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Determinants of public school financing in Montana

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THE DETERMINANTS OF PUBLIC SCHOOL FINANCING IN MONTANA

By

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Dean, Graduate School
The study investigated possible relationships between changes in certain sociological characteristics of the population of Montana and changes in per pupil expenditures for education at the primary and secondary level. Variables considered included changes in per capita income, population, urbanization, and age distribution of the population. The effects of the School Foundation Program were adjusted out.

The study investigated changes in spending over ten year intervals to coincide with availability of U.S. Census data. Expenditures were calculated on a per pupil basis for each county. A stepwise multiple regression analysis was then conducted to test for correlation between changes in the independent variables and changes in per pupil expenditures. No significant relationship was found. A cross section analysis was then run which did reveal a significant relationship between the values of certain of the independent variables at a given point in time and per pupil expenditures for education. However the predictive value of the analysis was questioned. A new analysis was then conducted to test for a relationship between changes in the previously considered independent variables and changes in total educational expenditures. A significant relationship was revealed between changes in the population aged 6-19 years and changes in total educational spending. The relationship was still more apparent when the effects of inflation on expenditure levels were not adjusted.

It was concluded that the taxpayers of Montana did not consider per pupil expenditure levels but rather total expenditure levels when voting on school mill levies. The taxpayers were not willing to offset the effects of inflation with higher tax levels. Taxpayers did demonstrate a willingness to fund for additional school enrollment levels.
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CHAPTER 1

INTRODUCTORY NOTE

Montana public officials yearly confront the citizenry with ever increasing requests for tax revenues. Highways, schools, airports, and a myriad of other projects are built and funded. Yet, in the literal sense there is no absolute necessity for most of these projects. The great mass of the citizenry will continue its existence if another school is not built, or another welfare department not added. Rather, there is an increasing demand for governmental services by the public, expressed through their approval of the actions of their political representatives in raising public expenditure levels.

There is not as yet complete understanding or analysis of the forces governing the demand by the public for government provided goods and services. A more detailed knowledge of the forces influencing the demand by the populace for governmental expenditures would allow for more accurate prediction of long run trends in public demand for governmental expenditures and would make possible the formulation of accurate long range revenue and expenditure estimates for governmental spending at all levels of government. The effects on governmental expenditure programs of short and long run changes in the economy of a given region could be more accurately predicted than at present.
It is the intent of this paper to investigate the factors influencing the demand for one particular governmental service in the State of Montana; the demand for educational expenditures for elementary and secondary school systems. This paper is divided into five main sections. The first section consists of a brief summary of the present system of school financing in the State of Montana. The second section contains a brief review of some of the literature relative to this paper. The third section summarizes the model used in this analysis, while the fourth section contains the results of the analysis. Finally, the fifth section summarizes the conclusions reached, and suggests further work that might be done.
Prior to 1949, educational funding in Montana was handled on a district to district basis. Each district would first establish its tentative budget for the coming fiscal year, and then levy taxes upon the taxable property in the district to generate the necessary funds. In relatively wealthy districts the mill levy needed to raise the required funds would be low, while in those districts with relatively low property valuation per pupil the mill levy required to raise even barely adequate funds would be extremely high. Taxpayers living in districts with high taxable property valuations per school child could fund extensive educational programs with relatively low mill levies while taxpayers in districts with low taxable property valuations per school child were forced to adopt extremely high mill levies, and in some cases were unable to fund an adequate program even with high mill levies. 1

In apparent response to the inequities produced by the then current system of school finance, and having realized that the benefits of education extended outside the individual school districts to the state as a whole, the Montana State Legislature of 1949 enacted the first school foundation program. It was established

upon the following principles:

1. The overall financial responsibility for public education should be shared by the state, the counties, and the local districts.

2. The financial contribution from these three sources should be used to provide a basic educational program for all the children in Montana public schools.

3. The Foundation Program should provide an adequate basic education program financed through district, county, and state contributions.

4. State financial support of the basic educational program would be limited by a schedule established by legislative action. Though theoretically the state schedule should provide sufficient funds for operation of an adequate scholastic program, in reality few districts in recent years have remained within the established guidelines, and no legislature has fully funded the program.

5. The state's financial contribution would be distributed after a uniform financial effort was made by the individual districts and counties.

6. The state's obligation is to provide sufficient funds to make up the difference between the district-county financial effort and the amount needed to bring every school's program up to the basic level as established by law.

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The present law established a schedule of minimum and maximum amounts of general education expenditures per pupil that may be budgeted by the district trustees without voter approval. These expenditure levels do not include such items as capital construction, bussing, teacher retirement, or interest on past debt which are funded by the districts under separate levies. This paper will consider only general school expenditures and not such ancillary programs. The schedule of general expenditure levels provided by the School Foundation Program sets both the least amount that may be spent per pupil and the most that may be spent without taxpayer approval of any additional mill levies needed to support a higher level of spending. The law sets eighty percent of the maximum schedule per pupil as the minimum that must be budgeted per pupil, which is theoretically sufficient to fund a minimum educational program within each district. The maximum schedule is as follows: 1

(This is the schedule as established by the 1969 Legislature.

ANB is the average number belonging for the district and is computed by dividing the total number of days present and absent by all pupils by one hundred eighty. It is computed for each school year using data from the previous school year.)

Elementary

1-9 ANB, $7,248

10-17 ANB, $7,248 plus $214 for each ANB over 9 to a maximum of 17

1Montana Education Association, Here's How, p. 3.
18-25 ANB, one teacher, $9,170 plus $85 for each ANB over 18 to a maximum of 25

18-50 ANB, two teachers, $16,470 plus $85 for each ANB over 18 to a maximum of 50

41-100 ANB, three or more teachers, $580.20 per ANB up to 41 decreased $.43 for each additional ANB to 100.

101-300 ANB, $554 per ANB decreased $.51 for each additional ANB over 101 to 300

301 and above ANB, $451.35 each ANB.

High School

1-24 ANB, $35,440

25-40 ANB, $1,476.35 decreased $9.75 for each additional ANB to 40

41-100 ANB, $1,320.35 decreased $6.60 for each additional ANB to 100

101-200 ANB, $923.75 decreased $2.15 for each additional ANB to 200

201-300 ANB, $708.75 decreased $.49 for each additional ANB to 300

301-600 ANB, $660.00 decreased $.125 for each additional ANB to 600

601 and above ANB, $622.50 each ANB.

The law provides for two levels of equalization; county and state. For the elementary school program, the first source of revenue applied towards funding the minimum county district budgets is the income from the state interest and income fund, plus several minor, miscellaneous sources. The interest and income money is derived from the interest received from the investment of the state permanent school fund, and from income derived from the manage-
ment of the state school lands and is divided among the counties on the basis of school population. These funds in 1969-70 amounted to about $7.8 million.¹

As these funds have not been sufficient to support the minimum foundation program, a county wide elementary school levy is next used. This levy is applied county wide to raise adequate revenues to support the minimum foundation schedule, and may not exceed twenty five mills. In practice, the maximum of twenty-five mills is levied in almost all counties, but the proceeds from this levy are generally still insufficient to fund the minimum scheduled amount. The distribution of revenues from this levy is computed by each county superintendent so as to bring all elementary schools in each county up to the same percentage funding of their foundation program. In this process of equalization, the taxpayers in a district having a low property valuation per pupil would contribute less in taxes than the district schools would receive in allotments from the proceeds of the county wide mill levy and conversely, the taxpayers in a district having a high property valuation per pupil would contribute more in taxes than the district schools would receive in allotments from the proceeds of the county wide mill levy.

