An analysis of state government growth in Montana, 1940-1979
by Douglas William Wolford

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Economics
Montana State University

Abstract:
The growth of state government in Montana, 1940-1979, is analyzed from an economic perspective. Theories of the size and growth of government are reviewed in Chapter 2. "Exogenous" and "endogenous" theories are distinguished: Exogenous theories explain size or growth by nonpolitical factors such as population and income levels and changes; endogenous theories focus on the institutional context in which political decisions are made. A primary objective of the thesis is to assess the applicability of each type of theory to the Montana experience.

The existing empirical literature on government growth is analyzed in Chapter 3. Basic data on Montana government employment, debt, revenues and expenditures,by functional category are presented in Chapter 4. Two (of nineteen) categories show the greatest percentage increases and account for over one-third of the growth in real per capita expenditure: state aid to lower and higher education.

An econometric analysis of the expenditure data is reported in Chapter 5. Total state expenditures appear to be strongly influenced by aid from the federal government: one dollar of such aid is estimated to increase state expenditures by 1.3 to 1.7 dollars. Hence, federal aid not only does not reduce tax burdens in Montana but actually increases them as much as 70 cents for each dollar of aid. This result may be due to the matching provisions of some federal programs and/or the existence of mandated programs which are only partially funded. University system expenditure growth appears to be primarily accounted for by the growth in enrollments associated with the "baby boom" cohort and the economic returns to higher education. Real expenditures per student actually declined slightly while charges per student rose; hence, there is no evidence that this cohort was able to use its political muscle to extract greater (per student) subsidies from the state. The major factor explaining growth in state expenditure for lower education also appears to be the baby boom. For the most part, expenditures per state resident increased simply because students per capita increased, but there is some evidence of political effects as well.

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APPROVAL

of a thesis submitted by

Douglas William Wolford

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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VITA

Douglas William Wolford was born to William and Lucy Wolford of Seattle, Washington, on May 21, 1956.

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ABSTRACT

The growth of state government in Montana, 1940-1979, is analyzed from an economic perspective. Theories of the size and growth of government are reviewed in Chapter 2. "Exogenous" and "endogenous" theories are distinguished: Exogenous theories explain size or growth by nonpolitical factors such as population and income levels and changes; endogenous theories focus on the institutional context in which political decisions are made. A primary objective of the thesis is to assess the applicability of each type of theory to the Montana experience.

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CHAPTER 1

INTRODUCTION

The purpose of this thesis is to analyze state government growth in Montana during the 1940-79 period. Such an undertaking is motivated by several factors. First, inquiries of this nature delve into the fundamentals of our democratic system of government. If it is concluded that government expands because the majority of constituents desire it, government is in a subservient role relative to the people. If however, it is found that government expands on the basis of its own independent desires, the people are in the subservient role. In part, this thesis will shed some light on the following question: Are the people of Montana dictating to Helena or is the opposite the case?

In spite of Buchanan's claim that such questions "get at the very heart of democracy" (1977, p. 5), Roberts admonishes, "we have forgotten that liberty is a function of the size of government not its form" (1980, p. xi). The size of the Montana state government in relative and absolute terms increased during the 40 year study period. The number of state employees, one measure of government size, expanded from around 2,000 in 1940 to approximately 22,000 in 1979.[1] This represents an annual average increase of four percent. State government employment also increased relative to Montana's work force. In 1940, it comprised 0.9 percent of the work force. Forty years later this figure was at 5.9 percent.

Real state expenditure levels, another measure of government size, also exhibit growth in absolute and relative terms.[2] They have risen to $530.6 million from $143.9 million in 1972 dollars. This translates to an annual average increase of three percent over the 1940-79 period which is approximately 0.7 percentage points higher than the national average growth rate. As measured relative to the population or on a per capita basis, real state expenditures have expanded from $257.40 to $765.04 which is an annual average increase of two percent.[3] This expenditure growth is also reflected in the share of personal income expended by the state which has increased from 9.44 percent to 15.46 percent.[4]

It is clear from these conventional measures, that a large and growing amount of resources have been channeled through state government in Montana. Regardless of one's acceptance or rejection of the view expressed by Roberts that this represents a reduction of individual freedom, the significant expansion detailed above warrants professional study.

An additional rationale for studies such as this is that the subject of government growth is of popular concern. Media and political attention has heightened in recent years. One of President Reagan's campaign promises was to reduce the size of government. Before the public and the politicians can make knowledgeable decisions concerning government size and growth information must be made available. This thesis will provide a detailed picture of state government growth in Montana which will hopefully answer questions about where and why growth has occurred.

In 1977, leading state officials were given an opportunity to express their interests, insights, and concerns regarding government growth.[5] These officials were then Governor Thomas Judge, U.S. Representative Ronald Marlenee, then U.S. Representative and now U.S. Senator Max Baucus, U.S. Senator John Melcher, and then U.S. Senator Lee Metcalf. Former Governor Judge pointed to inflation and federal aid revenue as being the salient factors in the growth of Montana state government. He also noted the pressure placed on officials by special interest groups to expand the public sector. However, Judge layed the ultimate responsibility at the feet of the voters.

> If taxpayers feel the cost of government is too burdensome, then it is their constitutional right and duty to relieve that burden either directly by rejecting voted levies or indirectly through the representatives they send to the state legislature, Congress, and elect to executive office (1977, p. 28).

This view was echoed by Metcalf, Melcher, and Baucus. However, Marlenee pointed to what he termed four "power structures" as being responsible for the expanding public sector. The first one he identified was the Carter administration which he blamed for enlarging the number and size of commissions, agencies, and departments. Second, Congress was blamed because it created new agencies and expanded existing ones. A third power structure which Marlenee identified as important in expanding government was the House and Senate assistants. "When not given adequate guidance they serve to expand and complicate legislation, hence driving up the cost of government" (1977, p. 28). The bureaucrats who act to expand and complicate programs in order to further their careers were the fourth element. Marlenee concluded that these four power groups compete to out-do each other which serves as a further impetus for increased spending.

Bennett and Johnson contend that "Public and professional interest in government should expand as rapidly as the government itself" (1980, p. ix). The professional literature in this area is growing but does not contain a time series study on an individual state. It is intended that this thesis partially fill this gap.

To this end, Chapter 2 reviews the numerous theories concerning the expansion of the public sector, and Chapter 3 explores various empirical works which test the theories. Chapter 4 examines the expenditure breakdown, identifies those programs which are most responsible for the expansion of Montana State government, and compares Montana with the national average. Those programs most responsible for growth are subject to econometric analysis in Chapter 5. Finally, Chapter 6 contains a summary of the results and some predictions concerning future state expenditures.

FOOTNOTES

[1]State employment and total work force figures were obtained in the Statistical Abstract of the United States published by the U.S. Department of Commerce, Bureau of the Census.

[2]State expenditure figures were obtained from State Government Finances published by the U.S. Department of Commerce, Bureau of the Census. They were deflated by the State and Local Implicit Price Deflator found in the Economic Report of the President 1981.

[3]Population figures were obtained in the Statistical Abstract of the United States published by the U.S. Department of Commerce, Bureau of the Census.

[4]Income figures were obtained from State Government Finances published by the U.S. Department of Commerce, Bureau of the Census.

[5]Taken from page 28 of the April 21, 1977, issue of the Great Falls Tribune.

CHAPTER 2

A REVIEW OF PUBLIC SECTOR GROWTH THEORY

Introduction

Many divergent theories have been proposed in efforts to explain the expansion of the public sector. Examples are Baumol's (1967) hypothesis which concentrates on lagging productivity growth in the government relative to that of private industry and Meltzer and Richard's (1981) theory in which an increase in the mean income relative the median voter's income results in public sector growth. In this chapter these and other theories will be categorized and reviewed.

Though categorization of government growth theories is complicated by many gray areas, a division may be made between theories emphasizing exogeneous and endogeneous factors. Exogenous theories concentrate on factors which are independent of the governmental structure and institutions such as war, economic conditions, or demographic characteristics. In contrast, endogeneous theories see the institutional and incentive structures of government as the salient factors in determining government expansion. Further dissection of the theories has examined demand or supply subdivisions, but controversy abounds concerning such classifications. Where such controversy does arise, both a demand and supply view will be presented. In addition, a dissection of those theories which truly explain government growth and those which merely say government is too big is contained in the chapter summary.

Exogenous Sources of Government Growth

The first exogenous factor thought to have a stimulatory effect on government growth is war. This view is derived from Peacock and Wiseman's (1961) social upheaval or displacement theory which contends that in war and other periods of crisis the population will willingly submit to governmental intervention well beyond previous peace time levels. Most notably, Peacock and Wiseman suggest that once the crisis period has expired, the amount of government expenditure and regulation will not return to the pre-crisis level. Such an occurrence would result in a net expansion of the public sector from the pre-crisis to post-crisis period.

Abramovitz and Eliasberg (1957) also concluded that war results in extensive bureaucratic growth. They claimed that the expanded bureaucracy is then applied to other functions in the post-crisis period rather than being trimmed dramatically.

If the proponents of social upheaval or displacement theory were correct, the public sector would be characterized by substantial expansion during wartime and small decline during peace time. Thus, a "ratchet effect" would be observed. Actual observations, however, do not reflect this pattern. Growth rates in the U.S. are often as high during peace time[1] causing Meltzer and Richard (1978) to conclude that while "it is true that government grows in wartime; it is not true that government requires a war to grow" (p. 114).

Just as controversy exists concerning the validity of social upheaval or displacement theory, it is not clear if such a theory is appropriately placed in the demand or supply category. If the collective tastes and preferences for military security were increased by war or its threat, the demand for government would be enhanced, resulting in an outward shift of the demand function. However, if the tastes and preferences for military security remained constant, increased expenditures may well be attributed to the increased cost of maintaining the desired static level of security. An increase in costs would then shift the supply function.

Demographic theories also rely on exogenous factors. The growth and changing composition of the population are hypothesized to produce government growth without respect to the governmental structure. An increase in population is interpreted as adding individual demand functions to the aggregate demand function thus producing a greater aggregate demand in the public sector. Compositional changes which are hypothesized to enlarge the public sector are increases in school-age population, elderly population, and urbanization.

Where a school system is public, a growing school-age population will generally result in increased government expenditures. This result may be attributed to individual students and their families augmenting the market demand for educational services or simply adding to the cost of providing a level of education to society and thus shifting the supply function back.

For two reasons, an increasingly elderly population is hypothesized to be a catalyst to government growth. First, governments often provide subsidized specialized services which the elderly consume. Such services include income maintenance, medical care, and shelter. Second, the life-cycle income hypothesis would indicate an increasingly elderly population would save less and thus spend more.[2] Viewing government as a normal good, aggregate demand for government would shift out accordingly and the equilibrium size of government would increase.

As in the educational case, differences of opinion occur concerning a demand versus a supply framework. If expenditures are for specialized elderly services, elderly citizens would demand more of such services designed to aid them. A supply analysis in contrast would maintain that society insists the elderly receive a level of adequate food, clothing, health care and shelter so that the increase in the proportion of elderly people adds to the cost of maintaining this standard of care.

Theories which identify exogenous economic phenomenon as important determinants of government growth concentrate on inflation, income growth, changing productivity rates, and an altered composition of the work force. Though inflation exaggerates government growth when measured in monetary terms, it may also aid public sector expansion in real terms. Where governments impose a progressive income tax, inflation will enhance <u>real</u> governmental revenue. This phenomenon is known as "bracket creep" which arises when nominal incomes rise and people are propelled into higher tax brackets with increased marginal tax rates. As a result, people pay a greater portion of their real income to the government. This real tax increase occurs without explicit legislative or voter consent but is the direct result of inflation and a progressive tax system.

Income growth, another exogenous factor, is thought to contribute to government growth by shifting out the society's budget constraint. Given that government is a normal good, its demand would be enhanced. In Montana this may occur by an increase in Montanan's personal income or increases in aid from the federal government.

The relationship between income and government size has received much study over many years. Initially the nineteenth century German economist Adolph Wagner (1893) proposed that as society's income level increases, preoccupation with the basic needs for survival would be lessened and people would begin to demand other goods including government. Specifically, the share of income taken by government would increase. This proposition, known as "Wagner's Law," identified three reasons for the positive relationship between the size of government and income. First, an increasingly complex society in terms of legal relationships and communication needs will lead to increased demands for governmental provision of regulatory and protective services. Second, increases in demand would occur for cultural activities, income redistribution, and health care. Finally, Wagner suggested that market failures such as monopoly associated with the industrial revolution would require the state to either rationalize or regulate industries.

North and Wallis (1982) elaborate on Wagner's insights. They claim that much of the growth which has occurred in the public sector has been in the non-transfer area as a response to technological and scientific progress.

> The wedding of science and technology in the late 19th Century made possible a technology of production whose potential was only realizable with an enormous increase in the resources devoted to political and economic organization - the

> transactions sector of the economy. A substantial part of this increase has occurred in the market and through voluntary organization, and a substantial share has also been undertaken by government (North and Wallis, 1982, p. 336).

Another theory of government growth based on exogenous factors was proposed by William Baumol (1967) and is known as "Baumol's Unbalanced Growth Hypothesis." In it all economic activity is classified into two sectors. The first sector is technologically progressive and is characterized by innovation, capital accumulation, and economies of scale. In this sector labor is seen primarily as "an incidental requisite for the attainment of the final product" (Baumol, 1967, p. 415). In contrast, the second sector, which is technologically nonproductive, "permits only sporadic increases in productivity and is by nature labor intensive" (p. 415). From his theoretical model where wages in both sectors increase with productivity gains made in the progressive sector and labor is mobile, Baumol derives four propositions which he summarized in the following manner:

> If productivity per man hour rises cumulatively in one sector relative to its rate of growth elsewhere in the economy, while wages rise commensurately in all areas, then relative costs in the non-progressive sectors must inevitably rise, and these costs will rise cumulatively and without limit (Baumol, 1967, p. 419).

The logical implication of lagging productivity is that as productivity growth increases progressive (private) sector wages, the opportunity cost of non-progressive (public) workers increases. Managers (politicians) in the non-progressive sector must, at least, cover the opportunity cost of the marginal worker or he will emigrate to the progressive sector. Thus, Baumol identified increasing labor costs as the salient factor in government growth. With an increase in the cost of an input, such as labor, the supply curve would shift back.

Baumol's assumptions and conclusions have not gone uncriticized. Bennett and Johnson (1980) contend that technological progress in the private sector results in increased real incomes and a higher relative price for public sector goods. Thus, government expenditures will rise only if the demand for public sector goods has a sufficiently high income elasticity and/or sufficiently low price elasticity. While Spann (1977) acknowledges the existence of lagging productivity in the public sector, he disagrees with Baumol's contention that it is a result of the labor intensive nature of governmental production. He finds government is not particularly labor intensive and that productivity gains in the public sector are less than the gains made in labor intensive private sector activities such as retail trade. This would indicate that the low productivity growth suffered in the public sector is attributable to behavioral differences between the two sectors which will be examined later.

Kau and Rubin (1981) provide another theory based on exogenous supply factors which is grounded in the government's increasing ability to generate revenues. This enhanced ability is derived from two basic economic phenomenon; first, the increased specialization and centralization if industry and second, higher female participation rates in the work force. The first phenomenon has resulted in increased record keeping and accountability as people leave entrepreneurial positions to become employees receiving paychecks and as sole proprietorships and partnerships become corporations accountable to stockholders. These changes ease the tax collection process. The second phenomenon of more women entering the work force results in a movement of women from non-taxable home production to taxable production.

Endogenous Sources of Government Growth

Investigations into endogenous sources of government growth focus on government failure which, in a democracy, results when the government takes action contrary to the desires and interests of the majority of citizens. How this occurs and how this results in government growth are the subjects of this section. In order to understand government failure and its relationship to public sector growth, the incentives and relationships of voters, politicians, and bureaucrats will be examined.

