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ABSTRACT

The development and application of a computerized model, designed to stimulate the nation's future educational needs and resources and the disaprities between them, are described. The results of the simulation, reported by region and by type of residential area, allow the following types of projections through 1980: (1) enrollment given alternative population forecasts; (2) teacher supply and demand as a function of enrollment, retirement, and program changes; (3) Federal, State, and local revenues for education based on alternative methods of financing; (4) expenditure levels for educational programs affecting special target groups; and (5) differences between future educational revenues for various kinds of school systems given alternate sets of assumptions. The raw data and the basic equations used to construct the model are appended along with discussions of the model's feedback implications, its implications for coordinating State and Federal educational planning, and its application to educational finance planning in California and Pennsylvania. (For related document, see ED 058 473.) (JH)

A Prototype National Educational Finance Planning Model

Submitted to The President's Commission on School Finance

THIS IS ONE OF SEVERAL REPORTS PREPARED FOR THIS COMMISSION. TO AID IN OUR DELIBERATIONS, WE HAVE SOUGHT THE BEST QUALIFIED PEOPLE AND INSTITUTIONS TO CONDUCT THE MANY STUDY PROJECTS RELATING TO OUR BROAD MANDATE. COMMISSION STAFF MEMBERS HAVE ALSO PREPARED CERTAIN REPORTS.

WE ARE PUBLISHING THEM ALL SO THAT OTHERS MAY HAVE ACCESS TO THE SAME COMPREHENSIVE ANALYSIS OF THESE SUBJECTS THAT THE COMMISSION SOUGHT TO OBTAIN. IN OUR OWN FINAL REPORT WE WILL NOT BE ABLE TO ADDRESS IN DETAIL EVERY ASPECT OF EACH AREA STUDIED. BUT THOSE WHO SEEK ADDITIONAL INSIGHTS INTO THE COMPLEX PROBLEMS OF EDUCATION IN GENERAL AND SCHOOL FINANCE IN PARTICULAR WILL FIND MUCH CONTAINED IN THESE PROJECT REPORTS.

WE HAVE FOUND MUCH OF VALUE IN THEM FOR OUR OWN DELIBERATIONS. THE FACT THAT WE ARE NOW PUBLISHING THEM, HOWEVER, SHOULD IN NO SENSE BE VIEWED AS ENDORSEMENT OF ANY OR ALL OF THEIR FINDINGS AND CONCLUSIONS. THE COMMISSION HAS REVIEWED THIS REPORT AND THE OTHERS BUT HAS DRAWN ITS OWN CONCLUSIONS AND WILL OFFER ITS OWN RECOMMENDATIONS. THE FINAL REPORT OF THE COMMISSION MAY WELL BE AT VARIANCE WITH OR IN OPPOSITION TO VIEWS AND RECOMMENDATIONS CONTAINED IN THIS AND OTHER PROJECT REPORTS.

A PROTOTYPE NATIONAL EDUCATIONAL FINANCE PLANNING MODEL

Projections of Educational Needs, Resources and Disparities under Various Forecasting and Policy Assumptions

Submitted to The President's
Commission On School Finance

By Sigmund L. Sklar and
William E. Ioup

December 31, 1971

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1. PURPOSE AND OBJECTIVES

1.1 COMMISSION MANDATE

Under Section II of the Executive Order No. 11513 it is stated that the functions of the Commission shall be to study and report to the President on the future revenue needs and resources of the nation's public and nonpublic elementary and secondary schools. Such a study and report shall include:

> The implications of the leveling off of school enrollments for the fiscal and educational planning on all levels of government and for nonpublic schools. The fiscal status of nonpublic elementary and secondary schools and intended implications for public schools and public policy.
>
> The probable rate of growth in per pupil expenditures in the coming decades and its consequences for tax policy, or educational finance, and for educational quality. A review of the financial structure of elementary and secondary education and an assessment of future trends in public and private sectors.
>
> The adequacy of existing tax base and structure for the support of public schools and possible alternatives. Possible inequities and disparities in educational expenditures among states and between urban, suburban and rural systems and the effect of federal and state programs on such disparities.
>
> Recent proposals by state and local governments to revise the organizational and financial structure of the school systems and need for complementary changes of federal programs and organizations.
>
> The implications of federal revenue sharing for financing of public and nonpublic education.
>
> The implication of possible changes in public welfare systems and in the program of aid to federally impacted areas for school services and financing of public and nonpublic education.

> Such other matters as the Commission finds it necessary to study in order to treat adequately those matters above.

Based on the Commission's mandate, it appeared to us that the objectives of such a study could not be easily met unless computerized analysis was employed. It was envisioned that a model should be developed which would represent the various ways in which funds are raised and used in the delivery of education. It appeared that such a model was essential for testing the fiscal implications of the complex set of interlocking alternatives that the Commission was expected to study. With the above objectives in mind, it was decided to undertake the development of a 'prototype' educational finance planning model to assist the Commission in its evaluation and deliberation processes. The model developed was a national model including both an educational needs sector and sector describing the resources available to education.

1.2 OBJECTIVES

Because of the inherent complexities in attempting to build a comprehensive model of the size and scope that would ultimately be required to depict the entire educational finance and educational delivery system in this country, we set out to develop a modeling framework which at the minimum would reflect wide-range assumptions. The model had to be able to accept data in a level of detail that could feasibly be developed within the time frame in which the Commission staff was allotted. We approached this task of developing a prototype model with the idea in mind that it would act as a guide for continuing comprehensive model building efforts which would be undertaken by the appropriate agencies after the Commission terminates its activities. On the other hand the prototype model was undertaken with the design philosophy to be as flexible as possible in the following areas of projection activity:

1. Projecting enrollments under alternative assumptions relating to population forecast and enrollment trends;

2. Projections of teacher supply and demand as a function of enrollments, hiring and retiring assumptions, and changes in educational programs;

3. Projections of revenue supply at federal, state and local levels based upon alternative methods of financing education as related to population characteristics, economic forecasts, and changes in patterns of taxation;

4. Projections in expenditure levels required for various types of educational programs affecting certain target groups and dependent upon enrollment projections and desired levels of program enrichment;

5. Identification of the aggregate differences between revenue supplied and expenditures anticipated for various kinds of school systems throughout the country as resulting from testing alternate sets of assumptions made regarding growth, expenditure levels and revenue programs.

The model was also designed to test the fiscal impact of adoption of preschool education, federal assumptions of welfare, revenue sharing, differentiated staffing, compensatory education, bilingual programs and handicapped programs. The model was envisioned to be of immediate benefit to the Commissioners in providing them with a vehicle for documenting the fiscal impact of the alternate recommendations upon which they will be deliberating.

The model could be expanded to accept data from continuously updated data bases. It is hoped that the fiscal impact of all major proposals for changes in educational delivery and educational finance could be tested by use of this type of model. It is also hoped that the feedback characteristics of the educational delivery system will be more adequately described and that the facility for analyzing its dynamic characteristics will be made available to educational planners. It is also envisioned that this model would be the first of a set of models which would describe the process of education through all levels, trace the flow of trained manpower and assist in measuring economic returns of various educational programs.

2. NEED FOR A PLANNING MODEL

2.1 DIFFICULTIES IN FORECASTING

POPULATION AND ENROLLMENT

Quite early in our study we learned that all information that existed concerning projections of population and enrollments and expenditures that have been previously developed were based on a wide range of assumptions. For instance in population forecasting one has to consider various possibilities in terms of the trends in birth rates and mortality rates and net migration rates. Migration rates are based on a series of assumptions that depend on economic changes within particular areas, and economic changes within a given area are in part dependent on the size and composition of the area's population. On the other hand, we found that projections of school age children and enrollments are dependent upon assumptions concerning school participation rates, grade to grade promotion rates, drop out rates and retention rates. Additional assumptions affecting these rates were made for school systems which were located in central cities, suburban and rural areas. Grade level assumptions were also made. In addition all forecasts concerning school age participation rates in the nonpublic schools were found to be based primarily on speculation because short term trends and long term historical trends have not reflected the changes that are now taking place.

INSTRUCTIONAL COSTS

In the area of projection of instructional costs we found that the conventional methods of extrapolation of trends are no longer relevant.

Increased unionization of teachers has changed the pattern in which salary level adjustments are being made.

The mix of teachers of various age experience categories was found to be markedly different in different places thereby affecting total instructional costs.

The ratios of students to teachers has not remained static over time, and these ratios have not seemed to change with any discernible pattern.

There appeared to be a wide range of per pupil expenditure levels across various kinds of school districts in various states and regions in the country.

In addition, continued increases in shifts of enrollment into high spending districts have tended to make trend line projections unreliable.

SPECIAL EDUCATIONAL NEEDS

Another complicating factor in attempting to project educational expenditures in regard to educational needs in the various types of school systems throughout the country is how to predict the amount required for varying types of programs. In many places, special programs such as handicapped programs, vocational programs, compensatory programs or other special programs are not being supported. It was our feeling at the outset that a sizeable portion of educational expenditures that would be required to deliver the desired levels of education has not been recorded historically due to budget limitations in many places.

CAPITAL OUTLAYS

In forecasting capital outlays, the information we were able to gather indicated that large numbers of classrooms needing replacement were not replaced and that the classroom projections available to us were primarily based on classroom size assumptions and enrollment projections. We felt that assumptions had to be made in terms of replacement needs as well as new classroom needs.

FINANCING

When we examined the way in which the educational delivery system was financed we found that forecasting in this area was even more tenuous and assumption laden than in forecasting of educational needs. Public education is financed on federal, state and local level. It is financed using the wide range of tax sources. Primarily, education is financed hrough locally based property tax revenues and, at state level, through general state revenues. Each state contributes widely varying percentages to education. Each state raises money in a variety of ways. A good portion of general revenue raised by states comes from sales taxes and personal income taxes. Several states get considerable funds from taxes on business. Certain portions of funds raised by states come from nonrevenue sources and certain portions of state revenues are exported or spread across populations of other states primarily through taxation of business in inter-state commerce. There have been several studies which have attempted to project financial ability of the existing state and local tax structure. Some projection work has attempted to project revenue by estimating the various tax bases in relation to economic

series and applying estimated effective tax rates. Classically these projections consider the ability of the various kinds of tax bases to expand or contract relative to expansion or contraction in the various economic series upon which they are assumed to be related. In converting these capacities into revenue projections, assumptions are made as to the relative tax efforts of various local governments in various places. Major problems have existed in trying to make estimates of revenue raising abilities of school districts because the school district boundaries are not conterminous with general governmental boundaries of other state and local taxing authorities. Accordingly we felt that it was almost a foregone conclusion that any one estimate of revenue for the finance of education is by and large indefensible, when additional assumptions as to capacity, elasticity, economic growth and tax effort are so easily made.

2.2 COMPLEXITY OF THE EDUCATIONAL DELIVERY SYSTEM

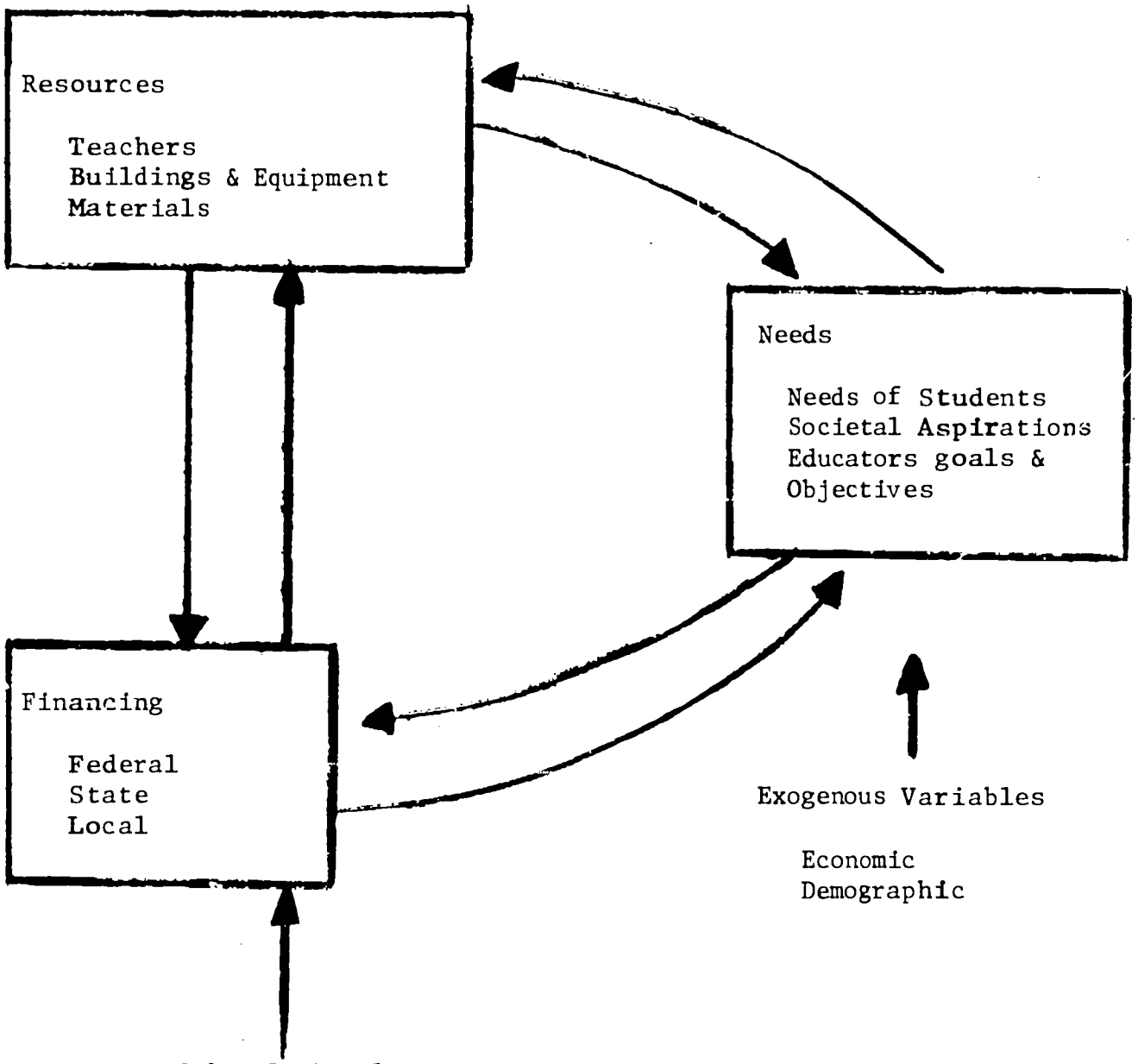
The public educational delivery system in the United States at elementary and secondary levels is complex. It is composed of three elements: resources, needs, and financing. The resources which are used in the education process primarily consist of teachers, buildings, equipment, and educational materials. Behind these direct process resources are local, state and federal administrations; a large private industry providing materials, schools and equipment; and colleges providing teachers. Educational needs are created by the number of students, their aspirations, the aspirations of society and the goals and objectives of educational institutions. The financing of public education takes place at the federal, state, and local level. The amounts so provided reflect aspirations of society as well as their desire to be taxed, the local tax base, and local tax effort.

As shown in Figure 1, these elements are interconnected. In one interaction, educational needs determine the resources and financing required whereas at the same time resources and financing determine the current educational expenditure levels attained. The combined impact of available educational and financial resources help mold the educational goals and fill educational aspirations of society.

Interactions also take place between resources and financing. For example, as the average teacher longevity increases, educational costs rise. This cost rise, in turn, inhibits further spending for additional teachers or other program enrichments.

In addition, outside factors affect the educational delivery system. Migration of people affects demand for school buildings and teachers, the change in fertility rates affects the growth or decline in school age population, and school age population creates the basic needs for educational resources. On the other hand, the state of the economy impacts upon both taxing capacity and the salary expectations of teachers.

Figure I



The educational delivery system is far more complex than these few examples indicate. The important question facing someone attempting to forecast the effect of changes in any part of this complex system is, how much of the complexity needs to be considered. For some questions a very simple view of the system is sufficient. For other questions a more detailed representation would be needed.

The inadequacy of simple extrapolation techniques to forecast the effects of alternative programs and situations in order to meet the Commission's goals has been described. More information than recent trends about the system is needed for adequate forecasting.

A large amount of information about the public educational delivery system is available in addition to the historical data upon which extrapolation forecasts are based. Extrapolation forecasts are simple. They merely project the trend of the variable being forecast.

In its most complex form the impact of five or six variables upon the variable being forecasted may be considered. For example, educational expenditures of a state might be estimated using forecasts of enrollment, personal income, change in enrollment, per pupil costs in similar states, and time. But such forecasting techniques ignore much of our knowledge about obvious relationships between variables in the system.

For example, instructional costs are affected strongly by the longevity of teachers in school systems. By using estimates of the rates of entry and exit of teachers and a simple aging process, it is possible to generate a clear representation of teacher longevity. Then with knowledge

of the salary structure and the way it changes, the teacher salary costs can be estimated more accurately than when using extrapolation forecasts. Similarly, there are simple methods of representing the aging of buildings and the repayment of bond issues which give a more detailed and accurate representation of replacement needs and debt financing capacity than single trend extrapolation. Another example of using knowledge about the detailed relationships is the representation of enrollment. Knowing how students advance by grade with promotion rates, drop out rates, and public school participation rates, and given the current age distribution, enrollments by grade can be forecast quite accurately.

THE NEED FOR COMPUTER SIMULATION

There is much detail that needs to be represented if detailed knowledge of the relationships among parts of the system is to be used for forecasting. The detail becomes too complex for the human imagination or simple mathematics to encompass. Today, the only method of studying a complex process such as the public educational delivery system is to use computer simulation. Computer simulation requires that a mathematical model of the system being studied be constructed. This model contains the description of all the detailed relationships of the system. Computer simulation places no constraint upon the study of the system. Any relationship that is precisely stated in English can be translated into mathematics. In fact, the requirement for precision of statement forces clarity of description. The advantage of the computer simulation model is that it can do what the human is incapable of. The computer model keeps track of and uses properly all the detailed descriptions of the

system under study. With the computer model the present situation of the educational system can be represented and then the model can be run to simulate the future. This simulation then is a forecast. The model allows different assumptions about population, educational programs, or the state of the economy to be represented in order to forecast the future impact of different programs and conditions upon the educational delivery system.

2.3 METHODOLOGY

Previously, the approach taken to estimate educational needs has been to develop enrollment flow models.1/ These flow models generally consider promotion, retention, dropout and transfer into and out of each grade level. The enrollment in each grade level can then be "flowed" to the next level over time. Although flow models give an accurate estimate of enrollments, they generally combine these estimates with various per-pupil costs which are not always pupil related. The resulting projection of educational needs may thus be distorted.

In this model, the school age population rather than the enrollment formed the basic flow. The only data available at the national level were age participation rates by grade level. However, using these participation rates, coupled with net migration rates, gave a reliable estimate of school enrollment.

An attempt was made to link to the number of pupils only those costs which are actually pupil related. Other costs were related to such variables as number and age of teachers, facilities, and debt outstanding. Regional variations in these costs were also included. In addition, a sector was developed to estimate the revenue available to meet the projected educational needs. The difference between these values could then be measured, with the resulting disparity influencing future requirements. The basic flow model design was thus enhanced by the inclusion of cost variations, revenue estimates and "feedback mechanisms."

2.4 FLOW-MODEL CHARACTERISTICS OF THE EDUCATIONAL DELIVERY SYSTEM

Flow models can best be used to represent the significant changes that take place over a moderate period of time. The significant changes which can be expected to occur in the delivery of education are described as follows:

- With entry of the post World War II baby boom population into the labor force and college and continued decline in birth rates, elementary and secondary school enrollments can be expected to stabilize or fall instead of increase;

- Pressures to increase the competitiveness of teachers salaries, coupled with increasing female participation in the labor force and an increase in the supply of new teachers, are all likely to increase the average longevity of teachers with associated increases in salary costs;

- As enrollment stabilizes, school replacement rather than new school construction will form the primary demand for new capital outlays.

All of these changes can be represented handily using flow model structures. However, while data to support a flow model is adequate, much of the knowledge about behavior which is needed to support a feedback model is sparsely documented.

But, given the ten-year time frame which was of primary interest to the Commission we anticipated relatively little time for feedback processes to have a large impact. It was believed that the significant changes mentioned above would likely dominate projected behavior.

3. A DESCRIPTION OF THE MODEL

3.1 MODEL SECTORS AND HOW THEY INTERACT

The model is divided into two sectors, educational needs and educational revenues. These sectors when compared through time generate a profile of fiscal disparities for urban, suburban and rural districts located in each of four regions of the nation.

The current design of the model makes these two sectors independent, even though available resources tend to influence perceived needs and actual educational demands affect revenues raised. The time frame over which these types of interactions generally occur exceeds the time span of the model. Also, a major use of the model was to point to those areas where revenues would be insufficient to meet projected needs if present financing methods continued.

3.1.1 THE EDUCATIONAL NEEDS SECTOR

This sector is structured into eight sub-sectors:

1. Population;
2. Enrollments;
3. Teacher demand;
4. Teacher supply and cost;
5. Other personnel requirements and costs;
6. Other current expenditures;
7. Capital expenditures;
8. Debt service.

Basically, this sector develops a population forecast in sufficient age level detail to provide a forecast of school age population. This forecast considers births, survival rates from age level to age level, and net migrations into or out of the type of residence within the region.

This forecast of school age population is then converted into enrollments by grade level, for public, nonpublic and special public schools. The formulation for conversion of school age population to enrollments considers not only the percentages of each age category enrolled in specific grades; it also considers the proportion of each grade's enrollment attending nonpublic or special public schools.

Desired teacher-student ratios currently exist as independent variables. Additional model formulation could make them dependent upon financial ability constraints.

A pool of existing teachers is maintained by age level for each residence type within region. These estimates consider various rates of entry to and exit from the profession at each age level, aging rates from one level to the next, and a retirement rate from the highest age level.

When this teacher supply exceeds teacher demand, no new hiring takes place. However, when demand exceeds supply, the required number of teachers is made available from an assumed 'infinite' supply of teaching eligibles. These teachers are added to the lowest age level.

Teacher costs are computed by applying the estimated average salary for each age level to the appropriate number of teachers in each age pool.

Other personnel requirements are projected proportional to existing teacher supply. These personnel include professional supervisory and nonsupervisory personnel and nonprofessional personnel. Costs of other personnel required are computed using average salaries for each of the three categories.

Other current expenditures including administration, retirement fund contribution, and other instructional expenditures are projected as a percent of instructional expenditures, total salaries, and instructional salaries, respectively.

Other current expenditures such as maintenance, operations, attendance, and health services are projected on a per pupil basis using public school enrollments. Cost of pupil transportation services are computed

on the percent of pupils transported in various categories of school districts.

Capital expenditures requirements are estimated in three segments:

- School building replacement;
- New school construction;
- Other capital expenditures.

School building replacement is estimated by keeping an inventory of pupil stations and applying an annual replacement percentage to that inventory.

New school construction is estimated by comparing public enrollment pupil station needs to a smoothed average of the existing inventory of pupil stations and, if positive, building the additional requirement.

The school construction capital expenditure requirement is then estimated by applying construction cost factors to all elementary and secondary pupil stations required.

Other capital expenditure requirements are estimated as a percentage of total instructional expenditures. The replacement percentages currently exist as independent variables. Additional model formulation could make them dependent on the level of debt service.