County equalization for high schools is provided by a separate county wide levy which may not exceed fifteen mills. Distribution of the funds from this levy is similar to that applicable to the elementary distribution.

¹Montana Education Association, Here's How, p. 3.
If a county has levied the maximum allowable by law and has not generated sufficient revenues to fund the minimum program, it must then turn to the state for further assistance. The state legislature, after consideration of revenues available and competing requirements for funding will appropriate monies to the equalization program to assist in raising each county's funding to the minimum foundation schedule. The funds earmarked for these purposes are twenty-five percent of the proceeds from the state individual income tax, the state's share of oil and gas royalties from the United States Government, and an appropriation from the general fund. On the basis of claims submitted by the county superintendents, the Office of the State Superintendent of Public Instruction apportions the available funds so as to minimize county variations in percentage of foundation funding. A county that could fully fund its own minimum school expenditures as specified by the foundation schedule would receive no state equalization aid, while a county that could not fund its minimum schedule would receive aid from the state funds.

If the state legislature does not appropriate sufficient funds to fund fully the state's share of the program, the State Superintendent determines the percentage that the state will be deficient, and so notifies the county superintendents. A county-wide mill levy is then applied in those counties which have as yet not fully funded their minimum foundation budgets, and the proceeds of this levy are apportioned among the districts of the county so as to fund fully the minimum foundation program for each school district. County deficiency levies for the 1969-70 school year varied from lows
of .52 mills for elementary districts and 1.08 mills for high school districts to highs of 6.85 mills for elementary districts and 4.16 mills for high school districts.\(^1\)

It is clear that even before additional funding over the foundation minimum occurs, counties are faced with varying burdens for educational funding over and above the foundation minimum levies.

If the local board of trustees of a school district determines that funding the minimum foundation schedule (80 percent of the maximum scheduled amounts) will not meet the desired goals of the educational program in the district, it may impose additional levies on the district taxable property to raise the level of funding up to the maximum foundation schedule with the approval of only the county commissioners. If additional spending over and above this is desired, this must be approved by majority vote of the district's taxpayers.

For the school year 1969-70, over three-fourths of the school districts of Montana voted funds in excess of the maximum foundation levels to finance their school systems.\(^2\)

This paper will work only with county wide average expenditure figures. There exists considerable variation in spending per pupil in the school systems of this state above the minimum required by the foundation program. For the 1969-70 school year, average county-wide voluntary spending ranged from a county low of eighty-one dollars per pupil in Custer County to a high of four hundred and twelve dollars per pupil.

\(^1\)Montana Education Association, *Here's How*, p. 5.

\(^2\)Ibid., p. 7.
in Powder River County. The range between minimum and maximum voluntary expenditure levels between individual school districts is much greater. The median county averaged voluntary spending between two hundred fifty and three hundred fifty dollars per pupil in additional expenditures over the foundation minimums for the 1969-70 school year.¹

¹Montana Education Association, Here's How, p. 8.
CHAPTER 3

PREVIOUS WORK

It has been only since 1952 that any serious quantitative work has been done on determining the causative factors for variations in public expenditures for education. In that year, Solomon Fabricant, in his book on governmental expenditure policy, applied a cross section multiple regression analysis to a cross section of expenditures of state and local governmental units, aggregated by state to avoid problems arising from variations in state versus local responsibility for governmental functions between states.¹ Since then, there have been many additional studies of the causative factors for variations in governmental expenditure patterns, and of these studies, a considerable number have been concerned with the area of educational expenditures. A brief review of the results of some of these studies is necessary to establish a proper foundation for this paper.

Roy Bahl submitted a paper at the 1969 meeting of the National Tax Association in which he briefly summarized some of the previous work in the field of public expenditure analysis and reviewed some of the necessary precautions to be taken in any study in this

A review of his criticisms of previous work will enable a more realistic appraisal of the results of subsequent work, and will enable a more realistic appraisal of the results of subsequent work, and will hopefully allow for the avoidance of past errors in this study.

It is Bahl's opinion, with which this author concurs, that public decision-making bodies have not chosen to utilize the quantitative work extant in the field of public expenditure policy; rather they continue to make policy decisions without considering the great mass of work done in the field of public expenditure policy which might be of value. It is understandable that the political decision-making body might be leary of techniques cast in terms of multiple regression analysis, factor analysis, or multi-equation equilibrium models. The theory behind these studies is that public expenditure patterns can be considered as functions of measurable public characteristics, and that these results of these analyses are capable of projecting service and revenue demands into the future. This is in opposition to much of current expenditure making policy criteria, which seem to assume that the quantitative work accomplished is relatively useless for purposes of decision making policy. This attitude is evidenced in the behavior of past Montana State Legislatures. In spite of the mass of quantitative work done

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2 Ibid., p. 548.
nation-wide on school financing, the state still does not have an expenditure estimation program for school financing for this state for the coming year, much less for ten years hence. School financing in Montana is still carried out on a year to year basis.

However, Mr. Bahl states also that there remains much work that could be done to make the present empirical techniques more usable to the layman and political decision maker. The intent of his article is to suggest how the quantitative approach to public expenditure analysis can be made more relevant from the viewpoint of the public official.

Three reasons are advanced for the great proliferation of determinates studies in the past two decades.\(^1\) The primary explanation lies in the prior absence of a theoretical basis from which the determinates of variations in governmental expenditure levels could be inferred. Therefore, economists have taken a positivistic approach to the problem, which implies an empirical approach. Also, in past years much more published data has been made available to the economist in easily accessible form, which has greatly facilitated the development of the positivistic approach. Finally, the regression technique, while outwardly complex and difficult, is in reality a relatively simple tool when combined with modern computers, and can produce valuable results if carefully used.

Conceptual problems can arise, however. The regression technique relates changes in one variable to changes in other(s),

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\(^1\)Roy Bahl, "Public Expenditure Analysis," p. 549.
but in no manner indicates causative relationships. It cannot be inferred that the formulation of a function between two variables with a high correlation indicates a cause and effect relationship between the two; rather only that a change in one was accompanied by a corresponding change in the other for the set of observed data.

The problem of circularity can arise in any project. For example, if Federal aid per capita is included in a study of educational expenditures as an independent variable, then expenditures per capita would be considered as a measure of influence on expenditures, which include the expenditures utilized as an explanatory variable. While a positive relationship does in all likelihood exist, the determination that expenditures by local governmental units are positively related to Federal aid received is not a particularly valuable one. The same sort of problem can arise when per capita assessed valuation of property is utilized as an independent variable. A positive relationship between changes in assessed valuation of property and expenditures is not surprising, since higher assessed valuations lead automatically to increased revenues from a given mill levy which may very well encourage increased expenditure levels. However, increased expenditure levels may, on the other hand, lead to increased assessment rates which will raise the assessed valuation of property with no real increase in actual property. In either case, the discovery that revenues and expenditures are positively related would not be surprising. Yet if changes in real expenditures are found to be positively related to autonomous changes in revenues, and if these changes in revenues can be predicted, then this relationship can be used to predict
expenditure changes, though the causative sociological factors for the revenue and expenditure variations would not be revealed.

