decision (P*PD) indicates that among high priority departments, the coefficient for the simple previous decision variable is -.30 rather than -.41. This means that, if a budget unit's previous appropriation at time t-1 represents an increase from the appropriation at time t-2, then a high priority budget unit decreases their current request by only 30% rather than 40% of ($App_{t-1} - App_{t-2}$). Like the variable WC*PD, however, the variable P*PD is also not statistically significant. The probability of this latter variable being different than zero is only .21.

The three hypotheses from Table 5.11 that are not supported by the

estimated request equation are #2, #4, and #5. Contrary to hypothesis #2, which states that high priority departments request greater percentages of their previous appropriations than low priority departments, the estimated coefficient for this variable is -.03. This indicates that high priority departments decrease their requests by 3% of last years appropriation. However, as with some of the other variables in the model, the coefficient for priority is not statistically significant. In fact, this variable is one of the two most insignificant variables estimated in the equation with a probability level of only .38. Such a high probability value means that not much confidence can be placed on the estimated effect of this variable.

The other highly insignificant variable is budget organization (OR). Like priority, the hypothesis on this variable's effect is also not supported. Hypothesis #4 for requests states that, on average, budget units request a smaller percent of last year's appropriation after the change in the budget process than before the change in the budget process. The estimated coefficient for this variable indicates that the opposite is true: budget units increase the requests by 2% of the previous years appropriation. However, like priority, not much confidence can be placed in the accurateness of this estimate because its statistical probability is .43.

The third hypothesis that is not supported is hypothesis # 5 which states that the Operations & Maintenance Division of the Public Service Department will request a smaller percentage of their previous appropriation than other budget units. The estimated coefficient for this variable, which is significant at the .05 level, is .19. This

means that the O & M division will request 19% more of its previous appropriation than other budget units.

Considering that the estimate is statistically significant, receiving a value of 19% rather than a negative number is quite inconsistent with the thinking about this variable and hypothesis #5. One possible explanation for this discrepancy is that the O & M Division responds to environmental stimuli as a high priority budget unit rather than a unit with multiple operating accounts and sources of operating funds. The O & M Division's place as a high priority department was indicated in Table 5.7. In light of the findings for the estimated request equation, the O & M Division should have been coded as a high priority department rather than a special budget unit. In other words, the variable PS should probably be removed from the request equation.

The other estimates of interest in the request equation are the coefficient for the base, the dependent variable intercept, and the R^2. The coefficient for the base, as expected, is not statistically different from zero. However, this coefficient also represents the null condition for the binary variables. This means that when all binary variables are zero (low wealth, pre-organizational change, low priority and non- Public Service Division units), requests are no different than zero. The dependent variable intercept has a value of -6806 which is statistically significant and indicates that when the variables containing previous decisions are zero, requests are reduced by an average of $6806. The last estimate, R^2, indicates that these variables explained 38% of the variance beyond the what the first stage accounted for.

Keeping in mind that the coefficients of the binary variables actually represent percent changes in the base in the first stage of the model, Table 6.6 is presented so that the reader can have a more precise understanding of the estimated effects of the second stage variables. According to the estimated coefficient for WC, during high wealth years, budget units increase their requests by 15% of the previous appropriation as shown by the actual base coefficient value of 1.15 in Table 6.6. In low wealth years, the percent increase is the same as what was estimated for A_{t-1} in the first stage of the model which is 1.10 (1.096). This variable is significant at the .05 level, as indicated by the probability value of .03, and the estimate is consistent with its respective hypothesis. Both the probability values and indicators of the results of the hypotheses tests for the second stage of the model are given in Table 6.6. The effects of the other variables on A_{t-1} can be interpreted in the same manner. The values in the first row associated with A are what was obtained from estimating this variable in the first stage. Its hypothesis can be found in Table 5.10.

The other figures in Table 6.6 represent the interactive effects of wealth and priority on previous decisions. For high wealth years, requests are decreased by 25 % of $(A_{t-1} - A_{t-2})$, while for low wealth years, requests are decreased by 41 % of that value. Also, the noninteractive variable of $(A_{t-1} - A_{t-2})$, which represents representing the simple effects of previous decisions on requests, is significant by itself and agrees with the hypothesis from Table 5.11. This is shown in the first row by the probability and hypothesis values for the -.41 figure. One final observation that can be made from Table 6.6 is that

TABLE 6.6

SPECIFIC VARIABLE EFFECTS ON THE BASE AND PREVIOUS DECISIONS: AS ESTIMATED IN THE REQUEST AND APPROPRIATION EQUATIONS PRESENTED IN TABLE 6.5

	REQUESTS						APPROPRIATIONS					
	A_{t-1}	p	hyp.	PD	p	hyp.	R_t	p	hyp.	PD	p	hyp.
	1.10	.01	*	-.41	<.01	*	.96	<.01	*	-.31	<.01	*
H Wlth	1.15			-.25			1.0			-.46		
(WC)		.03	*		.16	*		<.01	*		<.01	#
L Wlth	1.10			-.			.96			-.31		
H Prty	1.07			-.30			.96			-.03		
(P)		.38	#		.21	*		.84	#		.02	*
L Prty	1.10			-.41			.96			-.31		
Aft Ch	1.12			-			1.0			-		
(OR)		.43	#		-	-		.01	*		-	-
Pre Ch	1.10			-			.96			-		
O&M	1.29			-			.90			-		
(PS)		.04	#		-	-		.25	*		-	-
Other	1.10			-			.96			-		

* consistent with the hypothesis from Table 5.11
# inconsistent with the hypothesis from Table 5.11

the estimated values agree with five of the eight proposed hypotheses and were inconsistent with three of them.

The Appropriation Equation

In comparison to the request equation, six appropriation equation estimates are consistent with the hypotheses from Table 5.11 and 5.10. Examining Table 6.6 shows that the appropriating unit cuts requests by 4% (1 - .96) during low wealth years but cuts nothing from them during high wealth years. This supports hypothesis #1 from Table 5.11. Similarly, the appropriating unit cuts requests by 4% prior to the budget change but tend to leave the requests untouched after the budget change. This latter trend is consistent with hypothesis #4 in Table 5.11 and the argument that stronger and more central control of the budget process by the appropriating unit better insures that budget units' requests are close to the appropriating unit's expectations. As a result, there is little need for the appropriating unit to cut requests. However, the fact that hypothesis #4 is supported for the appropriation equation and not supported for the request equation does little to increase the confidence in the overall validity of the variable or its theoretical justification.

There is, however, one explanation for this discrepancy that is consistent with the theory. It may be that the change in the budget process had little effect on the overall increase or decrease in requests, but a significant effect on the distribution of the requests across line-items groups. This would occur because budget units are not necessarily in a better position to increase their overall budget after the change in the budget process, but should be better informed

about what types of specific items the appropriating unit wants funded. In this case, the appropriating unit would find little to cut from the requests, while the budget units would show no difference in their behavior as measured by the variable OR for total line-items. The only change that might occur in appropriations after the change in the budget process would be a change in the funding between line-items, such as personnel and maintenance, within separate budget units.

Another hypothesis that is supported for the appropriation equation but not supported for the request equation is hypothesis #5 which pertains to the differences in the O & M Division in comparison to the rest of the budget units (PS). Contrary to the hypothesis for requests, the O & M division increased their requests beyond other units by 19% of their previous appropriation. In contrast, although the coefficient estimate is not statistically significant, the appropriating unit cuts their requests by a total of 6% beyond other units which is consistent with hypothesis #5. The explanation proposed previously for the request results is that the O & M Division actually thought of themselves as high priority units rather than units with multiple sources of funding. In this case it may be that the appropriating unit views the O & M Division both ways. It cuts the budget unit's request in recognition of its multiple sources of funding, but it does not cut the request enough to compensate for the high increase that the request represents. In other words, the appropriating unit may recognize the high priority of the department, but is only willing to grant it a portion of the increase in requests because of its ability to procure operating funds elsewhere.

A third difference between the request and the appropriation

equation concerns the interactive variable of WC*PD. For the request equations, the hypothesis of a decrease in the effect of previous decisions on requests is supported (hypothesis #6 in Table 5.11). However, the same hypothesis is not supported for the appropriation equation. Specifically, the estimate shows a statistically significant increase in the effects of previous decisions on appropriations. The question then becomes why the variable wealth-certainty, which has the predicted direct effect on requests and appropriations (WC) and the predicted interactive effect with previous decisions on requests (WC*PD), does not have the predicted interactive effect with previous decisions on appropriations.

The answer may be that the appropriating unit is responding to the budget units' overall increase in requests and appropriations that result from good times and are demonstrated in the estimates of the other wealth-certainty variables. In other words, the appropriating unit allows the budget units to request a greater percent of their previous appropriations by cutting less percent of their requests during good times, but the appropriating unit draws the line at further relative increases in requests. In this case, the appropriating unit responds by actually increasing their cuts by a greater percent of the increase in requests over appropriations than they would during low wealth-certainty years. If this explanation is correct, it demonstrates the importance of the appropriating unit's goal of protector of the public purse even during financially sound years.

The other variables in the appropriation equation, including those that do not support their respective hypotheses, are consistent with the estimates of the request equations. The priority variable had

little effect on the appropriations, as it did on the requests, which suggests that a budget unit's priority has no direct effect on the expectation or behavior of budgetary participants (hypothesis #2 in Table 5.11). On the other hand, the priority of the department does seem to have the expected effect on the treatment of previous decisions. As seen from the results in Tables 6.6 and 6.5, hypothesis #7 in Table 5.11 is supported for both requests and appropriations. In conjunction, these contrasting results indicate that the priority of budget units are recognized, but their status only indirectly affects their funding. This occurs through use of another funding criterion, that of previous decisions, which is used variably by budget units with different priority evaluations.

The final estimate for the appropriation equation that needs some discussion here is the R^2. This value shows that 50% of the total variance was explained by the independent variables. This is variance in addition to what is explained by the estimate of the first stage of the model. The fact that the R^2 is higher for the appropriation equation than it is for the request equation, and the incidence of a higher number of significant variables for the appropriation equation, supports the claim that appropriating units are more likely to use elements of strategic calculations than budget units. Such a claim is also supported by previous budgeting research showing that appropriation equations usually explain more variance than request equations. In support of these findings, budgeting theory would suggest that appropriating units require more aids to calculations and use more elements of strategic thinking than budgeting units. This occurs because budget units are more familiar with their own budgets,

have more time to review them and more time to make decisions than appropriating units.

CONCLUSION

In this chapter, the first stage of the research model was estimated for all line-item categories and the second stage was estimated for total line-items only. The chapter also examines whether the assumptions of homoskedastic and uncorrelated error terms are reasonably valid prior to estimating the different stages of the model. With respect to the assumptions, the tests show that the error terms are not serially correlated, but they are also not homoskedastic. Because they are not homoskedastic, the research model is estimated using weighted least squares rather than normal least squares. In weighted least squares, the model is actually weighted according to the variable that is presumed to be the source of the heteroskedastic pattern of disturbances. In this case, the variable labelled the "base" is the one designated and all elements of the research model are divided by this variable. The result is that the impact of the base on the disturbances, in effect, is equalized and the research model is then accurately estimated.