Debt service expenditures are estimated in three segments:

- Current capital outlays;
- Principal repayments;
- Interest payments.

Total borrowings in the current year are calculated as a proportion of total capital expenditures, the remainder is assumed to be met from revenues.

Current year's borrowings are then computed into a uniform payment annuity over an average repayment span at a specified interest rate.

An annuity schedule for past borrowings is updated by current year borrowings and interest and principal repayments are aggregated for the current year.

3.12 THE EDUCATIONAL REVENUES SECTOR

This sector is structured into six sub-sectors:

1. A state revenue sub-sector describing
   - State personal income and sales taxes,
   - State corporate income tax revenues,
   - Other state revenues;
2. A state-wide local revenue sector describing
   - Property tax estimates for 3 types of property,
   - Other sources of local revenue;
3. An intra-state revenue sector;
4. State and local contribution to education sector;
5. Sector distributing state revenues to each region's type of residence;
6. Federal participation sector.

The basic driving force behind this sector is a set of economic time series developed for each state. These series were originally constructed for contiguous economic regions but later adjusted to reflect state-wide economic activity. The series used are:

- Total personal income;
- Total earnings net of govennment and agriculture;
- Total earnings from wholesale and retail trade.

These economic time series are provided to the model sector as inputs and there is no attempt to link them to population forecasts as developed in the 'Educational Needs' sector.

The rationale for not linking the two forecasts is based on intended model use. Population estimates will be varied in the model only as to birth rate assumptions. These assumptions would not materially affect the size of the work force in the 10 year planning horizon. Accordingly no measured impact on personal income or total earnings would be apt to occur.

The way in which these economic time series are used is:

- A change in the economic time series over its base year value is computed;
- This change is multiplied by an elasticity factor related to a particular tax base or tax revenue series;
- This product is added to the base year's tax base or tax revenue to derive the estimate.

The elasticity factor relates the change in the dependent time series, e.g., sales tax revenue; to the change in the independent time series, e.g., total residents personal income.

The state revenue sub-sector projects each state's personal income tax revenues, general sales tax revenues, selective sales tax revenues and other revenues as a function of total personal income.

State corporate income tax revenues are computed by measuring each state's relative share of total commercial earnings and residential property worth.

The state-wide local revenue sector projects three types of property tax bases. The market value of residential non-farm property and the

market value of commercial and industrial property are projected as a function of total earnings less governmental and agricultural earnings. The market value of farm property is projected as a function of total personal income.

These property tax bases are converted into property tax revenues using time related estimates of market value yields. Base period yields reflect state-wide average assessment and millage practices for these classes of property. Total state-wide "other" local revenue is projected as a function of total personal income.

The intra-regional revenue sector partitions local revenues among the three types of residence areas - central cities, urban fringe and rural.

The state and local contribution to education sector partitions total revenues raised state-wide from state and local sources into the amount used to support public elementary and secondary education.

The sector distributing state revenues to each region's type of residence makes use of the following factors:

1. The existing enrollment levels as developed in the educational needs sector;
2. An index reflecting historical patterns of how state educational revenues were distributed to districts as classified by type of residence;
3. The regional sum of state educational revenues.

This sub-sector prorates this revenue on the basis of weighted enrollments and adds it to local educational revenues.

It is in this sector that changes to existing state distribution formulae can be tested. If needs formulae are to be tested, additional interactions between the educational needs sector are conceivable.

The Federal Participation Sector estimates federal educational revenue contributions based on existing proportions of federal aid.

It is in this sector that new federal funding innovations can be tested. If such innovations are categorical in nature, i.e., relation of programs to targeted groups of children, then additional interactions are conceivable between this sector and the needs sector.

3.1.3 MEASURING OF DISPARITIES

Disparities are now computed by obtaining differences between educational expenditures 'needed' and educational revenues provided. If needs exceed revenues, it is now assumed that such needs are satisfied by emergency borrowings. But additional interactions which constrain educational expenditures to stay within some disparity limits could be developed. Feedback mechanisms which would adjust revenue effort or borrowing capacity could also be developed. Further refinement could lead to the making of adjustments in staffing ratios or to accelerated adoption of certain programs offering economies.

3.2 A DESCRIPTION OF THE NATION'S EDUCATIONAL DELIVERY SYSTEM

SIZE

As of the 1970-71 school year there are estimated to be 45,903,000 students enrolled in public schools and 5,283,000 students enrolled in nonpublic schools. In all 97.2% of all 5-17 year olds are enrolled in elementary and secondary schools.

The public schools are operated by approximately 17,000 local educational agencies (LEA's) under the overall supervision of the various state educational agencies (SEA's). The nonpublic schools are also subject to state controls. Approximately 83% of nonpublic pupils attend Catholic schools and about 5% more attend other church related schools.

COST

It is estimated that $44.6 billion will be spent for these schools in school year 1970-71. It is estimated that these schools employ 2.3 million teachers for an average of 44.4 classroom teachers for every 1,000 pupils. Historically administrative expenditures have averaged 6.5% of instructional expenditures.

ORGANIZATION

LOCAL GOVERNMENTAL UNITS

Local educational agencies are primarily responsible for the day to day operation of schools within their jurisdiction. They also are

responsible for budgeting program needs and accounting for funds spent. In addition, LEA's are engaged in fund raising activities. In 'independent' LEA's, such taxes have to be obtained from local governmental units such as municipal or county governments. In some instances bond authorities are used to raise moneys for school construction where in other instances the LEA is the bonding authority.

As far as local revenues are concerned, LEA's are in competition for the local tax dollar regardless of their dependent or independent status. This competition has become extremely severe in certain urbanized areas and especially in the major cities. Using national aggregates for FY 1970, 52.7% of all school support came from local sources, such as property tax revenues;but the property tax is also used to support such local services as fire, police, sewage, welfare, health and tax collection, etc. The demands and costs of these services have also been on the rise,particularly in urban areas. On the other hand the property and income tax base in urban areas has not kept pace and tax rates are at an all time high.

STATE GOVERNMENTS

State governments contribute substantially to elementary and secondary education. Although their participation in the total federal, state, and local educational revenue picture varies from 9.1% to 84.8%, the national average state contribution to education for Fiscal Year 1969 was 40.9% of the total.

States raise revenue for education primarily through their usual general revenue sources such as general sales taxes, personal and corporate income taxes and selective sales and use taxes.

State educational programs compete with other state programs such as health, welfare, police, highways and higher education. The proportion of funding for elementary and secondary education varies considerably from state to state.

In addition, states distribute educational program funds differently. In some states, flat per-pupil grants are made to LEA's on the basis of enrollment. In other states a 'foundation' or a fixed dollar sum per-pupil is stipulated and state distributions are made to subsidize the differences that occur in low spending LEA's. In still other states, LEA's are compensated for making higher local revenue raising effort while others compensate the LEA's more if they have less local wealth behind each pupil. Special distributions are made to subsidize pupil transportation, school lunches and/or health programs. The complexities in describing the ways in which funds are distributed to various kinds of LEA's are many, but the resulting patterns from state to state are measurable.

State educational agencies (SEA's) exist in all states and exercise varying degrees of supervisory control over elememtary and secondary education.

For the most part all SEA's control the licensing of teachers, set statewide minimums as to age and experience levels and associated pay scales, administer and fund teacher retirement programs, set certain curriculum requirements and minimum attendance requirements and in some instances set minimum student achievement levels. Certain SEA's set uniform assessment practices regarding local property and some states permit SEA's to set uniform assessments and/or millages on local property taxes for educational use.

THE FEDERAL GOVERNMENT

The Federal Government substantially increased its participation in the delivery of elementary and secondary education with the passage of the Elementary and Secondary Education Act of 1965. The Federal Government provided only 4.4% of the total educational revenues of the Nation in the school year prior to this Act (1963-64), and has provided as much as 8.8% in school year 1967-68. The federal share of school support was estimated to be 8.6% in fiscal year 1969.

The major programs being funded are ESEA '65 - Title I, aid to LEA's providing compensatory programs to the disadvantaged; ESEA '65 - Titles II and III, aid to LEA's for textbooks, library books, audio visual materials, and supplementary educational centers and services; PL 874 and PL 814, for school assistance in federally affected areas, and OEO and Indian education programs. Most of the federal programs are categorical and application is made either directly or with SEA approval. There has been considerable criticism as to the ability to administer and measure impact of such programs.

On the district level, school districts (LEA's), differ in many ways. LEA's serve different numbers of children in different numbers and types of schools with different numbers and types of staffs in different settings in different parts of the Nation. From an educational needs point of view many of these differences have proved significant.

An obvious element of differences is LEA size. Characteristically larger LEA's tend to require more administrative and support personnel. On the other hand these LEA's take on functions other than classroom teaching. They are involved in curriculum design, experimental programs and in some cases educational research. Small LEA's tend to be rural. They sometimes have to run less than optimum sized facilities and are unable to support certain innovative programs.

Another obvious element of difference is type of residence. LEAs' operating schools located in the inner city find themselves caught up with enrollments of large numbers of students with learning difficulties. In addition they tend to maintain older teaching staffs with associated higher average salaries. They also tend to have more facilities in need of replacement of repair. In many urban areas LEA's 'compete' with large nonpublic systems whose own inner city schools are being closed for lack of funds. On the other hand, rural systems exist which require large transportation programs. In contrast, suburban systems exist which are growing rapidly, requiring large capital outlays and debt service costs. These types of LEA's for the most part are able to attract better young teachers and offer enriched programs.

As far as regional differences are concerned, certain regions, such as the South, incur less absolute dollar costs per unit due to cost of living differentials.

The complexities of the Nation's educational delivery system emphasized the need to segment the data being gathered into like groups of school districts. Only in this manner would a model be able to accurately reflect the many differences described above.

3.3 LEVEL OF AGGREGATION EMPLOYED

In order to provide a sufficient level of detail for analytical purposes and at the same time provide an adequate description of the detailed workings of the Nation's educational delivery system, the educational cost and revenue data for each state were aggregated in a similar fashion.

Basic projections of the Nation's economic growth now developed by the U. S. Department of Commerce, Office of Business Economics, uses a grouping of the Nation's counties into 173 contiguous economic areas. The O.B.E. aggregated their economic area projections into state totals, adjusting such totals to account for the inter-state overlap of some of these regions.

The statewide economic series were necessary in projecting state and local revenues on a statewide basis. State level detail proved necessary in order to describe each state's revenue raising characteristics.

Because revenue source patterns differed by type of LEA within any state, LEA grouping by type of residence were adopted. Type of residence was limited to the one criterion most commonly available - the standard metropolitan statistical area (i.e., SMSA). LEA's state and local revenue characteristics were then aggregated into four regions (Northeast, North Central, South, West), for all LEA's in central city portions of SMSA's, or in SMSA's but not in central city portions, or outside SMSA's. This four by three breakdown made it possible to link the revenue sector to the rest of the model.

Federal distributions varied most significantly by type of residence in that the major thrust of existing aid was to urban target populations. Therefore an identical four by three breakdown appeared sufficient.

The educational cost data varied both regionally and by type of residence. Thus the data was aggregated to the same level as the revenue data. The population and enrollment projections were made to conform with this same regional pattern, providing a consistent level of aggregation for the entire model.

4. RESULTS

4.1 COMPARISON OF THE MODEL RESULTS WITH OTHER PROJECTIONS

The basic model projections were developed using input data displayed in Appendix II. These data consisted of base year values of population, enrollments, personnel expenditures and revenues. In addition estimates of trends in costs and enrollments projected through 1980 were also used. The supplier of many of these data, Joseph Froomkin, Inc., also provided the best estimate of projected expenditures for 1975 and 1980. The model was run using the basic data and some additional assumptions. The resulting expenditure projections for 1975 and 1980 were then compared to the best estimate provided by the contractor. The comparison was as follows:

	Current Expenditures (in millions of 1967 dollars)	
	1975	1980
Joseph Froomkin, Inc.	$ 41,381.8	$ 45,251.9
Model (Basic Projection)	41,947.0	49,944.0
Difference (dollars)	565.2	4,692.1
Difference (percent)	1.4%	10.4%

Some of the projected differences in current expenditures can be attributed to different assumptions. For example, the model assumed a discrete age distribution of teachers with an associated salary for each age level, a retirement rate, and entry and exit rates for the profession. The Froomkin estimates used average salaries and projected these averages. By aging the teachers, the

model projects larger numbers of older teachers due to a lessening of demand for teachers. The older teachers have higher than average salaries thus increasing expenditures at a faster rate than mere averages would indicate. This factor becomes particularly noticeable towards the end of the decade.

The basic model projection was used throughout as the point of reference for comparative analysis. Simulations were run using different values for certain parameters and the resulting change in the projection of current expenditure was compared to basic model projection.

It should be noted that all of the projections are stated in 1967-68 dollars and that the objective of these projections was to demonstrate the relative impact upon expenditures of each assumption. Accordingly, the reader is cautioned against using any projected dollar amounts independent of the comparative framework in which they have been presented.

The tables included throughout the remainder of this section present comparative projections for Central City, other SMSA and non-SMSA districts within each of four regions.

The code displayed on each table relates to each of these residence types within regions and can be interpreted as follows:

Residence Type	Northeast	North Central	South	West	Total
Central Cities	1.1	2.1	3.1	4.1	T.1
Other SMSA	1.2	2.2	3.2	4.2	T.2
Non SMSA	1.3	2.3	3.3	4.3	T.3
Total	1.T	2.T	3.T	4.T	T.T

4.2 POSSIBLE CHANGES IN THE NUMBER OF BIRTHS

The basic expenditure projections were made using Series E and Series C population estimates as derived from Population Estimates and Projections P-25, No. 448 published by the U. S. Department of Commerce, Bureau of the Census. A later publication, Population Estimates and Projections, Series P-25, No. 470 provided a slightly higher Series E population estimate. These projections of population, provided by the Bureau, are based upon differing fertility rate assumptions. The Series C estimate assumes a higher fertility rate than does the Series E estimate.

4.2.1 SIMULATION 1 - NEW SERIES E

Under the later Series E population estimate, modest increases in births occur in earlier years even though the total number of births projected remains the same.

	Number of births (thousands)	
	1975	1980
New Series E	3,905	4,222
Old Series E	3,628	3,957
Increase Reflected	277	265

The resulting changes in current expenditures were small relative to the total.

Reflected Increase in Current Expenditures	1975	1980
Dollar Increase (in millions)	$44.5	$605.5
Percentage Increase	0.11%	1.23%

4.2.2 SIMULATION 2 - SERIES C

Under Series C population estimates greater increases in births were introduced.

	Number of births (thousands)	
	1975	1980
Series C	4,476	5,270
Old Series E	3,628	3,957
Increase Reflected	1,248	1,313
Percentage Increase	34.4%	33,2%

The resulting changes in current expenditures were still small.

Reflected Increase in Current Expenditures	1975	1980
Dollar Increase (in millions)	$137.7	$1,936.6
Percentage Increase	0.33%	3.92%

In each of these simulations increased birth rates have a greater impact on expenditures in later years because of the 3 to 5 year delayed effect on enrollments. Due to the small overall impact of alternative population projections on educational expenditures in the next decade, the old Series E Population Estimates were adopted throughout the other simulations.

A detailed comparison of each of these simulations to the basic model follows:

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL
CURRENT EXPENDITURES (In Millions of Dollars)
Assumption - New Series E

4.2.1

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 1	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 1	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,188.80	$ 4.61	.14	1.1	$ 3,640.73	$ 3,690.70	$ 49.97	1.37
3,696.16	5,553.32	5,559.32	6.00	.11	1.2	6,903.31	6,989.20	85.89	1.24
1,659.85	2,413.50	2,416.41	2.91	.12	1.3	2,726.12	2,761.75	35.63	1.31
7,743.97	11,151.01	11,164.53	13.52	.12	1.T	13,270.16	13,441.65	171.49	1.29
2,238.89	2,892.08	2,895.84	3.76	.13	2.1	3,310.43	3,355.87	45.44	1.37
2,905.13	4,370.51	4,374.77	4.26	.10	2.2	5,376.52	5,439.95	63.43	1.18
2,906.43	3,960.67	3,964.38	3.71	.09	2.3	4,471.37	4,523.57	52.20	1.17
8,050.45	11,223.26	11,234.99	11.73	.10	2.T	13,158.32	13,319.39	161.07	1.22
2,886.20	4,091.69	4,095.65	3.96	.10	3.1	4,924.12	4,981.29	57.17	1.16
1,842.17	2,591.08	2,593.06	1.98	.08	3.2	3,108.09	3,143.70	35.61	1.15
3,804.85	5,624.63	5,628.55	3.92	.07	3.3	6,543.68	6,610.37	66.69	1.02
8,533.22	12,307.40	12,317.26	9.86	.08	3.T	14,575.89	14,735.36	159.47	1.09
1,908.86	2,567.17	2,571.05	3.88	.15	4.1	2,944.92	2,988.52	43.60	1.48
2,102.84	3,071.30	3,075.13	3.83	.12	4.2	3,614.94	3,663.46	48.52	1.34
1,389.33	1,661.19	1,662.84	1.65	.10	4.3	1,774.23	1,795.61	21.38	1.21
5,401.03	7,299.66	7,309.02	9.36	.13	4.T	8,334.09	8,447.59	113.50	1.36
9,421.91	12,735.13	12,751.34	16.21	.13	T.1	14,820.20	15,016.38	196.18	1.32
10,546.30	15,586.21	15,602.28	16.07	.10	T.2	19,002.86	19,236.31	233.45	1.23
9,760.46	13,659.99	13,672.18	12.19	.09	T.3	15,515.40	15,691.30	175.90	1.13
29,728.67	41,981.33	42,025.80	44.47	.11	T.T	49,338.46	49,943.99	605.53	1.23

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL
CURRENT EXPENDITURES (In Millions of Dollars)
Assumption - Series C

4.2.2

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 2	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 2	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,198.31	$ 14.12	.44	1.1	$ 3,640.73	$ 3,801.86	$ 161.13	4.43
3,696.16	5,553.32	5,573.25	19.93	.36	1.2	6,903.31	7,178.51	275.20	3.99
1,659.85	2,413.50	2,422.40	8.90	.37	1.3	2,726.12	2,840.39	114.27	4.19
7,743.97	11,151.01	11,193.96	42.95	.39	1.T	13,270.16	13,820.76	550.60	4.15
2,238.89	2,892.08	2,903.59	11.51	.40	2.1	3,310.43	3,456.60	146.17	4.42
2,905.13	4,370.51	4,383.55	13.04	.30	2.2	5,376.52	5,579.13	203.61	3.79
2,906.43	3,960.67	3,972.03	11.36	.29	2.3	4,471.37	4,637.36	165.99	3.71
8,050.45	11,223.26	11,259.17	35.91	.32	2.T	13,158.32	13,673.09	515.77	3.92
2,886.20	4,091.69	4,103.81	12.12	.30	3.1	4,924.12	5,106.37	182.25	3.70
1,842.17	2,591.08	2,597.15	6.07	.23	3.2	3,108.09	3,221.00	112.91	3.63
3,804.85	5,624.63	5,636.62	11.99	.21	3.3	6,543.68	6,754.62	210.94	3.22
8,533.22	12,307.40	12,337.58	30.18	.25	3.T	14,575.89	15,081.99	506.10	3.47
1,908.86	2,567.17	2,579.05	11.88	.46	4.1	2,944.92	3,085.68	140.76	4.78
2,102.84	3,071.30	3,083.02	11.72	.38	4.2	3,614.94	3,771.14	156.20	4.32
1,389.33	1,661.19	1,666.23	5.04	.30	4.3	1,774.23	1,842.40	68.17	3.84
5,401.03	7,299.66	7,328.30	28.64	.39	4.T	8,334.09	8,699.22	365.13	4.38
9,421.91	12,735.13	12,784.76	49.63	.39	T.1	14,820.20	15,450.51	630.31	4.25
10,546.30	15,586.21	15,636.97	50.76	.33	T.2	19,002.86	19,749.78	746.92	3.93
9,760.46	13,659.99	13,697.28	37.29	.27	T.3	15,515.40	16,074.77	559.37	3.61
$29,728.67	$41,981.33	$42,119.01	$137.68	.33	T.T	$49,338.46	$51,275.06	$1,936.60	3.92

4.3 SIMULATION 3 - POSSIBLE CHANGES IN PRESCHOOL ENROLLMENTS

The basic model projections of current expenditures was made assuming marked increases in preschool enrollment rates by the year 1980. The actual enrollment rates used in this projection were:

3 & 4 YEAR OLD PRESCHOOL ENROLLMENT RATES

	CENTRAL CITIES			OTHER SMSA			NON-SMSA		
	70	75	80	70	75	80	70	75	80
NE	.193	.428	.782	.190	.422	.771	.140	.311	.568
NC	.149	.365	.697	.146	.262	.557	.072	.129	.275
S	.214	.453	.831	.187	.396	.763	.104	.185	.425
W	.253	.525	.968	.215	.440	.817	.131	.272	.505

5 YEAR OLD ENROLLMENT RATES

	CENTRAL CITIES			OTHER SMSA			NON-SMSA		
	70	75	80	70	75	80	70	75	80
NE	.889	.934	.979	.910	.956	.999	.913	.940	.999
NC	.912	.921	.965	.888	.940	.983	.791	.837	.875
S	.648	.792	.948	.646	.789	.951	.423	.511	.733
W	.901	.942	.999	.935	.976	.999	.784	.819	.924

The assumption made in simulation 3 was that 1970 preschool enrollment rates would remain at the same levels through 1980 causing fewer children to be enrolled. The projected reduction in current expenditures due to the lower preschool enrollments were found to be minimal implying that the additional cost of the projected increase in preschool enrollment would not be expensive.

Reflected Decrease in Current Expenditures	1975	1980
Dollar Decrease (in millions)	$394.2	$764.4
Percentage Decrease	0.94%	1.55%

The detailed comparison follows:

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL
CURRENT EXPENDITURES (In Millions of Dollars)
Assumption - 1970 Pre-School Enrollment Rates Used Through 1980

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 3	Dollar Difference	Percent Difference		1980 Basic Projection	1980 Simulation No. 3	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,132.01	$ -52.18	-1.64	1.1	$ 3,640.73	$ 3,533.99	$-106.74	-2.93
3,696.16	5,553.32	5,491.40	-61.92	-1.12	1.2	6,903.31	6,903.31	-112.00	-1.62
1,659.85	2,413.50	2,390.34	-23.16	- .96	1.3	2,726.12	2,682.05	- 44.07	-1.62
7,743.97	11,151.01	11,013.75	-137.26	-1.23	1.T	13,270.16	13,007.35	-262.81	-1.98
2,238.89	2,892.08	2,854.03	-38.05	-1.32	2.1	3,310.43	3,225.60	- 84.83	-2.56
2,905.13	4,370.51	4,345.91	-24.60	- .56	2.2	5,376.52	5,324.02	- 52.50	- .98
2,906.43	3,960.67	3,943.52	-17.15	- .43	2.3	4,471.37	4,451.19	- 20.18	- .45
8,050.45	11,223.26	11,143.46	-79.80	- .71	2.T	13,158.32	13,000.81	-157.51	-1.20
2,886.20	4,091.69	4,045.61	-46.08	-1.13	3.1	4,924.12	4,840.62	- 83.50	-1.70
1,842.17	2,591.08	2,573.57	-17.51	- .68	3.2	3,108.09	3,078.82	- 29.27	- .94
3,804.85	5,624.63	5,601.11	-23.52	- .42	3.3	6,543.68	6,505.24	- 38.44	- .59
8,533.22	12,307.40	12,220.29	-87.11	- .71	3.T	14,575.89	14,424.68	-151.21	-1.04
1,908.86	2,567.17	2,526.45	-40.72	-1.59	4.1	2,944.92	2,854.53	- 90.39	-3.07
2,102.84	3,071.30	3,036.09	-35.21	-1.15	4.2	3,614.94	3,534.09	- 80.85	-2.24
1,389.33	1,661.19	1,647.06	-14.13	- .85	4.3	1,774.23	1,752.65	- 21.58	-1.22
5,401.03	7,299.66	7,209.60	-90.06	-1.23	4.T	8,334.09	8,141.27	-192.82	-2.31
9,421.91	12,735.13	12,558.10	-177.03	-1.39	T.1	14,820.20	14,454.74	-365.46	-2.47
10,546.30	15,586.21	15,446.97	-139.24	- .89	T.2	19,002.86	18,728.24	-274.62	-1.45
9,760.46	13,659.99	13,582.03	- 77.96	- .57	T.3	15,515.40	15,391.13	-124.27	- .80
29,728.67	41,981.33	41,587.10	-394.23	- .94	T.T	49,338.46	48,574.11	-764.35	-1.55

4.4 POSSIBLE CHANGES IN NONPUBLIC ENROLLMENTS

Projections of nonpublic enrollment were provided from two contractors, Joseph Froomkin, Inc., and the University of Notre Dame. Generally Notre Dame projects 15.6% fewer nonpublic pupils in 1975 and 18.4% fewer nonpublic pupils in 1980. Joseph Froomkin projects increases in nonpublic enrollment in the South in suburban and rural districts based upon assumptions of higher priviate school enrollment. Notre Dame projects enrollment declines similar to those experienced in other regions. The comparative table below illustrates these differences.