There is also a severe conceptual problem in the use of the terms "cost" and "expenditure." To clarify, each variation in expenditures may be thought of as having a cost differential and a quality differential. Thus when the intent of a research project is to explain per capita variations in expenditures, some allowance must be made for the separation of these variations into cost and quality variations. There are three options which may be used to cope with this problem. First, the assumption may be made that there are no quality differentials between units of governmental service provided. This is a highly unrealistic assumption, but does greatly simplify the analysis and may be required when accurate measures of quality variations are not available.

The second possible approach is to assume that independent variables measuring only quality differences can be included in the analysis. However, the variable specified must measure only quality differences and not introduce problems of circularity. For example, while the salaries paid to entering teachers in a school district might be considered to reflect the quality of those teachers and hence of the school system, these salaries also reflect an expenditure level for one of the major expenditure items in a school system's budget: the cost of teachers. This approach, as exemplified by Hirsch's study, would result in another attempt to explain varia-

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tions in expenditure levels in terms of variations in costs, which would be unrewarding.

The third possibility is to assume that the independent variables reflect some combination of quality and cost differentials. This, however, introduces problems in the predictive value of the model, as a simultaneous change in both costs and quality may cancel out and not be reflected in a change in the value of the variable in question.

No one approach can be specified as adequate for all analyses. In the long run, the approach to be used will be the one that results in the model with the greatest predictive value.

Bahl states that another conceptual problem may arise in connection with assumptions of economies of scale, supported by evidence of an inverse relationship between population size and per capita expenditures on a governmental function. While there may indeed be a relationship between population size and per capita expenditures, this relationship says nothing about the underlying production function. For example, while the cost of a government building may be constant regardless of city size, with a doubling of population the per capita cost of the building would fall by one-half, with no economies of scale, or at least intentional economies of scale involved. The city may very well require the building regardless of population size, and the reduction in per capita cost brought about by a rise in population would not be the result of any conscious cost reduction effort. Yet an inverse relationship would be shown between population and per capita
costs in the analysis.¹

Another problem arises when results of a cross-sectional study are utilized to make projections of changing levels of expenditures over time. As a cross-section approach considers only a static situation, contrasting expenditure levels for differing groups at one point in time, this technique ignores any long run dynamic effects that may be causing a change in expenditures over time without altering the relative levels of expenditures among groups. Therefore, time series and cross-section analyses of school expenditures, for example, show differing elasticities with respect to income for the same communities.²

The validity of a cross section approach for predicting future expenditures is therefore questionable, and the time series approach should be used when the results obtained will be utilized for predictive purposes. However, differences in independent variables at any one point in time can be used to predict future expenditures if the analysis indicates a relationship, as in this case a change in expenditure levels would be the dependent variable. The dependent variable would be the change in expenditure levels over time.

With the above criticisms and suggestions firmly in mind, the past work done in the field of public expenditure analysis relevant to school finance may be examined. Having done this, it should then

² Ibid., p. 563.
be possible to design and test a model with value as a predictive device.

In his work, *The Trend of Government Activity Since 1900*, Solomon Fabricant first applied a multiple regression analysis technique to variations in public expenditures. He aggregated his data by state, including all expenditures of local, county, and state governmental units as portions of the aggregate, to avoid the problems arising from variations in intergovernmental expenditure responsibilities between states. For education, using data from 1941, his analysis "explained" seventy-seven percent of the differences in expenditures for education by states in terms of differences in per capita income, population density, and the percent urbanization of the area. Additionally, he applied the same analysis to data from 1900 with similar results. From these mutually supporting results, he was led to believe that his analysis had significant predictive value.

Of the three independent variables considered by Fabricant in his analysis, differences in per capita income was the most significant in explaining expenditure variations. Differences in percent urbanization did not explain any variation at a statistically significant level, and differences in population density were related in only a minor way to variations in expenditures, though the relationship was statistically significant.

As Fabricant utilized a cross section technique, it is

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questionable whether or not inferences as to expenditure changes over time can or should be made. For example, he found in his analysis an elasticity of demand for education with respect to income of .78, a result not in agreement with results obtained from time series analyses. However, considering the pioneering nature of the work, Fabricant's analysis has made a significant contribution to the area of public expenditure analysis.

Glenn Fisher, using much the same technique as Fabricant, but with some additional variables and with 1957 data, was able to "explain" only fifty-three percent of the variation in interstate spending per pupil for education. An additional result of his study was the conclusion that not only was average per capita income but also income distribution related to variations in per pupil expenditures for education. He too utilized a cross section analysis, which leaves open to question the predictive value of his analysis.¹

The Maryland Tax Study of 1965 used Fisher's data, and added one additional variable; Federal aid per capita. With this additional variable, the proportion of variation "explained" rose to seventy-four percent. However, the use of revenues received and spent as an explanatory variable for expenditure variations introduces problems of circularity which introduce serious doubt as to the validity of the analysis. If monies received are used as an explanatory variable for monies spent, there undoubtedly will be some correlation, yet the underlying reasons for the increased

expenditures have not been clarified.\footnote{Bureau of Economic Research, Maryland Tax Study, (Baltimore: University of Maryland, 1965)}

The New York State Department of Audit and Control, using much the same form and variables as the other studies cited, achieved an $r^2$ of .81. However, the validity of this study for predictive purposes suffers from the same methodological problems as do the previously cited studies.\footnote{Ibid., p. 35.}

Harvey Brazer, in a paper published in 1959, investigated city expenditures for a wide variety of functions.\footnote{Harvey E. Brazer, City Expenditures in the United States (Washington, D.C.: National Bureau of Economic Research, 1959), p. 25.} While little of the study concerned educational expenditures, the wide scope of the work justifies a brief review at this time. In his paper, he investigated the city expenditures of 462 of the largest cities in this country. The analysis was based on 1951 data, and covered a wide range of city expenditure functions. Unfortunately, once again a cross section technique was used, which leaves the results of his analysis open to question.

One of the more important conclusions reached by Brazer was that for nearly every category of expenditure there are variations in expenditures between cities of different states that are statistically explainable as a result of interstate rather than intercity differences.\footnote{Harvey E. Brazer, City Expenditures, p. 10.} Brazer felt that these interstate differences stemmed from several factors.

Perhaps the most important factor was the historical
variation in the importance given to local governments in the provision of public goods and services. In the older states of New England, where historically the local governments have assumed a major role in the provision of public goods and services, city expenditures for all functions were significantly higher on a per capita basis than the national average. In the newer areas of the West, where local government has never achieved the autonomy and importance that it has in other regions, per capita expenditures by city governments were relatively low compared to the rest of the nation. Too, in the newer areas of the nation, later development of the area has meant that in certain instances more modern, cost saving features were designed into civic improvements, allowing for the same service level at a lower per capita cost. While streets in downtown Boston, for example, were first laid out in the seventeenth century, those in Missoula were first laid out in the late nineteenth, at which time wider streets were generally provided for than in earlier years. This saved the expense of extensive street widening with the advent of the automobile.

The most important aspect of the article for the purposes of this project is the section pertaining not to the actual amount of variations in expenditures, but rather to the causative factors behind these variations. While the degree of variation in expenditures for police protection between communities may have little effect on educational expenditures, the variation in per capita income between communities in all likelihood will affect not only per capita expenditures for police protection but also for education.
The first variable considered was the often utilized differences in population levels between counties. The results obtained indicated that per capita expenditures for police protection were statistically related to differences in population at a significant level. Variations in population density were also related to variations in expenditures for all functions of government except recreation at a statistically significant level.