According to the results of estimating the corrected research model for total line-items, the model supports many of the theoretical changes proposed here. As demonstrated with so many other budgeting models, the base is an important aid to calculation. If, as suggested here, the base is the point from which all substantive calculations about the budget proceed, then, based on the overwhelming predictive capabilities of the base in the first stage of the research model, it

seems quite reasonable to model the budgeting process in two stages. The variable previous decision also has the expected effect demonstrating that budgeting participants use previous changes in budget levels as indicators for the current year's decisions. In general, the variable wealth-certainty had the predicted effect on decisions which is that requests and appropriations tend to increase during high wealth and certain years. Also organizational change and the O & M Division have the predicted effect on appropriation decisions. (Although the latter variable is not significant at the .05 level, its value is in the expected direction.) There are, however, some inconsistencies between the model and hypotheses that do not seem to refute the general theoretical changes as much as they display unexpected strategies.

For instance, the interactive wealth-certainty and previous decision variable is significant at the .05 level, but it has a negative rather than the hypothesized positive effect on appropriations. As was explained previously, this may demonstrate the appropriating unit's adherence to the role of protector of public funds because of its willingness to go along with overall increases during good times. But the unit draws the line at increases when the budget unit already has a large request relative to the previous year's appropriation. Another major inconsistency between the suggested theoretical changes and the results is that the effect of the priority variable on overall requests and appropriations is not supported. However, the expected effect of the interactive priority and previous decision variable is evident, although it is not significant at the .05 level for requests. This indicates that budgeting official's possible

recognition of the budget unit's priority, but it demonstrates the indirect rather than the direct effect of this cue on decisions.

In general, the model's performance using total line-items demonstrates that the theoretical changes made here are apparently in the right direction. More hypotheses were supported than were not supported, and the each equation had a respectable level of explained variation for the second stage. The results show that, at least at the aggregate level of decision making, aids to calculation and incremental decision making is important even during poor economic periods. This means that the basic Davis, Dempster and Wildavsky theory seems viable for current events, but changes must be made in the theory for it to remain usable. Of the changes made here, the success of the wealth-certainty shows promise toward better explanations of budget levels across time. With respect to the priority variable, however, more testing and evaluation must be done to determine the reasons for different budegt levels across budget units.

Although the model performs adequately using total line-items, the question remains whether it performs better or more poorly for separate line-item categories. If the model performs better at the aggregate level of decision making, as the preliminary results of the first stage indicate, then there is evidence that budgeting is a top-down process with respect to separate funding accounts. If the model performs better at the disaggregate level, then the evidence shows that budgeting is a bottom-up process. If the latter results occur, then the criticisms that incremental budgeting occurs only at a disaggregate level are supported. To resolve these issues, the same research model is estimated for separate line-item categories. The results are

presented in the next chapter.

CHAPTER SEVEN

THE EMPIRICAL TEST: PART TWO

INTRODUCTION

The goal of this research is to test the general model of budgetary decision making that was presented in Equation 3.1 and make some claims about how and why budget outcomes differ across time and budget units in the City of Lansing. The first step towards this goal estimates the basic model using all line-items aggregated as a single dollar value as the unit of analysis. This was done in the previous chapter. The second step estimates the model on the four separate line-items of personnel, supplies and services, equipment and maintenance, and then compares the results with those in the first step. This chapter presents the second step of the analysis.

As discussed in Chapter Five, performing two sets of analyses on different units of data addresses the question of whether Lansing budgeting is a top-down or a bottom-up process. The answer to this question then provides evidence either for or against some current criticisms of the Davis, Dempster and Wildavsky theory. These criticisms state, in general, that the theory and its assumptions of incremental and stable decision making cannot account for recent unstable and decreasing budgeting outcomes. Only top-down budgeting can produce such outcomes and it is inconsistent with the decision making process modelled by Davis, Dempster and Wildavsky. Because the

research model presented here is based on the Davis, Dempster and Wildavsky theory, although slightly modified, comparing model estimates on both aggregate and disaggregate level data provides the opportunity to test the critics' claims. There is also potential to specify the model even further than could be done by estimating it on aggregate data alone.

Chapter Five also discusses three possible outcomes of comparing the two levels of data. If critics of the Davis, Dempster and Wildavsky theory are correct, then the research model should perform poorly for both levels of data. It should perform poorly for the aggregate level data because the model is an inherently incremental model of decision making and this type of decision making should not occur at an aggregate level. However, the model should also perform poorly at the disaggregate level because, according to the critics, an incremental model of decision making cannot account for unstable or decreasing budget levels. The data cover several periods of cutback and unstable budgeting, and these budget levels can only occur with a top-down budgeting procedure.

A second possible outcome of comparing the two levels of analysis is that the model works better at the disaggregate level. In this case, one could conclude that budgeting is basically a bottom-up process even during times of instability and fiscal stress. In contrast, if the model performs better at the aggregate level, then, contrary to the critics' claims, Lansing budgeting is a top-down process based on incremental decision making. If the evidence supports the latter outcome, then the results of estimating the model at the disaggregate level may reveal additional variables that should be added

to the research model.

Based upon the model estimates using aggregate level data that were presented in Chapter Six, the first outcome mentioned here is rejected. As the evidence shows, the model performed fairly well for at least one level of data- the aggregate level. Although some of the coefficients are insignificant at the .05 level, a little over half of the hypotheses from Table 5.10 are supported and the levels of change represented by the coefficients and the percent of explained variation are reasonable. From this, one can conclude that Lansing budgeting officials use an incremental decision process to make budget increases as well as budget decreases that are stable or unstable. With respect to the critics' claims, this does not support their contention that a different decision process than incrementalism is operating during times of fiscal stress and that a new set of assumptions about decision making is needed to explain such behavior. It does demonstrate that the behavior can be explained by making changes to the Davis, Dempster and Wildavsky theory that adhere to its hard core or primary set of assumptions.

With the first possible outcome rejected, the next question to address is whether budgeting in Lansing during the 16 year period was a top-down or a bottom-up process? The second section of this chapter presents the model estimates for the separate line-items and compares them to the estimates for aggregate line-items. This provides the most direct evidence for answering this question. Finally, the conclusion summarizes the results of the comparison and presents some suggestions for additional research.

MODEL ESTIMATES FOR SEPARATE LINE-ITEM CATEGORIES

Review of Stage One of the Research Model

In Chapter Six, the estimates for the first stage of the research model are presented for both aggregate and disaggregate data. In this stage, the impact of the base on requests and appropriations is examined and, in effect, removed from the decision calculus. Once the impact of the base is removed, then the effects of the direct decision variables (wealth-certainty, priorities, previous decisions, etc.) are estimated in the second stage. The second stage estimates with the disaggregate data are presented in this section. However, before discussing these results, a review of the first stage aggregate and disaggregate estimates that were computed in Chapter Six should be presented. Although the second stage estimates are substantively more interesting, the base is a very central concept to the Davis, Dempster and Wildavsky theory. Therefore, the first stage estimates provide consequential evidence for the question of whether Lansing's budgeting process is top-down or bottom-up.

The Davis, Dempster and Wildavsky theory, which is based on an incremental decision making process, hypothesizes that budgeting officials do not directly consider the base but begin their calculations of this year's budget at the base level. Thus, this year's request is almost entirely a function of last year's appropriation with the request decisions being calculated according to how much change should be made in last year's appropriation. This year's appropriation is determined by how much officials want to change this year's request. In support of this thinking, the base should be highly correlated with requests and appropriations and the amount of

change from the base to the request or appropriation, on average, should not be too great. Additionally, their theory hypothesizes that this year's requests should be greater than last year's appropriations and this year's appropriations should be less than this year's requests.

Of all four separate line-items groups estimated for the first stage, personnel was the only group to support the Davis, Dempster and Wildavsky theory of budgeting for both requests and appropriations. (See Table 6.2.) The base coefficients for these line-items are within the expected range and the R^2's are very high. In contrast, the estimates for the other three groups of line-items were somewhat inconsistent with the theory. The R^2's were, on average, approximately 20% lower than for personnel line-items. Three of the six confidence intervals for the base coefficients included values that were not within an acceptable range; and four of the six coefficients had values that represent large changes from the base. One can conclude from this that the base is not as good a predictor of supplies and services, maintenance, and equipment decisions as it is personnel decisions. One could also conclude that supplies and services, maintenance, and equipment decisions are less stable and less like the past than personnel decisions. In summary, it appears that officials are using different decision making techniques for the three line-items than the incremental techniques that are the basis of the Davis, Dempster and Wildavsky theory of budgeting.

One possible reason for the discrepancy between personnel and the other line-items is that personnel decisions are more constrained by external and internal factors. For instance, unions restrict the

firing and, in some cases, the hiring of personnel. Personnel decisions also have long range impacts. When a department hires someone, that it must be prepared to retain that person for many years. This means that it must anticipate enough future work to justify another employee, and it must secure wages and benefits for the new person far into the future if necessary. There are also humanistic criteria to consider. People simply are not as expendable as supplies and equipment, and decisions affecting jobs can impact both careers and lives. As a result, personnel decisions are not easily made and are not as flexible as other line-item decisions.

Examining the estimates for total line-items, the results fit the Davis, Dempster and Wildavsky theory of budgeting quite well. The R^2 and base coefficient for both requests and appropriations is what one would expect. The magnitude of the coefficients also show change that is relatively low but higher than for personnel decisions. Thus, from comparing the model's performance for total line-items to separate line-items on the basis of the first stage only, the conclusion is that budgeting is an incremental decision process that begins at the top. The primary decision about a unit's budget is made on the unit's total request or appropriation, and, on the basis of this sum, the levels of requests and appropriations for the separate line-items are determined. As explained previously, the reason for the model's good performance with personnel data, is that within this budget unit sum, personnel decisions are very constrained.

Although this explanation of total and personnel line-items seems feasible, there is one objection to this reasoning. Because personnel expenditures are such a large part of total expenditures, the aggregate

data for each budget unit may simply reflect the predominance of personnel decisions in total expenditures. The reason why budgeting appears to be top-down and incremental is that the varying amounts spent on supplies and services, equipment and maintenance have little impact on total expenditures. They impact total expenditures enough to slightly alter the base coefficients of total requests and appropriations relative to personnel requests and appropriations, but it does not alter them enough to change the coefficients of determination. Thus total expenditures, of which approximately 80% are personnel expenses, are not affected greatly. In other words, budget decisions may actually be bottom-up and mostly non-incremental but appear top-down and incremental because the predominance of personnel decisions. Under these circumstances, the only way to judge the budgeting process as either top-down or bottom-up is to compare the results at the second stage of the model.