Voters

Voters are the ultimate consumers of government goods and services, and their demands for such things as roads, schools, and income redistribution are expressed through the ballot box. A crucial question is how well voting outcomes reflect the demands of society. It appears that an accurate demand curve will not be reflected in voting outcomes for two reasons. First, not all persons are eligible to vote. In Montana, for instance, if one is under 18, irrespective of his or her desire for governmentally supplied goods and services, he or she cannot participate in the voting process. Second, not all eligible voters vote. This may be attributable to a lack of civic duty or patriotism, but rational decision making explains much of why low voter turn outs are observed.[3] Rational decision making results in the avoidance of those activities in which the expected benefits are less than the expected costs, and the participation in those activities in which the opposite is true. A rational decision concerning voting would therefore weigh the appropriate benefits and costs. Costs associated with voting include transportation, opportunity cost of time, and the cost associated with becoming sufficiently informed to vote appropriately to one's interests. The benefit of participating in the voting process is derived when the individual's vote determines the outcome. The probability of such an occurrence is equal to:

$$\frac{1}{\text{vote difference between victory and defeat}} .$$

In large constituencies this value is often extremely small relative to the costs, resulting in a rational decision not to vote.

Included in the total cost of voting is the cost of becoming informed. This implies that some personal monitoring of governmental activities is required. Roberts (1978) defines the benefit voters derive from monitoring activity as equal to the additional tax burden avoided by the monitor. He contends that the cost associated with monitoring activity rises steeply with the size of the public sector and concludes that "to avoid being constrained, all government has to do is adopt a tax burden that rises less steeply than the cost of monitoring" (Roberts, 1978, pp. 605-606).

Bennett and Johnson (1980) contend that accurate monitoring may be very difficult as well as costly. In their example it is shown how the full opportunity cost of governmental regulation might be overlooked by society. Graphically, this is shown in Figure 1 where gross national product (GNP) is plotted against the size of government as measured by the number of rules and regulations. The curve CED is a production frontier with resources and technology held constant. The initial effect of an increasing number of rules is a rise in GNP. This is due to increased efficiency in market operations as a result of such things as the enforcement of contracts. However, when the number of rules are increased beyond n, GNP declines as incentives and creativity are stifled. Thus, if the number of rules increases from n to n+x the opportunity cost in terms of GNP forgone is AB. Given constant resources and technology, a continual expansion in rules beyond n would result in a declining GNP.

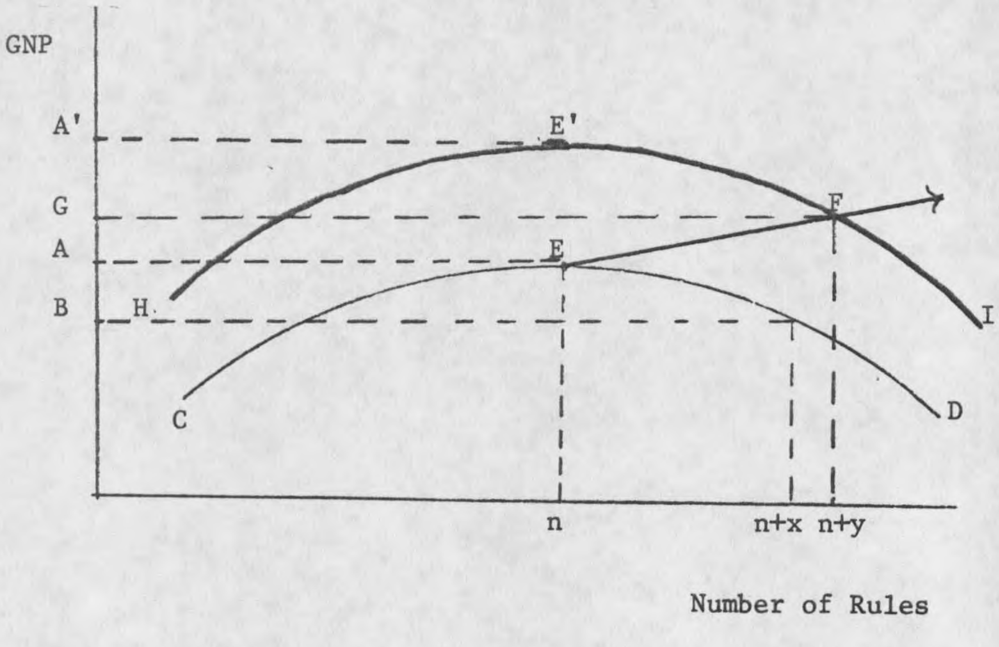


Figure 1. Size of Government as Measured by the Number of Rules and Regulations.

Source: The Political Economy of Federal Government Growth: 1959 to 1978, Bennett and Johnson, 1980, p. 113.

When the restriction of constant resources and technology is relaxed, the production frontier would shift up to HE'FI. If the number of rules were equal to n during this expansion, GNP would increase to E' from E. However, both technology and rules increase so the resulting level of GNP associated with n+y rules occurs at F. The opportunity costs which Bennett and Johnson claim are not monitored properly by the voter is the forgone output GA'.

Another problem voters face in monitoring activity is fiscal illusion. A person suffering from fiscal illusion would misperceive the benefits or the costs of government. Goetz (1977) identifies characteristics of taxation which would lead one to underestimate their total tax burden. First, cases in which taxes are incorporated into prices results in the purchasers being either unaware of the existence or the magnitude of the tax. Second, where the withholding provision is used in taxing income, the taxpayers will underestimate the total burden because they do not actually receive their entire salary and the payments are spread over time. Third, grants in aid to lower levels from higher levels of government are perceived by voters as costless funds in spite of their contributions to the higher governmental unit. A fourth source of fiscal illusion is debt financing. Certainly the voting population prefers paying later to paying now. Deferring of costs results in a larger potential for illusionary effects.

Goetz also discusses the general sales tax and the deductibility of state and local taxes from the federal income tax. With regard to the general sales tax, he cites two possible illusionary effects. First, where a local tax is added to the state tax, a "piggyback" feature is created. It is highly unlikely that the consumer/taxpayer can correctly impute the appropriate proportion of the tax associated with local government. As a consequence, the cost or tax burden of the state government is overestimated. Second, Goetz (1977, p.179) notes that "Knowledge of the correct tax rate is not necessarily to be equated with a correct conception of the total tax payment." The ability of taxpayers to deduct state and local taxes from their federal tax burden leads them to overestimate the cost associated with the non-federal public sector, and the tendency and magnitude of this error will be greater at higher income levels. This is because the standard deduction rather than the itemized return is used by those more often in the lower income groups and because "The effective value of the deduction is directly dependent on the individual's marginal income tax rates" (Goetz, 1977, p. 185).

Goetz provides several plausible rationales as to why taxpayers may underestimate their tax burden under certain circumstances and overestimate it under different circumstances. It has not been determined whether taxpayers correctly value the benefits of such publicly supplied goods as freeways, schools, and law enforcement. As a consequence it is impossible to conclude what the net effect of fiscal illusion is. However, it should be noted that fiscal illusion, regardless of the net effect, represents a failure to accurately monitor government activities.

An additional problem with the voting process is that elections occur, at most, once a year. As a consequence, politicians can only guess what the majority opinion may be at a given moment concerning an issue. Thus, actions may be taken by representatives that do not reflect the majority opinion.

Due in part to the inadequacies of the voting procedure, special interest groups are able to continuously express their wishes through lobbying efforts while voters can express their interests only once every one, two, or four years. Where special interests groups are successful in applying sufficient pressure to alter legislative decisions in such a manner that is contrary to the collective desires of the total population government failure occurs. Often this takes the form of concentrating benefits which accrue to themselves while defusing the associated costs of a legislative action among the entire society. Thus, such groups often find the expected benefits of lobbying action outweigh the costs. Individuals who stand in opposition to the desires of the special interest group, in spite of the probability of the sum of these individuals comprising a majority, often find individual lobbying efforts prohibitively expensive when their own benefit-cost ratio is computed. Thus it is possible for special interest groups not to bare the full cost of their action.[4]

The "bundle purchase effect" also creates the potential for government failure. In contrast to private sector purchases where one often has a wide variety of individual products from which to make a selection, public sector "purchases" are usually limited to two or perhaps three bundles of policies. Unless a voter is in complete agreement with one of the alternatives, he or she is forced to accept some policies which conflict with his views.

Regardless of the above problems, a demand is expressed in the public sector, and Meltzer and Richard (1981) examine what determines its position. Their theory is based on the median voter hypothesis and assumes that the only role of government is to redistribute income, that the real budget is balanced, and that voters are fully informed regarding the benefits and costs associated with their decision, thus avoiding many of the problems cited previously. Nonetheless, the authors contend that the size of government is dependent on the welfare maximizing choice of a decisive individual; the voter who earns the median income. Voters below the median income level choose representatives who advocate higher levels of taxation and redistribution. Voters above the median income desire lower levels of taxation and redistribution. The median and therefore decisive voter chooses the tax and redistribution level. When the mean income rises relative to the median income, the redistribution level will increase, thus expanding the public sector. One implication the authors draw from this hypothesis is that increasing government debt allows further redistribution. Meltzer and Richard view debt as an intertemporal redistribution and conclude that the "decisive voter has as much incentive to tax future rich as the current rich" (p. 925).[5]

An alternative to the median voter hypothesis is Director's Law which states that "public expenditures are made for the primary benefit of the middle classes, and financed with taxes which are borne in considerable part by the poor and rich" (Stigler, 1970, p. 1). Stigler proposes that the middle class is benefiting at the expense of the lower and upper tails of the income distribution by using the coercive power of government. Higher education, police and fire protection, farm policy, tax exempt institutions and minimum wage laws are seen as net transfers to the middle class.

Buchanan (1967), however, proposes that the exact opposite has been occurring. That is, income has been redistributed to the rich and poor from the middle class. The rich, according to Buchanan, will approve of taxes only if an increase in public services benefits them. The poor, on the other hand, will generate a large quantity demanded in the public sector due to the low taxes (price) they face. Thus, the median voter position of the middle class is overcome by the coalition of rich and poor voters.

C.2. Politicians

Politicians are intermediaries who theoretically reflect the demands of the population and transmit them to the bureaucracy which in turn supplies public sector goods and services. However, the politician, as with any individual, can be assumed to respond to incentives in a manner designed to maximize their utility. Buchanan (1977) suggests that politicians "seek profit in the form of political income, which will normally be obtained only if their behavior is not fully in accord with the desires of the electoral majority" (p. 13). If politicians are not constrained by the voting process, as one might suspect in view of the problems previously covered, they may have a wide range of discretionary ability to pursue their personal interests.

Buchanan, as well as Bennett and Johnson, argues that the politicians' incentives and their ability to act on them lead to a larger public sector. In terms of salary, Buchanan contends it is easier to justify a large salary in a large budget than a small budget. Public acceptability is enhanced if legislative salaries account for five percent rather than 25 percent of the budget. Also, Buchanan sees the trend of legislatures meeting more often as partially motivated by the desire for larger salaries. In addition to salary, bribery or its potential is also contained in political income. The opportunities for either illegal or sub-rosa bribery are increased with the enhanced size and scope of government. Prestige enters into the political profit function and is positively related to the size of the public sector. In general, "the power and prestige of the politician is enhanced by rapid government growth, particularly if patronage permits the politician to reward his supporters" (Bennett and Johnson, 1980, p. 97).

In a reelection bid Fiorna and Noll (1978) argue that incombent politicians have an advantage over their challengers which is derived from their power and favorable working relationship with the bureaucracy. This power and working relationship enhances the incumbent's standing among his or her constituents. The authors contend that this advantage creates an incentive to expand the budget and power of the bureaucracy, which will further the incumbents' standing and consequently increase their probability of reelection.

<u>Bureaucrats</u>

Niskanen (1971) defines a bureaucrat as an employee who works for an organization that derives some part, or all, of the recurring revenues from other than the sale of output at a per unit rate, and that the employee does not appropriate any part of the difference between revenues and costs as personal income. The first characteristic recognizes the fact that at least part of the resources required for operation are provided through the taxing power of the state. The second characteristic implies that there is no profit incentive to produce at minimum cost.

The theory of the firm provides an analytical framework in which decision making in both the private and public sector can be analyzed. It contends that a decision maker hires labor and other inputs up until the marginal revenue product is equated with the marginal factor cost. In the private sector, included in the decision maker's calculation of marginal benefits is that additional revenue derived from the additional production of the marginal worker. The marginal cost for that private sector decision maker includes the salary and other benefits received by the marginal worker. The inclusion of such factors in the private sector decision maker's calculation is a result of that person's status as a residual claimant.[6] That is, they receive any benefits (revenue) after the costs have been covered.

In contrast, for the public sector decision maker the salary and benefits which accrue to the marginal worker do not enter into the calculation of marginal costs. In fact, additional employees add not to costs, as in the private sector, they aid the public sector decision maker in the acquisition of additional benefits such as increased rank, salary, prestige, and perquisites. The level of these benefits is positively related to employment level or bureau size (see Niskanen, 1971). Therefore, one would expect the private sector decision maker to be more efficient and hire fewer workers than their counterpart in the public sector where a bigger bureaucracy is better.

In making budgetary and other decisions, representatives must act on less than perfect information because information is costly to collect and because the bureaucracy is the main source of information for legislatures. Given the incentives faced by bureaucrats, information will be biased to increase the growth of government.

Bennett and Johnson contend that this bias may be observed in the manipulation or even creation of crises. They write:

> If bureaucratic self-interest is the motivating factor, it is axiomatic that no crisis can ever be solved; if a crisis disappears, the justification for the agency, its employees, and its appropriations would also vanish (1980, p. 117).

Thus, they view bureaucratic failure as success. However, this is not necessarily the case. Bureaucratic managers who fail miserably in putting out forest fires, collecting garbage, or arresting criminals are probably not in a preferred position relative to those who do accomplish these tasks.

In addition to the distortion of information, Bennett and Johnson claim the bureaucrats may pressure politicians by threatening them with "red tape."

> The bureaucrats reward the legislators who expand the size of bureaucracy and serve bureaucratic self-interest by responding to the facilitation needs of the legislator, thereby increasing the incumbents' chances for reelection. Legislators who do not serve the interest of the bureaucracy find their constituents hopelessly ensnarled in red tape (1980, p. 99).

This analysis contrasts somewhat with Fiorina and Nolls view presented earlier in which incumbent politicians reward bureaucrats to further their chances for reelection. However, it appears that regardless of who rewards whom an expanded public sector is the result.

Public sector employees may also pressure politicians as a special interest group participating in the election process. As noted earlier, bureaucrats are motivated to expand the public sector and thus this will be reflected in their voting. The relative influence of bureaucratic voting was examined by Martin (1933). From his work, Bush and Denzau (1977) generate a power index, π, for bureaucratic votes, where

$$\pi = \frac{Vb}{Vb+Vnb(1-g)/g} .$$

The Vs are the voting participation rates of bureaucrats (Vb) and non-bureaucrats and their families (Vnb), and g is the percent of bureaucrats in the labor force. Assuming Vnb=0.50 and Vb=0.9, which according to Bushand Danzau is not atypical, the relationship between g and π is shown in table 1.

Table 1. Power of Bureaucratic Vote.

g	π
.05	.08
.10	.16
.20	.30
.30	.44
.38	.51

Source: Bush, Winston C., and Arthur T. Denzau "The Voting Behavior of Bureaucrats and Public Sector Growth," Budgets and Bureaucrats: The Sources of Government Growth, ed. Thomas E. Borcharding, Duke University Press, Durham, N.C., 1977, p. 98.

This table indicates that the higher voting participation rates associated with bureaucrats results in greater political power. In fact, it is shown that when bureaucrats comprise 38 percent of the work force they are an electoral majority.

The bureaucrats' higher voter participation rate may arise from a greater sense of public spirit or from the higher benefits they receive and lower costs they incur. On the benefits side, the probability of an individual bureaucrat of changing an election outcome is no greater than any other voter. However, the benefits may indeed exceed those of other citizens if they are able to affect an election since their jobs may be eliminated by the results. On the cost side, the vast majority of bureaucrats receive the election day off with pay so they avoid any monetary costs and are able to minimize queuing costs at the place of voting. Also, because a larger public sector is generally in their interests the cost of becoming sufficiently informed to vote in one's interest, may be lower.