The second variable considered was the rate of growth of population. Variations in this variable were significantly related to variations in expenditure levels for only total operating expenditures and for fire protection expenditures.

There was some indication from the results of the analysis that as the ratio of employees in manufacturing, trade, and services to the population rises, the level of per capita spending for city services also rises, yet this trend was only weakly defined in Brazer's analysis. All city expenditure functions were found to be positively related to the level of intergovernmental aid received.

Brazer found also that variations in the density of population and per capita income were significantly related to variations in expenditure levels for most governmental functions. In conjugation with the results of previously cited studies, this relationship seems to be quite universal, and deserves inclusion in any analysis of public expenditure policy.

Of those analyses limited to just the field of public education expenditure analysis, mention must be made of the work
done by Jerry Miner, the results of which were published in 1963.¹ Using data from 1959-60, and a cross section technique, he analyzed school district expenditures for 1,700 school districts in 23 states, both on an interstate and an intrastate basis. Miner considered a total of 23 independent variables in his analysis.

The dependent variables considered were spending per capita for education and spending per pupil for education. Expenditures were analyzed at the local level, both considering and ignoring state equalization aid in those states where such a program existed. Expenditures were then analyzed on an intrastate basis, to cancel out interstate variations in expenditures stemming from varying responsibilities of local governmental units for expenditures. Expenditures were analyzed also on an interstate basis, to isolate national trends in educational expenditure patterns.

The results obtained in Miner's analysis which are relevant to this study were derived from the analysis of intrastate expenditure variations, utilizing per pupil expenditures as the dependent variable. While some of the independent variables considered by Miner are not relevant to this current analysis for reasons discussed previously, expenditures per pupil were found to be positively related to income and population on a cross-section basis. Other independent variables considered, such as starting salaries paid to new teachers, are not useful, as they reflect more a cost function for education than a demand function. When some estimates place the percentage of general

¹Jerry Miner, Social and Economic Factors in Spending for Public Education (Syracuse: Syracuse University Press, 1963)
operating expenditures consumed by teachers' salaries at nearly seventy percent, it is not surprising that expenditures are found to be positively related to salary levels. While Miner's article does tend to associate variations in expenditure levels between districts with variations in other independent variables, it does not develop a satisfactory predictive model. As the model uses a cross section technique, it suffers from the predictive faults of all other cross section analyses; predictions cannot be reliably made for future changes from conditions existing at a given moment. However, Miner's analysis does tend to indicate that equalization, while successful on a state wide level in insuring reasonably equitable expenditures per pupil, has no effect on national variations in per pupil expenditures, and that in fact some sort of national equalization aid program might be desirable to insure adequate educational expenditures per pupil nationwide.¹

In 1959, Werner Hirsch published a study of the determinates of educational expenditure levels. For the first time use was made of the time series analysis technique, yet Hirsch utilized the salary levels of teachers as an independent variable. Together with changes in per capita income, this variable dominated the analysis. The other independent variables considered were the number of pupils in average daily attendance, variables relating to the sociological and economic characteristics of the population, a variable concerned with a productivity measurement of schools, and a measure of govern-

¹Jerry Miner, Social Factors, p. 144.
mental responsibility. The time period considered was from 1900 to 1958. His major conclusion applicable to this analysis was that rising expenditures were primarily a result of exogenous factors which act through increased salary and personal income levels to raise school expenditures. However, little was done to identify these factors.

In an unpublished master's thesis, Dennis Burr analyzed expenditures for the State of Montana for many governmental functions, including education, for the fiscal year 1961-62. For the analysis of educational expenditures, two data sources were used: United States Census of Government returns for the year 1961 and data made available by the Office of the Superintendent of Public Instruction. A cross section technique was used, and variables considered included Federal aid per student, median family income, the ratio of high school students to total students, population density, and absolute population. While some relationship was shown between income, density, and percent urbanization and spending per pupil for education, the $r^2$ achieved was much less than fifty percent. This result is lower than the earlier studies cited, and may indicate that forces peculiar to Montana influence educational expenditures in this state, and, indeed, that sociological forces may be primarily associated with variations in per pupil expenditures in this state. It is this hypothesis that this paper will attempt to test.

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Ten independent variables were chosen for inclusion in this analysis. These variables were chosen to reflect both financial and sociological forces which might influence public expenditures. The variables were chosen primarily from those used in earlier analyses. Wherever possible, the form was changed to a first difference percentage change. If this could not be done, then a cross section form was used, this being regressed against a first difference change in the dependent variable.

In choosing the independent variables to be included in this analysis, first consideration was given to results of inclusion of the variable in earlier analyses. In the case of changes in per capita income, all previous work had found some relationship between changes in income and changes in educational spending. If a variable used in earlier analyses did not produce positive results, it was not included in this analysis.

Other variables were then considered and either accepted or rejected depending upon their projected impact upon expenditures. If it was felt that a given variable could possibly have some significant effect upon educational expenditure demands, it was considered for inclusion in the analysis. Often these were included be-
cause of their impact upon demand for other public functions, as demonstrated in other analyses, or because of generally accepted theory.

Finally, those variables that were then selected for tentative inclusion in the analysis were examined to see if reliable data sources were available. While it might have been valuable to have considered a change in average standardized test scores of school children on achievement tests as a quality measurement, it was determined that these test scores were not available on other than a state wide basis for any given year, so this variable had to be dropped from the analysis.

Data gathering for a time series first difference analysis can present many problems to an investigator. One of the major unavoidable problems is that of inconsistencies within certain well used data sources, such as returns from the United States Census. There may be changes in data gathering and processing techniques from data year to data year, which cannot be avoided by the researcher. Also, some variables, such as most measured in money terms, must be adjusted to reflect changing values of the base measurement unit, such as the dollar. While some inconsistencies in the data cannot be avoided by analyzing changes for more than one time period it is hoped that such inconsistencies will become apparent. Other variables, such as prices, can be adjusted to reflect equivalent values in a chosen base year.

However, adjustment of dollar amounts to some base year equivalent can also raise some theoretical problems. In this paper
all dollar amounts were first recomputed in terms of constant
1967 dollars using the Consumer Price Index (CPI) compiled by the
United States Department of Commerce. The CPI is compiled to reflect
changes in living costs for an urban dwelling white collar worker.
As most Montanans are not urban dwelling white collar workers, the
CPI may not be an accurate reflection of changes in living costs
for Montanans. However, it must be used as no alternative is available.
As the CPI tends to be goods rather than service oriented, it may
not be an adequate deflator of educational expenditures, yet to
maintain continuity it was used. While the implicit deflator of
governmental services could have been utilized for educational
expenditures, to preserve continuity with the deflator used for
other variables the CPI was used. However, it must be questioned
whether living cost variations in Montana over the past two decades
have varied sufficiently over the national norm so as to render use
of the CPI inadvisable.