Comparison of Separate and Total Line-Items In the Second Stage of the Research Model

Tables 7.1a to 7.1d present the separate line-item estimates for the second stage of the model. Unlike the estimates for the first stage and total line-items for stage two, no outliers are removed from the stage two separate line-item estimates. Although there were significant outliers in many of the request and appropriation equations, in most cases, removing one group of outliers revealed others that should also be removed. Where such problems with outliers exist, it indicates that the equation estimates are more unreliable than estimates for equations without this problem. For instance,

TABLE 7.1a

STAGE TWO COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES: PERSONNEL LINE-ITEMS

	REQUESTS				APPROPRIATIONS			
VAR	COEFF.	BETA	t/F	prob.	COEFF.	BETA	t/F	prob.
BASE	a_{10} -.03		-1.1	.25	b_{10} -.01		-1.1	.26
C	a_2 -1223	-	1.4	.16	b_2 191	-	.42	.67
WC*PD	a_3 -.14	-.05	-1.1	.24	b_3 -.25	-.20	-4.2	<.001
P*PD	a_4 -.15	-.02	-.51	.61	b_4 .05	.02	.38	.71
PD	a_5* -.02	-.03	-.79	.43	b_5* -.10	-.19	-4.6	<.001
WC	a_6* .07	.12	2.8	.005	b_6* .03	.11	2.5	.01
P	a_7 .003	.005	.01	.99	b_7 .007	.02	.39	.70
OR	a_8 .04	.07	1.6	.11	b_8* .03	.10	2.5	.01
PS	a_9 .13	.06	1.5	.15	b_9* -.08	-.08	-2.1	.04
R^2	.07	-	5.72	<.01	.91	-	78.9	<.01

*consistent with respective hypothesis in Table 5.10

TABLE 7.1b

STAGE TWO COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES: SUPPLIES & SERVICES LINE-ITEMS

	REQUESTS				APPROPRIATIONS			
VAR	COEFF.	BETA	t/F	prob.	COEFF.	BETA	t/F	prob.
BASE	a_{10} -.04		-.38	.70	b_{10} .13		.79	.43
C	a_2 -3.9	-	-.1	.92	b_2 -23.8	-	-.20	.84
WC*PD	a_3* .08	.03	.78	.44	b_3* .63	.35	4.1	<.001
P*PD	a_4 -.12	-.08	-1.8	.07	b_4 -.39	-.06	-1.5	.14
PD	a_5* -.06	-.09	-1.8	.07	b_5* -.52	-.27	-4.3	<.001
WC	a_6 .0004	.0002	.00	.99	b_6 .004	.001	.029	.98
P	a_7 .05	.01	.28	.78	b_7* .51	.075	1.9	.06
OR	a_8 .009	.003	.08	.94	b_8 -.21	-.05	-1.2	.21
PS	a_9 1.04	.10	2.4	.02	b_9* -.20	-.01	-.32	.74
R^2	.13	-	18.5	<.01	.38	-	48.9	<.01

*consistent with respective hypothesis in Table 5.10

TABLE 7.1c

STAGE TWO COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES: EQUIPMENT LINE-ITEMS

	REQUESTS				APPROPRIATIONS			
VAR	COEFF.	BETA	t/F	prob.	COEFF.	BETA	t/F	prob.
BASE	a_{10} -7.5		-2.7	.007	b_{10} .07		.60	.54
C	a_2 -106	-	-.18	.86	b_2 -31	-	-1.12	.26
WC*PD	a_3 -1.2	-.15	-3.0	.002	b_3 .007	.009	.19	.85
P*PD	a_4 -1.2	-.07	-1.3	.18	b_4 -.07	-.03	-.69	.49
PD	a_5 -.001	-.001	-.001	.99	b_5 -.001	-.004	-4.1	.93
WC	a_6* 6.9	.12	2.4	.02	b_6* .30	.12	2.6	.009
P	a_7 -.08	-.001	-.02	.99	b_7 -.01	-.003	-.06	.95
OR	a_8 7.6	.13	2.7	.008	b_8 .03	.01	.23	.81
PS	a_9* -3.3	-.01	-.24	.81	b_9* -.11	-.01	-.18	.86
R^2	.115	-	6.5	<.01	.035	-	2.1	<.05

*consistent with respective hypothesis in Table 5.10

TABLE 7.1d

STAGE TWO COEFFICIENT ESTIMATES FOR WEIGHTED LEAST SQUARES: MAINTENANCE LINE-ITEMS

	REQUESTS				APPROPRIATIONS			
VAR	COEFF.	BETA	t/F	prob.	COEFF.	BETA	t/F	prob.
BASE	a_{10} 1.5		1.7	.10	b_{10} .29		1.0	.31
C	a_2 -27	-	-.60	.55	b_2 -.75	-	-.06	.96
WC*PD	a_3* 3.8	.35	4.7	<.001	b_3* 1.1	.12	3.5	<.001
P*PD	a_4 -9.1	-.50	-8.8	<.001	b_4* .33	.03	1.0	.31
PD	a_5* -2.7	-.35	-4.3	<.001	b_5* -1.1	-.87	-27.1	<.001
WC	a_6* .24	.01	.28	.78	b_6 -.02	-.001	-.05	.96
P	a_7* .99	.04	.80	.42	b_7* .11	.01	.28	.78
OR	a_8* -.77	-.04	-.81	.42	b_8* .23	.03	.79	.43
PS	a_9* -.45	-.01	-.24	.84	b_9 .05	.003	.08	.94
R^2	.13	-	4.48	<.01	.30	-	14.1	<.01

*consistent with respective hypothesis in Table 5.10

outliers could be removed in all first stage line-item groups and in the second stage total line-items without radically changing the entire equation. More importantly, however, where unreliable estimates are a problem, the outliers may not represent unique or unusual circumstances relative to other cases. As a result of this condition and its causes, no outliers are removed from any second stage, separate line-item equation.

Comparing the estimates for total line-items in Table 6.5 and the estimates for separate line-items in Tables 7.1a to 7.1d, the most obvious difference is the values of the percent of explained variation in both sets of equations. For separate line-item requests, the R^2's are, on average, 70% lower than for total requests. With the exception of personnel line-items, the R^2's for separate line-item appropriations are an average of 50% lower than total appropriations. In contrast, the R^2 for total appropriations, which is .50, is approximately 80% greater than the R^2 for personnel appropriations which is .91. Excluding personnel line-items, these figures demonstrate that, in general, the research model performs better at the aggregate than the disaggregate level.

There is one possible reason for total line-item's better performance according to the relative levels of explained variation. Excluding personnel line-items, the variation of each dependent variable for stage two separate line-items is greater than for any dependent variable variation for stage two total line-items. This may actually result from lower R^2's for stage one separate line-items compared to the stage one total line-items. Because the dependent variables in the second stage of the model are the residuals from the

first stage, the lower the R^2's in the first stage, the higher the variation of the dependent variable in the second stage. The higher the variation of the dependent variable, relative to the overall explained variation of the equation, the lower the R^2.

Another possible factor in the R^2 of .50 for stage two total appropriations is that the R^2 of .91 for stage two personnel appropriations may contribute to its value. The previous section discusses how the coefficients for stage one personnel line-items contributes to the coefficients for stage one total line-items. This same process may be occurring for stage two total appropriations. However, this process does not seem to occur in stage two requests.

The R^2 of .38 for stage two total requests is much higher than any R^2 for stage two separate requests. In fact, the R^2 for stage two personnel requests is the lowest among the four second stage request equations. On this basis, one can conclude, somewhat unequivocally, that the R values for second stage request equations indicate that the second stage of the model performs better for total line-item requests than for separate line-item requests. This brings into question the claim that stage two R^2's are entirely a function of stage one R^2's and the claim that the estimates for total line-items are a function of separate line-items. Given the inconsistent levels of R^2's for stage two appropriation equations, the question then becomes what can be done to judge the relative merits of the model for total and separate line-item appropriations.

Rather than looking at only R^2s for each set of equations, the values of the variable coefficients and the hypotheses tests for total and separate line-items must also be compared. Tables 7.1a to 7.1d

indicate which second stage statistical hypotheses are supported for each equation. An asterisk next to a coefficient shows whether the value of the coefficient is within the proper range as specified by its respective statistical hypothesis. According to Table 6.6, five of the seven stage two statistical hypotheses are supported for total appropriations. For personnel and supplies and services appropriations, four of seven stage two hypotheses are supported. For equipment appropriations only two statistical hypotheses are supported, and five statistical hypotheses are supported for maintenance appropriations.

Based on this criteria, it seems that the model performs only somewhat better for total stage two appropriations than for separate stage two appropriations. Although the R^2's are less, two of the second stage separate line-items have only one less supported hypothesis than stage two total line-items and one line-item, maintenance appropriations, has an equal number of supported hypotheses. However, examining the variable coefficients for stage two equipment and, especially, maintenance appropriations, their magnitudes weaken the overall performance of the model for these line-items. Specifically, the variable coefficients are rather large.

For instance, in the maintenance equation, the coefficient for priorities (P) is .11 meaning that officials increased maintenance appropriations by 11% of the base for high priority departments. After the change in the organization of the budget process (OR), maintenance appropriations were increased by 23% of the base. Maintenance appropriations were altered by 110% of the change in requests from last year's appropriations (PD), and this alteration was increased by 110%

during wealthy and certain years (WC*PD). The problem these coefficients pose is that they do not support the model's underlying hypotheses of incremental decision making techniques. One of the features of incremental decision making is that only a narrow range of alternatives are examined by budgeting officials. The magnitude of these coefficients imply that a much larger range of alternatives are considered by budgeting officials.

Examining the success of stage two statistical hypotheses for requests, a pattern similar to stage two appropriations emerges. According to Table 6.6, four of the seven second stage statistical hypotheses are supported for total requests. For personnel, supplies and services, and equipment requests, only two of the hypotheses are supported for each line-item. For maintenance requests, six of the seven hypotheses are supported. This latter amount is greater than any other request or appropriation equation in stage two. However, similar to the second stage maintenance appropriations, the magnitudes of the stage two maintenance request coefficients are much larger than the theory suggests. In fact, these coefficients are so large that their validity must be questioned.

According to Table 7.1d, maintenance requests were increased by 99% of last year's appropriation for high priority departments (P) and 24% during wealthy and certain years (WC). Requests were also changed by 270% of the change in last year's appropriation from the previous year (PD), and this figure was increased by 380% during wealthy years (WC*PD). It is difficult to imagine that maintenance requests change, on average, by such large amounts. Thus, although the model appears to explain stage two maintenance requests, the results do not fit the

underlying theoretical expectations.