This voting power provides an additional incentive for bureaucratic decision makers to augment the ranks of public sector employees. The more bureaucrats, the less politicians will resist growth demands of the public sector since public employees are a constituency.

For a more rigorous inquiry into bureaucratic functioning, it is useful to examine the Niskanen (1971) model. He equates budget expansion with growth in the bureaucratic utility level. As a consequence, bureaucrats produce that level of output which maximizes the budget rather than that level which maximizes the difference between revenue and cost. Since public sector decision makers are not allowed a direct profit the fiscal residuum can be claimed only indirectly through budget maximization.

Niskanen contends further that bureaus operate as perfect price discriminates due to their monopoly power in dealings with the legislature.

> The primary difference between the exchange relation of a bureau and that of a market organization is that a bureau offers a total output in exchange for a budget, whereas a market organization offers units of output at a price (1971, p. 40).

Orzechowski (1977) suggests the main implications of the Niskanen model as being one, "bureaucrats will produce an output level far beyond the social optimum: and two, "given normal elasticity conditions, such output will be produced at minimum costs."

Graphically, Niskanen's model is shown in figure 2, where (L) is the demand curve for public sector output (marginal benefits) and (MC) is the marginal cost function. The equilibrium output of the bureau occurs at (Q_B) where the largest possible budget is obtained, subject to the constraint that total revenues must equal total costs. Consumer surplus (ABC) generated on output levels up to (Q_o) is used to expand output to (Q_B). Further, by producing at (Q_B) the bureau is producing beyond the Pareto efficient level where (MC) intersects (L). This means that each unit of output produced beyond output level (Q_o) costs society more than it benefits them.

In his model Williamson (1964) contends that bureaucratic managers operate in a manner designed to further their own interests, though constrained somewhat by the demands of the public. The slack or residual indirectly appropriated through the production above minimum cost. This inefficiency occurs because of the preference among managers for an oversized staff which is a result of the positive relationship

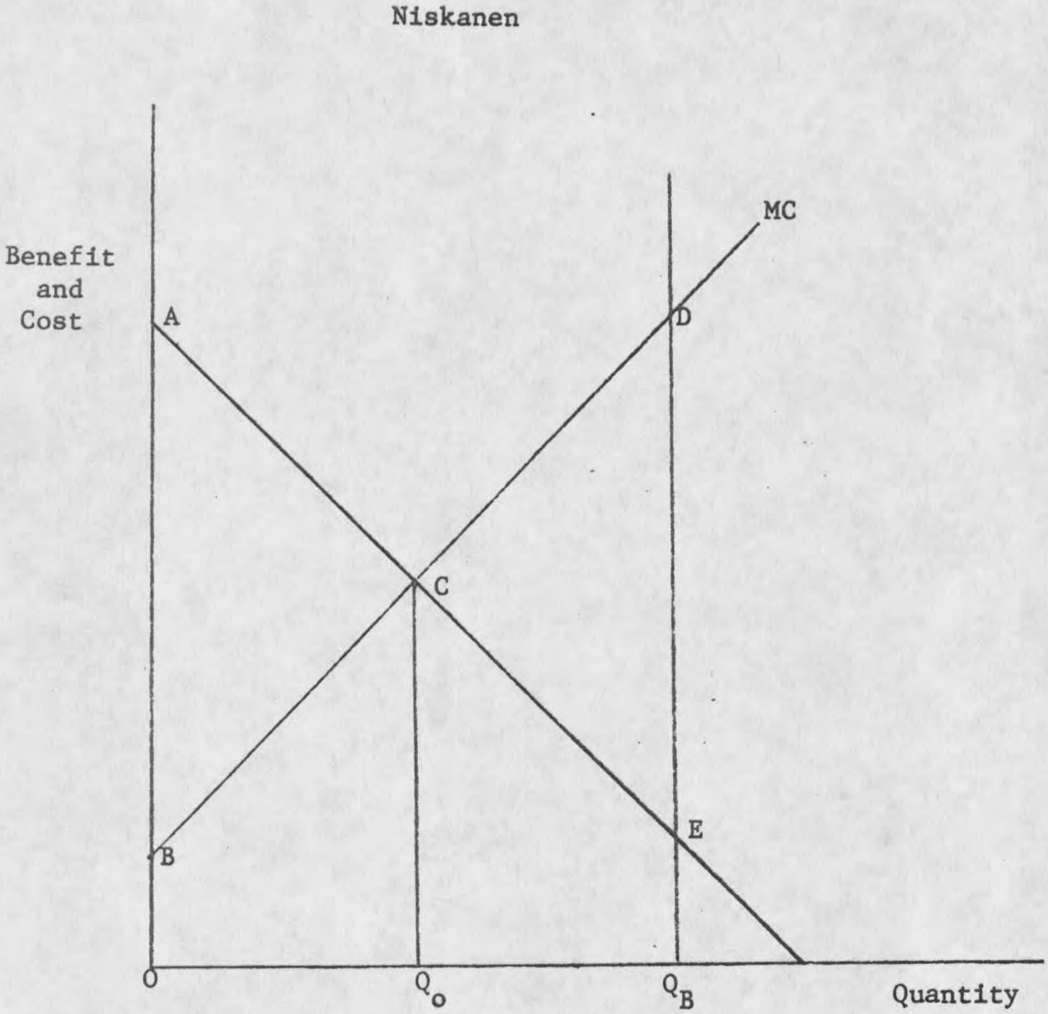


Figure 2. The Niskanen Model.

Source: Economic Models of Bureaucracy in Budgets and Bureaucrats: The Sources of Government Growth, William Orzechowski, 1977, p. 231.

between the decision makers' salary and the number of his or her subordinates and the fact that a larger staff enhances the security and reduces the anxiety of those in management positions.

Migue and Belanger (1974) developed a model which incorporates the superior monopoly power of Niskanen's model with Williamson's contention that bureaucrats produce above minimum cost. Were bureaucrats to act as this model predicts, they would be both production and exchange inefficient.

A graphical overview of the models is provided by Orzechowski (1977) and is reproduced in figure 3. Two wealth contours are drawn where θ_o represents a bureau acting under Williamson's model which does not include the monopoly power characteristics and θ_1 results from a high degree of monopoly power. Indifference curves I_o and I_1 represent those decision makers who may appropriate part of the fiscal residual through an oversized staff and perquisites of office. Williamson's decision maker is represented by position A. Position B is the equilibrium point for the Migue and Belanger manager and C is the Niskanen model's bureaucrat.

Orzechowski notes that the testable difference between the Niskanen model and the Migue and Belanger model is that the latter predicts bureaucratic production above minimum cost while the former does not. Both the Williamson and the Migue and Belanger models predict production above minimum cost. However, Williamson predicts managers will exhibit an input preference for staff while Migue and Belanger claim no input preference.

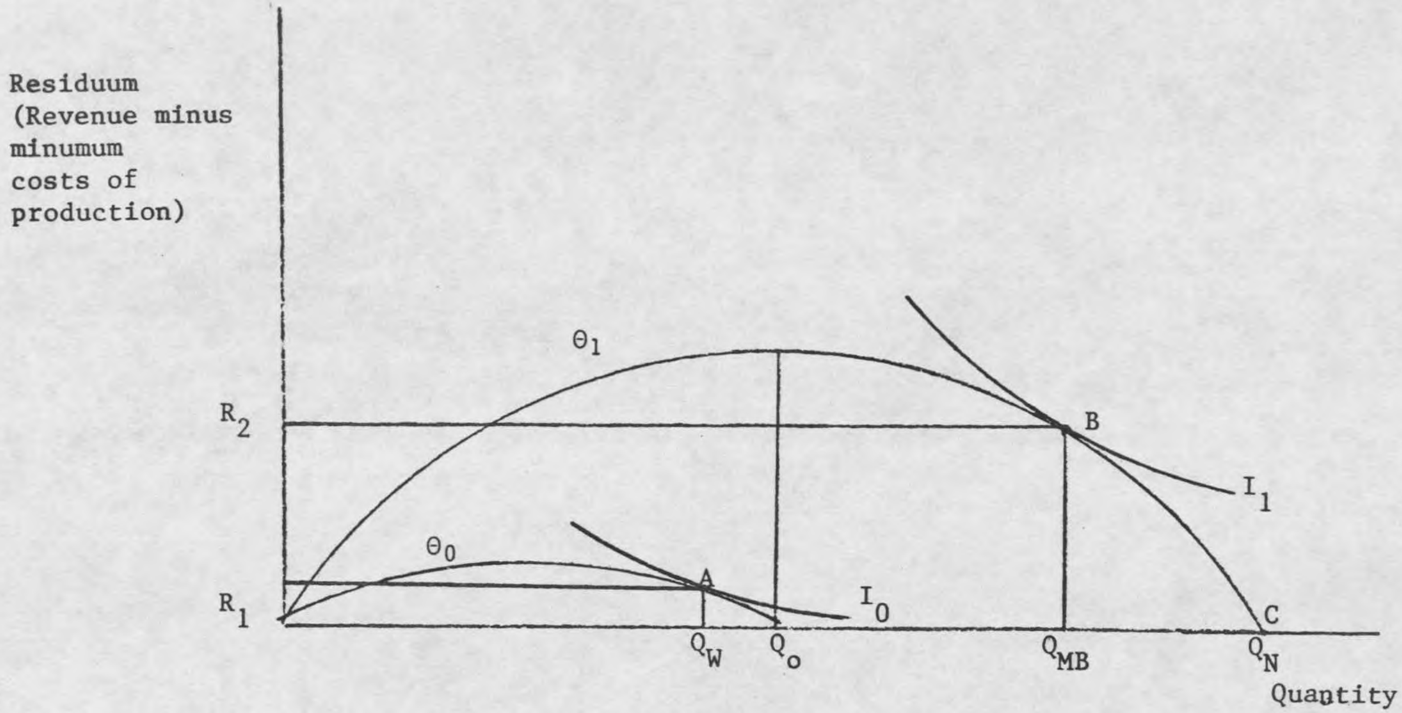


Figure 3. Orzechowski Model Summary

Source: "Economic Models of Bureaucracy," Budgets and Bureaucrats: The Sources of Government Growth, William Orzechowski, 1977, p. 237.

Chapter Summary

The purpose of this chapter was to review the various theories and observations made by economists concerning government growth. Those theories were divided into groups which emphasized exogenous and those which emphasized endogenous factors. Exogenous theories concentrated on such things as war, demographic changes, and general economic phenomena. In contrast, endogenous theories saw government failure as the root cause of public sector expansion. The government failure which was detailed involved the politicians and bureaucrats responding to their personal incentives to expand the public sector without being constrained in their ability to do so by the voting public.

A thoughtful analysis of the theories presented in this chapter requires one to distinguish between those theories which explain government growth and those which may only explain why government is too large. Theories which explain government growth must rely on some exogenous change which would increase the equilibrium size of government over time. If a theory fails to identify such an exogenous factor it fails to explain growth.

Peacock's and Wiseman's social upheaval or displacement theory, which hypothesized that war was the cause of government growth, would qualify as a growth theory in that war is an exogenous shock to the public sector equilibrium. Demographic theories which concentrated on such things as population growth, increased urbanization, a larger elderly population and more school children are also theories which truly try and explain the increase in government size. Economic phenomenon such as inflation, income growth, changes in the work force, and what Baumol called unbalanced growth were also hypothesized to be exogenous shocks to the equilibrium size of government. The median voter hypothesis, though it was classified under the "voters" section, also represents a growth theory in that changes in income distribution are hypothesized to change the level of transfers and thus government size.

In contrast, theories which point to government failure as the cause of government growth are flawed in that in essence they only explain why government is larger than optimal. Unless the institutional structure has been altered, they seem to have no way of explaining why government has taken an increasing share of the gross national product. If bureaucrats were budget maximizers in both 1940 and 1979 the size of the budget would not have increased unless the constraints they faced lessened over that time period.

Within the realm of government failure, it is plausible that several occurrences have lessened the constraints on government expansion all of which contribute to the decline of the power of an individual vote. First, the number of voters has increased. As a consequence, the probability of an individual influencing an election outcome is declining. Second, as former Montana Governor Judge commented, special interest groups have arisen which may usurp the power of voters. One particular special interest group which may be in an especially preferred position in responding to their desires is the bureaucrats. Though governments have grown in response to increased income and population, that growth has augmented the ranks of the bureaucratic special interest group. Thus, their power to expand government has increased. Finally, the increased size and complication of governmental operations results in higher monitoring costs which tends to remove the general public from the decision making process.

FOOTNOTES

[1]See John A. Henning, and Dale Tussing, "Income Elasticity of the Demand for Public Expenditures in the United States," Public Finance, Volume 29, No. 3-4, 1974, pp. 325-41.

[2]See Albert Ando, and Franco Modigliani, "The 'Life Cycle' Hypothesis of Saving," American Economic Review, Volume 53, March, 1963, pp. 55-84.

[3]During the 1940 to 1980 period U.S. voter turnouts have ranged from a low of 32.5 percent to a high of 58.5 percent in 1960. The average over this period was 47 percent which indicates that on the average, less than half the eligible voters voted. Taken from the Statistical Abstract of the United States, U.S. Department of Commerce, Bureauc of the Census, 1980, p. 515.

[4]It should be noted that in cases such as pollution control a special interest group may incur the brunt of the costs while the rest of the population enjoys the benefits.

[5]One implication the authors draw from this hypothesis is that since the median voter determines voting outcomes, everyone else will not be fully satisfied. As a consequence, criticism originates from an overwhelming majority of the citizenry.

[6]See Armen A. Alchain, and Harold Demsetz, "Production, Information Costs, and Economic Organization," American Economic Review, Volume 62, No. 5, December, 1972, pp. 777-95.

CHAPTER 3

AN EMPIRICAL REVIEW OF PUBLIC SECTOR GROWTH

This chapter will review some of the empirical works which test the theories presented in Chapter 2. In addition to looking at Wagner's Law and six additional empirical tests, the problems a researcher faces in this area are examined.

Public Sector Research Difficulties

The difficulties often encountered in empirical public sector research derive from the lack of a well developed, precise theory and the incomplete nature of data. Incorporating and testing the myriad of hypotheses presented in Chapter 2 is difficult. In addition to data limitations, a multitude of qualitative changes such as shifts in the political climate cannot be easily identified or expressed in an equation.

Inaccuracies may also exist in employment and budget figures which are most often used as measures of government size. Bennett and Johnson (1980) contend that employment levels quantitatively and qualitatively underestimate the size of government. The quantitative error occurs because "part time" employees and consultants may not be included in the total. The qualitative miscalculation comes as a result of shifts in responsibilities and service grade which are particularly significant at the federal level. Specifically, laborers have become managers, and those managers are now regulating the general public. Thus, an increase in government power and scope goes unreflected in manpower levels.

In addition, the achievement of government goals may come about through the manipulation of expenditures or regulation. The growth of government in the form of more stringent regulations will not be completely reflected in expenditure figures. Thus, where regulatory growth is occurring, expenditure figures will understate expansion. Another problem is that expenditure figures represent accounting costs, and thus do not accurately reflect the opportunity cost of the monies expended. When funds are not applied to their highest valued use, the opportunity cost is greater than the accounting cost. The possibility of such an occurrence is enhanced by the coercive taxing power of governments because such power is exercised regardless of the alternative uses the resources might have. Ignoring opportunity costs therefore understates public sector growth.

Wagner's Law

The reader will recall from the previous chapter that Adolph Wagner hypothesized that the income elasticity of demand for government is greater than one. Numerous attempts have been made at empirically testing this relationship. Bennett and Johnson (1980) summarized results of twenty such studies. Of these, only twelve or 60 percent confirm Wagner's Law.[1] Given these results, Bennett and Johnson recommend that "the Wagnerian Law should be consigned to Valhalla" (1980, p. 67). Since the term "law" connotates an invariable relationship, such a conclusion seems warranted.