NONPUBLIC ENROLLMENTS
(thousands)

	Actual 1970	Froomkin 1975	Notre Dame 1975	Froomkin 1980	Notre Dame 1980
Northeast					
Central Cities	934	860	668	520	484
Other SMSA	929	622	651	470	469
Non SMSA	224	153	154	123	110
North Central					
Central Cities	888	570	614	398	441
Other SMSA	512	635	364	457	281
Non SMSA	401	216	260	153	177
South					
Central Cities	500	355	383	334	309
Other SMSA	173	441	134	345	119
Non SMSA	181	194	144	255	121
West					
Central Cities	279	240	214	221	167
Other SMSA	257	246	215	210	182
Non SMSA	72	62	50	66	37
Total U.S.	5,350	4,564	3,851	3,552	2,897

The basic model projection of current expenditures used the Froomkin estimates of nonpublic enrollment. In order to test the impact of possible changes in nonpublic enrollment several simulations were run.

4.4.1 SIMULATION 4 - NONPUBLIC ENROLLMENT FORECASTS FROM NOTRE DAME

Notre Dame's nonpublic enrollment estimates were substituted for Froomkin's projections. These forecasts generated modest additional costs to public education due to the greater number of students projected to be transferring from the nonpublic sector.

Reflected Increase in Current Expenditures	1975	1980
Dollar Increase (in millions)	$504.9	$1,361.9
Percentage Increase	1.20%	2.76%

4.4.2 SIMULATION 5 - ACCELERATED NONPUBLIC ENROLLMENT DECLINE

Notre Dame's nonpublic enrollment ectimates for 1980 were projected to occur by 1975 thus accelerating projected declines in nonpublic enrollments. This was 36.5% less than the Froomkin 1975 nonpublic enrollment estimates used in the basic projections.

Again the additional costs to public education were modest, but were higher than in the previous example as more students transfer to the public sector.

Reflected Increase in Current Expenditures	1975	1980
Dollar Increase (in millions)	$1,220.9	$1,525.0
Percentage Increase	2.91%	3.09%

An additional analysis of these results was made considering not only current expenditures but capital outlay and debt service costs.

The additional total costs were approximately 60% more than additional current costs. In the basic model, total expenditures are generally about 50% greater than current expenditures implying that new facilities would be required at a faster rate if the nonpublic enrollment decline was accelerated.

4.4.3 SIMULATION 6 - NO DECLINE IN NONPUBLIC ENROLLMENT

Nonpublic participation rates were held constant from 1970 through 1980 and the resulting current expenditure projections were compared to the basic model projection using Froomkin's nonpublic enrollment rates. The differences in current expenditures between no decline in nonpublic enrollments and the projected decline in nonpublic enrollments was substantial. The following tables show the decrease in projected current and total expenditures if the projected decline in nonpublic enrollments did not occur.

Reflected Decrease in Current Expenditures	1975	1980
Dollar Decrease	$1,154.7	$2,843.7
Percentage Decrease	2.75%	5.76%

Reflected Decrease in Total Expenditures	1975	1980
Dollar Decrease (in millions)	$1,783	$3,636
Percentage Decrease	2.84%	5.13%

When these same costs are compared to the results of accelerated nonpublic enrollment decline, the impact is even more pronounced.

Reflected Difference in Current Expenditures	1975	1980
Dollar Difference (in millions)	$2,375.6	$4,368.7
Percentage Difference	5.66%	8.85%

Reflected Difference in Total Expenditures	1975	1980
Dollar Difference (in millions)	$3,813.0	$6,077.0
Percentage Difference	6.07%	8.57%

Tables showing the comparison of each of these simulations with the basic model projections of expenditures follows.

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL
CURRENT EXPENDITURES (In Millions of Dollars)
Assumption - Notre Dame Nonpublic Enrollment Projections

4.4.1

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 4	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 4	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,335.87	151.68	4.76	1.1	$ 3,640.73	$ 77.00	$ 136.27	3.74
3,696.16	5,553.32	5,534.09	-19.23	-.35	1.2	6,903.31	6,983.00	79.69	1.15
1,659.85	2,413.50	2,415.58	2.08	.01	1.3	2,726.12	2,775.55	49.43	1.81
7,743.97	11,151.01	11,285.54	134.53	1.20	1.T	13,270.16	13,535.55	265.39	.20
2,238.89	2,892.08	2,867.37	-24.71	-.85	2.1	3,310.43	3,309.22	-1.21	.04
2,905.13	4,370.51	4,555.28	184.77	4.23	2.2	5,376.52	5,617.51	240.99	4.48
2,906.43	3,960.67	3,935.80	-24.87	6.28	2.3	4,471.37	4,495.08	23.71	.53
8,050.45	11,223.26	11,358.45	135.19	.31	2.T	13,158.32	13,421.81	263.49	2.00
2,886.20	4,091.69	4,070.78	-20.91	.51	3.1	4,924.12	5,008.14	84.02	1.71
1,842.17	2,591.08	2,740.76	149.68	5.78	3.2	3,108.09	3,357.12	249.03	8.01
3,804.35	5,624.63	5,668.55	43.92	.78	3.3	6,543.68	6,791.25	247.57	3.78
8,533.22	12,307.40	12,480.09	172.69	1.40	3.T	14,575.89	15,156.51	580.62	3.98
1,908.86	2,567.17	2,595.16	27.99	1.09	4.1	2,944.92	3,066.17	121.25	4.12
2,102.84	3,071.30	3,093.50	22.20	.72	4.2	3,614.94	3,694.05	79.11	2.19
1,389.33	1,661.19	1,673.50	12.31	.74	4.3	1,774.23	1,826.22	51.99	2.93
5,401.03	7,299.66	7,362.16	62.50	.86	4.T	8,334.09	8,586.44	252.35	3.03
9,421.91	12,735.13	12,869.18	134.05	1.05	T.1	14,820.20	15,160.53	340.33	2.30
10,546.30	15,586.21	15,923.63	337.42	2.16	T.2	19,002.86	19,651.68	648.82	3.41
9,760.46	13,659.99	13,693.43	33.44	.24	T.3	15,515.40	15,888.10	372.70	2.40
29,728.67	41,981.33	42,486.24	504.91	1.20	T.T	49,338.46	50,700.31	1,361.85	2.76

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL
CURRENT EXPENDITURES (In Millions on Dollars)
Assumption - Substitution of Notre Dame's Projected Nonpublic Enrollments for 1980 into 1975

4.4.2a

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 5	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 5	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,476.98	$ 292.79	9.20	1.1	$ 3,640.73	$ 3,822.45	$ 181.72	4.99
3,696.16	5,553.32	5,695.75	142.43	2.56	1.2	6,903.31	7,029.17	125.86	1.82
1,659.85	2,413.50	2,451.67	38.17	1.58	1.3	2,786.12	2,786.38	60.26	2.21
7,743.97	11,151.01	11,624.40	473.39	4.25	1.T	13,270.16	13,638.00	367.84	2.77
2,238.89	2,892.08	2,979.36	87.28	3.02	2.1	3,310.43	3,344.87	34.44	1.04
2,905.13	4,370.51	4,610.58	240.07	5.49	2.2	5,376.52	5,632.55	256.03	4.76
2,906.43	3,960.67	3,989.71	29.04	.73	2.3	4,471.37	4,511.66	40.29	.90
8,050.45	11,223.26	11,579.65	356.39	3.18	2.T	13,158.32	13,489.08	330.76	2.51
2,886.20	4,091.69	4,136.51	44.82	1.10	3.1	4,924.12	5,033.80	109.68	2.23
1,842.17	2,591.08	2,740.76	149.68	5.78	3.2	3,108.09	3,296.45	188.36	6.06
3,804.85	5,624.63	5,686.96	62.33	1.11	3.3	6,543.68	6,798.23	254.55	3.89
8,533.22	12,307.40	12,564.23	256.83	2.09	3.T	14,575.89	15,128.48	552.59	3.79
1,908.86	2,567.17	2,638.75	71.58	2.79	4.1	2,944.92	3,078.83	133.91	4.55
2,102.84	3,071.30	3,113.06	41.76	1.36	4.2	3,614.94	3,700.11	85.17	2.36
1,389.33	1,661.19	1,682.16	20.97	1.26	4.3	1,774.23	1,829.03	54.80	3.09
5,401.03	7,299.66	7,433.97	134.31	1.84	4.T	8,334.09	8,607.97	273.88	3.29
9,421.91	12,735.13	13,231.60	496.47	3.90	T.1	14,820.20	15,279.95	459.75	3.10
10,546.30	15,586.21	16,160.15	573.94	3.68	T.2	19,002.86	19,658.28	655.42	3.45
9,760.46	13,659.99	13,810.50	150.51	1.10	T.3	15,515.40	15,925.30	409.90	2.64
29,728.67	41,981.33	43,202.25	1,220.92	2.91	T.T	49,338.46	50,863.53	1,525.07	3.09

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL

TOTAL EXPENDITURES (In Millions of Dollars)

Assumption - Substitution of Notre Dame's Projected Nonpublic Enrollments for 1980 into 1975

4.4.2b

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 5	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 5	Dollar Difference	Percent Difference
$ 2,387.96	$ 4,928	$ 5,426	$ 498	10.11	1.1	$ 5,436	$ 5,818	$ 382	7.03
3,696.16	8,344	8,578	234	2.80	1.2	9,779	9,990	211	2.16
1,659.85	3,624	3,687	63	1.74	1.3	3,934	4,022	88	2.24
7,743.97	16,896	17,691	795	4.71	1.T	19,149	19,830	681	3.56
2,238.89	4,517	4,670	153	3.39	2.1	4,989	5,093	104	2.08
2,905.13	7,071	7,486	415	5.87	2.2	8,221	8,670	449	5.46
2,906.43	5,837	5,885	48	.82	2.3	6,384	6,445	61	.96
8,050.45	17,425	18,041	616	3.54	2.T	19,594	20,208	614	3.13
2,886.20	5,791	5,858	67	1.16	3.1	6,726	6,878	152	2.26
1,842.17	3,716	3,946	230	6.19	3.2	4,264	4,559	295	6.92
3,804.85	7,898	7,990	92	1.16	3.3	8,932	9,232	300	3.36
8,533.22	17,405	17,794	389	2.23	3.T	19,922	20,669	747	3.75
1,908.86	3,849	3,970	121	3.14	4.1	4,247	4,446	199	4.69
2,102.84	4,708	4,780	72	1.53	4.2	5,304	5,430	126	2.38
1,389.33	2,587	2,624	37	1.43	4.3	2,691	2,765	74	2.75
5,401.03	11,144	11,374	230	2.06	4.T	12,242	12,641	399	3.26
9,421.91	19,085	19,924	839	4.40	T.1	21,398	22,235	837	3.91
10,546.30	23,839	24,790	951	3.99	T.2	27,568	28,649	1,081	3.92
9,760.46	19,946	20,186	240	1.20	T.3	21,941	22,464	523	2.38
29,728.67	62,870	64,900	2,030	3.23	T.T	70,907	73,348	2,441	3.44

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL

CURRENT EXPENDITURES (In Millions of Dollars)

4.4.3a

Assumption - 1970 Nonpublic Enrollment Rates Perpetuated Without Change Through 1980

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 6	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 6	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,032.2	$ 151.99	4.77	1.1	$ 3,640.73	$ 3,281.4	$ 359.33	9.87
3,696.16	5,553.32	5,289.6	263.42	4.74	1.2	6,903.31	6,271.5	631.81	9.15
1,659.85	2,413.50	2,327.9	85.60	3.55	1.3	2,726.12	2,565.1	161.02	5.91
7,743.97	11,151.01	10,650.0	501.01	4.49	1.T	13,270.16	12,118.0	1,152.16	8.68
2,238.89	2,892.08	2,797.5	94.58	3.27	2.1	3,310.43	3,057.7	252.73	7.63
2,905.13	4,370.51	4,162.4	208.11	4.76	2.2	5,376.52	4,874.3	502.22	9.34
2,906.43	3,960.67	3,840.2	120.47	3.04	2.3	4,471.37	4,201.1	270.27	6.04
8,050.45	11,223.26	10,800.1	423.16	3.77	2.T	13,158.32	12,133.1	1,025.22	8.79
2,886.20	4,091.69	4,044.0	47.69	1.17	3.1	4,924.12	4,784.1	140.02	2.84
1,842.17	2,591.08	2,526.3	64.78	2.50	3.2	3,108.09	2,930.4	177.69	5.72
3,804.85	5,624.63	5,576.1	48.53	.86	3.3	6,543.68	6,408.3	135.38	2.07
8,533.22	12,307.40	12,146.4	161.00	1.31	3.T	14,575.89	14,122.8	453.09	3.11
1,908.86	2,567.17	2,544.6	22.57	.88	4.1	2,944.92	2,873.5	71.42	2.42
2,102.84	3,071.30	3,034.3	37.00	1.20	4.2	3,614.94	3,503.0	111.94	3.10
1,389.33	1,661.19	1,651.2	9.99	.60	4.3	1,774.23	1,744.4	29.83	1.68
5,401.03	7,299.66	7,230.1	69.56	.95	4.T	8,334.09	8,120.9	213.19	2.56
9,421.91	12,735.13	12,418.3	316.83	2.49	T.1	14,820.20	13,996.7	823.50	5.56
10,546.30	15,586.21	15,012.9	573.31	3.68	T.2	14,002.86	17,579.2	1,423.66	10.17
9,760.46	13,659.99	13,395.4	264.59	1.94	T.3	15,515.40	14,918.9	596.50	3.84
29,728.67	41,981.33	40,826.6	1,154.73	2.75	T.T	49,338.46	46,494.8	2,843.66	5.76

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL

TOTAL EXPENDITURES (In Millions of Dollars)

4.4.3b

Assumption - 1970 Nonpublic Enrollment Rates Perpetuated Without Change Through 1980

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 6	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 6	Dollar Difference	Percent Difference
$ 2,387.96	$ 4,928	$ 4,682	$ 246	4.99	1.1	$ 5,436	$ 4,966	$ 470	8.65
3,696.16	8,344	7,944	400	4.79	1.2	9,779	8,975	804	8.22
1,659.85	3,624	3,493	131	3.61	1.3	3,934	3,725	209	5.31
7,743.97	16,896	16,119	777	4.60	1.T	19,149	17,666	1,483	7.74
2,238.89	4,517	4,360	157	3.48	2.1	4,989	4,655	334	6.69
2,905.13	7,071	6,729	342	4.84	2.2	8,221	7,528	693	8.43
2,906.43	5,837	5,653	184	3.15	2.3	6,384	6,037	347	5.44
8,050.45	17,425	16,742	683	3.92	2.T	19,594	18,220	1,374	7.01
2,886.20	5,791	5,725	66	1.14	3.1	6,726	6,563	213	3.17
1,842.17	3,716	3,626	90	2.42	3.2	4,264	4,051	213	5.00
3,804.85	7,898	7,829	69	.87	3.3	3,932	3,770	162	1.81
8,533.22	17,405	17,180	225	1.29	3.T	19,922	19,384	538	2.70
1,908.86	3,849	3,819	30	.78	4.1	4,247	4,172	75	1.77
2,102.84	4,708	4,653	55	1.15	4.2	5,304	5,172	132	2.49
1,389.33	2,587	2,574	13	.50	4.3	2,691	2,657	34	1.26
5,401.03	11,144	11,046	98	.88	4.T	12,242	12,001	241	1.97
9,421.91	19,085	18,586	499	2.61	T.1	21,398	20,356	1,042	4.87
10,546.30	23,839	22,952	887	3.72	T.2	27,568	25,726	1,842	6.68
9,760.46	19,946	19,549	397	1.99	T.3	21,941	21,189	752	3.43
29,728.67	62,870	61,087	1,783	2.84	T.T	70,907	67,271	3,636	5.13

Increased unionization of teachers has changed the pattern in which salary level adjustments are being made.

The mix of teachers of various age experience categories was found to be markedly different in different places thereby affecting total instructional costs.

The ratios of students to teachers has not remained static over time, and these ratios have not seemed to change with any discernible pattern.

There appeared to be a wide range of per pupil expenditure levels across various kinds of school districts in various states and regions in the country.

In addition, continued increases in shifts of enrollment into high spending districts have tended to make trend line projections unreliable.

SPECIAL EDUCATIONAL NEEDS

Another complicating factor in attempting to project educational expenditures in regard to educational needs in the various types of school systems throughout the country is how to predict the amount required for varying types of programs. In many places, special programs such as handicapped programs, vocational programs, compensatory programs or other special programs are not being supported. It was our feeling at the outset that a sizeable portion of educational expenditures that would be required to deliver the desired levels of education has not been recorded historically due to budget limitations in many places.

4.5 POSSIBLE CHANGES IN CLASS SIZE

4.5.1 SIMULATION 7 - DECREASING CLASS SIZE

Joseph Froomkin projected pupil teacher ratios to decline on the average from 23.7 to 1 in 1970 to 20.9 to 1 in 1975 and 20.0 to 1 in 1980. In order to test the sensitivity of this projection vis-a-vis added cost possibilities, class size reductions as projected in 1980 in the basic projection were assumed to have been obtained in 1975. This reduced class size in 1975 by 4.3%. The impact on cost was relatively substantial considering the relatively small class size reductions introduced.

Reflected Increase in Current Expenditures	1975	1980
Dollar Increased (in millions)	$1,507.2	$586.1
Percentage Increase	3.59%	1.19%

4.5.2 SIMULATION 8 - INCREASING CLASS SIZE

In order to determine what the potential savings would be if the trend in class size was reversed and class size that prevailed 5 and 10 years ago were reestablished over the next ten years, teacher ratios were increased by 11.44% in 1975 and 20.0% in 1980.

AVERAGE CLASS SIZE

1965-66	30.1	1957-58	32.4
1970-71	27.0	1970-71	27.0
Difference	3.1		5.4
1975 Adjustment	11.44%	1980 Adjustment	20.00%

The effect of this class size increase would be to reduce current expenditures. When compared to the basic model projection with decreasing class size, the potential savings projected proved to be material.

Reflected Decrease in Current Expenditures	1975	1980
Dollar Decrease (in millions)	$4,449.6	$8,303.0
Percentage Decrease	10.60%	16.83%

The following tables present the details of these two simulations when compared with the basic model projections of current expenditures.

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL
CURRENT EXPENDITURES (In Millions of Dollars)
Assumption - Increase Average Class Size

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 8	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 8	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 2,853.82	$ -330.37	-10.38	1.1	$ 3,640.73	$ 3,062.41	$ -578.32	-15.88
3,696.16	5,553.32	4,973.00	-580.32	-10.45	1.2	6,903.31	5,713.41	-1,189.90	-17.24
1,659.85	2,413.50	2,158.31	-255.19	-10.57	1.3	2,726.12	2,316.41	-409.71	-15.03
7,743.97	11,151.01	9,985.13	-1,165.88	-10.46	1.T	13,270.16	11,092.23	-2,177.93	-16.41
2,238.89	2,892.08	2,648.72	-243.36	-8.41	2.1	3,310.43	2,772.49	-537.94	-16.25
2,905.13	4,370.51	3,927.24	-443.27	-10.14	2.2	5,376.52	4,402.23	-974.29	-18.12
2,906.43	3,960.67	3,488.89	-471.78	-11.91	2.3	4,471.37	3,714.19	-756.88	-16.93
8,050.45	11,223.26	10,064.85	-1,158.41	-10.32	2.T	13,158.32	10,888.91	-2,269.41	-17.25
2,886.20	4,091.69	3,631.73	-459.96	-11.24	3.1	4,924.12	4,061.10	-863.02	-17.53
1,842.17	2,591.08	2,304.49	-286.59	-11.06	3.2	3,108.09	2,563.91	-544.18	-17.51
3.804.85	5.624/63	4.970.15	-654.48	-11.64	3.3	6,543.68	5,457.38	-1,086.30	-16.60
8,533.22	12,307.40	10,906.37	-1,401.03	-11.38	3.T	14,575.89	12,082.39	-1,086.30	-7.45
1,908.86	2,567.17	2,286.03	-281.14	-10.95	4.1	2,944.92	2,453.62	-491.30	-16.68
2,102.84	3,071.30	2,717.15	-354.15	-11.53	4.2	3,614.94	2,971.52	-643.42	-17.80
1,389.33	1,661.19	1,572.25	-88.94	-5.35	4.3	1,774.23	1,545.87	-228.36	-12.87
5,401.03	7,299.66	6,575.43	-724.23	-9.92	4.T	8,334.09	6,971.01	-1,363.08	-16.36
9,421.91	12,735.13	11,420.30	-1,314.83	-10.32	T.1	14,820.20	12,349.62	-2,470.58	-16.67
10,546.30	15,586.21	13,921.88	-1,664.33	-10.68	T.2	19,002.86	15,651.07	-3,351.79	-17.64
9,760.46	13,659.99	12,189.60	-1,470.39	-10.76	T.3	15,515.40	13,033.85	-2,481.55	-15.99
29,728.67	41,981.33	37,531.78	-4,449.55	-10.60	T.T	49,338.46	41,034.54	-8,303.92	-16.83

NATIONAL EDUCATIONAL FINANCE PLANNING MODEL

CURRENT EXPENDITURES (In Millions of Dollars)

4.5.1

Assumption-Decrease Average Class Size 1975 Student/Teacher Ratios = 1980 Student/Teacher Ratios

1970 Basic Projection	1975 Basic Projection	1975 Simulation No. 7	Dollar Difference	Percent Difference	Region Code	1980 Basic Projection	1980 Simulation No. 7	Dollar Difference	Percent Difference
$ 2,387.96	$ 3,184.19	$ 3,288.02	$ 103.83	3.26	1.1	$ 3,640.73	$ 3,679.53	$ 38.80	1.07
3,696.16	5,553.32	5,745.13	191.81	3.45	1.2	6,903.31	6,979.34	76.03	1.10
1,659.85	2,413.50	2,492.13	78.63	3.26	1.3	2,726.12	2,755.62	29.50	1.08
7,743.97	11,151.01	11,525.28	374.27	3.36	1.T	13,270.16	13,414.49	144.33	1.09
2,238.89	2,892.08	2,991.03	98.95	3.42	2.1	3,310.43	3,347.82	37.39	1.13
2,905.13	4,370.51	4,613.43	242.92	5.56	2.2	5,376.52	5,474.31	97.79	1.82
2,906.43	3,960.67	4,091.84	131.17	3.31	2.3	4,471.37	4,521.14	49.77	1.11
8,050.45	11,223.26	11,696.30	473.04	4.21	2.T	13,158.32	13,343.27	184.95	1.41
2,886.20	4,091.69	4,233.25	141.56	3.46	3.1	4,924.12	4,980.96	56.84	1.11
1,842.17	2,591.08	2,682.47	91.39	3.53	3.2	3,108.09	3,144.58	36.49	1.15
3,804.85	5,624.63	5,832.51	207.88	3.70	3.3	6,543.68	6,625.47	81.79	1.17
8,533.22	12,307.40	12,748.23	440.83	3.58	3.T	14,575.89	14,751.01	175.12	1.20
1,908.86	2,567.17	2,643.73	76.56	2.98	4.1	2,944.92	2,973.53	28.61	1.25
2,102.84	3,071.30	3,163.01	91.71	2.99	4.2	3,614.24	3,649.72	34.78	.97
1,389.33	1,661.19	1,711.99	50.80	3.06	4.3	1,774.23	1,792.52	18.29	.96
5,401.03	7,299.66	7,518.73	219.07	3.00	4.T	8,334.09	8,415.77	81.68	.98
9,421.91	12,735.13	13,156.03	420.90	3.31	T.1	14,820.20	14,981.84	161.64	1.09
10,546.30	15,586.21	16,204.04	617.83	3.96	T.2	14,002.86	19,247.95	245.09	1.75
9,760.46	13,659.99	14,128.47	468.48	3.43	T.3	15,515.40	15,694.75	179.35	1.16
29,728.67	41,981.33	43,488.54	1,507.21	3.59	T.T	49,338.46	49,924.54	586.08	1.19

4.6 DELIVERY OF SIMILAR LEVELS OF EDUCATIONAL SERVICES

4.6.1 SIMULATION 9 - REGIONAL APPLICATION UNIFORM SALARY SCHEDULES

The purpose of this simulation was to estimate the amount required to bring salaries in urban, suburban or rural districts within a region up to the regional average. The following table indicates the average teacher salaries estimated for each 'cell' used in the basic projection and the regional average that was adopted in simulation 9.