Based on the analysis of explained variation and statistical hypotheses for aggregate and disaggregate data at the research model's second stage, it seems that the basic theory proposed by Davis, Dempster and Wildavsky, although somewhat modified, explain top-down request decisions. This implies that budget officials use incremental decision making techniques in a top-down manner. These techniques are applied to total requests which are the budget officials' primary unit of analysis. Because total requests are the primary unit of analysis, decisions about separate line-items are secondary and are constrained within this total. The techniques used to make these secondary decisions may be incremental, but, in general, they are not explained by the research model.

With respect to appropriations, the results are not as conclusive as they are for requests. There is some question whether the personnel line-item results, relative to other separate line-items, impact the results at the aggregate level for both stage one and two of the model. However, given the model's slightly better performance at the aggregate level, and in light of the model's performance for request decisions, it seems reasonable to conclude that appropriations decisions are also top-down decisions that utilize incremental techniques. Assuming, then, that both requests and appropriations are aggregate level decisions, the question is do the disaggregate level results exhibit anything about aggregate level decisions that could help further specify the research model?

Examining the magnitudes of significant variable coefficients for stage two equipment and maintenance line-items, it seems that

conditions represented by the independent variables can have very exaggerated effects on request and appropriation decisions for these two line-items. Although the levels of equipment and maintenance expenditures are usually small compared to total expenditures, when a decision to change these levels is made, it frequently has a recognizeable impact on the overall expenditures. For this reason, and because many equipment and maintenance expenses are big ticket items, budget official's may consider equipment and maintenance expenditures as part of their aggregate level decision. In other words, budgeting officials' primary decisions are for budget units' total requests or appropriations, but officials may consider whether to include money for a particular piece of equipment or maintenance of an item in that total.

To integrate this phenomena into the model of the decision calculus, a variable measuring the relative need of each department for equipment and maintenance expenditures should be included in the model. Based on the evidence of the stage two maintenance and equipment equations, one would expect to find requests and appropriations increasing as budget units need for equipment and maintenance increases. These decisions may even vary according to wealth and certainty or the priority of the department.

CONCLUSION

Assuming that budgeting officials in Lansing use incremental decision making techniques, and that the budget process is explained successfully by the research model, this chapter demonstrates that the decision process is probably top-down. This means that the primary

decisions about requests and appropriations focus on a budget unit's total budget, and decisions about separate line-items are secondary. The impact of this aggregate level process on separate line-items decisions is that the sum of separate line-items is constrained within the total budget. If, in fact, budgeting in Lansing operates in this fashion, then the criticisms of the Davis, Dempster and Wildavsky theory that target its inability to explain current budget outcomes are brought into question.

Authors such as Behn (1985) and Bozeman and Straussman (1982) claim that a model of budgeting based on incremental decision making techniques cannot account for current budget outcomes. Recent finance literature on fiscal stress identifies these new budget trends which show unstable budgets and budget levels that are very different from previous years. This literature states that the late 70's and early 80's have been lean years for many governments because of public sentiment constraining their revenues, decreases from the federal government if revenue sharing, and decreases in revenue caused by recession and unemployment. As a result, the cities spending patterns have become less stable, many expenditures have decreased and expenditures, in general, are deviating more from the past. Some of the literature also shows that the Davis, Dempster and Wildavsky models do not explain or predict recent trends in budgeting as well as they explained previous trends. Behn, Bozeman and Straussman argue that the incremental decision making techniques, which are the foundations of the Davis, Dempster and Wildavsky theory, are the source of the theory's failure.

These same authors argue that for a city to budget successfully

under conditions of fiscal stress, top-down budgeting must be used. An aggregate decision process is the most centralized form of budgeting, and, it is only under centralized budgeting that large changes and decreases can be made in departments' budgets. Such changes and decreases are necessary for a city to remain viable under conditions of fiscal stress. The authors also claim that a theory of budgeting that uses incremental decision making techniques cannot incorporate top-down budgeting, and, by definition, such budgeting constitutes a bottom-up budgeting process.

The research model developed here recognizes the deficiency of the Davis, Dempster and Wildavsky theory to explain budgeting under fiscal stress. However, the incremental decision techniques are not the source of the problem. The model is developed according to the argument that incremental decision making techniques produce all budgeting outcomes whether they are unstable or decreasing, or the process is top-down or bottom-up. To account for budget outcomes under conditions of fiscal stress, or any other condition, the theory is changed to better include the environment in the budget official's decision calculus. The model uses the Davis, Dempster and Wildavsky theory as its foundation, but it also reflects these changes in the theory.

By testing the model using both bottom-up and top-down data, the claims that an incremental budgeting model cannot explain current budget outcomes is tested. Also, the claims that incremental budgeting techniques can only be found in bottom-up or disaggregate budgeting is tested. According to the findings in this chapter, budgeting in the City of Lansing is both top-down and incremental. The findings are then evidence against the broader argument that a new theory of budgeting is

needed to explain current budgeting behavior.

The deficiency in the claim that budgeting in the City of Lansing is both incremental and top-down is that comparing the model using top-down and bottom-up data is not a critical test. Because a competing model of nonincremental budgeting is not compared to the incremental budgeting model, one can only conclude that, if budgeting officials use incremental decision making techniques, then the budgeting process is probably top-down. The model performed reasonably well at both the first and second stages for total line items which is evidence for the theory underlying the model. But, the possiblity that budgeting in Lansing was nonincremental and bottom-up during the 16 year period has not been directly addressed. In fact, the previously discussed problems concerning the contribution of personnel line-items to the total line-item results in both the first and second stage lends evidence to the claim that Lansing budgeting is nonincremental and bottom-up. For this reason, the results in Chapter Six and Chapter Seven must be considered conditional upon testing of alternative models using aggregate and disaggregate data.

CHAPTER EIGHT

SUMMARY AND CONCLUSION

SUMMARY OF THE RESEARCH MODEL AND FINDINGS

The primary goal of this research is to test a model of budgetary decision making that represents budgeting officials' decision rules for requests and appropriations. The model is estimated on data obtained from Lansing, Michigan between FY 1969-70 and FY 1984-85. Using a theory of budgeting that is frequently labelled "incremental budgeting," the model focuses on how budgetary participants include the environment in their decision calculations and what impact the environment has on decisions about budget levels. The study argues that previous budgeting models inadequately represent environmental factors in participants' decision rules. The model also represents budgetary decisions as a two stage process. In the first stage, the impact of the base on budget levels, which represents the participants' recognitions of previous decisions, is estimated. In the second stage, the effects of more salient calculations concerning this years' decisions are estimated. The model is also estimated using two different units of analysis: total line-items and separate line-item groups.

The model's form and content are developed in response to various criticisms of incremental budgeting models that target the models' inability to explain decreasing budgets, abrupt shifts in budget trends and instances of a general instability in budget levels. Underlying the theory of incremental budgeting is a set of assumptions stating, in

general, that decision makers analyze only a small number of decision alternatives and rely on past decisions to guide this year's decisions. Many critics claim that the models' failures demonstrate that the theory's assumptions do not provide a valid foundation for explaining the budgeting process. In their opinion, a new theory of budgeting should be examined. However, because critics attack the theory's underlying assumptions, and do not offer another theory in its place, this study argues that such claims are unscientific.

A more scientific way of overcoming the theory's failures is to alter it within the framework of its assumptions. Assuming that budgetary decision making is, fundamentally, an incremental process, one must look for deficiencies within the theory's protective belt of ancillary tenets. Based on scientific and nonscientific criticisms, it seems that the incremental theory of budgeting does not adequately reflect environmental complexity. Specifically, the theory does not adequately represent budgeting participants' strategies or a difference in strategies based on environmental conditions. As a result, its models do not fully represent the politics of the process, and they do not address a very relevant question to its study. This question is: which budget units get money relative to other budget units and do they get greater or lesser amounts under varying circumstances? Accordingly, the goal is then to alter the theory in a way that focuses on solving these problems.

The model estimated here represents two major changes in the incremental theory of budgeting. First, two new set of assumptions concerning the structure and general functioning of the environment are added to the theory's fundamental assumptions. Based on a theory of

hierarchical systems, the first set of assumptions propose two environments that budgeting participants perceive in a different manner. One environment is external to the city government, the other includes the city government and all internal processes. The assumptions also propose unique characteristics for short-run and long-run behavior among the internal and external systems. Specifically, in the short-run, the behavior of budget units within the government is independent of the behavior of systems outside the government. Only in the long-run is the behavior of internal budget units affected by external systems.

On the basis of these added assumptions, explanations concerning the environment's impact on budgets decisions are made. With respect to the external environment, the study proposes that its characteristics act as constraints and opportunities for participant's behavior. Participants do not directly perceive this environment, they only perceive it indirectly as conditions of the internal environment.

To determine what external environmental characteristics affect the internal environment and budgeting behavior, a second set of assumptions are added to the original theory concerning economic exchange and the complexity of hierarchical systems. From these assumptions, a set of variables representing these conditions are proposed. These variables are its supply of resources, its demand for services and the stability and complexity of demands and resource. The participants then perceive these characteristics respectively as the governments' wealth, its priority over budget units, and its uncertainty.

To determine what internal environmental variables are important to

budgeting decisions, the study uses the incremental budgeting theory and a substantive analysis of the city's history and finances. From incremental budgeting theory, the variable 'changes in previous decisions' is included in the model. From the substantive analysis, which is based on observation rather than theory, the variables 'change in the organization of the city's budget process' and 'the Operations and Maintenance Division' are placed in the model. Finally, two other variables representing the interactive effects of the internal and external environment are also included in the model.

The second major change to the incremental models of budgeting is that the decision making process is presented in two stages. This new form for the model seems more consistent with the underlying assumptions of decision making and the theory's original assertion that the base is not considered by participants when deciding the level of requests and appropriations. Instead, participants recognize the base as the point from which calculations on the budget begin. By representing the model in two stages, the first stage becomes the participants process of acknowledging the base in their calculations, and the second stage becomes the participants substantive calculations concerning the actual levels of requests and appropriations. Stage one, then, estimates the effects of the base on requests and appropriations, and stage two estimates the effects of all of other variables on the residuals from stage one.

In addition to qualitative changes in the budgeting models, this research also makes two changes in their method of estimation. First, the models are estimated using pooled cross-sectional time series analysis. Previously, most models were estimated using only time series

analysis. By using a pooled method, the impact of the base is assumed to be equal across budget units and time. More importantly, the burden of explanation for differences in decisions across budget units and time is placed with the more essential decisions of stage two.

For instance, the variable wealth-certainty and its interactive term, which both change with each new fiscal year, measure differences in budget strategies over time. The variable priority over budget units and its interactive term, which both vary by budget unit, measure differences in budget strategies across budget units. The implication of being able to explain behavior across time and budget units is that it directs analysis towards the vital political issues of "who gets what, when and how." It also addresses one of the more debilitating criticisms of the incremental budgeting theory which is that it does not explain changes or differences in strategies.