Other Empirical Studies

The six additional studies to be presented here statistically estimate demand or supply functions or both for the public sector. First, the demand studies of Borcherding and Deacon (1972), Bergstrom and Goodman (1973), Henning and Tussing (1974), and Ehrenberg (1973) will be reviewed. The Ohles and Wales (1972) demand and supply analysis will be followed by a review of the Kau and Rubin (1981) supply analysis.

Borcherding and Deacon estimated demand functions for eight non-federal governmental operations. These included local education, higher education, highways, health and hospitals, police, fire, sewers and sanitation, and parks and recreation. Their model relies on the median voter hypothesis and permits statistical estimation of the hypothesized parameters. In their basic model per capita expenditures in a particular category, e, is a function of the wage rate, w, in the category, income of the median voter, y, and the number of citizens in a political unit, n. Using a double-log linear functional form this becomes:

$$\ell n\ e = \text{constant} + (\eta+1)\ \ell n\ w^{\hat{\beta}} + \Theta\ \ell n\ N + \alpha\ \ell n\ Y + \varepsilon.$$

The parameter $\hat{\beta}$ is the estimated share of total expenditures comprised by wages. Borcherding and Deacon also test urbanization and land area variables, but they provide no formal theoretical justification.

The results indicate that income elasticities of demand were positive and significant, ranging between 0.2 and 1.0. These inelastic demand responses refute Wagner's Law.

Their price elasticity estimates were derived from the wage rate as a measure of the marginal cost. Except for the higher education and highways categories, the estimated price elasticities were negative and statistically significant. The authors contended that the effect of federal aid revenue is responsible for the insignificance of the coefficients associated with the higher education and highways categories.

The variables land area and urbanization had little impact on the categories other than lower education, higher education, and highways. For these exceptions there was a positive and significant effect on per capita expenditures.

A "capturability" parameter was also estimated which measured the degree to which a good or service exhibited public goods characteristics. Though their findings indicated that most of the functions were private or quasi-private goods, Borcherding and Deacon advised great caution in drawing any conclusion concerning the optimal governmental provision level.

Another demand study done by Bergstrom and Goodman estimated individual demand functions for municipalities using 1962 data. The authors used a double-log functional form and an expenditure dependent variable as did Borcharding and Deacon. Their basic function was:

$$\log E = \text{constant} + \alpha \log n + \Theta \log \hat{T} + \varepsilon \log \hat{Y} + \sum_{i=1}^{k} \beta_i X_i + \text{error},$$

where E is the expenditure of a municipality on a specified category of municipal service. Those service expenditures include total general expenditures, police and parks and recreation. The number of households in a municipality is n, $\hat{T}$ is the estimated tax share of the citizen with the median income for a municipality, and $\hat{Y}$ is the estimated median income. The X_i's consist of values of several socio-demographic variables which describe a community or segments of a community. These included a crowding parameter, percent population change, an employment to residential ratio, percent owner-occupied housing, percent of population non-white, population density, percent of population age 65 and over, and percent of population living in the same house (1955-60).

The percent of owner occupied housing was included to reflect the author's hypothesis that "renters do not believe that they pay the entire property tax on their housing, and tend to vote for more public expenditures than homeowners with the same income" (1973, p. 289). This was confirmed in their regression results.

Bergstrom and Goodman's inclusion of the employment to residential ratio was to account for communities who have a large amount of commercial or industrial activity. The authors contend that "larger amounts of public services must be provided in order to attract and retain such activity" (1973, p. 290).

Percent change in population was included to account for cities which have grown rapidly and as a consequence not achieved a political-economic equilibrium. This implies a partial adjustment structure in government in which time is required to adjust to a new equilibrium after an exogenous shock. Bergstrom and Goodman interpret their negative coefficient estimate as being a result of inertia effects associated with expenditure growth in areas experiencing a decline in population.

The coefficient estimates on the percent of population over 65 were generally positive which is consistent with their prior belief. The life cycle income hypothesis was the basis of their prior belief and predicts that this age group would spend a larger portion of their current income on current consumption than younger people. Thus, one would expect the elderly to demand more goods and in particular more governmentally supplied goods.

Bergstrom and Goodman provide no reason for the use of the other socio-demographic variables except to say the associated coefficients were significantly different from zero. Variables of this type which were rejected on the basis of statistical insignificance were population per household, median school years, percent of population less than age 18, whether a municipality was a suburb, percent of the population with annual incomes below $3,000 and percent of the population with annual incomes exceeding $10,000.

Income elasticity estimates for the categories of total general expenditures, police expenditures, and parks and recreation expenditures were 0.64, 0.71, and 1.32, respectively. Again, these results do not confirm Wagner's Law.

The tax share or price elasticities had the predicted negative sign and had values of -0.23 for total general expenditures, -0.25 for police expenditures, and -0.19 for parks and recreation expenditures. The police expenditures elasticity was lower than the -0.9001 elasticity reported in the Borcherding and Deacon study as was the parks and recreation elasticity which was -0.4958 in Borcherding and Deacon.

In contrast to Borcherding and Deacon and Bergstrom and Goodman, Henning and Tussing (1974) confirm Wagner's Law in a demand study covering the U.S. from the year 1900 to 1971. However, they qualify this result noting that the shorter-run elasticity estimates were less than one. This result indicates a rather sluggish governmental response to changes in income.

As a consequence of this suspected sluggishness, Henning and Tussing employed a partial adjustment model of the form

$$g_t - \alpha g_{t-1} = aK(1-\alpha) + bK(\gamma_t - \alpha\gamma_{t-1}) + c(\Delta X_t - \alpha\Delta_{t-1}) + d(Z_t - Z_{t-1})$$
$$+ (1-K)(g_{t-1} - \alpha g_{t-2}) + e_t$$

where g is the log of the real non-defense expenditures per capita, γ is the log of the real GNP per capita, X is the log of the real defense expenditures per capita, and Z is the ratio of the real defense expenditures per capita, and Z is the ratio of full-employment real GNP per capita to the actual real GNP per capita. The letter e is a random error term and a, b, c, d, and K are the estimated parameters.

In the 1900 to 1971 time period, the speed of response parameter, K, was 0.434. This indicates that 43.4 percent of long run expenditures response occurs in the first year. The estimate for K in the 1900 to 1928 period was 0.988 while the 1929-1971 estimate was 0.804. This would seem to indicate that as the size of government grew, its ability to respond to changing conditions declined.[2]

The Peacock and Wiseman displacement theory of government growth was rejected by the authors since they found no "ratchet effect" for the entire study period. This is consistent with Meltzer and Richard's view that war or other types of social upheaval are not necessary conditions for public sector expansion.

While the previous three demand studies used expenditure figures as dependent variables in their regression analyses, Ehrenberg's (1973) work used government employment to gauge public sector size. Ehrenberg first estimated the per capita total employment budget, B/P, as a double-log function of the ratio of the average cost of publically produced to privately produced goods and services, RW, per capita personal income, Y/P, and per capita grants from the federal government, G/P. The independent variables per capita personal income and per capita federal grants reflected the total resources available to the state. The ratio of the average costs was a relative price indicator. Utilizing pooled cross sectional and time series data on states during the 1958-69 period, the author estimated

$$\log (B/P) = \underset{(21.48)}{-4.12} + \underset{(7.87)}{0.315)} \log RW + \underset{(17.32)}{0.222} \log (G/P)$$

$$+ \underset{(28.6)}{0.73} \log (Y/P) + e$$

$$R^2 = .754$$

The estimated per capita total employment budget $(\hat{B}/P)$ was then used as an instrumental variable in the demand equation. It was hypothesized in the demand equation that per capita full-time equivalent state and local government employment of category j (Mj/P) is a function of Wj, real average monthly payroll cost per full-time employee in category j, $\hat{B}/P$, real estimated per capita total employment budget for state and local government employees, SD1, population density, SD2, proportion of the population ages 5-17, and SD3, proportion of the population aged 65 and over. (Mj/P) is the quantity demanded, Wj is the price, $(\hat{B}/P)$ is analogous to income. The socio-demographic variables were selected on the basis of data availability and experimentation. Ehrenberg contends that these socio-demographic variables change tastes and preferences, and thus belong in the demand equations. The demand elasticity estimates for average monthly payroll ranged from -1.001 for the public welfare category to 0.67 for the "all other" category. The natural resources division had the lowest elasticity estimate for per capita total employment budget at 0.282, while public welfare had the highest at 1.569. Population density was significant in all but the "health" category. Estimates for this elasticity range from -.334 in the "natural resources" category to .141 in sanitation. As expected, the proportion of the population ages 5-17 was significant in education with an estimate of .183, but the variable held no importance in any other category. Regarding the variable proportion of the population 65 and over, public welfare and hospitals had positive elasticity estimates of 0.289 and 0.353, respectively. Paradoxically, health generated a negative elasticity of -0.361. This result "may be due to the preventative nature of many of the services in this category" (1973, p. 374).

The results of Ehrenberg's study suggest that state and local governments respond to market forces in their employment decisions. However, due to the estimated inelastic demand for employees he concluded that:

> These market forces do not appear to be sufficiently strong to limit the size of real wage increases which state and local employees may seek in the future. They (the results) also suggest that employees in each functional category have a stake in the economic well-being of members of all the other

> categories, as each category can minimize the potential employment losses of their members by seeking to increase the real wages of all categories, rather than merely their own real wage (p. 378).

Ohls and Wales attempt to identify the entire market by providing estimates of both supply and demand functions. In order to achieve this, the authors theoretically determined which variables should enter the supply (cost) equation and which should enter the demand equation. The variables assumed to influence costs were a wage index of employees providing state and local services, Wj, population change from 1960 to 1968, Δ pop, fraction of state's population living in non-metropolitan areas in 1966, NM, and population per square mile in 1968, D. Independent variables in the demand function were 1968 per capita income, Y, 1968 per capita federal grants to states and localities, G, and price, P. The dependent variables were per capita expenditures on highways, expenditures on education per school-age population, and local services expenditures per capita.

To test the theoretical analysis, Ohls and Wales assumed a linear demand for state-local services:

$$Q = \sum_i b_i X_{id} + \lambda P,$$

where Q is quantity demanded, P is price, the X_{id} are demographic variables affecting demand, and the b's and λ are parameters to be estimated. While P and Q are not directly observable in the public sector, total expenditures (P$\cdot$Q) is:

$$P \cdot Q = (\Sigma_{ai} x_{is})(\Sigma_{bi} X_{id} + \lambda \Sigma_{ai} X_{is})$$

This equation can be estimated using nonlinear techniques. However, since the parameters can only be determined up to a scale factor, the equation must be estimated subject to the constraint that $\Sigma_{ai}=1$. This scale factor is a result of the units of both P and Q, and are arbitrary with only their product observable. However, the associated elasticities are uniquely determined as they involve ratios of estimated parameters and are not affected by scale changes in these parameters.

The results of the Ohles and Wales study indicate price inelastic demand functions for both local services and education. Highway demand appears to be much more responsive to price; however, its elasticity estimate is still below one in absolute terms. Income and federal aid which are indicators of the budget constraint are highly significant in all three equations, with elasticity estimates ranging from 0.6 to 0.9, again refuting Wagner's Law.

In the supply equation, the wage rate was significant in the local services and education categories. No wage variable was available to the authors in the highway category. The population change variable was significant and held the correct sign in the local services and highway equations. This variable was used to explain capital expenditures. The demographic variables which represented population density and the degree of urbanization are highly significant determinants of highway costs but do not appear to affect local service at all. This result is not consistent with Borcherding and Deacon, Bergstrom and Goodman, or Ehrenberg. However, those studies concentrated on the demand side, and Ohles and Wales feel that their wage variable is "capturing some of the influences usually attributed to the NM and D variables in studies that do not include a wage variable" (p. 427). The authors claim that if their model specification is correct, it calls into question the conclusions of other studies which state that demand for local services is a function of demographic characteristics.

Kau and Rubin (1981) maintain that government growth is best characterized as a supply rather than a demand response. They argue that "the growth of government has come about because of technological change which has led to a reduction in the cost of collecting tax revenues, and hence in the supply of services offered by the government" (p. 262). The technological change to which Kau and Rubin refer occurred in the methods of production in the private sector. These changes include an increase in the specialization and division of labor, firms taking advantage of economies of scale, and a shift from home to market production. They hypothesize that tax revenue is a function of self-employment, economies of scale, home production and urbanization.

Having recognized the simultaneous relationships involved in the above functional form the authors employed a three-stage least-squares procedure on the time series data covering the 1929-1970 period. Kau and Rubin classified the following variables as endogenous and exogenous to the system:

Endogeneous variables

FSR = federal and state revenues as a percentage of GNP, their measure of tax revenue;

SE = self-employment as a percentage of civilian labor force, a measure of opportunities for barter;

FP = female labor force participation rates, a measure of home production;

U = urbanization, percent of the population in urban areas;

FR = farm revenues as a percentage of GNP.

Exogenous variables

MR = miles of paved roads, a measure of the cost of exchange;

CM = concentration of manufacturing, the percentage of manufacturing assets owned by the 100 largest firms, a measure of economies of scale;

I = per capita income;

CF = percent of females who are college graduates, a measure of the opportunity cost of female home production;

A = agricultural employment as a percentage of civilian labor force, also a measure of opportunities for barter;

FI = mean female income, also a measure of opportunity cost of home production;

T = time;

DW = a dummy which takes on the value 1 in 1942-46, to capture the effects of World War II.

(1981, pp. 269-270)

Using these variables the authors specify a system of five equations:

1. $$FSR = \underset{(-6.46)}{-25.69} - \underset{(-5.19)}{1.629SE} - \underset{(-2.21)}{2.349U} + \underset{(4.68)}{4.723FP} + \underset{(3.69)}{0.588FR} - \underset{(-0.73)}{0.056T} - \underset{(-3.07)}{0.249DW}$$

2. $$SE = \underset{(-15.33)}{-9.070} - \underset{(-4.15)}{0.330FSR} + \underset{(6.15)}{0.593MR} - \underset{(-6.34)}{0.767CM} + \underset{(2.12)}{0.469U} - \underset{(-2.39)}{0.108T} - \underset{(-1.00)}{0.020DW}$$

3. $$U = \underset{(4.85)}{5.312} + \underset{(0.55)}{0.044FSR} - \underset{(-0.20)}{0.041MR} + \underset{(3.43)}{0.122I} - \underset{(-0.11)}{0.006T} - \underset{(-2.89)}{0.046DW}$$

4. $$FP = \underset{(7.59)}{3.515} - \underset{(-3.00)}{0.184FSR} - \underset{(-0.47)}{0.046A} + \underset{(2.58)}{0.256CF} + \underset{(1.72)}{0.046FI} - \underset{(-0.085)}{.059FR} + \underset{(5.95)}{0.086T} + \underset{(7.13)}{0.078DW}$$

5. $$FR = \underset{(1.14)}{0.551} + \underset{(2.56)}{0.487FSR} + \underset{(12.20)}{0.682A} = \underset{(-0.79)}{0.040T} - \underset{(-0.64)}{0.031DW}$$

Note: t-values are in parentheses, the first-state coefficients of determination are .96, .93, .99, .99, and .96, respectively. All variables are in logarithms. Three-stage least-square techniques were used (1981, p. 270).

In the first equation tax revenues are negatively related to self-employment and positively related to female labor force participation rates. These results are consistent with their predicted signs. Urbanization had a negative coefficient which indicates that opportunities for tax avoidance in urban areas outweigh the increased ease of tax agencies in collecting information. The positive relationship between tax revenues and farm revenues indicates that the tax agencies' ease of monitoring land values outweighs the opportunities for barter. Use of the war dummy variable produced a negative coefficient. This surprising result was attributed to "the substantial increase in female labor force participation during the war and the large elasticity of tax revenues with female participation" (1981, p. 270). The results of the entire system of equations are for the most part consistent with their hypotheses. The hypothesis concerning the movement of women from home to market production was especially significant and was found to be a large factor in explaining tax revenues and therefore the size and growth of government.

FOOTNOTES

[1]Bennett and Johnson's interpretations of the results is questionable. Where an author has defined Wagner's Law where E(G/GNP)$\cdot$(GNP/POP) a coefficient value greater than zero would confirm Wagner's Law. It is therefore impossible to determine from Bennett's and Johnson's table if the lost six of the listed confirm or reject Wagner's Law.