AVERAGE TEACHER SALARIES

	Central Cities	Other SMSA	Non SMSA	Regional Average
Northeast				
1975	10,570	9,944	9,080	9,913
1980	11,303	10,634	9,710	10,599
North Central				
1975	10,384	9,972	8,849	9,659
1980	11,229	10,778	9,565	10,447
South				
1975	9,084	9,230	8,172	8,694
1980	10,162	10,325	9,141	9,753
West				
1975	10,487	10,363	9,127	10,099
1980	11,043	10,913	9,613	10,658

The results were as follows:

(Millions of Dollars)

	1975			1980		
	Sim. 9	Basic Model Proj.	Diff.	Sim. 9	Basic Model Proj.	Diff.
Northeast						
Central Cities	3,046	3,184		3,441	3,640	
Other SMSA	5,541	5,553		6,801	6,903	
Non SMSA	2,574	2,413	161	2,869	2,726	143
North Central						
Central Cities	2,748	2,892		3,097	3,310	
Other SMSA	4,274	4,370		5,196	5,376	
Non SMSA	4,229	3,960	269	4,696	4,471	225
South						
Central Cities	3,956	4,091		4,701	4,924	
Other SMSA	2,478	2,591		2,436	3,108	
Non SMSA	5,906	5,624	282	6,782	6,543	239
West						
Central Cities	2,504	2,567		2,835	2,944	
Other SMSA	3,091	3,071		3,502	3,614	
Non SMSA	1,789	1,661	128	1,884	1,774	110
Total U.S.			$840			$717

Thus, the amount required to bring all teachers up to the regional average teacher salary in 1975 would be 840 million dollars and 717 million dollars in 1980. This cost would necessarily assume that those teachers earning greater than the average would not have their salaries reduced.

4.6.2 SIMULATION 10 - APPLICATION OF UNIFORM STAFFING RATIOS

The purpose of this simulation was to estimate the amount required to bring staffing ratios in all 'cell' categories up to the U.S. average. The following table indicates the average staffing ratios used in each grade level in each region and in the nation as a whole. In actuality the model uses unique ratios for each grade level within each 'cell.'

STAFFING RATIOS

Year	Northeast	North Central	South	West	Total
1970					
Pre-Primary	43.4	49.2	37.3	39.4	43.0
Elementary	23.4	23.7	25.4	24.1	24.2
Secondary	19.9	21.2	22.1	22.4	21.4
1975					
Pre-Primary	40.0	42.3	35.2	35.6	38.8
Elementary	21.4	20.4	23.5	21.8	21.8
Secondary	18.6	20.0	19.8	20.3	19.6
1980					
Preprimary	37.7	40.4	33.7	34.0	36.9
Elementary	20.2	19.3	22.2	20.9	20.7
Secondary	17.9	18.9	18.7	19.2	18.6

The results obtained were as follows:

	1975			1980		
	Sim. 10	Basic Model Proj.	Diff.	Sim. 10	Basic Model Proj.	Diff.
Northeast						
Central Cities	3,111	3,184		3,504	3,640	
Other SMSA	5,403	5,553		6,600	6,903	
Non SMSA	2,358	2,413		2,619	2,726	
North Central						
Central Cities	3,075	2,892	183	3,417	3,310	107
Other SMSA	4,443	4,370	77	5,300	5,376	
Non SMSA	3,706	3,960		4,084	4,471	
South						
Central Cities	4,313	4,091	222	5,117	4,924	193
Other SMSA	2,668	2,561	107	3,153	3,108	45
Non SMSA	5,711	5,624	87	6,520	6,543	
West						
Central Cities	2,678	2,567	111	3,620	2,944	682
Other SMSA	3,146	3,071	75	3,651	3,614	37
Non SMSA	1,572	1,661	___	1,632	1,774	___
Total U. S.			$862			$1,064

Although these estimates give some insights as to the potential costs of interstate equalization they could be considerably understated. Due to the fact that 'cells' and not states were used, a good deal of averaging took place. It should also be noted that the requirements from simulations 9 and 10 are not additive in that combined adjustment of salary levels and staffing ratios would produce different results.

4.7 PROJECTION OF LOCAL, STATE, AND FEDERAL EDUCATIONAL REVENUES

As discussed previously, educational revenues were projected by deriving statewide revenues from state and local sources and distributing such revenues to school districts based on percentage shares spent on education in each type of district. Federal revenues were estimated by maintaining the current percentage of federal participation and applying this percentage to the total of state and local revenues.

The derived state and local revenues for the base year were compared to published sources on a state by state basis. Total state revenues for the U.S. were within two percent of actual, but local revenues varied to a much greater degree. (Refer to Exhibit 2.) The major reason for the wide variation of local revenues was due to the approximations used for elasticities of market values of property.

When the composition of educational revenues was analyzed, it was evident that central cities were more dependent on nonlocal revenue sources than were the other residence types. (Refer to Exhibit 3.) Perhaps this dependency on nonlocal revenue is due to the need of central cities to support other municipal services as well as education.

Exhibit 4 displays both the estimated revenues and estimated current expenditures by type of residence within region for 1970, 1975 and 1980. Only the basic projections have been used for this comparison. In general, the central cities appear more likely to

have a shortage of funds available for education than do the other residence types. This condition could be expected if no significant changes were made in the method by which revenues are raised.

It should be noted that the revenue projections ha deliberately been made independent of expenditure projections. Obviously taxing authorities would not allow revenues to be allocated well in excess of budgeted expenditures. Alternatively, budgets would not be allowed to exceed available revenues. The addition of 'budget constraints' into the model requires an extensive familiarity with the complex budgeting process, and has been excluded from the current research effort. Therefore, no simulations testing alternative revenue projections were analyzed. Only the basic revenue projection was used for measurement of disparity under alternative projections of educational need.

COMPARISON OF BASE YEAR STATE AND LOCAL TAXES WITH MODEL ESTIMATES

State Code	Total Local Revenue				Total State Revenue			
	Model Est.	Actual*	Differences $	%	Model Est.	Actual*	Differences $	%
1 Connecticut	685	872			841	840		
2 Maine	155	190			196	252		
3 Massachusetts	1,339	1,665			1,772	1,568		
4 New Hampshire	124	174			112	130		
5 New Jersey	1,974	2,182			1,742	1,605		
6 New York	6,296	7,102			7,336	6,904		
7 Pennsylvania	2,300	2,493			3,118	3,119		
8 Rhode Island	250	179			297	277		
9 Vermont	70	83			135	165		
Northeast	13,193	14,940	-1,747	-11%	15,549	14,860	689	4%
10 Illinois	2,572	3,105			2,183	3,166		
11 Indiana	954	1,118			1,141	1,275		
12 Iowa	671	784			747	757		
13 Kansas	522	607			525	542		
14 Michigan	1,997	2,331			3,089	2,770		
15 Minnesota	977	942			1,282	1,243		
16 Missouri	907	1,057			859	936		
17 Nebraska	394	448			305	335		
18 North Dakota	113	146			188	194		
19 Ohio	2,301	2,620			1,874	2,112		
20 South Dakota	157	182			136	159		
21 Wisconsin	960	1,145			1,494	1,556		
North Central	12,525	14,485	-1,960	-13%	13,823	15,045	-1,222	-8%
22 Alabama	473	483			750	787		
23 Arkansas	201	243			414	406		
24 Delaware	71	88			233	243		
25 Dist. of Col.	368	449			0	0		
26 Florida	1,363	1,499			1,424	1,610		
27 Georgia	707	858			1,100	1,084		
28 Kentucky	399	429			859	832		
29 Louisiana	524	559			1,116	1,129		
30 Maryland	929	1,046			1,113	1,251		
31 Mississippi	185	303			551	567		
32 North Carolina	533	602			1,418	1,381		
33 Oklahoma	399	416			684	690		
34 South Carolina	219	269			634	641		
35 Tennessee	570	634			857	808		
36 Texas	1,887	2,228			2,129	2,451		
37 Virginia	668	800			1,245	1,185		
38 West Virginia	270	204			420	455		
South	9,771	11,110	-1,339	-12%	14,947	15,520	- 573	-3%
39 Alaska	32	70			420	1,081		
40 Arizona	304	385			532	573		
41 California	4,653	7,487			7,211	6,260		
42 Colorado	538	588			589	606		
43 Hawaii	96	130			373	405		
44 Idaho	80	136			197	185		
45 Montana	160	184			164	167		
46 Nevada	148	168			145	170		
47 New Mexico	133	144			351	384		
48 Oregon	476	548			595	561		
49 Utah	121	192			284	321		
50 Washington	694	786			1,151	1,217		
51 Wyoming	60	94			109	114		
West	7,495	10,912	-3,417	-31%	12,121	12,049	72	1%
Total U. S.	42,984	51,447	-8,463	-16%	56,440	57,474	-1,034	-2%

*Governmental Finances in 1969-70
U. S. Dept. of Commerce, Bureau of the Census, Table 17

Exhibit 2

ESTIMATED COMPOSITION OF EDUCATIONAL REVENUES
(In Millions of Constant 1967 Dollars)

Type of Residence	Local		State		Federal		Total	
	$	%	$	%	$	%	$	%
Central Cities								
1970	2,540	35.7	3,964	55.8	601	8.5	7,105	100
1975	3,178	36.2	4,846	55.3	742	8.5	8,766	100
1980	3,908	36.5	5,887	55.0	909	8.5	10,744	100
Other SMSA								
1970	11,794	67.6	4,802	27.5	850	4.9	17,446	100
1975	14,851	67.4	6,095	27.7	1,078	4.9	22,024	100
1980	18,431	67.1	7,673	28.0	1,353	4.9	27,457	100
Non-SMSA								
1970	4,831	42.7	5,398	47.8	1,076	9.5	11,305	100
1975	5,991	43.7	6,397	46.7	1,308	9.6	13,696	100
1980	7,365	44.7	7,515	45.7	1,581	9.6	16,461	100
Total U.S.								
1970	19,165	53.4	14,164	39.5	2,527	7.1	35,865	100
1975	24,020	54.0	17,338	39.0	3,128	7.0	44,486	100
1980	29,704	54.4	21,075	38.6	3,843	7.0	54,622	100

EXHIBIT 3

ADEQUACY OF EDUCATIONAL REVENUES TO MEET ESTIMATED NEEDS
(In Millions of Constant 1967 Dollars)

1970

REGION:	Local Revenue	State Revenue	Local & State Revenue	Current Exp.	Diff. Between Local & State Rev.&Cur.Exp.	Total Rev.	Diff. Between Total Rev.&Cur.Exp.
Northeast							
Central Cities	1,230	1,108	2,338	2,387	(49)	2,517	(29)
Other SMSA	3,438	1,695	5,133	3,695	1,438	5,297	1,602
Non-SMSA	836	1,090	1,926	1,659	267	2,011	352
Total	5,504	3,893	9,397	7,741	1,656	9,825	2,084
North Central							
Central Cities	522	709	1,231	2,238	(1,007)	1,333	(906)
Other SMSA	3,972	1,229	5,201	2,904	2,297	5,398	2,494
Non-SMSA	1,857	1,198	3,055	2,906	149	3,251	345
Total	6,351	3,136	9,487	8,048	1,439	9,982	1,934
South							
Central Cities	441	1,218	1,659	2,886	(1,227)	1,863	(1,022)
Other SMSA	2,148	772	2,920	1,842	1,078	3,202	1,360
Non-SMSA	1,550	2,343	3,893	3,804	89	4,530	726
Total	4,139	4,333	8,472	8,532	(60)	9,595	1,063
West							
Central Cities	347	929	1,276	1,908	(632)	1,392	(516)
Other SMSA	2,236	1,106	3,342	2,102	1,240	3,549	1,447
Non-SMSA	588	767	1,355	1,389	(34)	1,513	124
Total	3,171	2,802	5,973	5,399	574	6,454	1,055
U.S. Total							
Central Cities	2,540	3,964	6,504	9,419	(2,915)	7,105	(2,314)
Other SMSA	11,794	4,802	16,596	10,543	6,053	17,446	6,903
Non-SMSA	4,831	5,398	10,229	9,758	471	11,305	1,547
Total	19,165	14,164	33,329	29,720	3,609	35,856	6,136

EXHIBIT 4

ADEQUACY OF EDUCATIONAL REVENUES TO MEET ESTIMATED NEEDS
(In Millions of Constant 1967 Dollars)

1975

REGION:	Local Revenue	State Revenue	Local & State Revenue	Current Exp.	Diff. Between Local & State Rev.&Cur.Exp.	Total Rev.	Diff. Between Total Rev.&Cur.Exp.
Northeast							
Central Cities	1,487	1,279	2,766	3,184	(418)	2,977	(207)
Other SMSA	4,127	2,135	6,262	5,553	709	6,461	908
Non-SMSA	1,016	1,247	2,263	2,413	(150)	2,361	(52)
Total	6,630	4,661	11,291	11,150	141	11,799	649
					(1,372)		
North Central							
Central Cities	647	873	1,520	2,892	2,111	1,644	(1,248)
Other SMSA	4,885	1,597	6,482	4,371	(243)	6,727	2,357
Non-SMSA	2,250	1,468	3,718	3,961		3,958	(3)
Total	7,782	3,938	11,720	11,224	496	12,329	1,105
South							
Central Cities	577	1,515	2,092	4,092	(2,000)	2,348	(1,743)
Other SMSA	2,782	930	3,712	2,591	1,121	4,069	1,478
Non-SMSA	1,962	2,774	4,736	5,625	(889)	5,511	(114)
Total	5,321	5,219	10,540	12,308	(1,768)	11,928	(380)
West							
Central Cities	467	1,179	1,646	2,567	(921)	1,797	(771)
Other SMSA	3,057	1,433	4,490	3,071	1,419	4,767	1,695
Non-SMSA	763	908	1,671	1,661	10	1,866	205
Total	4,287	3,520	7,807	7,299	508	8,430	1,131
U.S. Total							
Central Cities	3,178	4,846	8,024	12,735	(4,711)	8,766	(3,969)
Other SMSA	14,851	6,095	20,946	15,586	5,360	22,024	6,438
Non-SMSA	5,991	6,397	12,388	13,660	(1,272)	13,696	36
Total	24,020	17,338	41,358	41,981	(623)	44,486	2,505

EXHIBIT 4 (cont'd.)

ADEQUACY OF EDUCATIONAL REVENUES TO MEET ESTIMATED NEEDS
(In Millions of Constant 1967 Dollars)

1980

	Local Revenue	State Revenue	Local & State Revenue	Current Exp.	Diff. Between Local & State Rev.&Cur.Exp.	Total Rev.	Diff. Between Total Rev.&Cur.Exp.
Northeast							
Central Cities	1,792	1,483	3,275	3,594	(319)	3,525	(70)
Other SMSA	5,012	2,670	7,682	6,816	866	7,926	1,110
Non-SMSA	1,246	1,410	2,656	2,691	(35)	2,772	81
Total	8,050	5,563	13,613	13,101	512	14,225	1,122
North Central							
Central Cities	791	1,036	1,827	3,255	(1,428)	1,976	(1,279)
Other SMSA	5,961	1,998	7,959	5,310	2,649	8,261	2,951
Non-SMSA	2,712	1,728	4,440	4,394	46	4,725	330
Total	9,464	4,762	14,226	12,959	1,267	14,962	2,003
South							
Central Cities	725	1,895	2,620	4,850	(2,230)	2,941	(1,908)
Other SMSA	3,504	1,175	4,679	3,062	1,617	5,130	2,068
Non-SMSA	2,450	3,324	5,774	6,445	(671)	6,719	274
Total	6,679	6,394	13,073	14,357	(1,284)	14,790	433
West							
Central Cities	600	1,473	2,073	2,901	(828)	2,262	(639)
Other SMSA	3,954	1,830	5,784	3,558	2,226	6,140	2,582
Non-SMSA	957	1,053	2,010	1,748	262	2,245	497
Total	5,511	4,356	9,867	8,207	1,660	10,647	2,440
U.S. Total							
Central Cities	3,908	5,887	9,795	14,600	(4,805)	10,704	(3,896)
Other SMSA	18,431	7,673	26,104	18,746	7,358	27,457	8,711
Non-SMSA	7,365	7,515	14,880	15,278	(398)	16,461	1,183
Total	29,704	21,075	50,779	48,624	2,155	54,622	5,998

EXHIBIT 4 (cont'd.)

5. FUTURE MODEL DEVELOPMENT

Previously it was stated that the model was developed as a "Prototype", with the idea that it would act as "a guide for continuing comprehensive model building efforts by the appropriate agencies." These agencies would include state education agencies as well as federal education agencies. Certain enhancements were eluded to as being possibilities for such efforts. They were:

(1) Adding of data base update capability;

(2) Adding a conversational capability to provide flexibility and ease of use in testing educational proposals;

(3) Expanding model structure to include feedback relationships;

(4) Expanding model boundaries to include other supporting models and refining present model structure.

In this section we have tried to elaborate on some of these possibilities.

ADDING A DATA BASE UPDATE CAPABILITY

Appendix II describes in some detail the amount of data that were necessary in order to run the model. The footnotes to Appendix II enumerate the many and varied sources from which this data was developed. The amount of effort to update this data and the amount of effort required to change the data files used in the model is substantial. In order to overcome this handicap we envision having to develop documents, procedures and programs through which data collection and refinement can take place. In addition, having a data editor program which would allow the model data base to be accessed and changed in a variety of ways would facilitate corrections and updates.

ADDING A CONVERSATIONAL CAPABILITY TO PROVIDE FLEXIBILITY AND EASE OF USE IN TESTING EDUCATIONAL PROPOSALS

We have illustrated the types of educational proposals which may be presented to the model for evaluation and have documented several projections that were run by changing various input assumptions. In order for the model to accommodate these changes either the data bases have to be accessed and changed or the model has to be reprogrammed to reflect the new formulation. If a conversational capability were added, the user could be queried as to what he would like to change in the data base, what type of output he would like displayed, what set of formulation options he would like to use and how discrete or continuous he would like the calculations to be.

EXPANDING THE MODEL STRUCTURE TO INCLUDE FEEDBACK RELATIONSHIPS

Some feedback processes could add immeasurably to the usefulness of the model. The two feedback structures we felt would most enhance the model's usefulness were:

(1) A feedback structure controlling growth in educational needs and financial support;

(2) A mechanism of displacing educational financing from one government level to another.

In order to build in such structures, data gathering and analysis of quantitative as well as qualitative data would have to be undertaken. In addition, extensive experimentation with the resulting mechanism would be required to test sensitivities of the many interlocking behavioral assumptions being made.

EXPANDING MODEL BOUNDARIES TO INCLUDE OTHER SUPPORTING MODELS AND REFINING PRESENT MODEL STRUCTURE

The model could be expanded to include a description of the process of education through all levels, a tracing of the flow of trained manpower into the economy and a measuring of economic returns of various educational programs.

We also envision extending the model by having sub-models describing higher education and nonpublic education. In addition models could be built to predict demands of other governmental services and their impact on available revenues.

The model could also be refined to represent revenue sources more exactly. In the present model, revenue has been represented by measuring past elasticities of taxes with various indicators of income and wealth. The elasticity approach to forecasting revenue is quite useful for short-term forecasting. However, when planning for periods of 10 years or more, the use of elasticities may be inadequate. Potentially, a much more effective and correct representation and forecast of tax revenue is to represent in some detail the tax law itself. Then as indicators of wealth and income change, taxes will be forecasted more accurately and, more importantly, the impact of changes in tax law can be tested.

The model could be made to interface with other models. Some of the data used in this model such as migration rates between residence type and region, economic projections, birth rates, busing costs, administrative

costs, classroom utilization, now derived from analysis, could in part be developed within a set of interfacing models.

For example, economic models showing different residence types might be used to forecast migration between residences. Similarly, demographic and economic models of different regions might be used to forecast migration between regions. Models are available which forecast changes in fundamental economic time series such as gross national product, personal income, and government expenditures; and, they could be used to forecast economic variables which are inputs to the educational finance model.

Future model development could be a considerable undertaking. However the rewards from such an effort could also be considerable. Our hope is that the description of future development will encourage extensive construction and use of educational planning models.

APPENDIX I

1. MODEL FORMULATION

2. MODEL INPUT DATA

1. MODEL FORMULATION

The basic equations used in the model are presented in this section. The general notation is similar to the language in which the model is written, namely, Fortran. However, subscripts, rather than indices, are used in this presentation.

Each variable is defined directly beneath the equation in which it first appears. The subscript "i" denotes residence type and the subscript "t" denotes the current time period. These two subscripts appear throughout.