The second change in estimating the models is that each equation is estimated using two different units of analysis. The first unit of analysis is total line-items which is the unit used by most previous budgeting models. The second unit of analysis is actually four different units which represent separate line-item groups within total line-items. The four groups of line-items for which each equation is estimated separately is personnel, supplies and services, maintenance and equipment. The set of estimated coefficients for total requests and appropriations are then compared to the four sets of estimated coefficients for separate line-item requests and appropriations. The reason for comparing these two units of analysis is to determine whether budgetary calculations take place at an aggregate or disaggregate level of analysis. The outcome of this comparison

reflects on many of incremental budgeting theory's unscientific criticisms. These criticisms state, in general, that only aggregate level, or top-down, budgeting can explain current unstable and decreasing budget levels. They also claim that a top-down budgeting process is incompatible with incremental budgeting because the latter must be a bottom-up process.

After quantitative and nonquantitative analysis of the wealth and certainty characteristics of the 16 fiscal years and the priority levels of the 52 budget units, the model was estimated for both units of analysis. The principal findings from estimating the model are as follows:

A. For stage one of the model:

1. Total line-items and personnel line-items performed equally well, but total line-items showed more change in requests and appropriations from the base than personnel line-items.
2. The R^2's for maintenance, equipment and supplies and services line-items were distinctively lower than for total or personnel line-items. The coefficients for the former line-items were either not within the range specified by the hypotheses, or they had extreme values. An extreme value indicates that the level of change in the requests and appropriations from the base is much higher than expected.

B. For stage two of the model, total line-items:

1. Wealth-certainty had the predicted effect on requests and appropriations which is: the greater the wealth-certainty of a year, the higher the requests and appropriations.
2. Priority did not have the predicted effect on requests and appropriations which is: the higher the priority of a department, the greater the requests and appropriations of that department.
3. Previous decisions had the predicted effect on requests and appropriations which is: the greater the increase in previous decisions, the lower the requests and appropriations.
4. Although statistically insignificant, the interactive variable of previous decisions and wealth had the predicted effect on requests which is: high wealth will

decrease the impact of previous decisions on requests and appropriations. This interactive variable had a statistically significant impact on appropriations, but it was opposite from what was predicted.

5. Although statistically insignificant for requests only, the interactive variable of previous decisions and priority had the predicted impact on requests and appropriations. The predicted impact is: previous decisions will have less of an impact on requests and appropriations for high priority budget units.

6 Of the two special variables, change in the organization of the budget process and O&M unit, both had the predicted effect on appropriations only. However, only the variable budget organization change was statistically significant.

7. Approximately one-third and one-half of the variation not explained by the first stage request and appropriations equations, respectively, is explained by the second stage variables.

C. For stage two of the model, separate line-item groups:

1. In general, the number of supported hypotheses is lower for separate line-items than for total line-items. However, more hypotheses are supported for second stage appropriations than second stage requests.
2. For maintenance and request line-items, the levels of many of the coefficients which support the hypotheses are very extreme indicating that the level of change is much higher than expected or what the theory would predict.
3. In general, the level of explained variation is lower for separate line-items than total line-items.

PRINCIPAL CONCLUSIONS AND DISCUSSION OF THEIR THEORETICAL IMPLICATIONS

Based on the findings of estimating the research model, two principal conclusions are drawn. The first conclusion is that if budgeting in Lansing is an incremental process, then evidence shows that decisions are probably made at the aggregate level. However, it is not clear from the findings whether one can argue that budgeting is not a bottom-up process in which decision rules other than incremental ones are used by budgeting participants. There are two reasons for qualifying this conclusion. First, the comparison of aggregate and disaggregate level data for the same model is not a critical test between two competing models. Thus, one cannot conclude that some

other budgeting theory for disaggregate level data does not perform better than incremental budgeting theory at aggregate level data. Secondly, the results for separate line-item categories are not random or contrary to patterns of nonincremental decision making. In fact, the results demonstrate that if budgeting is a bottom-up process, then it is probably not incremental.

For instance, the poor performance of the base in the latter three separate line-item groups for stage one show that last year's decisions do not necessarily predict this year's decisions. The results also bring into question the participants' goals. Some coefficients are in the wrong direction which indicate that officials decrease some requests from previous years and increase some appropriations over requests. Both of these inferences, concerning goals and the predictability of this year's decisions from previous decisions, are very fundamental tenets for incremental budgeting theory. Moreover, the magnitudes of the coefficients support many critics claims' that budget outcomes can be unstable or much larger in magnitude than is appropriate for incremental budgeting.

One implication of this conclusion is that before the theory can be accepted or disposed of, it must be tested against competing budgeting models. The problem of accepting top-down incremental budgeting only with qualifications demonstrates the logic behind Lakatos' argument that a research program can be refuted only in reference to another research program (Ball, 1976). Similar to the problems of accepting or rejecting theories without replacements, theories cannot be tested in a vacuum. Therefore, before one can judge the validity of top-down or bottom-up budgeting, or even incremental budgeting theory, competing

models must be developed and tested.

In a more positive light, another implication of this conclusion is that the results corroborate this study's claim that incremental budgeting is not, by definition, bottom-up budgeting. What is really at stake here are the criticisms of incremental budgeting theory which claim that top-down budgeting is incompatible with an incremental decision process. According to the findings, budgeting in Lansing is either top-down and incremental or bottom-up and nonincremental. Either outcome is contrary to these critics' claims. Once again, this demonstrates the problems of making competing claims without a supporting theory or evidence. Without a theory to guide the development of testable hypotheses, such hypotheses run a greater risk of being irrelevant to any organized system of thinking and meaningless in reference to empirical evidence.

Many of these critics make their claims and develop their hypotheses on the basis of arguments attacking incremental budgeting theory's underlying assumptions. By attacking an established theory's underlying assumptions, it becomes difficult to formulate guided and testable hypotheses that are systematically related. A more rational procedure is to work within the framework of the established theory and change only parts of it to develop new hypotheses to explain behavior that the old form of the theory could not account for. If the new form of the theory fails, and subsequent changes also perform poorly, then there is a basis for questioning the underlying assumptions. Examing this study with respect to the performance of the proposed changes in the theory of budgeting reveals the second principal conclusion.

The second major conclusion that can be drawn from this study is,

of the theory fails, and subsequent changes also perform poorly, then there is a basis for questioning the underlying assumptions. Examing this study with respect to the performance of the proposed changes in the theory of budgeting reveals the second principal conclusion.

The second major conclusion that can be drawn from this study is, that at an aggregate level, many of the changes made in incremental budgeting theory seem appropriate. The models perform reasonably well, and they explain, in part, both current and past budgeting outcomes in Lansing. Concerning the change to a two stage decision process, the results of estimating the model, in conjunction with arguments for making such a change, indicate that a two stage model may represent the decision process more accurately.

As argued throughout the study, a two stage process is consistent with concepts of incremental decision making and the assumption that budgeting participants do not directly consider the base in calculating requests and appropriations. The results generally corroborate these claims. For total line-items, the model displayed the expected estimates with a high level of explained variation. Stage two equations explained approximately 38 and 50 percent more explained variation than stage one, with over half of the estimates exhibiting the expected levels.

Although higher R^2's and a greater number of supported hypotheses for stage two would be more convincing, the results for both stages are respectable enough to indicate that this method of representation should be examined more closely. This conclusion is especially convincing in light of the arguments for this method. Moreover, the results indicate that the related assumption that all budget units

the budget participants' perception of it, the results indicate such theoretical changes may more accurately represent the environment than other versions of incremental budgeting theory. Recall that the primary criticisms against the theory concern its difficulty in explaining many current budget outcomes. Such outcomes appear unstable, represent decreases from previous years, and have magnitudes that are greater than the theory can predict. The theoretical changes made here attribute these outcomes to the effects of the environment on budget participants strategies. The changes also attribute observed shifts in strategies, which are identified by Davis, Dempster and Wildavsky as inconsistent with their theory, to changes in environmental conditions. The model, which represents environmental impacts at stage two, explains 38 and 50 percent more variation than stage one and also supports most of the statistical hypotheses at this stage. Thus, there is evidence that many of the theoretical changes that address the criticisms are promising. Examining the effects of specific stage two variables exemplifies this point.

As demonstrated in Chapter Four and Chapter Five, the 16 fiscal years of data covered periods in the history of Lansing budgeting that required budget cuts, were unstable and which showed large changes from previous behavior. The model, to an extent, was able to account these conditions. For instance, the estimated effects of the variable wealth-certainty and its interactive term show that budgeting participants altered requests and appropriations in expected ways in response to changing fiscal conditions and differences in the predictability of the environment. As noted in previous chapters, however, the effects of the environment extend beyond changes in

behavior over time. Incremental budgeting theory is also deficient in explaining behavior across budget units. But one of the variables representing this condition indicates that the respective theoretical changes made here are also inadequate.

Of the variables representing differences among budget units, only one affected requests and appropriations as anticipated. The simple binary priority variable had no impact on the dependent variable indicating that participants do not directly consider the priority of budget units as defined here. In contrast, the priority variable affected requests and appropriations interactively with previous decisions. Such inconsistent findings could indicate that the variable's interactive effects occurred by chance or are spurious. However, it could also indicate that participants do indeed consider priority only indirectly. This finding, in relation to the success of the wealth-certainty, somewhat supports Crecine's claim that budget revenues are the only factors about the external environment that participants consider. Although Crecine did not test interactive effects, the results show that he may be correct about the direct effects of demands for services.

From the prospective of claims that a new budgeting theory is needed which has different underlying assumptions than incremental budgeting theory, the findings make an important statement about budgeting behavior and decision making in general. The findings demonstrate that budgetary decision making is an incremental process under both current and past conditions. The values of the coefficients indicate that the goals of the participants are what the original theory hypothesized, that decisions proceed from the base, and that

only a small number of decision alternatives are considered. The success of the binary variables indicates that decision rules are simple. In answer to these criticisms, the way in which budgeting outcomes can be unstable, decreasing or show large change is by the cumulative effect of incremental calculations or the analysis of only a few high change alternatives. Likewise, decisions can be both top-down and incremental through incremental decision making by participants at a central level of the organization.

Based on the estimated variables, one can conclude, in general, that the theoretical changes made here show promise. By making inroads into better explaining budget levels across time and budget units, participants' strategies become more realistic and representative of the politics of budgeting. Relative to the base, the equations at stage two demonstrate that both environments operate as constraints or opportunities on behavior and that the participants are somewhat insulated from the external environment. The success of the interactive variables for both wealth-certainty and priorities show that the decisions may be more complex than previously expected. It also demonstrates that the internal environment is more predominant in participants' strategies. More importantly, though, the theoretical changes made here and the findings of the analysis provide an avenue for further explanation.