[2]The authors do not attempt to explain how the estimates for K could be so different between the long run period and the two shorter run periods which comprise the long run.

CHAPTER 4

STATE GOVERNMENT GROWTH IN MONTANA

It is the purpose of this chapter to explore the size and growth of the state government of Montana during the 1940 to 1979 period. To accomplish this aim, detailed figures of the conventional measures of government size are displayed. These include employment, expenditure and debt figures. In addition, federal aid revenue which Governor Judge pointed to as a cause for government growth at the state level will also be examined.

Employment figures indicate a substantial amount of growth occurred over the 40 year study period (see Table 2). As measured relative to the population, full time equivalent employment expanded at the rate of four percent per year. Relative to Montana's workforce, state employment has increased from 0.9 percent to 5.9 percent which is an annual average increase of five percent. Unfortunately no time series employment figures were available on a category by category basis. It is clear from the totals, however, that state employment has increased dramatically relative to both population and workforce.

The reader should recall Bennett and Johnson's (1980) contention that employment figures underestimate government growth at the federal level because they fail to reflect increased grade and job responsibilities. Given that many governmental units have experienced increases in scope and powers, this phenomenon may have occurred in

Montana. However, Bennett and Johnson's analysis of standardized employee grades cannot be repeated for Montana as the state only recently instituted such a system. Thus, no trend in employees' responsibilities is readily available.

Table 2. Montana State Government Employment 1940-1979.

Year	FTE's Per 10,000 of Population	State Employment As A Percent of the Workforce
1940	35	0.9
1945	79	1.7
1950	84	2.2
1955	101	2.9
1960	121	3.9
1965	135	4.6
1970	183	6.2
1975	204	5.9
1979	205	5.9
Average Yearly Percent Increase	4%	5%

Source: Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census.

A much more detailed picture of state government is available in the expenditure figures. In Figure 4 total real per capita expenditures for Montana and national average real per capita expenditures are shown.[1] In every year except 1948 and 1975 the Montana figure is above the national average and on average, is 69 dollars above the national average expenditure level.

The greatest single contributor to State government growth was the lower education category (see Table 4). The next highest growth category is higher education, and in fact, the three education

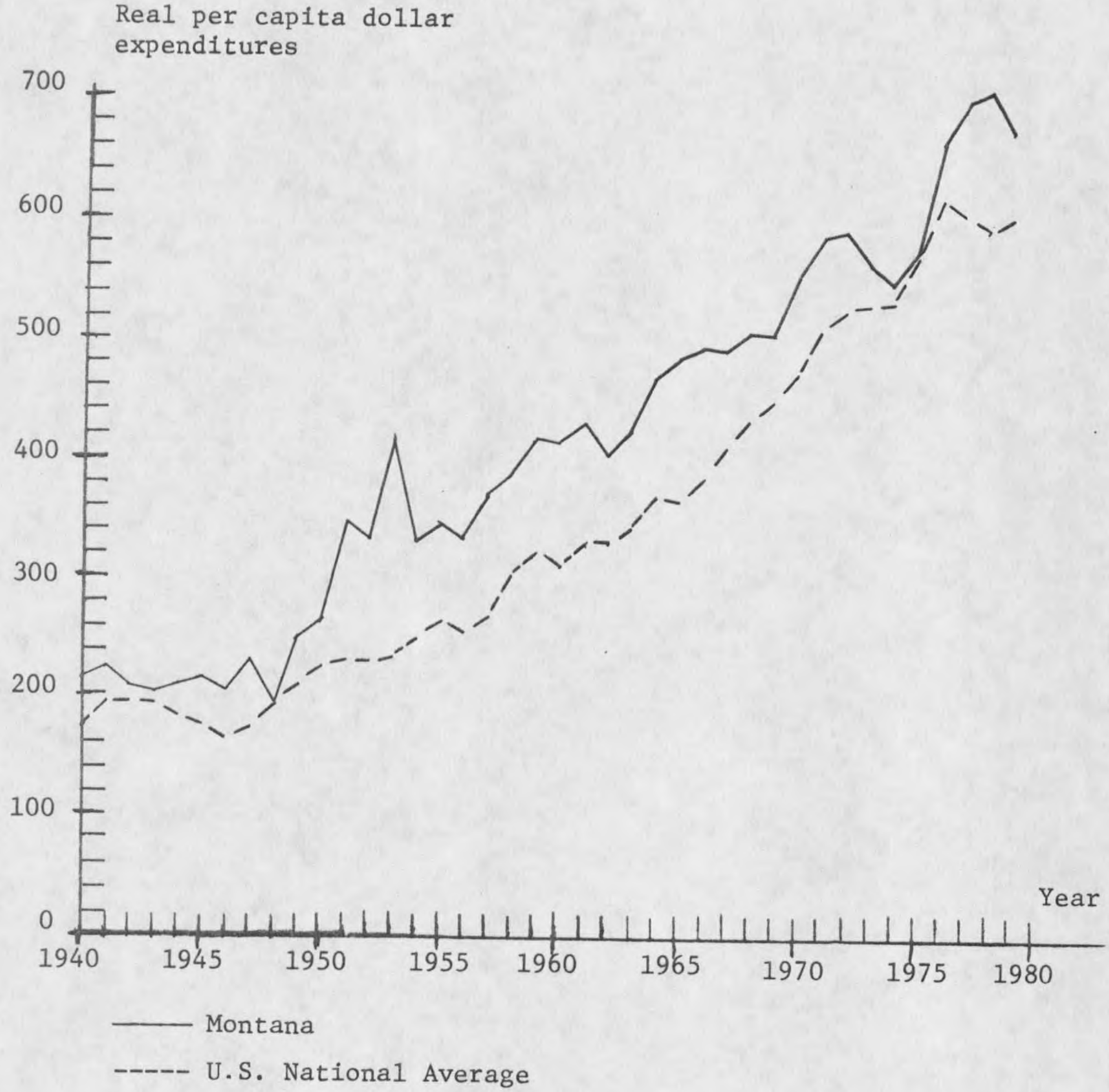


Figure 4. Montana and National Average Expenditures

Source: State Government Finances, U.S. Department of Commerce, Bureau of the Census

Table 3. Montana State Government Expenditure Category Growth Ranking 1940-1979

Rank	Category	Change in Real Per Capita Expenditures	% of Total Increase
1	Lower Education[a]	99.03	23.12
2	Higher Education	59.60	13.91
3	"Other"[b]	56.42	13.17
4	Pensions	32.48	7.58
5	Health and Hospitals	28.31	6.61
6	Public Welfare[c]	26.30	6.14
7	General Administration[d]	23.74	5.54
8	Natural Resources[e]	23.50	5.49
9	Transportation[f]	18.08	4.22
10	"Other" Education[g]	14.69	3.43
11	Public Safety[h]	13.92	3.25
12	Workman's Compensation[i]	12.70	2.96
13	Homestead Tax Relief[j]	7.43	1.73
14	Coal Board[k]	5.94	1.39
15	Employment Security[L]	4.03	0.94
16	Interest	1.64	0.38
17	Libraries	0.42	0.10
18	Housing and Urban Renewal	0.14	0.03
	Gross Increase	428.37	100
19	Liquor Stores[m]	-8.22	
		420.15	
	Rounding Error	-2.15	
	Net Increase	417.64	

[a]The lower education category reflects the direct expenditures of the state to aid local school districts.

Table 3. (cont'd)

[b]The "other" expenditures category is somewhat of an unknown, however, in a report done by Governor Judge's office in August 1976 some fifty new programs were created in the 1970-76 period. Perhaps these account for much of the "other" category.

[c]Public welfare activities include income maintenance and veterans services.

[d]General administration includes activities involving finance, taxation, central accounting, auditing, and budgeting as well as public building maintenance and improvement.

[e]Natural resource expenditures are comprised of expenditures on parks and recreation, agriculture including agricultural experiment stations, forestry, and environmental protection functions.

[f]The transportation expenditures include both highways and airport figures.

[g]The "other" education expenditures are comprised of tuition grants, fellowships, aid to private schools, and special programs expenditures.

[h]Public safety includes expenditures on law enforcement, the judicial system, the department of corrections, and regulation of business and profession.

[i]Workman's compensation is a state administered compulsory accident and injury insurance. The figure includes benefits paid, capital expenditures, and administrative costs.

[j]The Homestead Tax relief program is a state program which disperses money to homeowners in an effort to reduce their property tax burden.

[k]Coal board expenditures relate to the state administration of Montana's coal development.

[L]Employment security expenditures include administration, the maintenance of public employment offices, and benefit payments.

[m]Liquor store expenditure figures include the cost of goods sold, and capital as well as operating expenditures. The decline in expenditures is attributable to fewer state outlets.

Source: State Government Finances, U.S. Department of Commerce, Bureau of the Census.

Table 4. Real Per Capita Gross Debt of the State Government of Montana.

Year	Real Per Capita Gross Debt
1940	90.55
1945	99.40
1950	108.78
1955	30.34
1960	128.53
1965	143.68
1970	133.01
1975	85.05
1979	110.14

Source: State Government Finances, U.S. Department of Commerce Bureau of Census.

categories comprise over 40 percent of the total growth. This area of expenditures is explored in detail in the following chapter.

Another measure of Montana state government size is state indebtedness. An examination of Montana's debt figures indicates little government growth in real per capita terms has occurred over the study period (see Table 5). The evidence presented here conflicts with Meltzer and Richard's (1981) contention that voters below the median income increased debt to transfer income inter-temporally.

As noted in Chapter 1, former Governor Judge attributed much of the growth in state government to an expansion in federal aid and indeed over the 40 year period aid has expanded at the rate of three percent per year. The figures also indicate that federal aid constituted one-third of the State's expenditures during the 1960s and 1970s while it constituted only one-fifth during the 1940s and 1950s.

In Table 5 this growth is broken down into categories of aid and ranked in terms of growth. The "other" category led the way in federal aid growth. That was followed by public welfare, education, transporta-

Table 5. Federal Aid Revenue Growth Ranking for Montana's State Government 1940-1979.

Rank	Category	Real Per Capita Federal Aid Revenue Growth 1940-1979	% of Federal Aid Revenue Growth
1	"Other"[a]	49.01	29.83
2	Public Welfare[b]	37.26	22.68
3	All Education[c]	29.52	17.97
4	Transportation[d]	25.51	15.53
5	Health and Hospitals	6.63	4.05
6	General Revenue Sharing[e]	6.20	3.77
7	Employment Security	5.33	3.24
8	Natural Resources[f]	4.80	2.92
	Rounding Error	.01	.01
	Total Increase	164.29	100.00

[a]The "other" category is comprised of such programs as "CETA" and additional nonprogrammed expenditures.

[b]Public Welfare federal aid includes all transfer payments except unemployment compensation.

[c]Included in the "All Education" category is federal aid for higher, lower, and special education.

[d]Transportation federal aid is comprised of aid for the interstate freeways, other highways and airports.

[e]General Revenue Sharing is a transfer of unallocated funds for state use.

[f]Federal aid for natural resources includes forestry, agriculture and parks.

Source: State Government Finances, U.S. Dept. of Commerce, Bureau of the Census.

tion, health and hospitals, general revenue sharing, employment security, and natural resources.

It is evident from the statistics presented herein that Montana experienced significant public sector expansion and received an increasing amount of federal aid. State employment per capita and expenditures per capita grew at annual rates of four and two percent, respectively, while federal aid increased at a rate of three percent a year. From the expenditure growth breakdown it is clear that education was the principal area of growth during the study period. In the next chapter an econometric analysis of these growth areas as well as results of the analysis concerning total expenditures will be presented.

FOOTNOTES

[1]For a more complete picture of see Appendix, Table 8.

CHAPTER 5

AN ECONOMETRIC ANALYSIS OF STATE GOVERNMENT GROWTH IN MONTANA

This chapter examines why the state government of Montana has grown. Three expenditure categories are examined: total state expenditures, higher education, and lower education. The total expenditures category is an overall measure of government size. Higher and lower education expenditures rank one and two in real per capita expenditure growth and together account for 37.9 percent of the increase in state government expenditures between 1940 and 1979.

Total Expenditures

Econometric analysis of the total expenditures category proved rather fruitless. Numerous model specifications and statistical techniques were employed but parameter estimates proved to be extremely sensitive to the exact model specification. As a consequence, no conclusions were reached concerning the hypotheses associated with such variables as urbanization, payroll, median education level, percent unemployed, percent change in population, or others.

Nonetheless, some conclusions were reached regarding Wagner's Law and the effect of federal aid on total expenditures. In a regression of total expenditures on (only) income, the elasticity estimate was 1.46. This is consistent with Wagner's Law and Henning and Tussing's (1974) long-run result. However, the estimate changed substantially when other explanatory variables were included. More robust results were obtained for the effects of federal aid. In linear models which included a variety of other explanatory variables, coefficient estimates for federal aid ranged from 1.3 to 1.7. These estimates suggest that a dollar of federal aid not only does not substitute for a dollar of state tax revenue but actually results in an expenditure expansion of 30 to 70 cents. This result may be at least partially due to the institutional framework of matching grants which lowers the price to Montanans of certain governmentally supplied goods and services. Montana's political leaders also have little discretionary power concerning certain expenditures which are mandated, but only partially funded, by the federal government.

University System Expenditures

The public university system of Montana accounted for 11.14 percent of the total real per capita state expenditures during 1979 and also accounted for 14.74 percent of the total increase in state expenditures during the 1940 to 1979 period. Table 6 decomposes the growth occurring in the years 1951 to 1978. Real expenditures per student actually declined by 5.5 percent, while the ratio of students to total population increased dramatically. This increase was in turn caused by a doubling in the proportion of the population most likely to be in college (ages 18-25), and a tripling of the proportion of this age group which actually attends college. Also noteworthy is the increase in the share of expenditures paid directly by students in the form of charges. This

Table 6. Montana University System Expenditures and Enrollment 1951-1978.[a]

	1951	1978	% Δ 1951-1978
Real Per Capita University Expenditures	11.77	64.56	448.51
Real Per Student University Expenditures	1923.81	1817.91	-5.5
Proportion of Population Student Age	0.04	0.08	100.0
Students Per Student Age Population	0.14	0.47	235.71
Real Per Student University Charges	190.69	329.46	72.77
Difference Between Expenditures and Charges	1733.12	1488.45	-14.14

[a]The personal consumption implicit price deflator was used on all monetary figures to achieve real 1972 dollars. The university expenditures and charges are current expenditures and charges which exclude auxiliary enterprises such as dormitories, cafeterias, athletic events, and bookstores. The table does not reflect increases in aid to students which does not flow through the university system. Subsidized loans, for example, reduce real charges per student but are not counted.

Source: State Government Finances, U.S. Department of Commerce, Bureau of the Census, and Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census.

increased burden is somewhat surprising considering the special interest group theory of Chapter 2.

The basic hypothesis of the university system model is that the proportion of the student age population who attend college is a function of the price they face, state expenditures, and other variables. In addition, those students acting as a special interest group attempted to influence legislative decisions in a manner which would lower their price and/or raise state expenditures. As a consequence of the above joint dependencies, a system of three simultaneous equations are developed to test the hypotheses. The endogenous variables of the system are the log of the proportion of college age population attending college,[2] the university charges per student,[3] and university expenditures per student.[4]

In the first equation it is hypothesized that potential students make the decision concerning college attendance based on real per capita personal income in thousands of dollars,[5] the wage ratio between those who have attended college and those who have not,[6] student loans,[7] the unemployment rate,[8] and the charges associated with college attendance. The income and student loan variables are hypothesized to be indicators of the resources available to the potential student and have a positive influence on the proportion of potential students who do attend college. The wage ratio variable is meant to reflect the financial returns associated with a college education. It is hypothesized that the greater the differential the more potential students choose to attend college. The unemployment rate is included to reflect the opportunity costs associated with college attendance. It is hypothesized that a lower unemployment rate means a higher opportunity cost for the potential student since the decision to attend college is more likely to involve the sacrifice of a job. Therefore, one would expect higher attendance rates during high unemployment periods. The university charges variable also is a reflection of costs and is hypothesized to negatively affect the number of potential students who do opt for college attendance.