Changes in educational expenditures were analyzed for two
time periods; from 1950 to 1960 and from 1960 to 1970. These
periods were chosen primarily for the availability of census data
for the beginning and closing years for the periods. While it
would have been nice to have analyzed expenditures on both a yearly
and a longer time span basis, much data was available only from the
United States Census. In some cases, such as for the percent urbani-
zation of counties, data was not yet available for the 1970 census
at the time of this study, so data for the year 1960 was utilized
on a cross section basis for the analysis of expenditure changes.
at the time of this study, so data for the year 1960 was utilized on a cross section basis for the analysis of expenditure changes in the sixties.

Utilizing the value of an independent variable at one point in time in an analysis of changes in a dependent variable over a period of time can produce significant and useful results. If a relationship is shown to exist between the value of an independent variable at the outset of a given time period and the change in value of the dependent variable over that time period, then the known value of the independent variable at any given point in time can be used to predict a change in the dependent variable over a future period of time, barring any unforeseen changes in causal forces in the period considered. What differentiates this technique from other cross section approaches is that a change in the dependent variable is related to a value of an independent variable at any given point in time.

In other cases, such as for per capita income data obtained from the Montana Bureau of Economic Research, data was not available for the 1950, 1960, or 1970 Census years, so data was obtained for the year nearest the appropriate Census year, such as 1953 data for the 1960 Census year. It was felt that no great damage would result from this procedure, as the effects of a one year deviation in a ten year cycle should be minimal. While the precise numerical relationships might be altered, the general direction of any relationships between dependent and independent variables should not be affected.
Another advantage for using the time span between Census years as the base period of the study was the ability to measure long term rather than short term trends. By analyzing changes over a ten year time span, some of the effects of drastic changes from year to year in some variables should be eliminated.

The first independent variable to be considered was the change in per capita income for the time periods in question. This variable was chosen for inclusion in the analysis to test the commonly accepted hypothesis that per pupil expenditures for education are positively related to the level of per capita income, and that changes in per capita income should be positively related to changes in per pupil expenditure levels for education. If the community demand function for education was a normal demand function, then as real income of the community increased the amount of money that the community was willing to spend on educational purposes should have risen. The studies cited previously in this paper have all found indications of a positive relationship between changes in income and changes in educational expenditures per child, so this relationship was tested for Montana.

The data for per capita income was obtained from information made available by the Bureau of Economic Research at the University of Montana. Unfortunately data was not available from this source for the years 1960 and 1970, so data for the years 1959 and 1963 was used as a substitute. This led to the first difference between 1950 and 1959 being used in the first analysis run, for changes in educational expenditures between 1950 and 1960, and the first difference in per
capita income from 1959 to 1968 was used for the analysis of expenditure changes in the sixties. All dollar amounts were adjusted to constant, 1967 dollar equivalents.

The next independent variable which was considered was the percentage change in population density by county, which is identical to the percentage change in population. This variable was chosen primarily because of its inclusion in previously cited studies, though it may be considered a cost rather than a demand related variable. However, in Montana the school foundation schedule sets differing amounts of aid dependent upon school size, which is influenced by the density of the county. Therefore it may be theorized that the school foundation program eliminates variances in educational expenditures due to cost variations arising from density differences between districts, and that a correlation between changes in density and changes in per pupil expenditures for education would be due to some influence upon the communities' demand for education. This reasoning is tenuous, yet density changes should be included in the analysis if for no other reason than the consistent relationship shown between them and changes in educational expenditures in the previously cited analyses.

Density changes were calculated from Census returns. County population was available for all Census years, and the percentage change from Census year to Census year was computed from these returns.

The third independent variable to be included in this analysis was the percentage change in the urbanization of counties from Census
year to Census year. The population of each county, and the population
dwelling in urban areas, defined as a city area with a population of
one thousand or more, was available for the years 1950 and 1960 from
Census returns. The data for 1970 was not yet available, nor were
any alternative sources discovered. For the analysis of expenditure
changes in the fifties the percentage change in urbanization was
utilized, while for the analysis of expenditure changes in the sixties
the percentage of individuals residing in urban areas of one thousand
or more population in 1960 was used as the independent variable.

This variable was included for its theoretical effect on
attitudes towards educational expenditures. As increasing percentages
of the population of counties become urbanized, any attitude shifts
towards education which did occur should have been mirrored in changes in
permissive educational expenditures. In a rural community, the school,
of necessity, plays a more central role in the life of the community
than it does in an urban area. Urban areas provide many more leisure
time activities than do rural areas. Therefore, it may be theorized
that within a rural area school programs, athletic contests, and other
school related events play a more central part in the life style of
the community than is true in urban areas. This would imply that per
pupil expenditures should be relatively higher in rural as opposed
to urban areas, and that a decrease in the population dwelling in
rural areas should decrease the per pupil expenditures within the
county.

Variable four was the change in the percentage of the popu-
lation aged twenty five years or older with a college degree. This was hypothesized to be positively related to changes in educational expenditures per pupil. It was theorized that individuals who had invested a relatively large amount of time and money in their own education placed a high value on education. Therefore, these individuals should have been willing to support high expenditure levels for education within their communities. As the percentage of individuals with a college degree increased, increase in per pupil expenditures for education should have been expected.

It may be, however, that individuals without a college education placed more value on the attainment of such a goal by their children than did individuals with more education. If this was true, then as the general educational level of the community increased, per pupil outlays for education would fall, rather than increased as expected. A third possibility is that all groups valued education equally, in which case this variable would have had no effect on educational expenditures whatsoever.

The percentage change in the population over twenty five years of age with a college degree was computed for the period of the fifties from Census data, substituting the percentage change in individuals with four years of college or more for the percentage change in the population with a college degree. For the analysis of the sixties, data was not yet available for the 1970 Census, so the percentage change of the population with four years of college or more in 1960 was used as the independent variable. This tested whether or not
variances in the percent of the population with four years or more of college in 1960 was associated with changes in expenditures per pupil over a long period of time. As school trustees were elected for a term of several years, attitudes of a community at any one point in time were expected to exert an influence for several years.

The fifth independent variable considered was the change in the percentage of the population aged six to nineteen years. It was reasonable to assume that as the percentage of the population of school age rose, that absolute expenditures for education would also rise. However, as the number of individuals attending schools increased, the absolute amount spent on education must have risen, and the resultant burden on taxpaying individuals must also have risen. It was the hypothesis of this paper that as the percentage of the population aged six to nineteen years rose, that the amount spent per pupil on education would have fallen. Taxpaying individuals would have become less and less willing to accept higher tax burdens, and the amount budgeted per pupil would have fallen.

The distribution of the population was available for 1950, 1960 and 1970 from Census data. For the 1970 Census year, the population aged five and six was aggregated, so one half of this amount was used as an estimate of the six year old population.

The sixth independent variable included was the change in the general educational level of the adult population. This variable should have the same effect on educational expenditures as does the rise in the percent of the population aged twenty five or more with a college degree. A rise in the general educational level should indi-
cate a growing demand for higher cost secondary education, which will raise per pupil expenditures.

The change in the general educational level of the population was once again obtained from Census data. Returns were not yet available for the 1970 Census, so the percentage change in the general educational level of the population was utilized for the analysis of expenditure changes in the fifties, and the absolute educational level of the population was utilized for the analysis of the sixties. The Census reported the median years of schooling completed by sex for all individuals over age twenty five by county. The average of median years of schooling completed by the male and female population of each county was then computed, and the percentage change from 1950 to 1960 was then computed. This was the independent variable for the analysis of the fifties. For the 1960-1970 analysis, the average of median years of schooling completed by the population of each county was used as the independent variable. In no county was there a wide disparity between the educational levels of the male and female populations, nor was there a wide difference in the population of each of the sexes. Therefore, the use of a simple average of the medians for the male and female populations should be acceptable.