1.1 EDUCATIONAL NEEDS SECTOR

1.1.1. POPULATION SUB-SECTOR

EQ.1 $POP_{ijt} = POP_{ijt-1} + DT * (XMG_{ijt-1} + AA_{ijt-1} - AA_{ij+1t-1})$

WHERE:

POP_{ijt} = Regional population for age level 'j'
For type of residence 'i', period 't'

DT = Fraction of period (NOTE: Period equals 1 year)

XMG_{ijt} = Number of persons migrating in or out of type of residence 'i', for each age level 'j', for each period 't'

AA_{ijt} = Number of persons from age level 'j-1' entering age level 'j' in period 't'

AA_{ij+1t} = Number of persons from age level 'j' entering age level 'j + 1' in period 't'

EQ.2 $AA_{ij+1t} = POP_{ijt} + A_j$

WHERE:

A_j = Percentage of population of age level 'j' entering age level 'j+1' each year.

EQ.3 $XMG_{ijt} = POP_{ijt} * XNMG_{ij}$

WHERE:

$XNMG_{ijt}$ = Net migration rate in or out of type of residence 'i', for each age level 'j', for period 't'.

EQ.4 $TPOP_{it} = \sum_{j=1}^{8} POP_{ijt}$

WHERE:

$TPOP_{it}$ = Total population in region i, for age levels 1-8

The age levels used are:

j = 1 = New borns to 2 year olds:

j = 2 = 3 & 4 year olds,

j = 3 = 5 year olds;

j = 4 = 6 to 9 year olds,

j = 5 = 10 to 13 year olds;

j = 6 = 14 year olds;

j = 7 = 15 to 19 year olds;

j = 8 = Those over 19 years of age,

RESIDENCE CATEGORIES	REGIONS			
	NE	NC	S	W
Central city,	1	4	7	10
Outside central city,	2	5	8	11
Outside SMSA.	3	6	9	12

1.1.2 ENROLLMENTS SUB-SECTOR

EQ.5 $GPOP_{imt} = GPOP_{imt} + POP_{ijt} * R_{ij-1mt}$

WHERE:

$GPOP_{imt}$ = Total school enrollment for grade levels 'm' = 1, through 5, for type of residence 'i', year 't'

R_{ijmt} = Percentage of children of age level 'j' enrolled in grade level 'm' in year 't' for type of residence 'i'

EQ.5.1 $GPOP_{7m} = GPOP_{8m} * .277 + GPOP_{7m}$

EQ.5.2 $GPOP_{8m} = GPOP_{8m} * 1 - .277$

EQ.5.1 $GPOP_{10m} = GPOP_{11m} * .132 + GPOP_{10m}$

EQ.5.4 $GPOP_{11m} = GPOP_{11m} * 1 - .132$

WHERE:

$GPOP_{7m}$ = Adjusted enrollments cc-South

$GPOP_{8m}$ = Adjusted enrollments occ-South

$GPOP_{10m}$ = Adjusted enrollments cc-West

$GPOP_{11m}$ = Adjusted enrollments occ-West

EQ.6 $GPOP_{im+5t} = GPOP_{imt} * RNP_{imt}$

WHERE:

$GPOP_{im+5t}$ = Non-public enrollment for grade levels 'm' = 6 through 8, for type of residence 'i', year 't'.

RNP_{iml} = Percentage of total enrollment in non-public schools for grade levels 'm' = 1 through 3, for type of residence 'i', year 't'.

EQ.7 $GPOP_{i,m+9t} = GPOP_{imt} * RTG_{imt}$

WHERE:

$GPOP_{imt}$ = Target group enrollments for target group 'm' for type of residence 'i', year 't' for grade levels 'm' = 1 through 3.

RTG_{imt} = Percentage of total enrollment in target population 'm', type of residence 'i', year t.

EQ.8 $GPOP_{imt} = GPOP_{imt} - GPOP_{im+5t}$

WHERE:

$GPOP_{imt}$ = Public elementary & secondary enrollment by grade level

EQ.9 $TGPOP_{it} = \sum_{m=1}^{9} GPOP_{imt}$

WHERE:

$TGPOP_{it}$ = Total enrollment all grades

EQ.10 $DGPOP_{i1t} = GPOP_{i1t} + GPOP_{i2t} + GPOP_{i3t} * (1-ESEA_i)$

WHERE:
$DGPOP_{i1t}$ = Public elementary school enrollment

EQ.11 $DGPOP_{i2t} = GPOP_{i4t} + GPOP_{i5t} + GPOP_{i3t} * ESEA_i$

WHERE:
$DGPOP_{i2t}$ = Public secondary school enrollment

$ESEA_i$ = Percentage of grades 7 & 8 in secondary school

The grade levels used are:

m = 1 = Public - Pre-primary (Nursery, Kindergarten);

m = 2 = Public - Primary (Grades 1 through 6);

m = 3 = Public - Middle Grades (Grades 7 & 8);

m = 4 = Public - Secondary (Grades 9 through 12);

m = 5 = Public - Special Schools;

m = 6 = Nonpublic - Pre-primary (N/K):

m = 7 = Nonpublic - Primary

m = 8 = Nonpublic - Secondary

m = 9 = Target Group 1 - Pre-primary

m = 10 = Target Group 1 - Primary

m = 11 = Target Group 1 - Secondary

1.1.3 TEACHER DEMAND SUB-SECTOR

EQ.12 $$DTDMD_{it} = \sum_{m=1}^{8} \frac{GPOP_{imt}}{DTSR_{imt}} + \sum_{m=9}^{11} \frac{GPOP_{im1}}{YDTSR_{imt}}$$

WHERE:
$DTDMD_{it}$ = Desired teacher demand - Total

$DTSR_{imt}$ = Desired student teacher ratio by grade level 'm' within region 'i'

$XDTSR_{imt}$ = Desired student teacher enrichment ratio target group 'm' within region 'i'.

1.1.4 TEACHER SUPPLY AND COST SUB-SECTOR

EQ.13 $FETS_{ijt} = FETS_{ijt} + DT * (PROMO_{ijt} - PROMO_{ij+1t} + ENTRY_{ijt-1} - EXIT_{ijt-1})$

WHERE:

$FETS_{ijt}$ = Public school teacher supply by age level 'j'

$PROMO_{ijt}$ = Number of teachers aging into age level 'j'

$PROMO_{ij+1t}$ = Number of teachers aging into next age level 'j + 1'

$ENTRY_{ijt}$ = Number of teachers entering age level 'j'.

(e.g., New hires or re-hires)

$EXIT_{ijt}$ = Number of teachers exiting age level 'j'

(e.g., Terminations or retirements)

EQ.14 $PROMO_{ij+1} = FETS_{ij1} * PR_j$

WHERE:

PR_j = Aging rate - age level 'j'

EQ.15 $ENTRY_{ijt} = FETS_{ijt} * ENT_j$

WHERE:

ENT_j = Entry rate - age level 'j'

EQ.16 $EXIT_{ijt} = FETS_{ijt} * EX_j$

EX_j = Exit rate - age level 'j'

EQ.17 $$TDIF_{it} = \sum_{j=1}^{6} (ENTRY_{ijt} - EXIT_{ijt})$$

WHERE:
$TDIF_{it}$ = Total difference in number of teachers entering and leaving teaching in year 't', type of residence 'i'

EQ.18 $$TFETS_{it} = \sum_{j=1}^{6} FETS_{ijt}$$

WHERE:
$TFETS_{it}$ = Total teacher supply - public schools

EQ.19 $$TSAL_{it} = \sum_{j=1}^{6} (FETS_{ijt} * (\frac{ATSAL_{ij1}}{AVETSL_{i1}} * AVETSL_{it} * FUDG_{i})$$

WHERE:
$AVETSL_{it}$ = Current year regional average teacher salary cost index

$AVETSL_{it}$ = Base year regional average teacher salary cost index

$ATSAL_{ij1}$ = Base year national average teachers salary for type of residence 'i', age - experience level 'j'

$FUDG_{i}$ = Other instruction costs as a percent of instructional salaries

EQ.20 $$PROMO_{ilt} = DTDMD_{it} - TFETS_{it} + PROMO_{i\,7\,t-1} + TDIF_{it}$$

WHERE:
$PROMO_{ilt}$ = New Hires

$PROMO_{i7t-1}$ = Teachers retired last year

The teacher age categories are:

j = 1 = Under 30 years of age;

j = 2 = 30 - 34 years old;

j = 3 = 35 - 39 years old;

j = 4 = 40 - 49 years old;

j = 5 = 50 - 59

j = 6 = 60 years of age and over

1.1.5 OTHER PERSONNEL REQUIREMENTS AND COSTS SUB-SECTOR

EQ.21 $OPD_{ijt} = TFETS_{it} * DOPR_{ijt} * FUDG_{i}$

WHERE:

OPD_{ijt} = Other personnel demand, type 'j'

$DOPR_{ijt}$ = Desired other personnel demand ratio

EQ.22 $OPC_{ijt} = OPD_{ijt} * TOPR_{ijt}$

WHERE:

OPC_{ijt} = Other personnel cost, type 'j'

$TOPR_{ijt}$ = Other personnel cost

EQ.23 $TOPC_{it} = \sum_{j=1}^{3} OPC_{ijt}$

WHERE:

$TOPC_{it}$ = Total other personnel cost

EQ.24 $TIPC_{it} = TOPC_{it} + TSAL_{it}$

WHERE:

$TIPC_{it}$ = Total instructional personnel costs

The other personnel categories are:

j = 1 = Supervisory

j = 2 = Non-Supervisory

j = 3 = Non-Professional

EQ.25 $TINEXP_{it} = TIPC_i * REAF_{i,2}$

WHERE:
$TINEXP_{it}$ = Other instructional expenditures

$REAF_{i,2}$ = Other instructional expenditures as a % of instruction salaries.

EQ.26 $ADMEXP_i = (TIPC_i + TINEXP_i) * REAF_{i,1}$

WHERE:
ADMEXP = Adminstration Expenditures

$REAF_{i,1}$ = Administration Exp. as a % of instructional expenditures

1.1.6 OTHER CURRENT EXPENDITURES SUB-SECTOR

EQ.27 $PSP_{it} = \sum_{m=1}^{5} GPOP_{imt}$

WHERE:
PSP_{it} = Total public school enrollment

EQ.28 $CEXP_{it} = \sum_{m=1}^{5} PPX_{im} * PSP_{it}$

WHERE:
$CEXP_{it}$ = Other current expenditures

PPX_{i1} = $PPOPR_i$ = Per-pupil cost of operation of plant

PPX_{i2} = $PPMCT_i$ = Per-pupil cost of maintenance of plant

PPX_{i3} = $PPATT_i$ = Per-pupil cost of attendance services

PPX_{i4} = $PPHLTH_i$ = Per-pupil cost of health services

$PPX_{i5} = PTRR_i * PPTCT_i$ = Per-pupil cost of transportation

EQ.29 $SALEXP_i = (PPX_{im} * PSP_{it} * REAF_{im}) + TIPC_i + (ADMEXP_i * REAF_{i10})$

WHERE:
$SALEXP_i$ = Expenditures for salaries

$REAF_{im=5-10}$ = % of expenditures for salaries

EQ.30 $RETFND_i = SALEXP_i * REAF_{i4}$

WHERE:
$RETFND_i$ = Retirement fund requirements

$REAF_{i4}$ = Contribution to retirement fund as a % of salaries

EQ.31 $TCEXP_i = CEXP_i + TIPC_i + TINEXP_i + ADMEXP_i + RETFND_i$

WHERE:
$TCEXP_i$ = Total current expenditures

1.1.7 CAPITAL EXPENDITURES SUB-SECTOR

EQ.32 $ESDIFF_{ijt} = DGPOP_{ijt} - XMPOP_{ijt}$

WHERE:
$ESDIFF_{ijt}$ = Positive difference in elementary and secondary pupil stations over smoothed average number of pupil stations

$DGPOP_{ijt}$ = Elementary and secondary school enrollment

$XMPOP_{ijt}$ = Smoothed average elementary and secondary school enrollment

EQ.33 $NCAPX_{it} = \sum_{j=1}^{2} ESDIFF_{ijt} * CPPS_{ijt}$

WHERE:
$NCAPX_{it}$ = New capital expenditure - New pupil stations

$CPPS_{ijt}$ = Cost per pupil station

EQ.34 $$RCAPX_{it} = \sum_{j=1}^{2} (DGPOP_{ijt} * CPPS_{ijt} * REPFCT_{i})$$

WHERE:
$RCAPX_{it}$ = Capital expenditures - replacements

$REPFCT_{i}$ = % of existing classrooms being replaced

EQ.35 $$CAPEXP_{it} = NCAPX_{it} + RCAPX_{it}$$

WHERE:
$CAPEXP_{it}$ = Total capital expenditures

1.1.8 DEBT SERVICE SUB-SECTOR

EQ.36 $$PRBOUT_{it} = CAPEXP_{it} * PCFBB$$

WHERE:
$PRBOUT_{it}$ = New borrowings - principal balance outstanding

PCFBB = Percentage of capital expenditures being debt financed

EQ.37 $$AVLPMT_{it} = \frac{AINTRT_{it}}{1-(1+AINTRT_{it})-AVLGTH_{it}} * PRBOUT_{it}$$

WHERE:
$AVLPMT_{it}$ = Average annual level payment of interest and principal

$AINTRT_{it}$ = Average annual interest rate

$AVLGTH_{it}$ = Average length of bond repayments

EQ.38 $$AVEINT_{it} = AINTRT_{it} * DT * PRBOUT_{it}$$

WHERE:
$AVEINT_{it}$ = Average annual interest repayment

EQ.39 $$CAPPMT_{it} = AVLPMT_{it} - AVEINT_{it}$$

WHERE:
$CAPPMT_{it}$ = Average annual capital repayment new borrowings

EQ.40 $PRBOUT_{it} = PRBOUT_{it} - CAPPMT_{it}$

WHERE:
$PRBOUT_{it}$ = New borrowings adjusted to end of year

EQ.41 $REPINT_{ij} = REPINT_{ij} + AVEINT_{il}$

WHERE:
$REPINT_{ij}$ = Annual total interest repayment for 'j'

t + 1 through 'j' = total length + 2

EQ.42 $REPRIN_{ij} = REPRIN_{ij} + CAPPMT_{il}$

WHERE: Annual total principal repayment for 'j' =

t + 1 through 'j' = total length + 2

EQ.43 $TPRBOT_{ij} = TPRBOT_{ij} + PRBOUT_{it}$

WHERE:
$TPRBOT_{ij}$ = Total principal balance outstanding

1.2 EDUCATIONAL REVENUE SECTOR

1.2.1 STATE TAX SUB-SECTOR

STATE PERSONAL INCOME AND SALES TAXES

EQ.1 $$USRPMV_t = BRPMV_{52} + (EFMV_{52} * \frac{PI_{52,1,t} - PI_{52,1,1}}{PI_{52,1,1}} * BRPMV_{52})$$

WHERE:

$USRPMV_t$ = Current year market value residential property - Total U.S.

$BRPMV_{52}$ = Base year market value residential property - Total U.S.

$EFMV_{52}$ = Elasticity factor for market value residential property - Total U.S.

$PI_{52.mt}$ = Total personal income (m=1) for total U.S. in year 't'

EQ.2 $$REV_{klt} = BREV_{kl} + (EFP_{kl} * \frac{PI_{kmt} - PI_{kml}}{PI_{kml}} * BREV_{kl})$$

WHERE:

REV_{klt} = Revenue from source l in year t, state k

EFP_{kl} = Elasticity factor for revenue source l, state k

PI_{kmt} = Economic time series 'm' used in projecting revenue source l, year t, state k

Three major sources of revenue are:

l = 1 = Personal income taxes

l = 2 = General sales taxes

l = 3 = Selective sales taxes, and

Economic time series = Total personal income

EQ.10 $TSRV_{kt} = TOSRV_{kt} + TMSRV_{kt} *$

WHERE:
$TSRV_{kt}$ = Total state revenue, state k

1.2.2 STATEWIDE LOCAL REVENUE SECTOR

PROPERTY TAX BASES

EQ.10 $EFFP_{kt} = (FPP_k/PIP_k) * TEFFP_t$

EQ.11 $PTBR_{ikt} = BPTBR_{kl} + EFRP_{kt} * (PI_{kmt} - PI_{kml}/PI_{kml}) * BPTBR_{kl}$

(m = 3 = Total earnings less government & agriculture)

EQ.12 $PTBC_{kt} = BPTBC_k + EFCP_{kt} * (PI_{kmt} - PI_{kml}/PI_{kml}) * BPTBC_k$

(m = 3 = Total earnings less government & agriculture)

EQ.13 $PTBF_{kt} = BPTB_k + EFFP_t * (PI_{kmt} - PI_{kml} / PI_{kml}) * BPTB_k)$

(m = 1 = Total personal income)

WHERE:
$PTBR_{jt}$ = Property tax base - resident non farm market value

$PTBC_{kt}$ = Property tax base - commercial and industrial market value

$PTBF_{kl}$ = Property tax base - farm mareket value

$EFRP_{kt}$ = Elasticity factor - residential non farm market value

$EFCP_{kt}$ = Elasticity factor - commercial and industrial market value

FPP_k = % increase in farm property, 1961 - 1970

PIP_k = % increase in personal income, 1961 - 1970

$TEFFP_t$ = Trend in elasticity factor - farm property

$EFFP_{kt}$ = Elasticity factor - farm property market value

PROPERTY TAX REVENUE

EQ.14 $SPTRV_{kt} = (PTBR_{kt} * YRPCT_k * TYRP_t) +$

$(PTBC_{kt} * YCPT_k * TYCP_t) +$

$$(PTBF_{kt} * YFPT_{k} * TYFP_{t})$$

WHERE:

$SPTRV_{kt}$ = Local property tax revenue, state k

$YRPT_{kt}$ = YIeld - resident non farm property tax

$YCPT_{kt}$ = Yield - Commercial and industrial property tax

$YFPT_{kt}$ = Yield - Farm property tax

$TYRP_{t}$ = Trend in yields - RP

$TYCP_{t}$ = Trend in yields - CP

$TYFP_{t}$ = Trend in yields - FP

EQ.15 $$TOLRV_{kt} = (BTLR_{k} - BSPTRV_{k}) * \left(\frac{PI_{kmt} - PI_{km}}{PI_{kml}}\right) + BTLR_{k} - BSRPTRV_{k}$$

(m = 1 = Total personal income)

WHERE:

$TOLRV_{kt}$ = Total other local revenue state 'k'

EQ.16 $$TLRV_{kt} = TOLRV_{kt} + SPTRV_{kt}$$

WHERE:

$TLRV_{kt}$ = Total local revenue, state 'k'

EQ.17 $$RLSMSA_{kt} = TLRV_{kt} * PSMSA_{k}$$

WHERE:

$RLSMSA_{kt}$ = SMSA portion of local revenue in state k

WHERE:

$RL_{rkt} = RLSMSA_{kt} * PCC_{k}$

EQ.18 RL_{rkt} = Local state-wide revenue by type of residence

r = 1, Center City SMSA

r = 2, Outside Center City SMSA

r = 3, Non-SMSA

PCC_{k} = Center City portion of local revenue in state k

4.2.3 REGIONAL ANALYSIS

SUBSCRIPT SUBSETS

STATES	REGIONS	TYPE OF RESIDENCE WITHIN REGION	TYPE OF RESIDENCE
k = 1 - 9,	n = 1;	i = 1 - 3;	j = 1 - 3
k = 10 - 21;	n = 2,	i = 4 - 6;	j = 1 - 3
k = 22 - 38;	n = 3,	i = 7 - 9;	j = 1 -3
k = 39 - 51,	n = 4;	i = 10 - 12,	j = 1 = 3

EQ.19 $EDLR_{jkt} = RL_{rkt} * PLER_{i} * TFLRE_{it}$

WHERE:

$EDLR_{jkt}$ = Educational revenues local sources for region 'i', type of residence 'j', state k

EQ.20 $TLEDR_{k} = \sum_{j=1}^{3} EDLR_{jkt}$

WHERE:

$TLEDR_{k}$ = Total local revenue by state

EQ.21 $TRLEDR_{n} = \sum_{k=n_1}^{n_2} TLEDR_{k}$

WHERE:

$TRLEDR_{n}$ = Total local revenue by region

EQ.22 $SEDR_{kt} = TSRV_{k} * PSER_{k} * TFSER_{kt}$

WHERE:

$SEDR_{kt}$ = State educational revenues k

$PSER_{kt}$ = % state revenues to education

$TFSER_{kt}$ = Trend factor in % state revenue to education

REGIONAL SUMMARY LOCAL REVENUES

EQ.23 $$RLEDR_{it} = \sum_{k=kl}^{k2} EDLR_{jkt} \text{ for } j = 1, 2, 3$$

WHERE:

$RLEDR_{it}$ = Regional local education revenue by type of residence within region

EQ.24 $$RSEDR_{nt} = \sum_{k=kl}^{k2} SEDR_{kt}$$

WHERE:

$RSEDR_{nt}$ = Regional state education revenue

DISTRIBUTION OF STATE REVENUES TO TYPES OF RESIDENCE

EQ.25 $$TWENR_{nt} = \sum_{i=1}^{3} TGPOP_{it} * WF_{i}$$

WHERE:

$TWENR_{nt}$ = Total weighted regional enrollments

$TFPOP_{it}$ = Total regional enrollments by type of residence

WF_{i} = Weighting factor to reflect the impact of state educational revenue distributions to various types of residence.

EQ.26 $$RSLER_{it} = RLEDR_{it} + RSEDR_{nt} * \frac{TGPOP_{it} * WF_{i}}{TWENR_{nt}}$$

WHERE:

$RSLER_{it}$ = Regional state and local educational revenue by type of residence within region

and

n = 1, i = 1 - 3

n = 2, i = 4 - 6

n = 3, i = 7 - 9

n = 4, i = 10 - 12

FEDERAL PARTICIPATION

EQ.27 $RFSLER_{it} = RSLER_{it} / (1-FERP_{it})$

WHERE:

$RFSLER_{it}$ = Regional federal, state and local educational revenues

$FERP_{it}$ = Federal percentage of educational revenues by type of residence

DISPARITY

EQ.28 $DISP_{it} = TCEXP_{it} - RFSLER_{it}$

WHERE:

$DISP_{it}$ = Regional disparity by type of residence

EQ.29 $EDCOST_{it} = TCEXP_{it} + DISP_{it} * PINT_{j}$

(If $DISP_{i+}$,0)

WHERE:

$PINT_{j}$ = Short term borrowing rate by type of residence

$EDCOST_{it}$ = Educational cost adjusted by short term borrowings for disparity

and

i = 1, 4, 7, 10; j = 1

i = 2, 5, 8, 11, j = 2

i = 3, 6, 9, 12; j = 3

2. MODEL INPUT DATA

The input data required by the model is described by defining each of the variables into which the data are entered. The data are then displayed in tabular form with a cross reference to the specific symbolic variable name used in the model.

2.1 OPERATING PARAMETERS

TLGTH

Total number of years being projected beyond the base year.

DT

Recalculation frequency expressed as a fraction of a year.

PTR

Frequency in which printout is desired expressed as a fraction or multiple of a year.

2.2 INITIALIZATION DATA - EXPENDITURE SECTOR

NOTE: The following tables of input data are provided for each of twelve geographic units 'i' (e.g., 3 types of residence within 4 regions).

2.2.1 POPULATION SECTOR -

POP $_{i\ j\ 1}$ (Table size = 12 x 8)

Population for the base year '1'

8 age groups 'j'.