FUTURE RESEARCH DIRECTIONS

Relative to this study, one primary avenue for future research is to test the model in other municipalities. Because the model is estimated on data for only one city, the findings and conclusions have

little external validity. In other words, there is no assurance that the findings are reliable across different cities and different circumstances faced by other cities. For instance, as was argued in Chapter Four, Lansing's experiences with fiscal stress was not as devastating as other cities. As a result, the analysis of incremental decision making under such conditions is not as rigorous as possible. It is possible that the model tested here could not explain budgeting outcomes as well for cities that experienced more fiscal stress. Other conditions that could be factors in the model estimates are differences in the type of city government, the budgeting process or even demographic characteristics. For this study's findings to be accurate with respect to such conditions, more cities must be tested.

Another direction for future research is determining how budget levels differ across budget units. Because of the inconsistent performance of the simple priority variable and the interactive priority variable, the criteria of a general priority among budget units is questionable. According to preliminary testing with the data, there are predominant differences in budgeting levels for many of the budget units. The question, then, is why do these budget levels differ? Answering such a question addresses an important issue concerning the politics of the budgeting process and fills a significant void in the incremental budgeting model. In fact, research may find that differences among budget units is a more important factor in participants strategies than changes in conditions from one year to the next.

One suggestion for how to proceed with research into budget unit differences is to explore the relationships among budget units based on

information and expertise, exchange of services, or the supply of necessary skills to the functioning of other budget units. Whereas the priority of a budget unit as a explanation of differences among units' budget levels is based on the influence of the external environment, the relationships among budget units is based on the influence of the internal environment. If the conclusion that the internal environment is more important than the external environment in determining budget outcomes, then it may be that budgeting participants pay more attention to each other than the external environment when making requests and appropriations.

A third focus for future research would be to examine the request process more closely. As with previous models of incremental budgeting, this model shows that requests are more easily explained than appropriations. Given the structure of both types of equations and these findings, explaining requests may be a more important factor in comprehending the full budgeting process than expected. Because requests tend to differ more from previous appropriations than appropriations differ from requests, it appears that requests drive the entire model. In other words, appropriating units may use requests as more of a base than budget units use previous appropriations as a base. This occurs because the appropriating units' simplifications needs or they realize that budget units have already done the primary thinking about this year's budget. In either case, this means that budget units may be more responsible for the level of their appropriations than appropriating units. (See Sharkansky, 1968a and Leloup, 1973.)

A final direction for future research, which has already been discussed, is the development of competing models of budgeting that can

be tested at a disaggregate level of data. Also, more work must be done in the analysis of how budgeting decisions are made at the disaggregate level and how concerns about separate line-items could enter into aggregate level calculations. Above all, however, future research must address these issues in a scientific manner.

NOTES

NOTES

[1] Two major definitions of the term incrementalism are used in the literature. The first, which Lindblom labels "descriptive incrementalism" or "incremental politics", refers to political change by small steps. The second, called "process incrementalism" or "incremental analysis," is a method of decision making characterized by the use of aids to calculation and consideration of a limited number of choices. As Lindblom argues, the two definitions cannot be used interchangeably and one cannot infer that analytical incrementalism produces incremental outcomes. However, many authors' use of the term in unclear or ambiguous (Lindblom, 1979, 517-18). Here, the term incrementalism, or incremental decision making, refers to the second definition.

[2] One reason Davis et al assumed that budgetary decision rules are linear is that it simplifies the empirical analysis, however, this also simplifies the theoretical analysis. Although their unit of analysis are groups of decision makers (the request equations represent the agency's decisions and the appropriation equations represent the legislature's decisions), the theory applies to individual decision makers. They argue that this discrepancy between the theory and the empirical observation is valid because individual linear decision rules can be aggregated as a single decision rule for a group. Because the aggregated decision rule is a linear function of the individual decision rule, tests of hypotheses and inferences made about the group decision rule apply directly to the individual one.

[3] The form of the new Davis et al models tested are as follows:

$$X_t = (b_0 + b_1 Z_{1t} + \ldots\ldots b_m Z_{mt}) Y_{t-1} + b_{m+1} (Y-X)_{t-1} + e1_t$$

$$Y_t = (a_0 + a_1 Z_{1t} + \ldots\ldots a_m Z_{mt}) X_t + a_{m+1} (Y-X)_{t-1} + e2_t$$

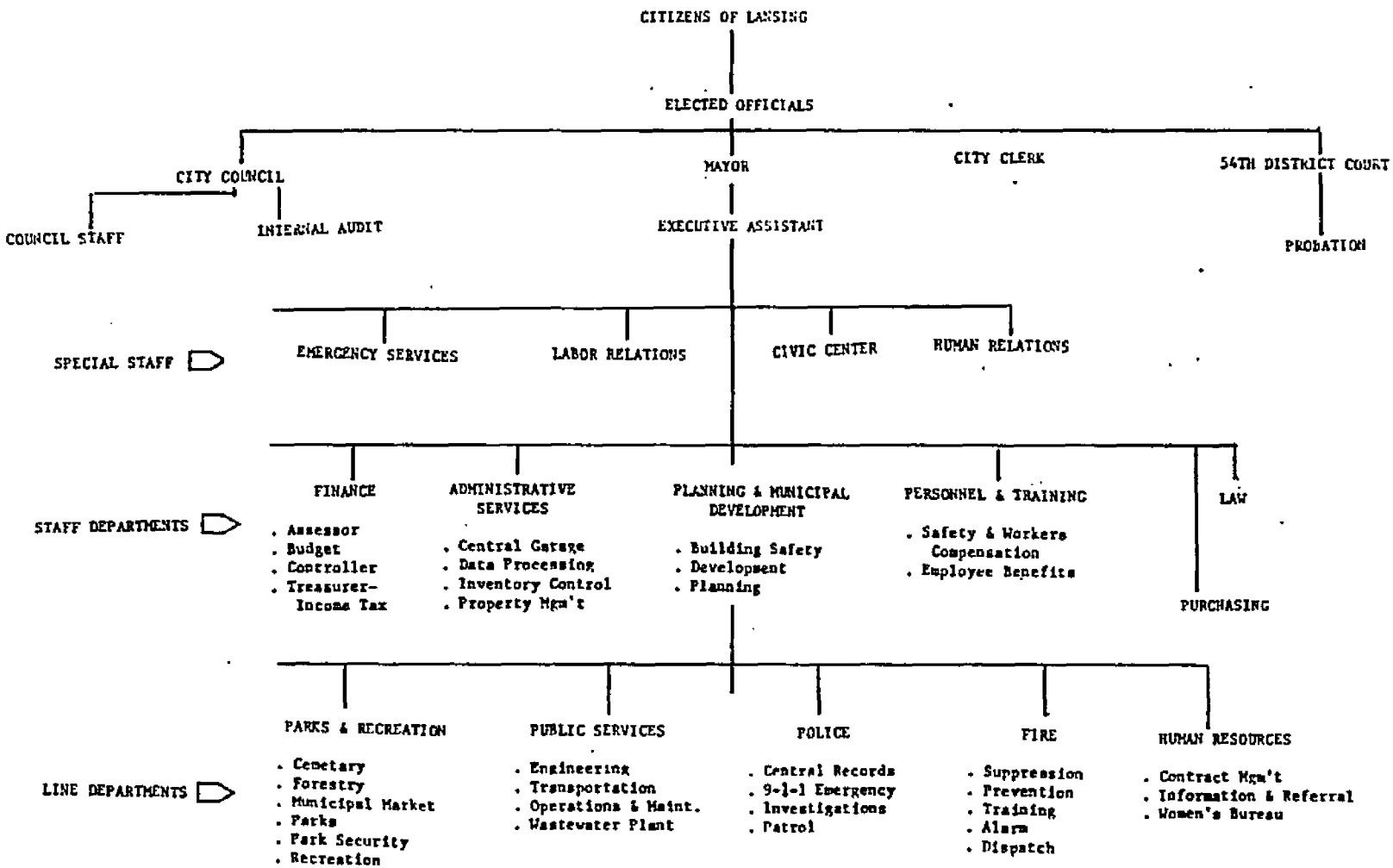
Here, X represents the requests and Y represents the appropriations. The variables $Z_1 - Z_m$ represent the political, economic, social and administrative environmental conditions.

[4] The only wage information that was available for the early years was information on a sample of personnel from the three original unions. This particular sample of information was compiled by the previous director of personnel for his own files. Thus, to maintain consistency with current years, his same sample of personnel was used for the entire 16 years.

APPENDICES

APPENDIX A

ORGANIZATIONAL CHART OF THE CITY OF LANSING



Source: Lansing. Executive Summary FY 1985-86 Budget and Services

APPENDIX B

DESCRIPTION OF BUDGET UNITS AND SERVICES

1. Mayor: Strong mayoral system.

2. City Clerk and Elections: Maintain required city records and conduct the registration and oversight of elections. Also, issues various public licenses and permits.

3. Finance Administration and Budget: Administration of the Finance Department, management of all retirement funds and insurance for the city, and coordination and development of the executive budget.

4. Accounting: Controlling disbursement of city funds, preparation of financial statements and supervision of all financial processes.

5. Assessor: Determining the value of all real and personal property in the city.

6. Purchasing: Monitor and assist all departments in the procurement of city goods and services.

7. Treasury and Income Tax: Collection and processing of all taxes and revenues. Investigation, auditing and enforcement of tax systems.

8. Attorney: Provide legal services for the city and its departments.

9. Administrative Services- Administration: Administration of the divisions that provide supporting services for other city departments.

10. Central Garage: Maintain the city's fleet of vehicles and some heavy equipment.

11. Data Processing: Provides city departments with automated data processing services and programming.

12. Property Management: Maintenance, sale, leasing and purchasing of all city-owned property.

13. Operational Services: Responsible for internal mail delivery, printing and copying, microfilm.

14. Inventory Control and Warehouse: Storage of city records and maintenance of inventory.

15. Personnel and Safety, Labor Relations: General administration of the city's personnel system, hiring and training of personnel, and labor relations and union negotiation.

16. Police Administration: Administration of the Police Department, internal affairs and criminal intelligence operations.

17. Police- Administrative Support: Provide supporting services for police, training personnel, prepare budget, research and crime analysis.

18. Central Records: Process and maintenance of criminal and traffic records.

19. Police- Radio Maintenance, Radio Lab : Installs and maintains all Police and Fire radio systems and equipment.

20. 911 Operations Center: Dispatching police, fire and emergency services.

21. Police- Investigation: Investigation of property and personal crime.

22. Police- Uniform: All line services associated with police and patrol of parks.

23. Fire Administration: Administration of of Fire Department.

24. Fire- Maintenance: Supply, repair and maintenance of all buildings and equipment of the Fire Department.

25. Fire- Suppression: All fire fighting activities.

26. Fire- Preventions: Investigation of fires, inspection of buildings and maintaining building code compliance.

27. Fire- Training: Training all fire fighters.

28. Fire- Alarm: Installation and maintainance of radio alarm system.

29. Fire- Dispatch: Dispatching fire and emergency services.

30. Fire- Ambulance: Oversee paramedics and provide emergency services.

31. Parks and Recreation Administration: Administration of Parks and Recreation Department. Departmental planning and policy development, park design and security.