There may exist a relationship between employment patterns and demand for educational expenditures. If the taxpayers in a community are generally satisfied with their employment, and also consider similar employment worthy for their children, then there may not be a demand by the populace for increased educational expenditures. However, if the satisfaction which the jobholders in a community
gain from their employment is low, and these jobholders do not consider similar employment desirable for their children, then there may be a demand for increased educational expenditures to enable the children of an area to obtain better job opportunities.

In Montana, the majority of the state's workers are employed in either blue collar or agricultural pursuits. Historically, agricultural communities have considered education as a vital community service. Schools were quite often one of the first buildings constructed in a new agricultural area. A large agricultural population implies a large rural population, which should also influence educational expenditures as indicated earlier in this paper. Therefore, it is hypothesized that there is a direct relationship between changes in the proportion of the work force in agricultural employment and changes in educational expenditures per pupil.

Similar reasoning applies for including the change in the proportion of the work force involved in blue collar pursuits in the analysis. Here the evidence is not as clear cut as to what the effect of changes in the work force involved in blue collar avocations might be, yet inclusion of this variable will indicate if any uniform attitude towards educational expenditures might exist among this group. The current popularization of a blue collar psychology further strengthens the case for inclusion of this variable.

Data for agricultural and blue collar employment was not available for the 1970 Census year at the time of this study. Therefore, for the analysis of the fifties, the differences in percentages of the labor force employed in agricultural and blue collar jobs between
1950 and 1960 were used as the independent variables. For the analysis of the sixties, the absolute percentages of the work force employed in agricultural and blue collar pursuits were used as the independent variables.

Variable nine was related to a measurement of changes in the quality of education by county. Measuring quality is at best a tenuous exercise, but it was felt that some sort of independent variable measuring quality should be included in this analysis. It was decided to use the change in the percentage of graduating high school seniors who indicated an intent to continue past high school to a four year college or university as a measurement of educational quality. While this undoubtedly also measures community attitudes towards education, it was felt that an emphasis on continuation of education to the college level would indicate the presence of a college preparatory curriculum at the high school level, and possibly a demand for better classes at the high school level to more adequately prepare students for college work. While admittedly this is an inadequate measure of quality, no other variables were available that would offer better results. Were any standardized achievement test scores available on a county by county basis for the state, use of these scores would be an excellent step, but unfortunately no such scores were available. Data was available for the years 1957-58 and 1965-70 from the Montana Department of Public Instruction for determination of the percentage of graduating high school seniors who indicated an intent to enter college the following fall. The percentage indicating an intent to attend college after graduation for the 1957-58 school year was used as the independent variable for the analysis of the fifties, and the change in the percent-
age of high school seniors indicating an intent to attend college between 1958 and 1970 was used as the independent variable for the analysis of expenditure changes in the sixties.

Unfortunately problems of multicollinearity may have been introduced with the inclusion of this variable. This variable may have in fact measured similar factors as the previously included general educational level of the population and the percent of the population with four or more years of college. However, such a problem can be considered if in fact a significant relationship is demonstrated to exist between the above cited independent variables and changes in educational expenditures per pupil, or between the independent variables themselves.

The change in the percentage of voters voting Republican for Governor was available by county for all elections from data published by the office of the Secretary of State. As no election for Governor was held in either 1950 or 1970, the change in the percentage of the electorate voting Republican from 1948 to 1960 was used in the analysis of expenditure changes in the fifties, while the change in the percentage voting Republican from 1960 to 1968 was used in the analysis of expenditure changes in the sixties.

This variable was included to test for a possible relationship between changes in political beliefs and attitudes towards education. It may be conjectured that a more conservative outlook towards government may lead either towards increased expenditures for education versus welfare and the like or to increased expenditures for education alone. Therefore, changes in the percentage of voters voting Republican in an election should be positively related to changes in educational
expenditures per pupil if in fact any relationship exists. The office of Governor was chosen as the basis of comparison as it was felt that voting patterns for this office would most nearly reflect voter attitudes towards state government. If returns from a congressional race were used, these returns would reflect voter attitudes towards national rather than state issues, and if returns from a more local state election, such as for the State House of Representatives, were used then these returns would be prejudiced by personality differences between the many candidates. While the personalities of the candidates for Governor would influence voter behavior, these personality differences should influence voter patterns uniformly throughout the state, so that variations in the change in percentage of the voters who vote for the Republican candidate among the counties should reflect changes in the basic political beliefs among the counties.

Finally, the dependent variable, the percentage change in average real per pupil expenditures for education, was available from data published by the State Board of Equalization. The yearly property tax levies by county over and above the required foundation levies and deficiency levies were listed for each year, and these amounts were divided by the relevant consumer price index to obtain amounts in constant 1967 dollars. This resulting figure for total optional real expenditures per county was divided by the average number belonging (students) for each county, available from the Biennial Report of the Superintendent of Public Instruction, to compute per pupil real expenditures in constant 1967 dollars by county for the school years
1949-50, 1959-60, and 1969-70. The percentage change in expenditures from 1949-50 to 1959-60 and from 1959-60 to 1969-70 were then computed.
CHAPTER 5

RESULTS

The data for the above variables was then analyzed using a stepwise multiple regression computer program. In the program used, variables are considered in order of their statistical significance as indicated by the T ratio computed for each variable. Each step in the analysis includes one additional variable, and computes the resulting changed $r^2$.

At this point it might be of value briefly to recapitulate the independent variables considered in the analysis. They are as follows:

$\text{I}_1 = \text{The percentage change in per capita income for the period in question.}$

$\text{I}_2 = \text{The percentage change in density of population (identical to the change in total population) for each county.}$

$\text{I}_3 = \text{The percentage change in urbanization of each county for the 1950-60 analysis, and the absolute percentage of urbanization of each county in 1960 for the 1960-70 analysis.}$

$\text{I}_4 = \text{The change in the percentage of the population of each county with a college degree from 1950 to 1960 for the analysis of the fifties, and the absolute percentage of the population of each county with a college degree in 1960 for the analysis of the sixties.}$
I₅ = The percentage change in the population aged 6-19 years from 1950 to 1960 for the analysis of that period, and from 1960 to 1970 for the analysis of that period.

I₆ = The absolute change in the average years of education completed for the adult population from 1950 to 1960 for the earlier analysis, and the absolute educational level of the adult population in 1960 for the later analysis.

I₇ = The change in the percentage of the labor force employed in blue collar pursuits from 1950 to 1960 for the earlier analysis, and the absolute percentage of the labor force employed in blue collar pursuits in 1960 for the later analysis.

I₈ = The change in percentage of the labor force employed in agricultural work from 1950 to 1960 for the analysis of the fifties, and the absolute percentage of the work force employed in agriculture in 1960 for the later analysis.

I₉ = The percentage of high school graduating seniors in 1958 indicating an intent to continue on to college for the analysis for 1950-60, and the change in the percentage of high school graduating seniors indicating an intent to continue on to college from 1958 to 1970 for the analysis of the period from 1960 to 1970.