XNMR $_{i\ j\ k}$ (Table size = 12 x 8 x 3)

Population net migration rate for 8 age groups, 'j' and 3 points in time 'k' (e.g., FY 67-68, 75-76, 80-81).

BR $_{i\ t}$ (Table size = 12 x 11)

Number of births projected for each of eleven years 't'

(FY 70-71, FY 80-81)

2.2.2 ENROLLMENTS SECTOR

$\underline{R}_{i\ j\ m\ t}$ (Table size = 12 x 6 x 5 x 3)

Percentage of school age population 'j' enrolled in grade level 'm' at 3 points in time 't'.

- $\underline{RNP}_{i\ m\ t}$ (Table size = 12 x 3 x 3)

Percentage of total enrollment in grade level 'm' enrolled in non-public schools at 3 points in time 't'.

- $\underline{RTG}_{i\ m\ t}$ (Table size = 12 x 3 x 3)

Percentage of total enrollment in a target group in grade level 'm' at 3 points in time 't'.

2.2.3 TEACHER DEMAND SECTOR

$\underline{DSTR}_{i\ m\ t}$ (Table size = 12 x 11 x 3)

Desired student teacher ratio

for public school grade levels m = 1 through 4 (N/K, Elem, Sec, SS);

non-public school grade levels m = 5 through 7 (N/K, Elem, Sec);

and target programs m = 8 through 10(N/K, Elem, Sec);

at 3 points in time 't'.

2.2.4 TEACHER SUPPLY AND COST SECTOR

$\underline{FETS}_{i}$ (Table size = 12)

Number of public school teachers in the base year .

$AVETSL_{it}$ (Table size = 12 x 3)

Average salary of public school teachers at three points in time 't'.

2.2.5 OTHER PERSONNEL DEMAND AND COST SECTOR

DOPR $_{i\ j\ t}$ (Table size = 12 x 3 x 3)

Ratio of other instructional personnel types 'j' desired (i.e., supervisory, non-supervisory, non-professional) relative to number of teachers at 3 points in time 't'.

TOPR $_{i\ j\ t}$ (Table size = 12 x 3 x 3)

Other instructional personnel salaries of types 'j'.

2.2.6 OTHER CURRENT EXPENDITURES

PPOPR $_{i\ t}$ (Table size = 12 x3)

Per-pupil operation of plant cost, 3 points in time 't'.

PPMCT $_{i\ t}$ (Table size = 12 x3)

Per-pupil maintenance of plant cost, 3 points in time 't'.

PPATT $_{it}$ (Table size = 12 x3)

Per-pupil attendance service cost, 3 points in time 't'.

PPHLTH $_{it}$ (Table size = 12 x3)

Per-pupil health service cost, 3 points in time 't'.

PPTCT $_{i}$ (Table size - 12)

Base year cost per-pupil transported.

PTRR $_{it}$ (Table size = 12 x 3)

Percentage of pupils transported at 3 points in time 't'

2.2.6 ADJUSTMENT FACTORS

REAF $_{i\ j}$ (Table size = 12 x 10)

j = 1 = Administration as a percent of instructional expenditures

2 = Other instructional expenditures as a percent of inst. sal.

3 = Retirement fund as a percent of salaries

4 = Miscellaneous services as a percent of total current exp.

5 = Salary costs as a percent of total expenditures for operations

6 = Salary costs as a percent of total expenditures for maintenance

7 = Salary costs as a percent of total expenditures for attendance

8 = Salary costs as a percent of total expenditures for health

9 = Salary costs as a percent of total expenditures for transportation

10 = Salary costs as a percent of total expenditures for administration

2.2.7 CAPITAL EXPENDITURE SECTOR

CPPS $_{i\ jt}$ (Table size = 12 x 2 x 3)

Cost per pupil station for type of school 'j', (i.e., elementary, secondary) for three points in time 't'.

REPFCT $_{ij}$ (Table size = 12 x 2)

Percentage of pupil stations being prepared in a given year for elementary and secondary.

2.2.8 DEBT SERVICE SECTOR

AINTRT $_{i}$ (Table size = 12)

Base year average annual interest rate.

AVLGTH $_{i}$ (Table size = 12)

Base year average length of bond repayment.

PCFBB $_i$ (Table size = 12)

Percentage of capital expenditures being debt financed.

PCNEQ $_i$ (Table size = 12)

Expenditures for new equipment as a percentage of instructional expenditures.

2.3 INITIALIZATION DATA - REVENUE SECTOR

NOTE: The following tables of input data are provided for each of 52 geographic units, 'k' (i.e., 50 States, D.C. and the total U.S.).

2.3.1 REVENUE SECTOR

STATE REVENUES

BREV $_{k\ 1}$ (Table size = 52 x 5)

Base year State revenue from 5 revenue sources '1' (i.e., personal income taxes, general sales taxes, selective sales taxes, corporate income taxes, total state revenues).

CITY $_k$ (Table size = 52)

Corporate income tax yield, expressed as a percentage of corporate income.

PSER $_k$ (Table size = 52)

Percentage of state revenue going for education

2.3.2 LOCAL PROPERTY TAX DATA FOR BASE YEAR (Table size = 52 x 6)

$BPTBR_k$ - Resident Non-Farm Property

$BPTBC_k$ - Commercial and Industrial Property

$BPTBF_k$ - Farm Property

$BTLR_k$ - Total local revenues

$BSPTRV_k$ - State-wide Property tax revenue

$BRPMV_k$ - Residential property market value

2.3.3 PROPERTY TAX YIELDS

(Expressed as a percentage of property tax base)

(Table size = 52 x 5)

$YRPCT_k$ - Residential non-farm property yield

$YCPCT_k$ - Commercial and industrial property yield

$YFPCT_k$ - Farm property yield

2.3.4 INTRA-STATE ALLOCATORS

(Table size = 52 x 2)

FPP_k - Percentage increase in farm property, 1961-1970

PIP_k - Percentage increase in personal income, 1961-1970

$PSMSA_k$ - SMSA portion of local revenue in state k

PCC_k - Portion of SMSA locally-raised revenue from central city sources in state.

2.3.5 REVENUE PREDICTORS

Economic Time Series (Table size = 52 x 3)

$PI_{k\,m\,t}$

State-wide Economic Time Series for 5 series 'm' (i.e., total personal income, total earnings, total earnings less agricultural and governmental earnings, total earnings from wholesale and retail trade, total earnings in mining) for 3 points in time 't' (FY 1970, 1975, 1980).

2.3.6 STATE-WIDE ELASTICITIES

Elasticity Factors expressed as an annual percentage change in predicted series (e.g., market value of residential property) relative to an annual percentage change of the predictor series (e.g., personal income).

EFMV $_k$ - Elasticity factor - market value of residential property

EFP $_{k\,1}$ - Elasticity factor - for 3 state revenue sources '1' (i.e., personal income taxes, general sales taxes, selective sales taxes).

EFRP $_k$ - Elasticity factor - residential non-farm property tax base

EFCP $_k$ - Elasticity factor - commercial and industrial property tax base

2.3.7 TREND DATA expressed as an annual percentage change at 3 points in time 't'.

TRENDS IN YIELDS

TYRP $_t$ - Residential non-farm property tax.

TYCP $_t$ - Commercial and industrial property tax.

TYFP $_t$ - Farm property tax.

OTHER TRENDS

TEFFP $_t$ - Trend in elasticity - farm property

TFSER $_t$ - Trend in % state revenue going to education

TFLFR $_t$ - Trend in % local revenue going to education

2.3.8 REGIONAL DATA

NOTE: The following tables of input are provided for each of 12 geographic units 'i' (i.e., 3 types of residence within 4 regions).

PLER i - (Table Size = 12)

Percentage of local educational expenditures being provided from local revenues

FERP i (Table Size = 12)

Percentage of total educational revenues coming from federal sources

PINT i (Table size = 12)

Percentage interest paid in short term borrowings to cover deficits

WF i (Table size = 12)

Weighting factor (weighting enrollments by types of residence) used to reflect the impact of state educational revenue distribution to various types of residences.

POPULATION OF 8 AGE GROUPS - 1970

(in thousands)

REGION	0-2 Years Old	3-4 Years Old	5 Years Old	6-9 Years Old	10-13 Years Old	14 Years Old	15-19 Years Old	Older than 19
SYMBOLIC NAME	POP(I,1)	POP(I,2)	POP(I,3)	POP(I,4)	POP(I,5)	POP(I,6)	POP(I,7)	POP(I,8)
NORTHEAST								
Central Cities	852	557	229	1176	1230	294	1413	11099
Other SMSA	1089	767	403	1738	1779	446	1982	13463
Non-SMSA	528	342	191	798	811	198	922	6660
NORTH CENTRAL								
Central Cities	829	606	310	1196	1269	324	1495	10559
Other SMSA	1013	789	421	1897	1931	459	2056	11675
Non-SMSA	993	667	355	1518	1589	394	1852	12357
SOUTH								
Central Cities	881	597	301	1266	1278	331	1549	11205
Other SMSA	850	671	361	1518	1581	372	1712	9788
Non-SMSA	1443	1016	531	2251	2357	591	2808	17538
WEST								
Central Cities	573	374	199	837	824	191	934	7361
Other SMSA	778	607	315	1316	1372	347	1588	9046
Non-SMSA	410	271	143	619	654	162	749	5137

ANNUAL PROJECTIONS OF BIRTHS FROM 1970 to 1980

(in thousands)

REGION	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
SYMBOLIC NAME	BR(I,1).										.(BR(I,11)
NORTHEAST											
Central Cities	288	284	280	275	270	267	269	271	273	275	276
Other SMSA	359	363	367	371	375	380	390	400	410	420	431
Non-SMSA	175	176	177	178	179	180	184	188	192	196	201
NORTH CENTRAL											
Central Cities	276	276	277	278	278	279	282	285	287	290	293
Other SMSA	338	349	360	371	383	395	400	405	410	415	419
Non-SMSA	331	331	331	330	330	330	334	338	342	347	352
SOUTH											
Central Cities	294	297	300	304	308	312	317	322	327	332	336
Other SMSA	283	288	293	398	303	308	319	330	341	352	364
Non-SMSA	481	485	489	494	499	504	508	512	516	521	526
WEST											
Central Cities	191	193	195	197	200	203	207	211	216	220	225
Other SMSA	259	267	275	283	292	301	312	323	334	345	356
Non-SMSA	137	138	139	141	143	145	146	148	150	152	154

ENROLLMENT RATES BY AGE AND LEVEL OF ATTENDANCE FOR TOTAL UNITED STATES, REGION AND TYPE OF RESIDENCE AVERAGE 1967/68/69

SYMBOLIC NAME	N or K R(I,j,1,1)	E 1-6 R(I,j,2,1)	E 7,8 R(I,j,3,1)	HS 9-12 R(I,j,4,1)	Special Schools R(I,j,5,1)
Northeast					
Central City					
3,4	.188	-	-	-	-
5	.704	.181	-	-	-
6-9	.009	.986	-	-	-
10-13	-	.520	.432	.043	-
14	-	.022	.216	.740	-
15-19	-	-	.018	.559	-
Other SMSA					
3,4	.190	-	-	-	-
5	.740	.167	-	-	-
6-9	.008	.982	-	-	-
10-13	-	.496	.453	.041	-
14	-	.012	.119	.861	-
15-19	-	-	.006	.620	-
Outside SMSA					
3,4	.137	-	-	-	-
5	.799	.114	-	-	-
6-9	.011	.980	-	-	-
10-13	-	.519	.437	.037	-
14	-	.018	.169	.801	-
15-19	-	-	.014	.610	-

ENROLLMENT RATES BY AGE AND LEVEL OF ATTENDANCE FOR TOTAL UNITED STATES, REGION AND TYPE OF RESIDENCE AVERAGE 1967/68/69

SYMBOLIC NAME	N or K R(I,j,1,1)	E 1-6 R(I,j,2,1)	E 7,8 R(I,j,3,1)	HS 9-12 R(I,j,4,1)	Special Schools R(I,j,5,1)
North Central					
Central City					
3,4	.140	-	-	-	-
5	.827	.080	-	-	-
6-9	.017	.974	-	-	-
10-13	-	.543	.413	.032	-
14	-	.025	.230	.728	-
15-19	-	-	.017	.579	-
Other SMSA					
3,4	.146	-	-	-	-
5	.822	.065	-	-	-
6-9	.014	.979	-	-	-
10-13	-	.515	.454	.024	-
14	-	.016	.156	.809	-
15-19	-	-	.006	.640	-
Outside SMSA					
3,4	.068	-	-	-	-
5	.748	.039	-	-	-
6-9	.022	.973	-	-	-
10-13	-	.544	.430	.018	-
14	-	.019	.178	.801	-
15-19	-	-	.013	.626	-

ENROLLMENT RATES BY AGE AND LEVEL OF ATTENDANCE FOR TOTAL UNITED STATES, REGION AND TYPE OF RESIDENCE AVERAGE 1967/68/69

	N or K	E 1-6	E 7,8	HS 9-12	Special Schools
SYMBOLIC NAME	R(I,j,1,1)	R(I,j,2,1)	R(I,j,3,1)	R(I,j,4,1)	R(I,j,5,1)
South					
Central City					
3,4	.209	-	-	-	-
5	.549	.094	-	-	-
6-9	.013	.972	-	-	-
10-13	-	.555	.413	.021	-
14	-	.029	.276	.675	-
15-19	-	-	.028	.562	-
Other SMSA					
3,4	.184	-	-	-	-
5	.518	.124	-	-	-
6-9	.003	.986	-	-	-
10-13	-	.534	.433	.026	-
14	-	.025	.255	.738	-
15-19	-	-	.063	.615	-
Outside SMSA					
3,4	.100	-	-	-	-
5	.324	.099	-	-	-
6-9	.001	.985	-	-	-
10-13	-	.569	.398	.026	-
14	-	.032	.278	.661	-
15-19	-	-	.056	.579	-

ENROLLMENT RATES BY AGE AND LEVEL OF ATTENDANCE FOR TOTAL UNITED STATES, REGION AND TYPE OF RESIDENCE AVERAGE 1967/68/69

SYMBOLIC NAME	N or K R(I,j,1,1)	E 1-6 R(I,j,2,1)	E 7,8 R(I,j,3,1)	HS 9-12 R(I,j,4,1)	Special Schools R(I,j,5,1)
West					
Central City					
3,4	.241	-	-	-	-
5	.796	.106	-	-	-
6-9	.005	.983	-	-	-
10-13	-	.538	.415	.040	-
14	-	.015	.123	.838	-
15-19	-	-	.002	.587	-
Other SMSA					
3,4	.212	-	--	-	-
5	.823	.113	--	-	-
6-9	.007	.989	--	-	-
10-13	-	.525	.446	.024	-
14	-	.012	.127	.850	-
15-19	-	-	.005	.652	-
Outside SMSA					
3,4	.123	-	-	--	-
5	.734	.050	-	-	-
6-9	.007	.980	-	-	-
10-13	-	.533	.441	.018	-
14	-	.019	.166	.803	-
15-19	-	-	.009	.641	-

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

NORTHEAST REGION

1975

SYMBOLIC NAME	N or K R(I,j,1,2)	E 1-6 R(I,j,2,2)	E 7,8 R(I,j,3,2)	HS 9-12 R(I,j,4,2)	Special Schools R(I,j,5,2)
Region					
NORTHEAST					
Central City					
3,4	.423	-	-	-	.005
5	.727	.202	-	-	.005
6-9	.040	.951	-	-	.008
10-13	-	.517	.429	.043	.010
14	-	.010	.181	.787	.021
15-19	-	-	.010	.583	.024
Other SMSA					
3,4	.422	-	-	-	-
5	.776	.175	-	-	.005
6-9	.010	.981	-	-	.008
10-13	-	.496	.452	.041	.010
14	-	.010	.112	.861	.016
15-19	-	-	.005	.642	.023
Outside SMSA					
3,4	.306	-	-	-	.005
5	.825	.110	-	-	.005
6-9	.010	.981	-	-	.008
10-13	-	.517	.435	.037	.010
14	-	.010	.112	.861	.016
15-19	-	-	.005	.631	.021

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

NORTH CENTRAL REGION

1975

SYMBOLIC NAME	N or K R(I,j,1,2)	E 1-6 R(I,j,2,2)	E 7,8 R(I,j,3,2)	HS 9-12 R(I,j,4,2)	Special Schools R(I,j,5,2)
Region					
NORTH CENTRAL					
Central City					
3,4	.361	-	-	-	.004
5	.836	.080	-	-	.005
6-9	.012	.982	-	-	.005
10-13	-	.548	.414	.032	.005
14	-	.010	.194	.774	.021
15-19	-	-	.020	.599	.029
Other SMSA					
3,4	.262	-	-	-	-
5	.869	.066	-	-	.005
6-9	.014	.978	-	-	.007
10-13	-	.513	.453	.024	.009
14	-	.010	.110	.860	.019
15-19	-	-	.005	.663	.024
Outside SMSA					
3,4	.125	-	-	-	.004
5	.793	.039	-	-	.005
6-9	.022	.970	-	-	.007
10-13	-	.571	.401	.018	.009
14	-	.010	.107	.861	.021
15-19	-	-	.010	.648	.024

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

SOUTH REGION

1975

SYMBOLIC NAME	N R(I,j,1,2)	E 1-6 R(I,j,2,2)	E 7,8 R(I,j,3,2)	HS 9-12 R(I,j,4,2)	Special Schools R(I,j,5,2)
Region					
SOUTH					
Central City					
3,4	.448	-	-	-	.005
5	.671	.116	-	-	.005
6-9	.010	.982	-	-	.007
10-13	-	.552	.411	.025	.011
14	-	.015	.234	.730	.020
15-19	-	-	.018	.594	.024
Other SMSA					
3,4	.394	-	-	-	.002
5	.635	.150	-	-	.004
6-9	.005	.989	-	-	.005
10-13	-	.536	.434	.024	.005
14	-	.012	.139	.840	.008
15-19	-	-	.030	.642	.016
Outside SMSA					
3,4	.180	-	-	-	.005
5	.395	.111	-	-	.005
6-9	-	.994	-	-	.005
10-13	-	.569	.399	.026	.005
14	-	.015	.295	.679	.010
15-19	-	-	.030	.606	.024

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

WEST REGION

1975

SYMBOLIC NAME	N R(I,j,1,2)	E 1-6 R(I,j,2,2)	E 7,8 R(I,j,3,2)	HS 9-12 R(I, j,4,2)	Special Schools R(I,j,5,2)
Region					
WEST					
Central City					
3,4	.521	-	-	-	.005
5	.822	.115	-	-	.005
6-9	.005	.989	-	-	.005
10-13	-	.545	.406	.040	.008
14	-	.005	.133	.840	.021
15-19	-	-	.002	.607	.021
Other SMSA					
3,4	.440	-	-	-	-
5	.859	.117	-	-	-
6-9	.005	.989	-	-	.005
10-13	-	.533	.431	.030	.005
14	-	.005	.133	.853	.008
15-19	-	-	.002	.675	.015
Outside SMSA					
3,4	.267	-	-	-	.005
5	.698	.116	-	-	.005
6-9	.005	.986	-	-	.008
10-13	-	.528	.436	.025	.010
14	-	.005	.158	.825	.011
15-19	-	-	.005	.663	.024

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

NORTHEAST REGION

1980

SYMBOLIC NAME	K R(I,j,1,3)	E 1-6 R(I,j,2,3)	E 7,8 R(I,j,3,3	HS 9-12 R(I,j,4,3)	Special Schools R(I,j,5,3)
Region					
NORTHEAST					
Central City					
3,4	.777	-	-	-	.005
5	.762	.212	-	-	.005
6-9	.040	.951	-	-	.008
10-13	-	.517	.429	.043	.010
14	-	.010	.130	.838	.021
15-19	-	-	.010	.599	.024
Other SMSA					
3,4	.771	-	-	-	-
5	.812	.182	-	-	.005
6-9	.010	.981	-	-	.008
10-13	-	.496	.452	.041	.010
14	-	.010	.112	.861	.016
15-19	-	-	.005	.665	.023
Outside SMSA					
3,4	.563	-	-	-	.005
5	.880	.114	-	-	.005
6-9	.010	.981	-	-	.008
10-13	-	.517	.435	.037	.010
14	-	.010	.112	.861	.016
15-19	-	-	.005	.654	.021

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

NORTH CFNTRAL REGION

1980

SYMBOLIC NAME	N R(I,j,1,3)	E 1-6 R(I,j,2,3)	E 7,8 R(I,j,3,3)	HS 9-12 R(I,j,4,3)	Special Schools R(I,j,5,3)
Region					
NORTH CENTRAL					
Central City					
3,4	.693	-	-	-	.004
5	.875	.085	-	-	.005
6-9	.010	.984	-	-	.005
10-13	-	.548	.414	.032	.005
14	-	.010	.144	.824	.021
15-19	-	-	.014	.621	.030
Other SMSA					
3,4	.557	-	-	-	-
5	.906	.072	-	-	.005
6-9	.014	.978	-	-	.007
10-13	-	.513	.453	.024	.009
14	-	.010	.110	.860	.019
15-19	-	-	.005	.687	.024
Outside SMSA					
3,4	.271	-	-	-	.004
5	.831	.039	-	-	.005
6-9	.022	.970	-	-	.007
10-13	-	.571	.401	.018	.009
14	-	.010	.107	.861	.021
15-19	-	-	.008	.672	.024

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

SOUTH REGION

1980

SYMBOLIC NAME	N R(I,j,1,3)	E 1-6 R(I,j,2,3)	E 7,8 R(I,j,3,3)	HS-9-12 R(I,j,4,3)	Special Schools R(I,j,5,3)
Region					
SOUTH					
Central City					
3,4	.826	-	-	-	.005
5	.805	.138	-	-	.005
6-9	.010	.982	-	-	.007
10-13	-	.549	.409	.030	.011
14	-	.010	.187	.782	.020
15-19	-	-	.010	.626	.024
Other SMSA					
3,4	.761	-	-	-	.002
5	.749	.198	-	-	.004
6-9	.005	.989	-	-	.005
10-13	-	.536	.434	.024	.005
14	-	.012	.125	.854	.008
15-19	-	-	.020	.669	.016
Outside SMSA					
3,4	.420	-	-	-	.005
5	.558	.170	-	-	.005
6-9	.010	.984	-	-	.005
10-13	-	.569	.399	.026	.005
14	-	.010	.204	.775	.010
15-19	-	-	.030	.629	.024

PROJECTED RATES OF SCHOOL ENROLLMENT BY GRADE GROUPINGS

WEST REGION

1980

SYMBOLIC NAME	N R(I,j,1,3)	E 1-6 R(I,j,2,3)	E 7,8 R(I,j,3,3)	HS 9-12 R(I,j,4,3)	Special Schools R(I,j,5,3)
Region					
WEST					
Central City					
3,4	.963	-	-	-	.005
5	.872	.122	-	-	.005
6-9	.005	.989	-	-	.005
10-13	-	.545	.406	.040	.008
14	-	.005	.133	.840	.021
15-19	-	-	.002	.629	.021
Other SMSA					
3,4	.817	-	-	-	-
5	.878	.121	-	-	-
6-9	.005	.989	-	-	.005
10-13	-	.533	.421	.040	.005
14	-	.005	.133	.853	.008
15-19	-	-	.002	.698	.015
Outside SMSA					
3,4	.500	-	-	-	.005
5	.804	.115	-	-	.005
6-9	.005	.986	-	-	.008
10-13	-	.527	.436	.025	.010
14	-	.005	.158	.825	.011
15-19	-	-	.005	.687	.024

SOURCE: Average 1967, 68, 69, Bureau of the Census, based on analysis of CPS Sample Enrollment by single year of school.