In the second equation the university charges variable is hypothesized to be a function of the proportion of potential students who attend college, the ratio of the college age population to the voting age population, and university expenditures per student. It is hypothesized that the greater the proportion of potential students who attend college the lower the charges associated with a college education would be. This variable is a reflection of the political success achieved by the students and their families in reducing charges. The ratio of the college age population to the voting age population is thought to have the opposite effect. That is, it is hypothesized that the more students per voter the greater would be the cost of any given subsidy rate. Thus, the higher cost is hypothesized to positively affect the charges. As a consequence of these opposing forces it is impossible to predict, a priori, the net effect of students on charges. Real per student expenditure is assumed to represent the quality of education and is expected to have a positive effect on charges per student.

In the third equation real university expenditures per student is hypothesized to be a function of real per capita personal income, the proportion of the college age population who do attend college, the ratio of the college age population to the voting age population and real university charges per student. Each of the independent variables is hypothesized to have a positive effect on expenditures. An increase in real per capita personal income is hypothesized to increase the resources available to the state for higher education and thus shift out the state budget constraint. If an increase in the proportion of potential students who do attend college occurs it is hypothesized that the legislature will respond to the greater political pressure and raise expenditures. Expenditures are also hypothesized to increase if the ratio of the college age population to the voting age population expands. This is based on the increased cost associated with a given subsidy rate. Real university charges per student are hypothesized to positively affect expenditures by providing more revenue.

Regression results from the first equation are as follows:

1.
$$\underset{(3.46)}{\text{LPROPUEN} = 2.45} + \underset{(1.15)}{0.00026}\ \text{PERINC} - \underset{(3.63)}{4.613}\ \text{RELWGE}$$

$$+ \underset{(0.7035)}{0.002}\ \text{AID} + \underset{(0.0111)}{0.00092}\ \text{UNEMP} - \underset{(0.36)}{0.0006}\ \text{UNCHARGPS}$$

$$+ \text{ERROR TERM}$$

$$\bar{R}^2 = 0.7542$$

The coefficient estimate on the income variable, PERINC, indicates that a $100.00 increase in real per capita income results in a 2.6 percent increase in the proportion of college age students enrolled. During the study period real per capita income rose $1,815.00 which, according to the coefficient estimate, is responsible for a 47 percent increase in the proportion of college age students enrolled. However, the low t-statistic, 1.15, implies the hypothesis that effect of income is zero cannot be rejected and that the coefficient estimate of 0.00026 is imprecise.

The variable RELWGE is defined as the wage received by those who hold only a high school degree divided by the wage received by those who hold a college degree. The estimate implies that an increase in the value of the wage ratio by 0.01 causes a 4.6 percent decrease in the proportion of the college-age population actually enrolled. During the 1959 to 1975 study period this variable registered an increase of 0.576 which translates to a 265 percent decline in the proportion of the student age population enrolled. Thus it appears that the decline in the financial returns of a college education has produced a significantly lower enrollment rate than would have been maintained had this ratio not changed.

The AID variable is a national average financial assistance figure deflated by the personal consumption implicit price deflator. Its coefficient estimate indicates that the $126 increase in this figure had a positive 25 percent effect on the proportion of college age students actually in attendance. However, the low t-statistic suggests little confidence may be attributed to the accuracy of the coefficient estimate and the hypothesis that the affect of student financial aid is zero cannot be rejected.

Montana's annual unemployment rate is represented by the variable UNEMP. Its coefficient estimate of 0.00092 suggests that the 0.5 percent increase in the unemployment rate resulted in only a 0.046 percent increase in the proportion enrolled. This coupled with the extremely low t-statistic of 0.0111 suggests that changes in the unemployment rate have no effect on the college attendance decision.

Finally, the endogenous variable university charges is deflated by the number of students and the personal consumption implicit price deflator. The estimate indicates that the $263 rise in real charges per student reduced by 15 percent the proportion of college age students that would be in attendance had this figure remained constant. However, as with the variables AID and UNEMP, the extremely low t-statistic indicates the estimate is imprecise and the actual effect may be zero.

What can be concluded from this equation with any degree of confidence is that the financial returns associated with a college degree are a major factor in the college attendance decision. It is also clear that the greater the returns the more the college age population will attend college. What cannot be concluded or decerned is the effects of the other variables due to their low t-statistics. The lack of verifiable conclusions concerning most of the variables is reflected in the adjusted coefficient of determination. Its value of 0.7542 indicates that the variation in the independent variables explains approximately 75 percent of the variation in the proportion of potential students who did attend college. In Figure 5 this is shown graphically where the observed values are compared to the values predicted by the equation.

The results of equation two are as follows:

$$\underset{}{\text{UNIVCHARGPS}} = \underset{(0.916)}{-313.4} - \underset{(0.001)}{0.28}\ \text{LPROPUEN} + \underset{(0.5366)}{2096}\ \text{RELAGEDS}$$

$$+ \underset{(2.28)}{0.324}\ \text{UNIVEXPPS} + \text{ERROR TERM}$$

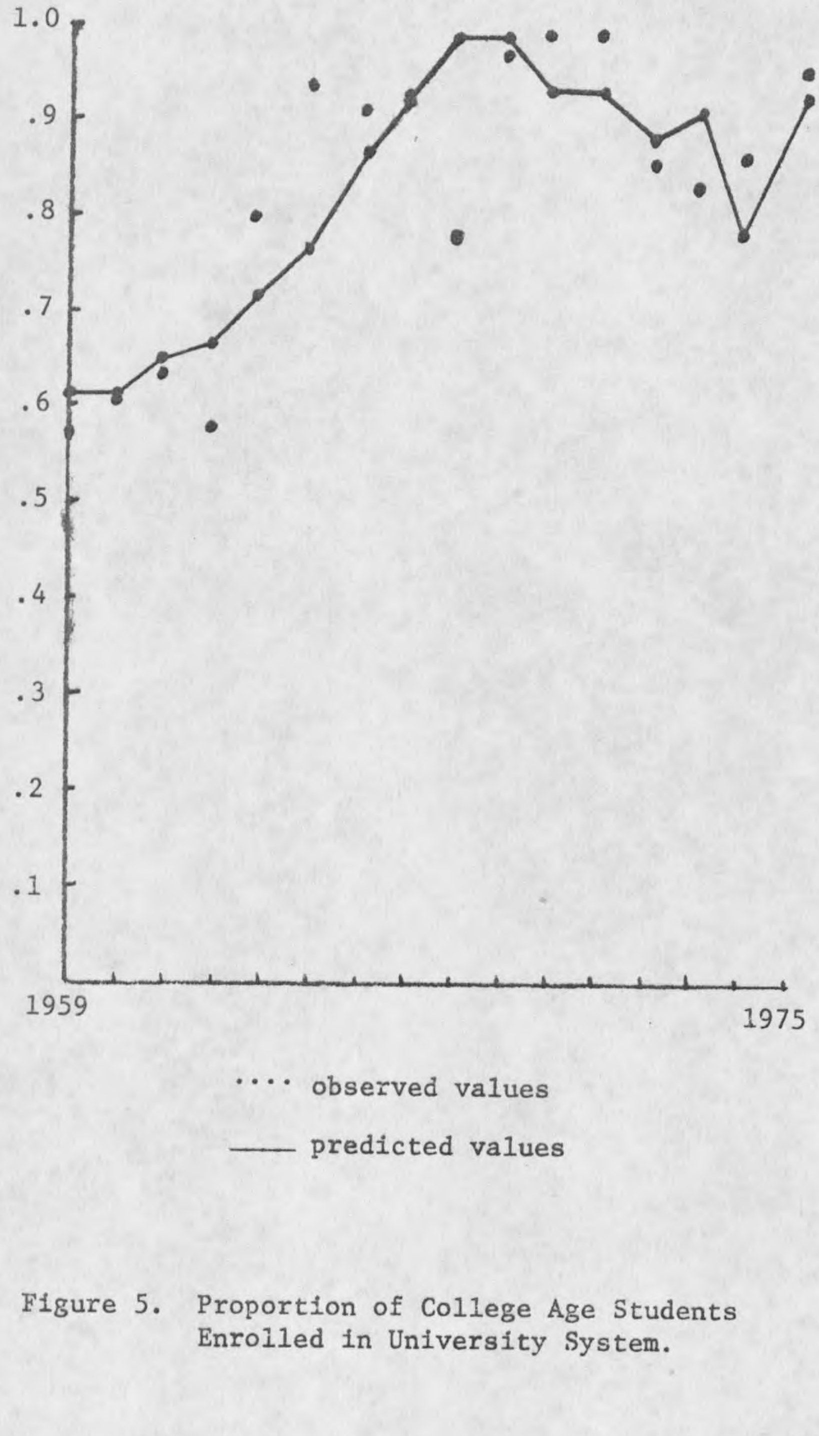


Figure 5. Proportion of College Age Students Enrolled in University System.

$$\bar{R}^2 = 0.5576$$

Here, the real university charges per student, UNIVCHARGPS, is shown as a function of an intercept, the log of the proportion of university age students enrolled in college, LPROPUEN, the ratio of college age population to the voting age population, RELAGEDS, and real per student university expenditures, UNIVEXPPS.

The variable measuring the ability of the students and their families to lower university charges through political action, LPROPUEN, has the hypothesized sign. However, the associated t-statistic of 0.001 indicates that little or no significance can be assigned to this variable. Thus, the hypothesis that students and their families act as a special interest group to reduce university charges is rejected.

The variable RELAGEDS which measures the effect of a change in the proportion of voting age population going to college has a coefficient value which indicates that the 0.05 increase in the proportion has resulted in a $104.80 increase in real per student charges. However, the t-statistic of 0.5366 makes it impossible to reject the hypothesis that the effect of this variable is zero.

Finally, the variable UNIVEXPPS was found to be significant. Its coefficient value of 0.324 has the hypothesized positive sign and indicates that the increase in real per student university expenditures of $263.78 has resulted in an $85.46 dollar increase in real per student university charges. Thus, the hypothesis that real per student university expenditures positively affect real per student charges is accepted.

The adjusted coefficient of determination for equation 2 is 0.5576 which indicates that approximately half of the variation in the dependent variable is explained by the variations in the independent variables. This somewhat poor fit is shown graphically in Figure 6.

Regression results for the final equation of the system are shown below.

$$\begin{aligned} \text{UNIVEXPPS} = {} & \underset{(0.465)}{376.78} - \underset{(0.7048)}{378.46}\ \text{LPROPUEN} + \underset{(0.1745)}{1730}\ \text{RELAGEDS} \\ & + \underset{(1.0326)}{0.1755}\ \text{PERINC} + \underset{(0.60153)}{0.505}\ \text{UNIVERCHARGPS} + \text{ERROR} \end{aligned}$$

$$\bar{R}^2 = 0.5576$$

Here the variable UNIVEXPPS represents the dependent variable real per student university expenditures which is hypothesized to be a function of the log of the proportion of college age students actually enrolled, LPROPUEN, the log of the ratio of college age population relative to the voting age population, RELAGEDS, real per capita personal income, PERINC, and real per student university charges, UNIVERCHANRGPS. Of the independent variables, only the real per capita personal income, PERINC, has the hypothesized sign and any measure of statistical significance. Its coefficient value of 0.1755 indicates that a one hundred dollar increase in real per capita personal income results in an additional 17 cent expenditure in higher education. However, the hypothesis that the effect is zero cannot be rejected.

The adjusted coefficient of determination for the third equation is 0.5578 which, as with the second equation, indicates the variations in the independent variable explain approximately half of the variation in the dependent variable. This is shown graphically in Figure 7.

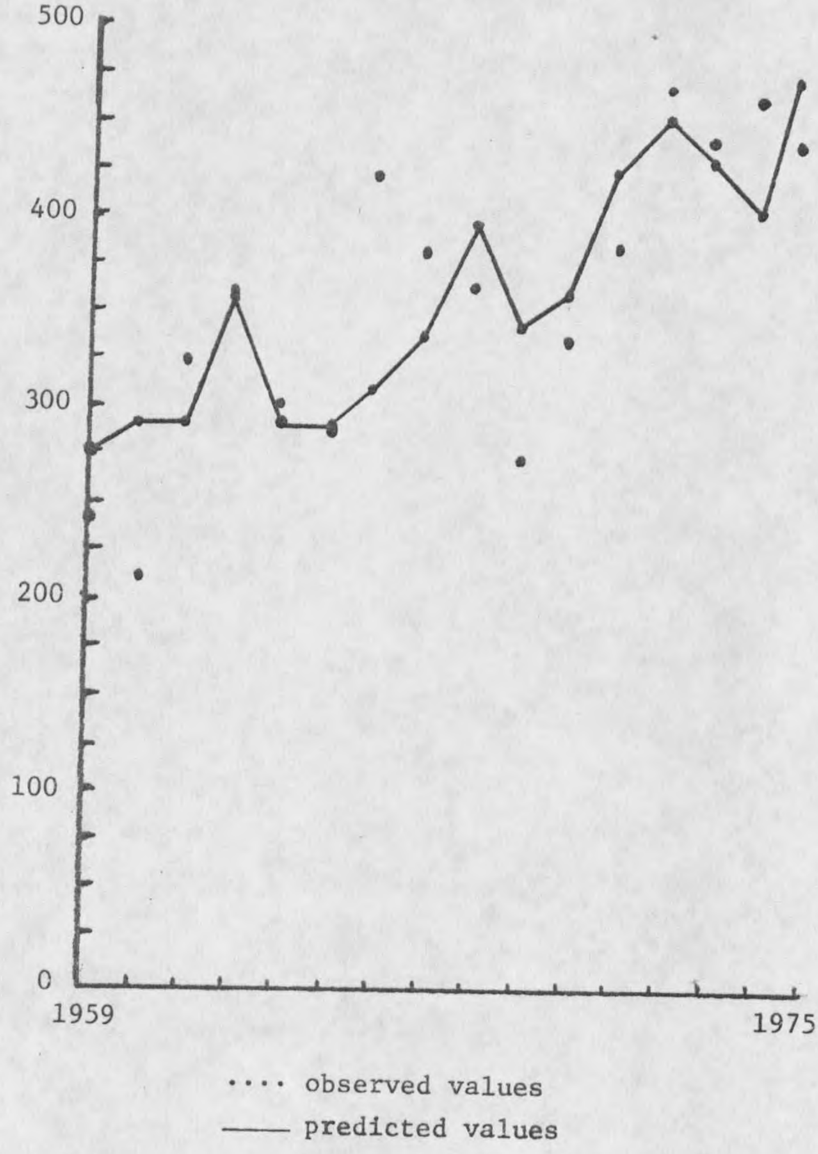


Figure 6. Real University Charges per Student.