32. Parks: Maintenance and development of parks, zoo, golf courses and winter operations.

33. Recreation: Development and Management of recreational activities, community centers, sports and arts.

34. Forestry: Tree planting, care and maintenance of trees.
35. Cemetery: Sale of cemetery lots, burial and grounds maintenance.

36. Community and Economic Development Administration: Administration of Community and Economic Development Department.

37. Planning: Development of land-use policies, coordination of Capital Improvements Projects, zoning and housing assistance.

38. Development: Coordinate rehabilitation and development projects, loan and grants assistance, acquiring properties, administration of CDBG program.

39. Building and Safety: Inspection of buildings for plumbing, electical, general code, and land use. Building and mechanical permits.

40. Human Relations: Promote human relations between city government and community.

41. Human Resources: Provision and delivery of human and welfare services.

42. Civic Center: Provide rental space for cultural, social and business activities.

43. Emergency Services: Coordinate and plan for community response to environmental or man-made disasters.

44. Public Service Administration and Engineering: Administration and technical support for Public Service Department.

45. Operations and Maintainance: Street and sewer maintenance and refuse collection.

46. Transportation: Developing traffic policies, operation and maintenance of city-owned parking facilities.

47. Council: The legislative unit of the government.

48. Internal Audit: Audit the financial transactions of the city.

source: Lansing. Executive Summary FY 1985-86 Budget and Services

BIBLIOGRAPHY

BIBLIOGRAPHY

Aldrich, Howard and Sergio Mindlin. 1978. "Uncertainty and Dependence: Two Perspectives on Environment." In Lucien Karpick, . Organizations and Environments, Beverly Hills: Sage Publications.

Anchiot, John L. (ed.) 1983. Population Abstract of the United States, vol. 1. McLean, Virginia: Anchiot Association.

Ando, Albert and Franklin Fisher. 1963. "Near-decomposability, Partition and Aggregation, and the Relevance of Stability Discussions." In A. Ando, F. Fisher and H. Simon, Essays on the Structure of SocialScience Models. Cambridge, Mass: MIT Press. 92-106.

Anton, Thomas J. 1967. "Roles and Symbols in the Determination of State Expenditures," Midwest Journal of Political Science, 11, 27-43.

Ashby, W. Ross. 1964. An Introduction to Cybernetics. London: University Paperbacks.

Bailey, J.J. and P.J.O'Connor. 1975. "Operationalizing Incrementalism: Measuring the Muddles," Public Administration Review, 35, 60-66.

Ball, Terence. 1976. "From Paradigms to Research Programs: Toward a Post-Kuhnian Political Science." American Journal of Political Science, 20, 151-177.

Barnett, Vic and Toby Lewis. 1978. Outliers in Statistical Data. Chichester: John Wiley and Sons.

Behn, Robert D. 1985. "Cutback Budgeting." Journal of Policy Analysis and Management, 4, 155-177.

Bozeman, Barry and Jeffrey D. Straussman. 1982. "Shrinking Budgets and the Shrinkage of Budget Theory." Public Administration Review, 42, 509-515.

Braybrooke, David and Charles E. Lindblom. 1970. A Strategy of Decision: Policy Evaluation as a Social Process. New York: The Free Press.

Brazer, Harvey. 1959. City Expenditures in the United States. New York: National Bureau of Economic Research.

Brecher, Charles and Raymond D. Horton. 1985. "Retrenchment and Recovery: American Cities and the New York Experience."

Public Administration Review, 45, 267-274.

Brewer, Garry D. 1975. "Analysis of Complex Systems: An Experiment and Its Applications for Policy Making." In LaPorte (ed.), Organized Social Complexity. New Jersey:Princeton University Press, 3-39.

Browning, Rufus P. 1970. "Innovative and Non-Innovative Decision Processes in Government Budgeting." In Ira Sharkansky (ed.), Policy Analysis in Political Science, Chicago: Markham Publishing Co., 304-34.

Caldeira, Greg A. and Andrew T. Cowart. 1980. "Budgets, Institutions and Change: Criminal Justice Policy in America," American Journal Of Political Science, 24, 412-438.

Clark, Terry N. (ed.) 1968. Community Structure and Decision Making: A Comparative Analysis. San Fransisco: Chandler Publishing Co.

_____. (ed.) 1974. Comparative Community Politics. Beverly Hills: Sage Publications.

_____, and Lorna Cowley Ferguson. 1983. City Money: Political Processes, Fiscal Strain and Retrenchment. New York: Columbia University Press.

Cohen, Michael D., James G. March and Johan P. Olsen. 1972. "A Garbage Can Model of Organizational Choice," Administrative Science Quarterly, 17, 1-25.

Cook, R. Dennis. 1977. "Detection of Influential Observations in Linear Regression." Technometrics, 19, 15-18.

Cook, Thomas and Donald T. Campbell. 1979. Quasi-Experimental Design and Analysis: Issues in Field Settings. Chicago: Rand McNally.

Cowart, Andrew T., Tore Hansen and Karl-Erik Brofoss. 1975. "Budgetary Strategies and Sucess at Multiple Levels in the Norwegian Urban Setting," American Political Science Review, 69, 543-558.

Crecine, John R. 1969. Governmental Problem Solving: A Computer Simulation of Municipal Budgeting. Chicago, Rand McNally.

_____ (ed.). 1970. Financing the Metropolis: Public Policy in Urban Economics. Beverly Hills: Sage Publications.

_____ and Gregory Fisher. 1973. "On Resource Allocation Processes in the U.S. Department of Defense." In Cornelius P. Cotter (ed.), Political Science Annual, vol 4. Indianapolis: Bobbs-Merrill Co. 181-236.

Cyert, Richard M. and James G. March. 1963. Behavioral Theory of the Firm. New Jersey: Prentice Hall.

Danzinger, James N. 1978. Making Budgets: Public Resource Allocations. London: Sage Publications.

_____, and Peter Smith Ring. 1982. "Fiscal Limitations: A Selective Review of Recent Research." Public Administration Review, 42, 47-55.

Davis, Otto A, M.A.H. Dempster and Aaron Wildavsky. 1966a. "On the Process of Budgeting: An Empirical Study of Congressional Appropriations." In Gordon G. Tullock, Papers on Non-marketing Decision Making, Charlottesville: University of Virginia, 63-132.

_____, _____ and _____. 1966b. "A Theory of the Budgetary Process," American Political Science Review, 60, 529-47.

_____, _____ and _____. 1974. "Towards a Predictive Theory of Government Expenditures: U.S. Domestic Appropriations," British Journal of Political Science, 4, 419-52.

Dawes, Robyn M. and Bernard Corrigan. 1974. "Linear Models in Decision Making." Psychological Bulletin, 81, 95-106.

Dawson, Richard E. and James Robinson. 1963. "Interparty Competition, Economic Variables and Welfare Policies in the American States," Journal of Politics, 23, 256-89.

Dempster, M.A.H. and Aaron Wildavsky. 1979. "On Change: Or, There is No Magic Size for an Increment, "Political Studies, 27, 371-89.

Downs, Anthony. 1967. Inside Bureaucracy. Boston: Little, Brown and Co.

Duncan, Robert B. 1972. "Characteristics of Organizational Environments and Perceived Environmental Uncertainty," Administration Science Quarterly, 17, 313-327.

Falls, Robert. 1980. "Power." Lansing Magazine, 4(6), 20-31.

Fenno, Richard J. 1966. The Power of the Purse: Appropriations Politics in Congress. Boston: Little, Brown.

Fisher, Franklin and Albert Ando. 1962. "Two Theorems on Ceteris Paribus in the Analysis of Dynamic Systems," American Political Science Review, 58, 108-13.

Fisher, Glenn W. 1964. "Interstate Variations in State and Local Government Expenditures," National Tax Journal, 17, 57-74.

Fried, Robert C. 1975. "Comparative Urban Policy and Performance." In Fred Greenstein and Nelson Polsby, Handbook of Political Science: Politics and Policy Making, vol. 6, Mass: Addison-Welsley, 305-79.

Friedman, Louis B. 1975. Budgeting Municipal Expenditures: A Study in Comparative Policy Making. New York: Praeger Publishers.

Gist, John R. 1974. Mandatory Expenditures and the Defense Sector. Sage American Politics Series, Number 04-049. Beverly Hills: Sage Publications.

_____. 1977. "'Increment' and 'Base' in the Congressional Appropriations Process," American Journal of Political Science, 21, 341-52.

_____. 1982. "'Stability' and 'Competition' in Budgetary Theory," American Political Science Review, 76, 859-72.

Gerwin, Donald. 1969. Budgeting Public Funds. Madison: University of Wisconsin Press.

Glassberg, Andrew. 1978. "Organizational Responses to Municipal Budget Decreases." Public Administration Review, 38, 325-331.

Gramlich, Edward M. 1969. "State and Local Governments and Their Budget Constraints," International Economic Review, 10, 163-82.

_____. 1978. "State and Local Budgets the Day After It Rained: Why Is the Surplus So High." In Arthur Okun and George Perry, Brookings Papers on Economic Activity. Washington, D.C., Brookings Institute.

Greider, William. 1981. "The Education of David Stockman," The Atlantic Monthly, 248-6, 27-54.

Halperin, Morton H. 1974. Bureaucratic Politics and Foreign Policy. Washington, D.C: Brookings Institute.

Hofferbert, Richard I. 1966. "The Relationship Between Public Policy and Some Structural, Environmental Variables in the American States," American Political Science Review, 60, 464-83.

_____. 1972. "State and Community Policy Studies: A Review of Comparative Input-Output Analysis," Political Science Annual, 3, 3-72.

Hoole, Francis, Brian Job and Harvey Tucker. 1976. "Incremental Budgeting and International Organizations." American Journal of Political Science, 20, 273-301.

Horowitz, Ann. "A Simultaneous-Equation Approach to the Problem of Explaining Interstate Differences in State and Local Government Expenditures." The Southern Economic Journal, 34, 459-476.

Horton, Raymond and Charles Breecher (eds.). 1979. Setting Municipal Priorities- 1980. New York: Universe Books.

_____. 1980. Setting Municipal Priorities- 1981. New York: Universe Books.

Hull, C. Hadlai and Norman Nie. 1981. SPSS Update 7-9. New York: McGraw-Hill.

Johnston, J. 1972. Econometric Methods (2nd ed.). New York: McGraw-Hill.

Kalzmar, Kurt. 1979. "Intergovernmental Aid." In Raymon Horton and Charles Breecher (eds.), Setting Municipal Priorities- 1980, New York: Universe Books, 34-49.

Kamlet, Mark S. and David C. Mowery. 1980. "The Budgetary Base in Federal Resource Allocation," American Journal of Political Science, 24, 804-21.