NOTES: 3,4 all in N or K. 5-year-olds, same proportion in first grade as in 1967-69. 6 to 9-year-olds, 1 percent in K. 10 to 13-year-olds, 1-6 .546 of all elementary in 1-6 for CC; .523 in Other SMSA; .543 in Outside SMSA. 7-8 difference between .999 and 1-6 enrollment. 14-year-olds, 1 percent in 1-6. 15-19, proportion in college 1.15 times in 1975; 1.26 times in 1980 from OPPE enrollment model. Note on Special Schools: when enrollment nears .995 additional enrollment is in Special Schools for other categories in proportion to enrollment of eligibles.

AVERAGE 1967-1969 AND PROJECTED 1975, 1980 RATIO OF PRIVATE TO TOTAL SCHOOL ENROLLMENT FOR THE TOTAL U. S., BY REGION AND TYPE OF RESIDENCE

SYMBOLIC NAME	Central City 67-69 RNP (I,M,1)	Central City 1975 RNP (I,M,2)	Central City 1980 RNP (I,M,3)	Other SMSA 67-69 RNP (I,M,1)	Other SMSA 1975 RNP (I,M,2)	Other SMSA 1980 RNP (I,M,3)	Outside SMSA 67-69 RNP (I,M,1)	Outside SMSA 1975 RNP (I,M,2)	Outside SMSA 1980 RNP (I,M,3)
Northeast									
N or K	.193	.272	.328	.249	.368	.452	.193	.279	.345
E 1-6	.312	.265	.222	.195	.120	.068	.125	.065	.049
E 7,8	.303	.239	.199	.184	.115	.070	.102	.040	.016
HS 1-4	.224	.140	.072	.127	.065	.024	.080	.032	.013
North Central									
N or K	.160	.226	.272	.200	.295	.363	.108	.156	.193
E 1-6	.194	.165	.138	.185	.114	.065	.117	.061	.046
E 7,8	.225	.178	.148	.172	.108	.066	.115	.045	.018
HS 1-4	.196	.123	.063	.129	.066	.024	.036	.014	.005
South									
N or K	.495	.544	.656	.626	.685	.726	.561	.613	.739
E 1-6	.100	.085	.071	.097	.060	.034	.031	.016	.012
E 7,8	.080	.063	.053	.159	.100	.061	.021	.008	.003
HS 1-4	.077	.048	.025	.061	.031	.011	.024	.009	.003
West									
N or K	.258	.364	.438	.211	.311	.383	.266	.384	.475
E 1-6	.116	.098	.082	.076	.047	.027	.040	.021	.016
E 7,8	.101	.080	.066	.064	.040	.024	.033	.013	.005
HS 1-4	.083	.052	.027	.044	.023	.008	.018	.007	.002

ACTUAL PUPIL-TEACHER RATIOS FOR PUBLIC SCHOOLS

1968-69

SYMBOLIC NAME	N or K DTSR(I,1,1)	Elementary DTSR(I,2,1)	Secondary DTSR(I,3,1)	Total DTSR(I,4,1)
Region				
NORTHEAST				
Central Cities	46.1	22.9	20.3	22.9
Other SMSA	44.5	23.6	19.6	22.5
Non-SMSA	38.6	23.4	20.3	23.0
NORTH CENTRAL				
Central Cities	54.0	25.7	23.1	25.9
Other SMSA	49.7	24.0	21.6	24.0
Non-SMSA	44.7	22.1	19.5	21.8
SOUTH				
Central Cities	38.8	26.2	22.9	25.1
Other SMSA	45.4	25.5	21.8	24.3
Non-SMSA	31.8	24.8	21.8	23.6
WEST				
Central Cities	40.4	25.1	24.1	25.3
Other SMSA	39.3	24.8	22.9	25.0
Non-SMSA	38.2	22.2	19.3	21.6

PROJECTED PUPIL-TEACHER RATIOS FOR PUBLIC SCHOOLS

1975-76

SYMBOLIC NAME	N or K DTSR(I,1,2)	Elementary DTSR(I,2,2)	Secondary DTSR(I,3,2)	Total DTSR(I,4,2)
Region				
NORTHEAST				
Central Cities	42.1	20.9	18.9	20.4
Other SMSA	40.7	21.6	18.3	20.1
Non-SMSA	35.3	21.4	18.9	20.2
NORTH CENTRAL				
Central Cities	46.4	22.1	21.9	22.6
Other SMSA	42.7	20.6	20.4	20.7
Non-SMSA	38.4	19.0	18.4	19.0
SOUTH				
Central Cities	36.0	24.3	20.5	22.3
Other SMSA	42.1	23.6	19.5	21.3
Non-SMSA	29.5	23.0	19.5	21.0
WEST				
Central Cities	36.4	22.6	21.9	22.4
Other SMSA	35.4	22.3	20.8	22.1
Non-SMSA	34.4	20.0	17.5	18.8

PROJECTED PUPIL-TEACHER RATIOS FOR PUBLIC SCHOOLS

1980-81

SYMBOLIC NAME	N or K DTSR(I,1,3)	Elementary DTSR(I,2,3)	Secondary DTSR(I,3,3)	Total DTSR(I,4,3)
Region				
NORTHEAST				
Central Cities	39.9	19.8	17.9	19.6
Other SMSA	38.5	20.4	17.3	19.1
Non-SMSA	33.4	20.3	17.9	19.5
NORTH CENTRAL				
Central Cities	44.0	20.9	20.6	22.0
Other SMSA	40.5	19.5	19.3	20.0
Non-SMSA	36.4	18.0	17.4	18.2
SOUTH				
Central Cities	34.0	23.0	19.4	21.1
Other SMSA	39.8	22.3	18.4	20.4
Non-SMSA	27.9	21.7	18.4	19.8
WEST				
Central Cities	34.8	21.6	20.6	21.5
Other SMSA	33.8	21.4	19.6	21.4
Non-SMSA	32.9	19.1	16.5	18.0

Source: 1968-69 based on reanalysis of Elementary-Secondary General Information Survey (ELSEGIS) and adjusted to estimated enrollments for 1968-69; Estimates for 1967-68 and Projections for 1975-76 and 1980-81 based on changes in pupil-teacher ratio as reported by U.S. Department of Health, Education, and Welfare, Office of Education, Enrollments, Teachers and School Housing, Fall 1961, Fall 1962, Fall 1963, and Statistics of Public Schools, Fall 1964, Fall 1965, Fall 1966, Fall 1967, Fall 1968, Fall 1969 and Fall 1970, U.S. Government Printing Office, Washington, D.C.

NUMBER OF PUBLIC SCHOOL TEACHERS
IN 1968-1969
(in thousands)

SYMBOLIC NAME	TOTAL XFETS(I)
Region	
NORTHEAST	
Central Cities	130.4
Other SMSA	202.2
Non-SMSA	91.4
NORTH CENTRAL	
Central Cities	138.5
Other SMSA	192.8
Non-SMSA	207.9
SOUTH	
Central Cities	201.5
Other SMSA	132.2
Non-SMSA	274.8
WEST	
Central Cities	111.6
Other SMSA	131.3
Non-SMSA	100.5

AVERAGE SALARIES OF PUBLIC SCHOOL TEACHERS
ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981
(in constant 1967 dollars)

SYMBOLIC NAME	1967-1968 Actual AVETSL(I,1)	1975-1976 Projection AVETSL(I,2)	1980-1981 Projection AVETSL(I,3)
Region			
NORTHEAST			
Central Cities	8,429	10,570	11,303
Other SMSA	7,930	9,944	10,634
Non-SMSA	7,241	9,080	9,710
NORTH CENTRAL			
Central Cities	8,155	10,389	11,229
Other SMSA	7,827	9,972	10,778
Non-SMSA	6,946	8,849	9,565
SOUTH			
Central Cities	6,739	9,084	10,162
Other SMSA	6,847	9,230	10,325
Non-SMSA	6,062	8,172	9,141
WEST			
Central Cities	8,561	10,487	11,043
Other SMSA	8,460	10,363	10,913
Non-SMSA	7,452	9,129	9,613

RATIO OF SUPERVISORY AND NON-SUPERVISORY PROFESSIONAL PERSONNEL TO CLASSROOM TEACHERS, AND RATIO OF PUPILS TO NON-PROFESSIONAL PERSONNEL ESTIMATED 1968-69, PROJECTED 1975-76 AND 1980-81 BY REGION AND TYPE OF RESIDENCE

	1968-69			1975-76			1980-81		
	Super-visory	Non-Super-visory	Non-Pro-fessional	Super-visory	Non Super-visory	Non-Pro-fessional	Super-visory	Non-Super-visory	Non-Pro-fessional
SYMBOLIC NAME:	DOPR (I,1,1)	DOPR (I,2,1)	DOPR (I,3,1)	DOPR (I,1,2)	DOPR (I,2,2)	DOPR (I,3,2)	DOPR (I,1,3)	DOPR (I,2,3)	DOPR (I,3,3)
NORTHEAST									
Central Cities	.070	.050	245	.084	.063	245	.088	.065	245
Other SMSA	.068	.055	256	.082	.069	256	.085	.072	256
Non-SMSA	.051	.045	293	.061	.056	293	.064	.059	293
NORTH CENTRAL									
Central Cities	.064	.05[illegible]	291	.064	.054	291	.064	.064	291
Other SMSA	.056	.[illegible]54	327	.056	.057	327	.056	.068	327
Non-SMSA	.062	.047	337	.062	.049	337	.062	.059	337
SOUTH									
Central Cities	.060	.049	246	.060	.054	246	.060	.064	246
Other SMSA	.062	.046	330	.062	.051	330	.062	.060	330
Non-SMSA	.064	.044	306	.065	.048	306	.065	.057	306
WEST									
Central Cities	.063	.05[illegible]	118	.066	.061	118	.069	.066	118
Other SMSA	.060	.049	211	.063	.059	211	.066	.064	211
Non-SMSA	.062	.043	314	.065	.052	314	.068	.056	314

OTHER INSTRUCTIONAL AND NON-PROFESSIONAL PERSONNEL SALARIES
BY TYPE OF RESIDENCE WITHIN REGION
FOR 1967-1968 ACTUAL AND PROJECTED 1975-1976 and 1980-1981

	1967-1968 Actual			1975-1976 Projection			1980-1981 Projection		
	Super-visory	Non-Super-visory	Non-Pro-fessional	Super visory	Non-Super-visory	Non-Pro-fessional	Super-visory	Non-Super-visory	Non Pro-fessional
SYMBOLIC NAME	TOPR (1,1,1)	TOPR (1,2,1)	TOPR (1,3,1)	TOPR (1,1,2)	TOPR (1,2,2)	TOPR (1,3,2)	TOPR (1,1,3)	TOPR (1,2,3)	TOPR (1,3,3)
NORTHEAST									
Central Cities	12,264	8,790	4,402	15,958	10,820	5,520	18,697	11,997	5,903
Other SMSA	12,093	9,291	4,324	15,659	11,396	5,422	18,346	12,636	5,798
Non-SMSA	10,585	7,889	3,798	13,693	9,723	4,763	16,042	10,781	5,093
NORTH CENTRAL									
Central Cities	13,573	10,056	4,700	17,725	12,393	5,987	20,938	13,860	6,472
Other SMSA	12,951	9,286	4,528	17,131	11,570	5,769	20,236	12,940	6,235
Non-SMSA	9,880	8,232	3,537	13,092	10,326	4,506	15,464	11,548	4,870
SOUTH									
Central Cities	11,036	7,678	3,759	15,290	10,076	5,300	18,721	11,673	5,668
Other SMSA	11,886	8,094	4,060	16,420	10,624	5,725	20,104	12,308	6,122
Non-SMSA	9,068	6,752	3,121	12,574	8,873	4,401	15,396	10,279	4,706
WEST									
Central Cities	13,450	9,895	5,186	17,290	12,004	6,353	19,926	13,102	6,690
Other SMSA	13,882	10,291	5,255	17,771	12,463	6,437	20,480	13,603	6,779
Non-SMSA	11,302	8,585	5,051	14,277	10,315	6,187	16,453	11,259	6,516

PER-PUPIL COST PER PLANT OPERATION
ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981
(in constant 1967 dollars)

SYMBOLIC NAME	Actual 1967-1968 PPOPR(I,1)	Projected 1975-1976 PPOPR(I,2)	Projected 1980-1981 PPOPR(I,3)
Region			
NORTHEAST			
Central Cities	56.29	70.20	80.60
Other SMSA	62.06	77.40	88.86
Non-SMSA	52.58	65.53	75.29
NORTH CENTRAL			
Central Cities	59.26	72.20	81.69
Other SMSA	57.54	70.11	79.32
Non-SMSA	50.29	61.27	69.32
SOUTH			
Central Cities	32.39	43.32	51.94
Other SMSA	35.84	47.93	57.48
Non-SMSA	24.84	33.22	39.84
WEST			
Central Cities	49.36	60.14	68.04
Other SMSA	52.06	62.21	70.39
Non-SMSA	47.96	58.43	66.11

PER-PUPIL COST FOR PLANT MAINTENANCE
ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981
(in constant 1967 dollars)

SYMBOLIC NAME	Actual 1967-1968 PPMCT(I,1)	Projected 1975-1976 PPMCT(I,2)	Projected 1980-1981 PPMCT(I,3)
Region			
NORTHEAST			
Central Cities	19.60	22.08	23.78
Other SMSA	21.69	24.43	26.32
Non-SMSA	16.89	19.03	20.50
NORTH CENTRAL			
Central Cities	21.05	23.34	24.90
Other SMSA	15.72	17.43	18.59
Non-SMSA	15.26	16.92	18.05
SOUTH			
Central Cities	16.15	19.07	21.16
Other SMSA	17.39	20.54	22.78
Non-SMSA	12.17	14.37	15.95
WEST			
Central Cities	26.36	29.93	32.40
Other SMSA	20.86	23.68	25.64
Non-SMSA	17.05	19.36	20.96

PER-PUPIL COST FOR ATTENDANCE SERVICE
ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981
(in constant 1967 dollars)

SYMBOLIC NAME	Actual 1967-1968 PPATT(I,1)	Projected 1975-1976 PPATT(I,2)	Projected 1980-1981 PPATT(I,3)
Region			
NORTHEAST			
Central Cities	4.82	6.04	6.46
Other SMSA	1.34	1.68	1.80
Non-SMSA	0.91	1.14	1.22
NORTH CENTRAL			
Central Cities	3.43	4.37	4.72
Other SMSA	0.69	0.88	0.95
Non-SMSA	0.50	0.64	0.69
SOUTH			
Central Cities	1.73	2.33	2.61
Other SMSA	2.28	3.07	3.44
Non-SMSA	1.53	2.06	2.31
WEST			
Central Cities	3.03	3.71	3.91
Other SMSA	0.81	0.99	1.04
Non-SMSA	0.93	1.14	1.20

PER-PUPIL COST FOR HEALTH SERVICE
ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981
(in constant 1967 dollars)

SYMBOLIC NAME	Actual 1967-1968 PPHTH(I,1)	Projected 1975-1976 PPHTH(I,2)	Projected 1980-1981 PPHTH(I,3)
Region			
NORTHEAST			
Central Cities	8.83	10.72	11.46
Other SMSA	11.21	13.61	14.55
Non-SMSA	9.43	11.45	12.24
NORTH CENTRAL			
Central Cities	4.61	5.68	6.15
Other SMSA	2.93	3.61	3.91
Non-SMSA	2.34	2.89	3.12
SOUTH			
Central Cities	2.37	3.09	3.46
Other SMSA	1.97	2.57	2.88
Non-SMSA	1.90	2.48	2.77
WEST			
Central Cities	5.24	6.21	6.54
Other SMSA	4.28	5.08	5.35
Non-SMSA	2.09	2.48	2.61

COST PER-PUPIL TRANSPORTED FOR TRANSPORTATION IN 1967-1968

SYMBOLIC NAME	Per-Pupil Cost PPTCT(I)
Region	
NORTHEAST	
Central cities	108.00
Other SMSA	67.50
Non-SMSA	50.81
NORTH CENTRAL	
Central Cities	65.74
Other SMSA	54.78
Non-SMSA	53.32
SOUTH	
Central Cities	33.95
Other SMSA	37.72
Non-SMSA	38.48
WEST	
Central Cities	53.02
Other SMSA	58.91
Non-SMSA	61.32

PERCENTAGE OF PUPILS TRANSPORTED

ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981

SYMBOLIC NAME	Actual 1967-1968 PTRR(I,1)	Projected 1975-1976 PTRR(I,2)	Projected 1980-1981 PTRR(I,3)
Region			
NORTHEAST			
Central Cities	24.5	28.2	30.8
Other SMSA	45.8	54.9	58.1
Non-SMSA	85.2	90.1	95.3
NORTH CENTRAL			
Central Cities	10.9	15.7	22.7
Other SMSA	45.1	54.1	56.0
Non-SMSA	66.4	70.2	72.7
SOUTH			
Central Cities	17.1	24.7	28.5
Other SMSA	43.4	52.5	54.4
Non-SMSA	69.1	73.1	75.7
WEST			
Central Cities	15.7	22.7	26.2
Other SMSA	26.1	31.1	34.8
Non-SMSA	49.7	59.6	61.7

ADJUSTMENT FACTORS TABLE

SYMBOLIC NAME	Admin. as a % of Instruct. Expend. REAF(I,1)	Other Instruct. Expend. as a % of Instruct. Salaries REAF(I,2)	Retirement Fund as a % of Salaries REAF(I,3)	Miscellaneous Services as a % of Tot. Cur. Expend. REAF(I,4)	Salary Costs as a % of Total Expenditure for — Operations REAF (I, 5)	Maintenance REAF (I, 6)	Attendance REAF (I, 7)	Health REAF (I, 8)	Transportation REAF (I, 9)	Admin. REAF (I,10)
Region										
NORTHEAST					56.4	45.2	95.0	90.7	19.4	72.5
Central Cities	5.69	6.98	11.47	7.97						
Other SMSA	5.76	11.04	9.20	5.50						
Non-SMSA	6.14	12.32	8.63	5.63						
NORTH CENTRAL					56.6	31.0	94.1	84.4	38.1	79.2
Central Cities	4.24	8.56	5.34	7.42						
Other SMSA	5.57	7.23	3.66	6.21						
Non-SMSA	6.25	7.99	2.56	6.23						
SOUTH					54.2	42.0	90.4	71.1	54.4	77.7
Central Cities	3.66	6.87	2.59	8.19						
Other SMSA	3.97	7.02	2.55	8.08						
Non-SMSA	4.94	9.25	2.42	9.20						
WEST					63.9	48.9	95.7	81.5	49.4	83.8
Central Cities	3.96	6.42	5.09	8.16						
Other SMSA	4.07	7.04	4.42	6.72						
Non-SMSA	5.05	8.75	4.58	6.32						

MULTIPLIER TO INFLATE INSTRUCTIONAL PERSONNEL AND FRINGE COSTS SO AS TO INCLUDE OTHER INSTRUCTIONAL COSTS*

SYMBOLIC NAME	Adjustment Factor FUDG(I)
Region	
NORTHEAST	
Central Cities	1.16
Other SMSA	1.12
Non-SMSA	1.13
NORTH CENTRAL	
Central Cities	1.09
Other SMSA	1.00
Non-SMSA	.99
SOUTH	
Central Cities	1.09
Other SMSA	1.02
Non-SMSA	1.00
WEST	
Central Cities	1.09
Other SMSA	1.05
Non-SMSA	.97

*Including substitute teachers, consulting, travel, etc.

COST PER-PUPIL STATION FOR CONSTRUCTION
BY TYPE OF SCHOOL AND RESIDENCE WITHIN REGION
ACTUAL 1967-1968 AND PROJECTED 1975-1976, 1980-1981
(In constant 1967 dollars)

	Actual 1967-1968		Projected 1975-1976		Projected 1980-1981	
	Elementary	Secondary	Elementary	Secondary	Elementary	Secondary
SYMBOLIC NAME	CPPS (I,1,1)	CPPS (I,2,1)	CPPS (I,1,2)	CPPS (I,2,2)	CPPS (I,1,3)	CPPS (I,2,3)
Region						
NORTHEAST						
Central Cities	1982	2713	2029	3020	2111	3143
Other SMSA	1686	2698	1872	2976	1948	3097
Non-SMSA	1584	2454	1800	2729	1873	2840
NORTH CENTRAL						
Central Cities	1221	2367	1379	2589	1435	2695
Other SMSA	1242	2125	1345	2296	1400	2389
Non-SMSA	1217	2061	1332	2265	1386	2357
SOUTH						
Central Cities	1020	1591	1127	1774	1173	1846
Other SMSA	932	1495	1141	1616	1187	1681
Non-SMSA	929	1600	1004	1620	1044	1686
WEST						
Central Cities	1134	2039	1202	1980	1251	2061
Other SMSA	1188	1882	1261	2044	1312	2127
Non-SMSA	1244	2085	1367	2066	1423	2150

PROJECTED FIVE-YEAR REPLACEMENT RATES BY TYPE OF RESIDENCE WITHIN REGION AS A PERCENT OF PUPIL STATIONS

SYMBOLIC NAME	Elementary % REPFCT(I,1)	Secondary % REPFCT(I,2)
Region		
NORTHEAST		
Central Cities	15.5	17.1
Other SMSA	12.5	15.0
Non-SMSA	12.5	15.0
NORTH CENTRAL		
Central Cities	14.6	15.0
Other SMSA	12.5	15.0
Non-SMSA	12.5	15.0
SOUTH		
Central Cities	18.7	16.0
Other SMSA	12.5	15.0
Non-SMSA	13.3	22.5
WEST		
Central Cities	18.7	15.0
Other SMSA	12.5	22.5
Non-SMSA	12.5	15.0

AVERAGE ANNUAL INTEREST RATE AND LENGTH OF BOND REPAYMENT FOR 1969-71

SYMBOLIC NAME	Average Interest Rate (%) AINTRT(I)	Average Maturity (years) AVLGTH(I)
Region		
NORTHEAST		
Central Cities	6.88	11.1
Other SMSA	5.95	13.8
Non-SMSA	5.54	12.3
NORTH CENTRAL		
Central Cities	5.84	9.9
Other SMSA	5.87	9.7
Non-SMSA	5.63	12.1
SOUTH		
Central Cities	5.52	12.7
Other SMSA	5.67	12.3
Non-SMSA	6.04	12.4
WEST		
Central Cities	5.51	9.5
Other SMSA	5.49	9.4
Non-SMSA	5.67	7.5

PERCENTAGE OF CAPITAL EXPENDITURES BEING
FINANCED BY BOND ISSUES
AVERAGE 1966-1970

SYMBOLIC NAME	% PCFBB(I)
Region	
NORTHEAST	78.4
NORTH CENTRAL	84.3
SOUTH	94.9
WEST	77.5

EXPENDITURES FOR NEW EQUIPMENT AS A PERCENTAGE OF INSTRUCTIONAL EXPENDITURES BY RESIDENCE WITHIN REGION

SYMBOLIC NAME	% of Instructional Expenditures PCNEQ(I)
Region	
NORTHEAST	
Central Cities	1.4
Other SMSA	2.5
Non-SMSA	2.7
NORTH CENTRAL	
Central Cities	2.7
Other SMSA	4.4
Non-SMSA	4.8
SOUTH	
Central Cities	3.5
Other SMSA	5.1
Non-SMSA	4.2
WEST	
Central Cities	3.8
Other SMSA	4.1
Non-SMSA	3.4