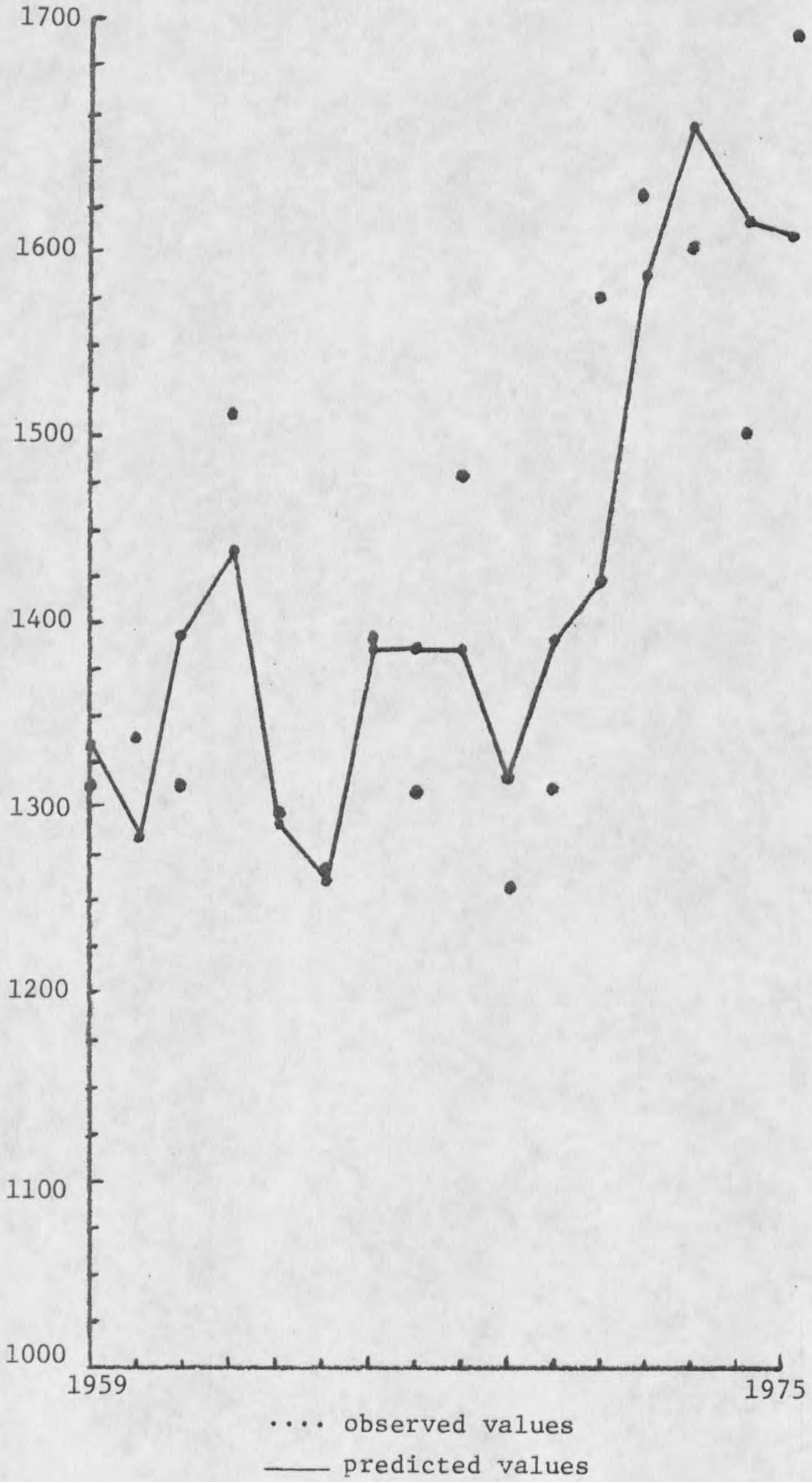


Figure 7. Real University Expenditures per Student.

What can be concluded from the university model is that the outcome of the college attendance decision is based largely on the expected difference in the financial returns associated with a college education and that the real university charges per student are positively affected by the real university expenditures per student. Also, it is concluded that the students and their families have not formed an effective special interest group.

Lower Education Model

The third and final expenditure category examined here is lower education which accounted for just over 23 percent of the expansion in real per capita state expenditures from 1940 to 1979. In Table 7, this growth is decomposed into growth in students and growth in expenditures per student during the years 1949 to 1977. These figures suggest that increases in the number of students relative to the population is a major factor in the growth of real per capita expenditures.

To explain this expenditure growth another econometric model is developed in which the real per student state expenditures on lower education is the dependent variable.[9] This is hypothesized to be a function of the prime interest rate,[10] an energy price index,[11] a Republican-Democratic dummy,[12] urbanization,[13] real per capita personal income,[14] Montana Education Association membership,[15] real average teacher salary levels,[16] the enrollment population ratio,[17] local school district expenditures,[18] and the number of children per school district.[19] The variables which are intended to reflect the cost of inputs are the prime interest rate, to reflect capital costs, the energy

Table 7. Montana State Lower Education Expenditures and Enrollment 1949-1977.[a]

	1949	1977	% Δ 1949-1977
Real Per Capita Lower Ed. Exp.	96.69	134.92	39.54
Real Per Student Lower Ed. Exp.	574.57	607.52	5.73
Students Per Capita	0.17	0.22	29.41

[a]The state and local implicit price deflator was used on all monetary figures to achieve real 1972 dollars.

Source: State Government Finances, U.S. Department of Commerce, Bureau of the Census, and Montana Taxation, Montana Tax Foundation, Inc., 1981.

index, to reflect the cost of heating and transportation, and real average teacher salaries, to reflect the labor costs. There is no a priori hypothesis concerning the signs of these variables since results would be dependent on the elasticity condition associated with each input. The variables which are to test the political influences of various groups were the Republican-Democratic dummy, the Montana Education Association (MEA) membership, and the enrollment to population ratio. There is no a priori hypothesis concerning the sign associated with the Republican-Democratic dummy variable, however, both the MEA membership and the enrollment to population variables are hypothesized to positively affect real per student state expenditures. Specifically, it is hypothesized that the MEA lobbied for higher levels of expenditures and that their success in this is aided by greater membership.[20] It is also hypothesized that an increased enrollment to population level would result in more political power for parents which would be reflected in legislative expenditure decisions.

The urbanization variable is defined as the percent of population residing in communities in excess of 10,000 in population. This variable is hypothesized to negatively affect real per student state expenditures for two reasons. First, school districts may enjoy significant economies of scale and second, state expenditure equalization policy mandates greater expenditures per child in smaller school districts than large ones. A variable having a similar hypothesis is the children per school district. It is included to test the effect of a 57 percent decrease in the number of school districts during the 1949 to 1977 period. Such consolidation is usually based on efficiency considerations so it is hypothesized that this would have a negative effect on real per student state expenditures. The real per capita personal income variable was included to reflect the state budget constraint. Specifically, it is hypothesized that income growth had resulted in increased real per capita state expenditures on lower education or, lower education is not an inferior good. Finally, the variable local school district expenditures is included to account for the institutional affects of the state equalization and minimum funding policies. It is hypothesized that an increased amount of spending at the school district level resulted in a decline in real per student state expenditures.

Using ordinary least squares (OLS) the previously mentioned hypotheses are tested. Regression results (shown in Appendix, Table 9) indicate several things. First, the Republican-Democratic dummy, real per capita personal income, MEA membership, and real average teacher salaries were not statistical significant. Thus, the associated hypotheses were rejected. Second, the urbanization and children per school district variables are highly collinear. Third, there is an autocorrelation problem as indicated by the Durbin-Watson statistic.

In view of the above results, the variables which were not significant are dropped from further regressions. Also, to solve the multicollinearity problem associated with the variable children per school district it dropped as well. Finally, the OLS option of the SHAZAM econometrics program was replaced by the autocorrelation option which adjusts the predicted values of the dependent variable with the logged residual thereby producing the Best Linear Unbiased Estimates (BLUE).[21]

One problem that cannot be effectively remedied is the suspected simultaneity problem between expenditures at the local level and those at the state level. It seems plausible that causation would run in both directions; that is, state expenditure decisions are influenced by local expenditure decisions and the reverse. Normally this problem can be eliminated by estimating a system of jointly determined equations as was done in the university system model. However, a properly identified system of equations could not be developed here. As a consequence, two equations are reported one of which contains the real per student local expenditures variable and one which does not.

The first equation presented here contains the real per student local expenditures variable.

$$\text{STEXPC} = \underset{(5.29)}{546.78} - \underset{(3.31)}{11.55}\ \text{PRMI} + \underset{(6.45)}{4.52}\ \text{ENERGY} - \underset{(1.41)}{11.00}\ \text{PCTURPOP}$$

$$+ \underset{(1.69)}{858.06}\ \text{RATIENPO} - \underset{(5.52)}{1.23}\ \text{LOCEXPC} + \text{ERROR TERM}$$

$\bar{R} = .9002$ (see Figure 8)

The dependent variable, real per student state expenditures represented by STEXPC, is hypothesized to be a function of the prime rate, PRMI, in energy index, ENERGY, the percent of urbanized population, PCTURPOP, the enrollment to population ratio, RATIENPO, the real per student local expenditures, LOCEXPC, and a random error term, ERROR.

The results of this equation indicate that every variable has at least some level of statistical significance and none of the signs are inconsistent with their associated hypothesis. The coefficient estimate on the prime rate variable indicates that a one percent increase in the prime rate would result in an $11.55 decline in the state real per student expenditure. Thus it can be concluded that the state has an elastic demand for lower education capital. Conversely, the energy index variable coefficient estimate has a positive sign indicating an inelastic demand for lower education energy consumption. Specifically a one point rise in the index stimulates a $4.52 increase in the dependent variable. As predicted, increased urbanization results in lower real per student state expenditures. More specifically, it is estimated that a one percent increase in urbanized population results in an $11.00 decline in real per student state expenditures in this category. The enrollment to population ratio variable also held the hypothesized sign. Its coefficient value indicates that the increased political power of parents has resulted in an estimated $88.76 rise in the real per student

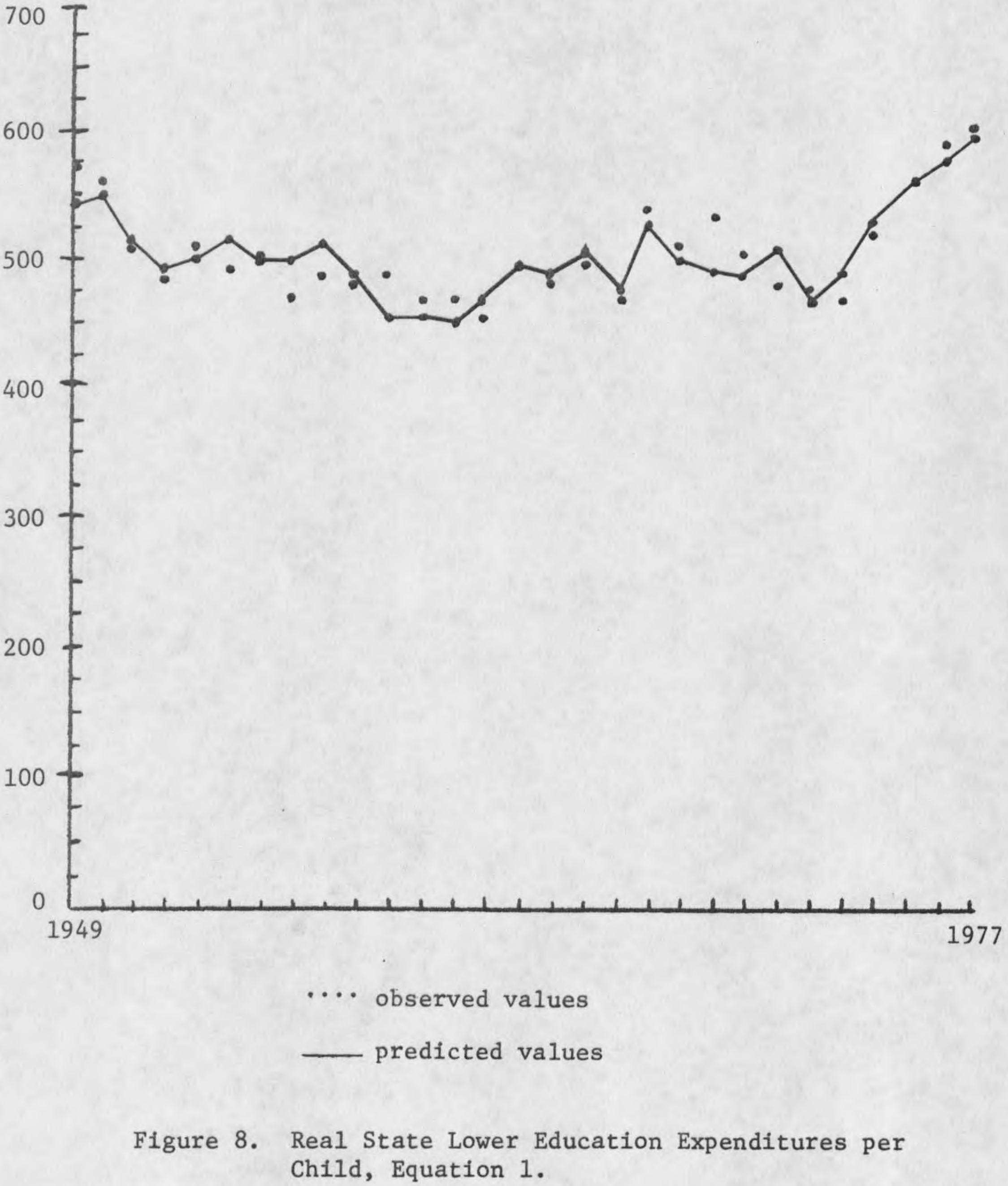


Figure 8. Real State Lower Education Expenditures per Child, Equation 1.

state lower education expenditures over the 1947-1977 period. Finally, the local expenditures variable coefficient of -1.23 indicates that an increase of one dollar in real per student local expenditures results in a decline of $1.23 in the state figure. Caution should be taken in the interpretation of this figure, however, due to the afore mentioned joint dependency problem.

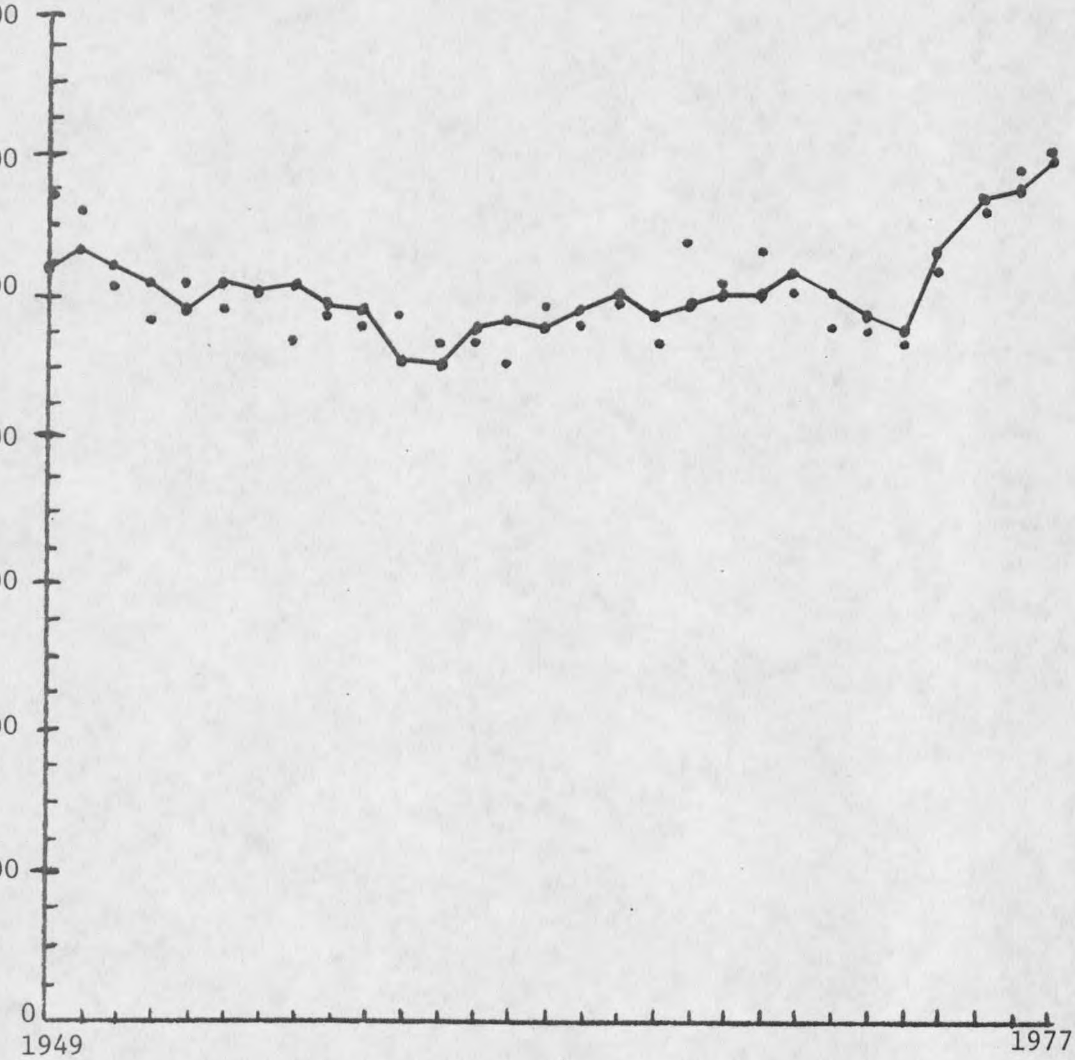
As a result of the joint dependency problem, the local expenditures variable is excluded from the second equation in which the following results are obtained:

$$\underset{}{\text{STEXPC}} = \underset{(6.50)}{768.75} - \underset{(2.09)}{10.5\ \text{PRMI}} + \underset{(4.14)}{3.19\ \text{ENERGY}} - \underset{(2.71)}{24.98\ \text{PCTURPOP}}$$

$$+ \underset{(2.01)}{1186.5\ \text{RATENPO}} + \text{ERROR}$$

$$\bar{R}^2 = 0.7624 \qquad \text{(see Figure 9)}$$

Coefficient estimates remain essentially the same between the two equations for the ENERGY and PRMI variables, but the absolute coefficient values and t-statistics increased substantially for the PCTURPOP and RATENPO variables in the second equation. Specifically, the coefficient on PCTURPOP is 24.98 in the second equation, whereas it is -11.00 in the first indicating a larger effect. Also, the RATENPO coefficient is at 858.06 in the first equation versus 1186.5 in the second equation. Equation 1 has the higher adjusted coefficient of determination but because of the joint dependency problem one equation cannot be viewed as better than the other. One can conclude, however, that the hypothesis concerning all the variables is accepted.