Kanter, Arnold. 1972. "Congress and the Defense Budget: 1960-1970," American Political Science Review, 66, 129-44.

Kestenbaum, Justin L. 1981. Out of a Wilderness. California: Windsor Publications.

Kmenta, Jan. 1971. Elements of Econometrics. New York: Macmillan Publishing Co.

Lakatos, Imre. 1970. "Falsification and the Methodology of Scientific Research Programmes." In I. Lakatos and A. Musgrave (eds.), Criticism, The Growth of Knowledge. Cambridge: Cambridge, University Press.

Lansing, Michigan. 1955. Charter of the City of Lansing Michigan.

Lansing, Michigan. 1979. Charter of the City of Lansing Michigan.

Lansing, Michigan. 1969-1985. City Council Proceedings.

LaPorte, Todd R. 1975. "Organized Social Complexity: Explication of a Concept." In LaPorte (ed.), Organized Social Complexity, Princeton: Princeton University Press, 3-39.

Lasswell, Harold. 1950. Politics: Who Gets What, When and How. New York: Peter Smith Co.

League of Women Voters of Michigan. 1979. The State We're In. Lansing, MI: League of Women Voters of Michigan.

Leloup, Lance T. 1973. "Agency Policy Actions: Determinants of Non-incremental Change." In Ripley et al. (eds.), Policy Making in the Federal Executive Branch. Beverly Hills: Sage Publications, 65-90.

_____. 1978. "The Myth of Incrementalism: Analytical Choices in Budgetary Theory," Polity, 10, 488-509.

Levine, Charles, Irene S. Rubin and George Wolohojian. 1981. The Politics of Retrenchment: How Local Governments Manage Fiscal Stress. Beverly Hills: Sage Publications.

Levy, Frank, S., Arnold J. Meltsner and Aaron Wildavsky. 1971. Urban Outcomes: Schools, Streets and Libraries. Berkley, University of California Press.

Lineberry, Robert L. and Robert E. Welch. 1974. "Who Gets What: Measuring the Distribution of Urban Public Service," Social Science Quarterly, 54, 700-712.

Lindblom, Charles E. 1979. "Still Muddling, Not Yet Through," Public Administration Review, 39, 517-525.

Luce, R. Duncan and Howard Raiffa. 1957. Games and Decisions. New York: John Wiley and Sons.

March, James G. and Herbert A. Simon. 1958. Organizations. New York: John Wiley and Sons.

_____, and Johan P. Olsen. 1976. Ambiguity and Choice. Bergen, Norway: Columbia University Press.

McCaffery, Jerry. 1981. "Revenue Budgeting: Dade County Tries a Decremental Approach." Public Administration Review, 41-special issue, 179-189.

Meltsner, Arnold J. 1971. The Politics of City Revenue. Berkley: University of California Press.

Menchick, Mark D., Judith Fernandez and Michael Caggiano. 1982. How Fiscal Restraint Affects Spending and Services in Cities. California: Rand Corporation.

Michigan Compiled Laws, Vol. 8a, Sections 128.1 to 144.end. 1985. Cumulative Pocket Part.

Michigan State University, Graduate School of Business Administration, Division of Research. 1979. Michigan Statistical Abstracts (14th ed.). East Lansing, Michigan.

Moreland, William B. 1973. "A Non-incremental Perspective on Budgetary Policy Actions." In Ripley et al. (eds.), Policy Making in the Federal Executive Branch, Beverly Hills: Sage

Publications, 45-64.

Morss, Elliot, J. Eric Fredland and Saul H. Hymans. 1967. "Functions in State Expenditures: An Econometric Analysis." Southern Economic Journal, 33, 496-517.

Mowery, David C., Mark S. Kamlet and John P. Crecine. 1980. "Presidential Management of Budgetary and Fiscal Policymaking. Political Science Quarterly, 95, 395-425.

Musgrave, R.A. and J.M. Calbertson. 1953. "The Growth of Public Expenditures in the United States, 1890-1948," National Tax Journal, 17, 75-85.

Natchez, Peter B. and Irwin C. Bupp. 1973. "Policy and Priority in the Budgetary Process," American Political Science Review, 67, 951-63.

Newell, Alan and Herbert A. Simon. 1972. Human Problem Solving. New Jersey: Prentice-Hall.

Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karin Steinbrenner, Dale H. Bent. 1975. Statistical Package For The Social Sciences. New York: Mcgraw Hill.

Olsen, Johan P. 1970. "Local Budgeting, Decision Making or Ritual Act," Scandanavian Political Studies, 5, 85-118.

Ostrom, Charles W., Jr. 1978a. "A Reactive Linkage Model of the U.S. Defense Expenditures Policy Making Process." American Political Science Review, 72, 941-957.

_____. 1978b. "A Theory of the Budgetary Process as a Research Program in Public Administration." Paper delivered at conference at Michigan State University, Kellog Biological Station.

Ostrom, Charles W. 1978c. Time Series Analysis: Regression Techniques. Beverly Hills: Sage Publications.

Padgett, John F. 1980a. "Bounded Rationality in Budgetary Theory," American Political Science Review, 74, 354-72.

_____. 1980b. "Managing Garbage Can Hierarchies," Administrative Science Quarterly, 25, 583-604.

_____. 1981. "Hierarchy and Ecological Control in Federal Budgetary Decision Making," American Journal of Sociology, 87, 75-129.

Peacock, Alan T. and Jack Wiseman. 1961. The Growth of Public Expenditures in the United Kingdom. Princeton: Princeton University Press.

Peroff, Kathleen and Margaret Podolak-Warren. 1979. "Does Spending on Defense Cut Spending on Health?: A Time Series Analysis of the U.S. Economy- 1929-74," British Journal of Political Science, 9, 21-39.

Peterson, Paul E. 1981. City Limits. Chicago: University of Chicago Press

Pfeffer, Jeffrey and Gerald Salancik. 1974. Organizational Decision Making as a Political Process: The Case of a University Budget." Administrative Science Quarterly, 19, 135-151.

_____, _____ and Huseyin Leblebici. 1976. "The Effects of Uncertainty on the Use of Social Influence in Organizational Decision Making," Administrative Science Quarterly, 19, 45-59.

_____ and Anthony Leong. 1977. "Resource Allocation in United Funds: Examination of Power and Dependence," Social Forces, 53, 775-90.

_____ and William L Moore. 1980. "Power in University Budgeting: A Replication and Extension," Administrative Science Quarterly, 25, 637-53.

Pierce, Lawrence. 1974. "Organizational Constraints and Public Bureaucracy." In Cornelius P. Cotter (ed.), Political Science Annual, vol 5. Indianapolis: Bobbs-Merril Co. 131-175.

Pindyck, R.S. and D.L. Rubinfeld. 1981. Econometric Models and Economic Forecasts, (3rd ed.) New York: McGraw-Hill.

Ripley, Randall B., Grace A. Franklin, William B. Holmes and William B. Moreland (eds.). 1973a. Policy Making in the Federal Executive Branch. Beverly Hills: Sage Publications.

_____, _____, _____ and _____. 1973b. "Structure, Environment and Policy Action: An Empirical Exploration." In Ripley et al. (eds.), Policy Making in the Federal Executive Branch, Beverly Hills: Sage Publications, 117-43.

_____, William B. Holmes, Grace A. Franklin and William B. Moreland. 1973c. "Explaining Changes in Budgetary Policy Actions." In Ripley et al. (eds.), Policy Making in the Federal Executive Branch, Beverly Hills: Sage Publications, 145-69.

Sacks, Seymour and William F. Hellmuth, Jr. 1961. Financing Government in a Metropolitan Area: The Cleveland Experiment. New York: The Free Press.

_____ and Robert Harris. 1964. "The Determinants of State an Local Government Expenditures and Intergovernmental Flow of

Funds," National Tax Journal, 17, 75-85.

Salancik, Gerald R. and Jeffrey Pfeffer. 1974. The Bases and Use of Power in Organizational Decision Making: The Case of a University," Administrative Science Quarterly, 19, 453-473.

Sbragia, Alberta. 1983. The Municipal Money Chase. Colorado, Westview Press.

Schelling, Thomas C. 1960. The Strategy of Conflict. Cambridge, Mass.: Harvard University Press.

Schick, Allen. 1980. "Budgetary Adaptations to Resource Scarcity." In Charles Levine and Irene S Rubin (ed), Fiscal Stress and Public Policy. Beverly Hills: Sage Publications. 113-134.

Scott, W. Richard. 1981. Organizations: Rational, Natural and Open Systems. New Jersey: Englewood Cliffs.

Sharkansky, Ira. 1968a. "Agency Requests, Gubernatorial Support and Budget Success in State Legislatures," American Political Science Review, 62, 1220-31.

_____. 1968b. Spending in the American States. Chicago: Rand McNally.

_____ and Richard Hofferbert. 1969a. "Dimensions of State Politics, Economics and Public Policy," American Political Science Review, 63, 867-80.

_____. 1969b. Politics of Taxing and Spending. New York: Bobbs-Merrill.

Simon, Herbert A. 1955. "A Behavioral Model of Rational Choice," Quarterly Journal of Economics, 69, 99-118.

_____. 1976. Administrative Behavior: A Study of Decision Making Processes in Administrative Organizations, (3rd ed.). New York: The Free Press.

_____. 1979. Models of Thought. New Haven: Yale University Press.

_____. 1981. Sciences of the Artificial, (3rd ed.). Mass: The MIT Press.

Starling, Jay. 1975. "Use of Systems Constructs in Simplifying Organizational Social Complexity." Concept." In LaPorte (ed.), Organized Social Complexity, Princeton: Princeton University Press, 3-39.

Steiss, Alan Walter. 1975. Local Government Finance. Massachusetts: Lexington Books.

Steinbruner, John D. 1974. The Cybernetic Theory of Decisions: New Dimensions of Political Analysis. Princeton: Princeton University Press

Strouse, Jones C. and J. Oliver Williams. 1972. "A Non-additive Model for State Policy Research," Journal of Politics, 34, 648-57.

U.S. Department of Commerce, Bureau of the Census. 1977. County and City Data Book.

U.S. Department of Commerce, Bureau of the Census. 1983. County and City Data Book.

Wanat, John R. 1974. "Bases of Budgetary Incrementalism," American Political Science Review, 68, 1221-8.

Wayne State University, School of Business Administration, Bureau of Business Research. 1984. Michigan Statistical Abstracts, (18th ed.). Detroit, Michigan.

Wildavsky, Aaron. 1974. The Politics of the Budgetary Process, (3rd ed.). Boston: Little-Brown.

_____. 1975. Budgeting: A Comparative Theory of Budgeting Processes. Boston: Little, Brown.

Wolman, Harold and Barbara Davis. 1980. "Local Government Strategies to Cope with Fiscal Pressure." In Charles Levine and Irene S Rubin (ed), Fiscal Stress and Public Policy. Beverly Hills: Sage Publications.