I₁₀ = The change in the percentage of the electorate of each county voting Republican for Governor from 1948 to 1960 for the earlier analysis, and the change in the percentage of each county voting Republican for Governor from 1960 to 1968 for the later analysis.

D = The percentage change in real per pupil average expenditures between 1950 and 1960 and between 1960 and 1970 for the analyses
of the two periods.

The results of the analyses were not as predicted. For the analysis of either the period of the fifties or the period of the sixties the independent variables considered demonstrated no statistically significant relationship to the dependent variable. No independent variable demonstrated any relationship at the .95 confidence level for either period considered. The model as constructed had no valid predictive value. Therefore, it may very well be that other factors are related to changes in educational expenditures.

It may be hypothesized that taxpayers, in approving or disapproving permissive mill levies, are concerned not so much with changes in spending per pupil as they are with changes in total spending. For this reason, it was decided to examine the relationship between changes in certain of the previously considered independent variables and changes in total real permissive expenditures for education by counties within the State.

The dependent variables considered were the change in total real permissive expenditures for education by county from 1950 to 1960, and from 1960 to 1970. Data was once again available for the dependent variables from the published Biennial Reports of the Department of Public Instruction, and was converted into constant 1967 dollar equivalents using the CPI.

For the analysis of the 1950 to 1960 period, seven independent variables were considered. These were:

\[ I_1 \] = The change in population of each county in thousands.
$I_2 = \text{The change in the urban population of each county in thousands.}$

$I_3 = \text{The change in the population of each county aged 6-19.}$

$I_4 = \text{The change in the taxable property valuation of each county in tens of thousands of dollars.}$

$I_5 = \text{The change in total personal income of each county in millions of dollars.}$

$I_6 = \text{The change in agricultural employment by county.}$

$I_7 = \text{The change in the number of college graduates residing in each county.}$

$I_D = \text{The change in total real expenditures in tens of thousands of 1967 dollars for the periods of the two analyses.}$

The fourth independent variable was new to the analysis. It may be theorized, and is in fact supported by the literature and studies cited earlier in this paper, that increases in the taxable property base will be positively related to changes in total expenditures. While increasing the mill levy in excess of the permissive levy will indeed increase revenues, assuming a stable tax base, such a step requires voter approval and can be somewhat difficult to implement. However, if the real taxable property base increases, the old mill levy will produce increased revenues which may be expended without voter approval. Therefore, it would seem likely that an increased tax base should be positively related to increased expenditures. Additionally, as some increases in the tax base can be predicted, this variable has value as a predictive device. However, care must be
taken to insure that increases in the tax base have come about from real additions to property and not from changes in assessment techniques.

The analysis was carried out utilizing the same program and procedures as for the previous analyses. However, results were greatly improved. Four independent variables were found to be statistically significant in the new analysis at the .95 level of confidence, and an $r^2$ of .96245 was achieved. The resulting regression equation was:

$$Y = .37947 + .02156I_1 + 2.27096I_2 + .01100I_3 - .02674I_4$$

where $Y$ is the change in real expenditures in tens of thousands of dollars.

It should be noted that while the effects of changes in the population aged 6-19 years and changes in the taxable property base of a county have the expected sign in the regression equation, changes in the urbanization of a county produce expenditure changes which are the reverse of what was predicted. An increase in the urban population of a county is associated with a rise in total educational expenditures, which is opposed to the initial prediction. However, a rise in the urban population may result in the construction of schools with a larger number of students, and hence a larger number of expensive supplemental educational programs and added courses.

It is interesting to note that, contrary to hypothesized results, a rise in agricultural employment is associated with a fall in total discretionary educational expenditures. This indicates that as the agricultural work force in Montana continues to decrease in
numbers a trend towards increased real expenditures may appear. However, the effect is slight for any change in the agricultural work force, as a decrease of one agricultural worker is associated with a rise in total educational discretionary expenditures of only about $260.

The analysis for the 1960 to 1970 time period considered only four independent variables:

- \( I_1 \) = The total change in county population in thousands
- \( I_2 \) = The change in the population aged 6-19
- \( I_3 \) = The change in the taxable valuation of property of each county in tens of thousands of dollars.
- \( I_4 \) = The change in total personal income by counties in millions of dollars.

The values of these variables were obtained from the sources mentioned previously in this paper, and the analysis was carried out using the same computer program as previously. Results obtained were not as decisive as those obtained for the analysis of the fifties, but the results obtained did support the results of the earlier analysis.

Only one independent variable was statistically significant at the .95 level of confidence. The change in the population aged 6-19 years was once again significantly related to changes in voluntary real expenditures. The resultant regression equation was:

\[
Y = 3.93856 + 0.01617I_2 \\
(6.586)^2
\]

The \( r^2 \) obtained for this analysis was .44546. Thus once again significant variations in expenditure changes were related to changes
in the population aged 6-19 years.

It may also be that taxpayers look not at the amount of expenditures but rather at the taxes that they pay. The visible measurement of the tax level is the mill levy, and changes in the mill levy from year to year are given great visibility by the press. For this reason a test was run for a relationship between the previously considered sociological variables and changes in the mill levy for permissive educational expenditures. No significant relationship was discovered between changes in the independent variables and changes in the mill levy on the scale of that obtained for the relationship between changes in the population aged 6-19 and changes in real expenditures. However, there was a relationship between agricultural employment in 1960 as a percentage of the work force and changes in the mill levy. The regression equation obtained was:

\[ M = 42.012 - 0.45758I \]
\[ (-4.585)^8 \]

An \( r^2 \) of .28031 was obtained with this test.

For the 1950-1960 analysis some relationship was also revealed between changes in agricultural employment as a percentage of the work force and changes in the permissive mill levy. For that analysis the regression equation obtained was:

\[ M = 14.430 + 0.37436I \]
\[ (1.940)^8 \]

An \( r^2 \) of .065 was achieved in that analysis.

To test for the existence of a money illusion in the Montana electorate the change in non-deflated expenditures for education was
regressed against the independent variables used previously. For the
time period 1960-1970, a regression equation with an $r^2$ of .63345 was
obtained. The regression equation obtained was:

$$ Y = 12.82721 + 0.030201 $$

Again, the independent variable related to changes in permissive ex­
penditures is the change in the population aged 6-19 years. This
result compares to an $r^2$ of .44546 for the analysis utilizing monetary
data adjusted for price changes.

To compare the results of this analysis against what might be
expected for the cross-section approach a cross section analysis was
run for the years 1950 and 1960. For the analysis of expenditures in
1950 the following independent variables were used:

$I_1 = \text{County population in thousands}$

$I_2 = \text{Urban population for each county in thousands}$

$I_3 = \text{The county population aged 6-19 in thousands}$

$I_4 = \text{The property tax base in thousands of 1967 dollars}$

$I_5 = \text{The number of agricultural employees in thousands by}
\text{county}$

$I_6 = \text{Total personal income by county in thousands of 1967}
\text{dollars}$

$I_7 = \text{The population of each county in thousands with a}
\text{college degree.}$

The dependent variable was total educational spending in
excess of Foundation specified amounts expressed in millions of 1967
dollars.
The regression equation obtained was:

\[ Y = .00777 + .03660I_1 - .01748I_2 - .12532I_3 \]
\[ (10.571) (-4.378)^2 (-3.303) \]

For this analysis an \( r^2 \) of .92962 was achieved.