. . . . observed values

——— predicted values

Figure 9. Real State Lower Education Expenditures per Child, Equation 2.

FOOTNOTES

[1]An example is the program to increase handicapped access in public buildings.

[2]This variable is generated by adding the previous four years of graduating senior classes in Montana. Source: Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census.

[3]University charges were taken from the publication State Government Finances, U.S. Department of Commerce, Bureau of the Census. They excluded charges for room, board, and athletic events. The actual enrollment figures which were obtained from the Statistical Abstract of the United States, U.S. Department of Commerce, Bureau of the Census, are used as a deflator. Also used as a deflator is the personal consumption implicit price deflator found in the Economic Report of the President, 1981, GPO.

[4]The university expenditures figures are also deflated by the personal consumption implicit price deflator and the actual enrollment figures. They do not include expenditures for the provision of room, board, and athletic events.

[5]Income figures are on a per capita personal income basis obtained in the State Government Finance, U.S. Department of Commerce, Bureau of the Census. Again, these are deflated by the personal consumption implicit price deflator.

[6]Data on the wage differential is an unpublished national average obtained from Dr. Douglas Young, of Montana State University.

[7]The data on the student loans variable is a real national average figure taken from the Statistical Abstract of the United States.

[8]An unemployment rate figure was taken from the Statistical Abstract of the United States and is specific to Montana.

[9]This figure was obtained from State Government Finances, U.S. Department of Commerce, Bureau of the Census.

[10]Data was obtained for this variable in the Economic Report of the President, 1981, GPO.

[11]This variable is the gasoline price index obtained in the Economic Report of the President, 1981, GPO.

[12] The Republican-Democratic dummy variable was generated by determining which party had control of at least two of the Governor's Office, the House, and the Senate.

[13] Urbanization was defined as the percent of the population residing in cities in excess of 10,000 in population. This was obtained from the Statistical Abstract of the U.S., U.S. Department of Commerce, Bureau of the Census.

[14] Real per capita personal income figures were obtained from the State Government Finances publication of the U.S. Department of Commerce, Bureau of the Census, and deflated by the personal consumption implicit price deflator published in the Economic Report of the President, 1981, GPO.

[15] The Montana Education Association membership was obtained from their headquarters in Helena.

[16] Average teacher salary figures were obtained from The Statistical Abstract of the U.S., U.S. Department of Commerce, Bureau of the Census.

[17] Enrollment and population figures were found in the Statistical Abstract of the U.S., U.S. Department of Commerce, Bureau of the Census.

[18] Local school district expenditure figures were obtained in the State Government Finances publication of the U.S. Department of Commerce, Bureau of the Census.

[19] The number of school districts was found in an unpublished doctoral dissertation by Winston Warren Wetzel of the University of Montana entitled "Montana's Educational System," 1964.

[20] One should note that a reverse causality may exist in that increased expenditures may result in more teachers and quite possibly more MEA members.

[21] The SHAZAM econometrics program was developed by Kenneth J. White of the Department of Economics, Rice University.

CHAPTER 6

SUMMARY AND CONCLUSIONS

This thesis has examined the rationales of government growth studies, reviewed the economic literature that attempts to explain government growth, reviewed state government growth in Montana in terms of employment, debt and expenditures, and applied econometric methods to try and explain the growth which occurred. This chapter will provide some conclusions concerning state government growth.

In drawing conclusions based on this or any other public sector growth research one must always be aware of limitations and hindrances that plague this area. As mentioned earlier, employment, expenditure, or debt figures have limitations in measuring the actual size and scope of government. Also hindering research is the lack of a single concise theory.

In spite of the above problems and the effects of innumerable influences on the total expenditure category two significant results were obtained. First, Montanans spend an estimated 30 to 70 cents above each dollar they receive in federal aid, and second, Wagner's Law was confirmed. The first result has serious implications regarding President Reagan's "New Federalism." If a substantial reduction were to occur in Montana's federal aid, as proposed by this program, a decline of greater proportions would occur in state expenditures unless the state increased its share of the burden. Such an effect would mediate or eliminate Montana's state government growth.

Given the problems associated with the total expenditures category two other categories of expenditures, lower and higher education, were examined. In the lower education category it was estimated that increased energy prices and a rise in the students to population ratio were positively related to real per student state funding while the prime interest rate, percent urban population and local real per student funding were negatively related. The variable students to population ratio was a political variable. Its coefficient results indicate that government failure is present in this area to some degree. In the higher education category no government failure was found. That is, students and their families were not estimated to be responsible for either a rise in expenditures or a decline in charges. The rise in expenditures was estimated to be a result of increases in the proportion of college age students choosing to attend college and changes in the age composition of the population. This change in the college attendance proportion was estimated to be a result of increased financial returns associated with a college degree during the study period.

Unfortunately many theories contained in the Chapter 2 review were not tested. Specifically, those theories concerned with the behavior of bureaucrats were not tested because of the difficulties in obtaining the relevant data. As a consequence it should be noted that data availability had an influence on model formulation. Also, results obtained may be somewhat spurious in nature in that bureaucratic effects were ignored.

Predicting the future is risky at best, but recent demographic and economic trends provide some guide for future state expansion. With regard to lower education, declines in the birth rate during the 1970s indicate growth will decline. However, the decline in the birth rate may have recently been reversed which would indicate that often a brief leveling off in the growth rate the state will again experience a surge in lower education expenditures.

A similar pattern may be in store for higher education unless the wage differential changes significantly. Recent trends indicate that the differential is declining. As a consequence, expenditures in this area may drop significantly.

In the introduction of this thesis a question was asked concerning who determined state policy: the people or Helena. No clear cut answer may be given to this question. Indeed evidence government failure was discovered in the lower education category but this was the extent of it. That is not to say that government failure is limited to this area but only the capability to test for it is and that each category must be examined on an individual basis. One may suspect that government failure may be occurring for as Tullock (1977) writes, "We are, in the end, all bureaucrats, even if we do not like to admit it." That is, each Montanan, regardless of his/her political bent, is willing to justify growth in his/her favorite expenditure category.

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APPENDIX

APPENDIX

Table 8. Montana State Government Expenditures 1940-1979.[a]

	1940	1950	1960	1970	1979
Total State	31496	77029	159118	343105	900928
% Of Total	100	100	100	100	100
Real Per Capita	269.37	335.04	417.37	557.67	675.04
% Real Per Capita Δ Over Decade	_____	24.38	24.57	33.61	21.05
Transportation [b]	9453	16743	45333	99010	132111
% Of Total	30.23	21.73	28.49	28.85	14.66
Real Per Capita	80.64	72.82	118.91	160.92	98.99
% Real Per Capita Δ Over Decade	_____	-9.70	63.29	35.33	-38.48
Public Safety [c]	893	1908	4948	8491	32179
% Of Total	2.86	2.48	3.11	2.47	3.57
Real Per Capita	7.64	8.30	12.98	13.80	24.11
% Real Per Capita Δ Over Decade	_____	8.64	56.38	6.32	74.71
Natural Resources [d]	8.53	35.81	8374	16071	41101
% Of Total	2.73	4.65	5.26	4.68	4.56
Real Per Capita	7.30	15.58	21.96	26.12	30.80
% Real Per Capita Δ Over Decade	_____	113.42	40.95	18.94	17.92
Public Welfare [e]	4452	11670	15203	28861	85967
% Of Total	14.24	15.15	9.56	8.41	9.54
Real Per Capita	38.07	50.76	39.88	46.91	64.41
% Real Per Capita Δ Over Decade	_____	33.33	-21.43	17.62	37.30
Interest	436	416	1382	3446	7173
% Of Total	1.38	0.54	0.87	1.00	0.80
Real Per Capita	3.70	1.81	3.62	5.60	5.37
% Real Per Capita Δ Over Decade	_____	-51.08	100.0	54.70	-4.11
Housing And Urban Renewal	0	0	0	0	186
% Of Total	0	0	0	0	0.02
Real Per Capita	0	0	0	0	0.14
% Real Per Capita Δ Over Decade	_____	0	0	0	_____

Table 8. Cont'd.

	1940	1950	1960	1970	1979
Workmans Comp. [f]	0	0	2954	5384	16957
% Of Total	0	0	1.86	1.57	1.88
Real Per Capita	0	0	7.75	8.75	12.70
% Real Per Capita Δ Over Decade	_____	0	_____	12.90	45.14
Liquor Store [g]	5787	11850	13228	19931	36180
% Of Total	18.51	15.38	8.31	5.81	4.02
Real Per Capita	49.49	51.54	34.70	32.39	27.11
% Real Per Capita Δ Over Decade	_____	4.14	-32.67	-6.66	-16.30
Higher Education	1412	5255	18107	46799	100368
% Of Total	4.48	6.82	11.38	13.64	11.14
Real Per Capita	12.08	22.86	47.49	76.06	75.20
% Real Per Capita Δ Over Decade	_____	89.24	107.74	60.16	-1.13
Health And Hospitals	1134	3720	6762	14010	50746
% Of Total	3.63	4.83	4.25	4.08	5.63
Real Per Capita	9.70	16.18	17.74	22.77	38.02
% Real Per Capita Δ Over Decade	_____	66.80	9.64	28.35	66.97
Libraries	8	14	107	499	654
% Of Total	0.03	0.02	0.07	0.14	.07
Real Per Capita	0.08	0.06	0.28	0.81	0.49
% Real Per Capita Δ Over Decade	_____	-25.0	366.67	189.28	-39.51
General Administration [h]	668	1889	3659	11778	39313
% Of Total	2.14	2.24	2.30	3.43	4.36
Real Per Capita	5.72	8.22	9.60	19.14	29.46
% Real Per Capita Δ Over Decade	_____	43.71	16.79	99.37	53.92
Employment Security [i]	3238	4983	13391	9972	42370
% Of Total	10.36	6.47	8.41	2.91	4.70
Real Per Capita	27.69	21.67	35.12	16.21	31.75
% Real Per Capita Δ Over Decade	_____	-21.74	62.07	-53.84	95.87

Table 8. Cont'd.

	1940	1950	1960	1970	1979
Pensions	149	373	4490	11029	45057
% Of Total	0.48	0.48	2.82	3.21	5.00
Real Per Capita	1.28	1.62	11.78	17.93	33.76
% Real Per Capita Δ Over Decade	———	26.56	627.16	52.21	88.29
Lower Education [j]	1879	6361	16969	47682	153633
% Of Total	6.01	8.26	10.66	13.90	17.05
Real Per Capita	16.08	27.67	44.51	77.50	115.11
% Real Per Capita Δ Over Decade	———	72.08	60.86	74.12	48.53
"Other Education" [k]	0	0	1502	7411	19601
% Of Total	0	0	0.94	2.16	2.18
Real Per Capita	0	0	3.94	12.04	14.69
% Real Per Capita Δ Over Decade	———	0	———	205.58	22.01
Coal Board [l]	0	0	0	0	7953
% Of Total	0	0	0	0	5.94
Real Per Capita	0	0	0	0	0.88
% Real Per Capita Δ Over Decade	———	0	0	0	———
Homestead Tax Relief [m]	0	0	0	0	9918
% Of Total	0	0	0	0	1.10
Real Per Capita	0	0	0	0	7.43
% Real Per Capita Δ Over Decade	———	0	0	0	———
"Other" [n]	1134	8266	4211	12731	79479
% Of Total	3.63	10.73	2.64	3.71	8.82
Real Per Capita	9.70	35.95	11.04	20.69	59.55
% Real Per Capita Δ Over Decade	———	270.62	-69.29	87.41	187.82

[a] The first row of each category contains the operation and capital expenditure figure in thousands of current dollars. In the second row the percent of the total budget comprised by a category is given. The expenditure level in real per capita terms is indicated in the third row. The monetary deflator used was the implicit price deflator for purchases of goods and services by state and local governments (Economic Report of the President, January 1981 p.237). In the fourth row the percent change over the last ten years is

Table 8. Cont'd.

given. The figures for the 1940-50 period is under the column labeled 1950.

[b]The transportation expenditures includes both highways and airport figures.

[c]Public safety includes expenditures on law enforcement, the judicial system, the department of corrections, and regulation of business and profession.

[d]Natural resource expenditures are comprised of expenditures on parks and recreation, agriculture including agricultural experiment stations, forestry, and environmental protection functions.

[e]Public welfare activities include income maintenance and veterans services.

[f]Workmans compensation is a state administered compulsory accident and injury insurance. The figure includes benefits paid, capital expenditures, and administrative costs.

[g]Liquor store expenditure figures include the cost of goods sold, and capital as well as operating expenditures.

[h]General administration includes activities involving finance, taxation, central accounting, auditing, and budgeting as well as public build-maintenance and inprovement.

[i]Employment security expenditures include administration, the maintenance of public employment offices, and benefit payments.

[j]The lower education category reflects the direct expenditures of the state to aid local school districts.

[k]The "other" education expenditures are comprised of tuition grants, fellowships, aid to private schools, and special programs expenditures.

[l]Coal board expenditures relate to the state administration of Montana's coal development.

[m]The Homestead Tax relief program is a state program which disperses money to home owner in an effort to reduce their property tax burden.

Table 8. Cont'd.

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[n] The "other" expenditures category is somewhat of an unknown, however, in a report done by Governor Judge's office in August 1976 some fifty new programs were created in the 1970-76 period. Perhaps these account for much of the "other" category.

Source: State Government Finances, U.S. Department of Commerce, Bureau of the Census.

Table 9. Rejected Lower Education (OLS) Equation.

$$
\begin{aligned}
\text{LOCEXPC} = & -116.78 - \underset{(3.13)}{15.05}\ \text{PRMI} + \underset{(6.23)}{6.34}\ \text{ENERGY} \\
& -\underset{(0.41)}{17.08}\ \text{REPDEM} - \underset{(1.90)}{16.18}\ \text{PCTURPOP} \\
& -\underset{(.07)}{.002}\ \text{PERINC} - \underset{(2.09)}{.04}\ \text{MEAMEM} \\
& + \underset{(4.76)}{4206}\ \text{RATIOENPO} + \underset{(.31)}{0.00}\ \text{SALEXP} \\
& + \underset{(0.66)}{0.18}\ \text{SCHDISTS} - \underset{(2.79)}{0.88}\ \text{LOCEXP} \\
& + \text{ERROR TERM}
\end{aligned}
$$

$\bar{R}^2 = 0.7713$ DW = 1.04