For the analysis of expenditures in 1960 the following independent variables were used:

- \( I_1 \) = County population in thousands
- \( I_2 \) = Urban population by county in thousands
- \( I_3 \) = The county population aged 6-19 in thousands
- \( I_4 \) = The property tax base by county in thousands of 1960 dollars
- \( I_5 \) = The number entering college from high school by county in 1957
- \( I_6 \) = The number of agricultural employees by county
- \( I_7 \) = Personal income by county in millions of 1960 dollars in 1959.

The dependent variable was total educational expenditures per county in excess of the Foundation specified amounts for 1960 expressed in 1960 dollars. The regression equation obtained was:

\[ Y = -5.78462 + 15.05018I_1 + 1.26987I_2 - .35716I_3 + .01227I_4 \]
\[ (7.739) (2.942) (-3.449) (3.098) \]

An \( r^2 \) of .97317 was obtained.

It should be noted that though similar \( r^2 \) were achieved for the 1950 and 1960 analyses, none of the independent variables considered were significantly related to changes in the dependent variable in both the 1950 and 1960 analyses.
On a cross sectional basis over 90 percent of variations in expenditures can be "explained" by variations in social variables. This is a higher percentage "explained" than in any of the analyses cited previously. Yet, when the sociological variables are regressed on a first difference basis with changes in per pupil permissive educational expenditures, no significant relationship is apparent.

For the State of Montana, then, the cross section approach is worthless from a predictive viewpoint. While the sociological variables considered are related to educational expenditures at any one point in time, no relationship is apparent between changes in the sociological variables considered and changes in voluntary educational expenditures.

However, the relationship between changes in the population aged 6-19 and changes in total permissive expenditures is highly significant. While this is not particularly surprising, as a higher number of students should be associated with higher expenditures, when this relationship is coupled to the lack of responsiveness of spending per pupil to changes in social variables some conclusions can be reached. It is apparent that the Montana electorate considers not the needs of the individual student but rather the needs of the school systems to educate increasing numbers of school aged children.
In fact, between 1960 and 1970 mill levies for permissive educational expenditures increased in magnitude in 49 out of 56 counties, while real expenditures per pupil dropped in 31 out of 56 counties. It is apparent that there is a willingness of the Montana electorate to increase expenditures to educate additional numbers of students, but little willingness to increase real expenditures per pupil. New students apparently induce sufficient funding to furnish an adequate education, but once the new students are provided for there is little willingness on the part of the electorate to increase expenditures to allow for increased expenditures per pupil or even to hold them constant in real terms.

The lack of responsiveness between changes in the permissive mill levies and changes in population and other sociological variables supports the above conclusion, as apparently Montana taxpayers look not at the level of the tax but rather at the numbers of new students to be provided educational facilities. The higher $r^2$ achieved for the 1960 to 1970 analysis when cost figures are not adjusted for inflation indicates that a "money illusion" definitely exists for the Montana electorate. The individual voter does not consider the effect of inflation on the cost of providing either new or increased levels of education to the student. In fact, it appears that new students do induce adequate amounts of additional real expenditures to provide necessary educational funding over and above the Foundation specified levels, but no allowance is made for additional funding to allow for the effects of inflation on educational expenditures already allocated.
for previously enrolled students. As the school population continues to stagnate or decrease in many Montana communities, this unfortunately implies that unless Foundation schedules are continually adjusted upward sufficiently to mitigate the effects of inflation on both Foundation specified expenditures and on voluntary permissive expenditures that the quality of education in much of Montana will decline.

It is also interesting that changes in the tax base had no significant effect on permissive educational spending for the periods considered. While a change of ten thousand dollars in assessed property valuation was associated with an increase of only one hundred dollars in permissive spending, expressed in 1967 dollars, for the 1950 to 1960 analysis, no relationship was evident for the analysis of educational expenditures for the 1960 to 1970 time period. This is very interesting, as it reinforces the hypothesis that Montanans are willing to provide for funding increased student numbers regardless of ability to do so but are unwilling to increase expenditures for students already enrolled. If industrial development of Montana is accomplished without any concurrent increase in the school aged population, which could occur if no immigration of labor occurred, then as a region of the state becomes more industrialized, with a concurrent increase in real property values, then the mill levy for permissive educational expenditures should drop. Unfortunately, as the property valuation in some of the Eastern Montana counties drops, the mill levy for educational expenditures can be expected to rise. This, then, indicates that the spread between highest and lowest mill levies for permissive educational expenditures will probably widen
over the coming years. A solution would be an increase in the School Foundation Program, with an increased State share of equalization, to equalize mill levies for education throughout the state. This would allow the counties with a higher property valuation per student to assume more of the burden for education, and would prevent extremely high mill levies in those counties with high school aged populations and low property valuations.

As the results of this analysis indicate that the electorate in each county is willing to raise expenditures only to provide for additional students, and not to increase real expenditures for students already in the system, any increase in real expenditures per pupil will have to be initiated at the State Legislature level. This could easily be accomplished by a significant increase in Foundation specified minimum expenditure levels. Coupled with a state wide mill levy for education, such a program would insure an adequate expenditure level per pupil statewide, without any county or district maintaining a confiscatory mill levy. As the economic development of only certain sections of the state proceeds, the imposition of such a program of truly statewide school financing becomes more critical.

Of course, much remains to be done in a truly all inclusive study of Montana educational expenditures. An analysis should be run to test for any relationship existent between changes in School Foundation minimum expenditure levels and changes in locally financed permissive expenditures. This would indicate how much of a change in the Foundation Schedule would be necessary to accomplish a desired change in individual educational expenditures.
It would also be worthwhile to test for a relationship between the sociological variables considered previously but on a cross sectional basis and changes in permissive educational expenditures per pupil on a first difference basis. It may be that the sociological composition of a population at any one point in time will effect expenditure levels for years to come, and that if one knew the composition of the population at any one point in time he could predict expenditures for some years to come. As the State Legislature of any one year will influence expenditures for many years after this seems a reasonable hypothesis to test.

Since no relationship was shown between changes in sociological variables and changes in permissive expenditures, it might be valuable to test for a relationship between changes in these independent variables on a state wide basis and changes in Foundation funding levels. It might be that the population expresses changing attitudes towards education funding levels not through local funding but rather through changes in the Foundation schedules accomplished by the State Legislature. This could be tested by running a time series analysis to test for changes in Foundation minimum levels from Legislature to Legislature as related to changes in the sociological variables considered in this analysis. Problems would rise with data collection, as most of the sociological variables to be included are compiled only on ten year intervals.

To summarize, it is apparent that increases in the school aged population will be accompanied by increases in permissive school expenditures on the local level, though in an inflationary environment
these increases will not be sufficient to offset the effects of inflation. However, no allowance will be made for the effects of inflation on funding levels for the school population already in attendance. A rising school aged population will be accompanied by rising real expenditures, but a stagnate school population will suffer from falling real educational expenditures. Thus, as sections of Montana continue to lose population and stagnate economically, the educational program in those counties will suffer. In those sectors of the State with rising economic development, the educational programs will be funded to allow for increasing enrollments. The long term solution to the rising inequalities of per pupil education funding appears to be a major increase in the roll of the School Foundation Program to truly provide a minimum realistic educational program for the school children of Montana and to truly equalize the mill levy burden for education throughout the state.
SELECTED BIBLIOGRAPHY