REGIONAL DATA

SYMBOLIC NAME	% Local Rev. to Ed.* PLER(I)	Fedl. % of Ed. Rev.*[22] FERP(I)	% Interest** PINT(I)	State Distr. Weighting Factor* WF (I)
Region				
NORTHEAST				
Central Cities	28.8	7.10	6.00	0.914
Other SMSA	57.8	3.08	6.00	0.841
Non-SMSA	46.6	4.20	6.00	1.100
NORTH CENTRAL				
Central Cities	36.6	7.54	6.00	0.732
Other SMSA	61.4	3.65	6.00	0.808
Non-SMSA	52.9	6.04	6.00	0.879
SOUTH				
Central Cities	34.0	10.93	6.00	1.150
Other SMSA	49.8	8.79	6.00	1.120
Non-SMSA	47.2	14.05	6.00	1.540
WEST				
Central Cities	38.6	8.38	6.00	0.985
Other SMSA	49.5	5.81	6.00	0.931
Non-SMSA	41.7	10.46	6.00	1.190

*Computed (see 5.3.7)

**Estimated

STATE TAX REVENUES - BASE YEAR 1969

(In Millions of Dollars)

SYMBOLIC NAME	Pers.Inc. Tax Rev.[1] BREV(K,1)	Gen.Sales Tax Rev.[2] BREV(K,2)	Selective Sales Tax Rev.[3] BREV(K,3)	PIT + GST + SST + Corp.Inc. Tax[4] BREV(K,4)	Total Rev. State Sources[5] BREV (K,5)	% Yield Corp.Inc. Tax* CITY (K)	% State Sch.Exp. from Own Fund[14] PSER (K)
U. S. Total	7,591.1	12,539.2	11,606.3	34,916.8	49,536.7	2.8	
Alabama	74.9	197.4	198.0	499.3	691.1	1.6	32.7
Alaska	25.2	000.0	18.2	47.7	123.0	3.6	35.6t
Arizona	52.8	147.5	102.6	321.0	495.0	2.0	28.8
Arkansas	37.7	103.7	110.3	274.1	368.3	3.3	27.7
California	1,086.9	1,684.3	1,169.6	4,533.3	5,938.4	5.2	24.8
Colorado	103.5	122.8	94.4	352.7	524.1	3.8	17.5
Connecticut	000.0	174.1	193.8	454.1	664.5	5.0	24.1
Delaware	61.4	000.0	36.7	113.2	202.5	5.9	36.1
Florida	000.0	573.8	456.7	1,030.5	1,423.8	0.0	37.8
Georgia	139.2	308.0	253.0	281.9	344.6	4.1	34.8
Hawaii	86.5	137.1	44.6	773.4	950.3	3.3	36.8
Idaho	38.5	38.4	38.1	125.0	176.9	3.6	27.6
Illinois	000.0	989.6	662.4	1,652.0	2,183.2	2.8a	25.2
Indiana	181.5	349.4	233.9	773.6	1,122.9	0.4	28.2
Iowa	106.9	207.5	143.9	482.4	698.1	0.8	22.1
Kansas	72.4	137.4	95.5	325.4	483.7	2.0	21.7
Kentucky	107.6	247.7	181.4	576.1	778.6	3.7	28.2
Louisiana	44.5	159.8	202.9	441.8	1,044.9	2.4	29.4
Maine	000.0	70.4	57.3	127.7	196.0	2.8a	31.1
Maryland	313.4	162.4	230.4	760.9	1,001.7	2.3	27.8
Massachusetts	452.6	158.3	318.3	1,114.3	1,390.6	2.1	12.8
Michigan	390.2	794.8	450.7	1,852.5	2,640.1	2.8	27.8
Minnesota	304.2	174.0	230.8	791.6	1,112.6	4.3	29.4
Mississippi	20.4	173.5	125.1	352.3	482.6	3.8	28.6
Missouri	118.2	295.7	167.9	600.3	820.7	0.9	27.4
Montana	31.2	000.0	42.7	82.0	147.3	2.6	26.9
Nebraska	36.6	70.4	82.2	196.1	291.4	2.8a	12.6
Nevada	000.0	44.2	63.5	107.7	144.6	0.0	23.8
New Hampshire	2.9	000.0	53.8	56.7	112.0	0.0	7.2
New Jersey	14.5	264.9	432.3	868.8	1,418.5	1.5	26.7
New Mexico	19.6	82.7	59.0	166.4	340.1	2.0	33.4
New York	2,151.6	698.8	1,085.7	4,546.4	6,057.4	6.0	30.0
North Carolina	239.6	239.6	274.7	866.4	1,187.2	6.2	41.4
North Dakota	14.0	35.6	30.4	82.2	183.5	1.5	14.7
Ohio	000.0	620.7	571.1	1,191.8	1,874.2	0.0	26.5
Oklahoma	47.8	87.0	177.1	334.0	638.4	4.3	20.7
Oregon	204.3	000.0	91.8	33.6	518.2	4.0	17.3
Pennsylvania	000.0	891.2	672.2	1,847.4	2,527.8	4.3	33.3
Rhode Island	000.0	72.5	74.6	175.2	239.7	4.6	18.5
South Carolina	84.4	137.8	164.2	426.9	551.6	4.1	38.2
South Dakota	000.0	34.7	40.2	75.5	134.6	0.3	9.1
Tennessee	11.4	228.9	205.1	507.0	731.7	2.9	31.8
Texas	000.0	440.6	670.0	1,110.6	2,128.6	0.0	31.6
Utah	50.9	65.2	44.4	171.2	262.2	2.8	34.8
Vermont	34.0	000.0	43.7	83.3	124.0	2.6	12.7
Virginia	273.4	185.3	288.1	814.3	1,106.9	3.3	25.3
Washington	000.0	532.3	254.8	787.1	1,150.9	0.0	32.9
West Virginia	31.0	157.1	113.7	305.9	411.9	2.8a	29.6
Wisconsin	461.9	116.8	232.4	912.1	1,286.9	5.6	16.5
Wyoming	000.0	29.5	21.7	51.2	108.8	0.0	15.6
Dist. of Columbia	64.0	96.0	000.0	160.0	000.0	4.6	32.0

*Computed

[a]National Average Used.

LOCAL PROPERTY TAX DATA - BASE YEAR, 1969
(in Millions of Dollars)

SYMBOLIC NAME	Res NonFarm[6] BPTBR(K)	Comm & Ind[7] BPTBC(K)	Farm[8] BPTBF(K)	Total Local Rev[9] BTLR(K)	Total Prop Tax Rev[10] BSPTRV(K)	Mkt Value Res Pers Prop[11] BRPMV(K)
U.S. Total	754,582	100,179	213,139.4	45,860.8	29,691.9	865,310
Alabama	9,329	2,544	4,905.1	430.8	106.3	9,437
Alaska	855	179	45.7	59.8	29.3	1,155
Arizona	5,782	782	1,282.5	331.2	202.2	8,120
Arkansas	3,751	820	5,723.6	215.6	115.7	4,910
California	120,558	13,170	16,728.6	6,883.7	4,628.5	159,069
Colorado	8,082	1,391	2,351.6	527.9	357.0	8,558
Connecticut	18,868	2,061	981.2	730.0	630.0	16,028
Delaware	2,403	161	664.9	78.1	41.2	1,969
Florida	24,763	5,197	12,205.9	1,315.8	695.5	39,080
Georgia	10,962	7,668	6,023.1	734.4	376.7	11,703
Hawaii	3,682	329	278.9	121.8	69.4	4,372
Idaho	1,649	53	2,256.3	122.1	83.2	1,931
Illinois	49,672	3,807	15,712.4	2,714.5	1,906.5	56,160
Indiana	17,288	1,921	6,841.6	1,056.1	825.1	15,556
Iowa	9,653	1,177	11,437.8	653.6	485.9	7,177
Kansas	8,153	858	8,8650	550.0	407.0	6,951
Kentucky	9,622	1,535	5,435.9	392.2	182.8	6,937
Louisiana	13,022	1,403	1,762.3	502.2	198.8	11,814
Maine	3,299	638	415.6	163.4	142.1	3,876
Maryland	15,839	1,946	4,436.0	876.8	520.7	17,787
Massachusetts	27,522	3,168	1,546.6	1,450.7	1,228.9	24,232
Michigan	34,223	4.029	2,569.1	2,053.9	1,374.4	34,559
Minnesota	10,899	1,740	4,242.5	841.2	572.7	15,313
Mississippi	3,844	90	4,513.7	280.8	137.4	4,820
Missouri	16,273	1,947	6,893.9	937.3	563.7	16,399
Montana	2,327	383	1,838.1	164.6	127.2	2,550
Nebraska	4,082	629	6,065.7	401.9	289.9	4,258
Nevada	2,600	609	633.4	140.8	71.4	2,139
New Hampshire	4,441	332	18-.3	150.6	129.9	3,137
New Jersey	36,296	5,512	1,966.2	1,987.1	1,578.4	38,636
New Mexico	2,835	426	1,298.9	132.6	64.0	3,990
New York	67,959	8,420	4,956.7	6,414.7	3,863.2	18,071
North Carolina	13,074	2,607	6,695.9	534.1	327.9	16,196
North Dakota	1,310	263	2,869.1	138.1	98.9	870
Ohio	47,122	5,296	6,072.7	2,321.5	1,513.8	52,495
Oklahoma	8,421	748	6,169.3	384.0	228.6	9,757
Oregon	7,924	1,378	3,281.1	506.7	367.9	6,019
Pennsylvania	44,613	5,419	5,272.2	2,210.8	1,249.0	43,782
Rhode Island	4,007	1,648	78.4	162.9	142.8	3,014
South Carolina	3,978	631	1,595.5	234.0	131.2	6,975
South Dakota	1,442	280	3,201.0	167.2	134.2	1,235
Tennessee	10,747	1,323	4,030.5	552.0	272.5	8,997
Texas	30,687	3,697	15,465.5	1,957.0	1,260.2	27,108
Utah	3,978	73	897.0	180.3	123.8	4,128
Vermont	1,225	293	322.8	74.5	66.1	1,162
Virginia	16,224	2,847	4,795.2	689.1	373.5	17,935
Washington	15,844	1,708	5,552.8	693.6	353.8	16,041
West Virginia	5,324	1,830	1,346.5	190.2	115.3	5,146
Wisconsin	18,102	2,700	3,607.3	975.3	755.3	14,680
Wyoming	1,774	39	531.0	86.9	51.8	905
Washington,D.C.	4,072	318		386.6	120.3	4,173

PROGRAM TAX YIELDS
(Per Cent)

Symbolic Name:	Tax Yield of Res Prop YRPCT(K)	Tax Yield of Comm & Ins Prop YCPCT(K)	Tax Yield of Farm Prop YFPCT (K)	Inc. in Value of Farm Prop 61-70[12] FPP(K)	Incr. in Value of Personal Income 61-70[13] PIP(K)
TOTAL	1.972	11.483	.998	43.7	58.9
Alabama	.732	2.332	1.551	30.1	56.7
Alaska	.163		.175	54.8	92.0
Arizona	.220	17.898	1.180	83.4	92.4
Arkansas	1.070	4.901	.402	24.9	55.0
California	.198	14.162	1.759	71.5	81.6
Colorado	2.138	10.949	1.789	79.2	71.0
Connecticut	2.092	8.919	.638	27.8	67.4
Delaware	1.372		.242	51.6	75.7
Florida	1.549	5.584	.566	113.5	95.0
Georgia	1.307	6.961	.333	43.9	57.4
Hawaii	1.094		1.327	33.0	62.1
Idaho	.757		1.248	26.6	55.7
Illinois	1.983	15.953	1.094	37.6	49.9
Indiana	1.789	16.729	1.349	28.3	51.1
Iowa	1.974	11.786	1.517	18.9	52.1
Kansas	1.723	17.350	1.015	23.2	52.6
Kentucky	1.084	4.217	.378	30.0	51.3
Louisiana	.296	12.359	.474	32.6	62.4
Maine	2.043	9.295	1.646	26.0	53.0
Maryland	2.217	10.531	.398	51.3	76.0
Massachusetts	2.749	11.120	.568	26.9	43.8
Michigan	1.991	14.479	2.064	26.9	57.9
Minnesota	2.924	16.706	2.337	5.21	59.6
Mississippi	.744		.278	30.6	64.5
Missouri	1.649	10.580	.850	37.7	48.0
Montana	1.486	15.245	1.634	19.7	50.3
Nebraska	2.820	10.281	1.686	19.4	52.3
Nevada	1.286	6.816	.611	33.8	103.0
New Hampshire	2.278		1.273	30.1	58.8
New Jersey	2.832	9.464	.804	34.4	62.6
New Mexico	.804	8.307	.488	44.8	75.9
New York	3.198	18.097	..954	40.2	50.5
North Carolina	1.146	5.719	.412	35.8	57.6
North Dakota	2.233	11.528	1.507	4.1	52.9
Ohio	1.544	13.411	.912	43.4	60.5
Oklahoma	1.125	15.271	.557	40.4	52.3
Oregon	2.049	9.592	1.313	33.4	54.5
Pennsylvania	2.160	6.157	.778	27.7	45.5
Rhode Island	2.174	8.597	1.049	27.7	39.9
South Carolina	.569	13.467	.543	29.8	62.4
South Dakota	3.362	10.059	1.485	12.0	63.7
Tennessee	1.545	8.062	.431	38.0	55.6
Texas	1.552	18.341	.686	44.2	53.2
Utah	1.372		1.132	23.7	62.6
Vermont	2.428	8.323	2.162	27.2	45.3
Virginia	1.223	4.577	.494	45.1	56.2
Washington	1.128	8.160	.642	27.0	53.8
West Virginia	1.003	7.549	.284	28.3	43.8
Wisconsin	2.162	10.033	2.154	44.4	53.9
Wyoming	.879		1.705	58.9	49.4
Washington, D.C.	1.537	12.262			47.2
	*Computed	*Computed	*Computed		

INTRA-STATE ALLOCATORS

SYMBOLIC NAME:	% Local Rev. from SMSA'S[23] PSMSA (K)	% Local Rev. from CC'S * PCC (K)
Alabama	60.3	22.2
Alaska	00.0	00.0
Arizona	77.2	20.8
Arkansas	35.9	9.9
California	90.3	15.0
Colorado	69.5	20.4
Connecticut	82.4	34.4
Delaware	86.0	25.5
Florida	70.8	15.2
Georgia	61.2	15.6
Hawaii	80.3	80.3
Idaho	14.5	4.1
Illinois	81.3	18.8
Indiana	65.3	13.0
Iowa	33.2	6.4
Kansas	39.4	7.4
Kentucky	57.2	22.2
Louisiana	66.1	28.9
Maine	26.2	16.0
Maryland	87.5	31.3
Massachusetts	84.4	32.0
Michigan	83.0	19.8
Minnesota	57.7	11.7
Mississippi	17.0	6.7
Missouri	73.4	23.5
Montana	24.1	6.7
Nebraska	40.7	11.5
Nevada	80.4	16.6
New Hampshire	15.7	11.0
New Jersey	77.3	13.4
New Mexico	37.6	20.7
New York	92.1	58.2
North Carolina	49.4	17.6
North Dakota	15.1	5.0
Ohio	82.2	20.7
Oklahoma	57.2	17.6
Oregon	61.3	14.0
Pennsylvania	83.8	23.8
Rhode Island	86.3	41.0
South Carolina	40.5	7.4
South Dakota	12.9	3.4
Tennessee	54.0	37.2
Texas	73.0	23.6
Utah	76.0	14.6
Vermont	00.0	00.0
Virginia	72.8	31.2
Washington	65.8	17.9
West Virginia	42.7	10.1
Wisconsin	57.5	18.6
Wyoming	00.0	00.0
District of Columbia	00.0	98.0

*Computed

TOTAL PERSONAL INCOME[21]
(Millions of 1967 Dollars)

	1970	1975	1980
Symbolic Name:	PI(K,1.1)	PI(K,1,2)	(PI(K,1,3)
UNITED STATES	707,041	895,939	1,115,899
MAINE	2,863	3,527	4,376
NEW HAMPSHIRE	2,354	3,016	3,759
VERMONT	1,367	1,664	2,178
MASSACHUSETTS	21,992	27,816	34,616
RHODE ISLAND	3,284	4,263	5,283
CONNECTICUT	13,085	16,547	20,632
NEW YORK	77,090	96,003	117,490
NEW JERSEY	29,279	37,053	47,131
PENNSYLVANIA	40,999	50,724	62,726
DELAWARE	2,109	2,796	3,464
MARYLAND	14,858	18,999	23,857
DISTRICT OF COLUMBIA	3,599	4,684	5,749
MICHIGAN	31,968	43,528	54,015
OHIO	37,506	48,518	59,967
INDIANA	17,415	23,261	29,238
ILLINOIS	44,364	56,648	69,449
WISCONSIN	14,470	18,441	22,710
MINNESOTA	12,903	16,347	20,514
IOWA	9,220	11,751	14,208
MISSOURI	15,354	19,749	24,220
NORTH DAKOTA	1,635	1,983	2,268
SOUTH DAKOTA	1,865	2,056	2,394
NEBRASKA	4,929	5,704	6,613
KANSAS	7,609	9,530	11,615
VIRGINIA	14,891	18,170	22,542
WEST VIRGINIA	4,654	5,627	6,802
KENTUCKY	8,762	10,553	12,966
TENNESSEE	10,733	13,429	16,793
NORTH CAROLINA	14,452	17,403	21,513
SOUTH CAROLINA	6,740	7,944	9,859
GEORGIA	13,580	16,380	20,599
FLORIDA	22,069	26,301	33,575
ALABAMA	8,701	10,983	13,543
MISSISSIPPI	5,050	5,965	7,139
LOUISIANA	9,850	12,274	14,926
ARKANSAS	4,758	6,040	7,352
OKLAHOMA	7,512	9,038	10,901
TEXAS	35,107	44,751	57,999
NEW MEXICO	2,819	3,725	4,637
ARIZONA	5,680	6,803	8,614
MONTANA	2,079	2,447	2,820
IDAHO	2,044	2,482	3,016
WYOMING	1,045	1,266	1,499
COLORADO	7,494	8,989	11,244
UTAH	3,023	3,942	4,965
WASHINGTON	12,098	15,045	18,574
OREGON	6,882	8,630	10,753
NEVADA	2,006	2,452	3,255
CALIFORNIA	78,607	105,933	135,756
ALASKA	1,239	1,396	1,686
HAWAII	3,049	3,363	4,099

TOTAL CIVILIAN EARNINGS [21]
(Millions of 1967 Dollars)

	1970	1975	1980
Symbolic Name;	PI(K,2,1)	PI(K,2,2)	PI(K,2,3)
UNITED STATES	546,382	710,889	881,503
MAINE	2,128	2,706	3,364
NEW HAMPSHIRE	1,818	2,391	2,967
VERMONT	1,055	1,316	1,714
MASSACHUSETTS	16,825	21,893	27,167
RHODE ISLAND	2,446	3,279	4,070
CONNECTICUT	10,130	13,239	16,407
NEW YORK	58,376	75,153	91,834
NEW JERSEY	23,312	30,017	37,832
PENNSYLVANIA	32,086	41,607	50,914
DELAWARE	1,566	2,149	2,667
MARYLAND	11,968	15,361	19,128
DISTRICT OF COLUMBIA	2,448	3,380	4,206
MICHIGAN	25,748	35,694	43,827
OHIO	30,436	39,595	48,473
INDIANA	14,258	19,226	23,861
ILLINOIS	35,278	45,843	55,770
WISCONSIN	11,486	14,846	18,156
MINNESOTA	10,248	13,198	16,429
IOWA	7,120	9,306	11,212
MISSOURI	11,750	15,494	18,961
NORTH DAKOTA	1,116	1,460	1,681
SOUTH DAKOTA	1,352	1,541	1,803
NEBRASKA	3,628	4,373	5,078
KANSAS	5,635	7,360	8,977
VIRGINIA	11,278	14,071	17,461
WEST VIRGINIA	3,588	4,460	5,371
KENTUCKY	6,753	8,268	10,139
TENNESSEE	8,520	10,865	13,474
NORTH CAROLINA	11,441	13,912	17,099
SOUTH CAROLINA	5,227	6,292	7,777
GEORGIA	10,677	13,055	16,327
FLORIDA	15,505	19,579	25,220
ALABAMA	6,735	8,763	10,749
MISSISSIPPI	3,840	4,682	5,592
LOUISIANA	7,417	9,560	11,617
ARKANSAS	3,562	4,700	5,718
OKLAHOMA	5,455	6,222	7,667
TEXAS	26,662	34,765	45,039
NEW MEXICO	2,108	2,931	3,638
ARIZONA	4,350	5,315	6,720
MONTANA	1,545	1,835	2,144
IDAHO	1,612	1,983	2,397
WYOMING	785	982	1,163
COLORADO	5,642	6,990	8,739
UTAH	2,414	3,194	3,988
WASHINGTON	9,077	11,957	14,694
OREGON	5,360	6,936	8,582
NEVADA	1,647	2,007	2,629
CALIFORNIA	59,751	83,526	106,653
ALASKA	946	1,074	1,299
HAWAII	2,272	2,538	3,109

MINING EARNINGS[21]
(Millions of 1967 Dollars)

	1970	1975	1980
Symbolic Name	PI(K,3,1)	PI(K,3,2)	PI(K,3,3)
UNITED STATES	5.825	6.024	6.813
MAINE	2	1	2
NEW HAMPSHIRE	3	4	5
VERMONT	7	8	10
MASSACHUSETTS	10	13	16
RHODE ISLAND	2	2	3
CONNECTICUT	10	10	12
NEW YORK	87	96	110
NEW JERSEY	41	35	40
PENNSYLVANIA	368	352	391
DELAWARE	1	1	1
MARYLAND	16	24	29
DISTRICT OF COLUMBIA			
MICHIGAN	110	132	154
OHIO	218	208	238
INDIANA	73	76	86
ILLINOIS	240	225	244
WISCONSIN	23	28	33
MINNESOTA	129	129	142
IOWA	24	31	37
MISSOURI	69	68	78
NORTH DAKOTA	14	17	20
SOUTH DAKOTA	17	20	24
NEBRASKA	12	15	18
KANSAS	97	100	108
VIRGINIA	123	101	115
WEST VIRGINIA	452	409	456
KENTUCKY	243	213	240
TENNESSEE	47	45	51
NORTH CAROLINA	25	29	35
SOUTH CAROLINA	11	12	15
GEORGIA	49	47	57
FLORIDA	63	72	85
ALABAMA	69	64	73
MISSISSIPPI	52	58	67
LOUISIANA	471	543	623
ARKANSAS	35	44	51
OKLAHOMA	363	407	451
TEXAS	1.009	1.126	1.253
NEW MEXICO	144	159	181
ARIZONA	204	164	192
MONTANA	58	59	67
IDAHO	30	29	34
WYOMING	104	108	122
COLORADO	147	143	162
UTAH	112	104	120
WASHINGTON	18	21	24
OREGON	12	19	22
NEVADA	36	42	50
CALIFORNIA	327	374	424
ALASKA	48	37	42
HAWAII			

TOTAL TRADE EARNINGS[21]
(Millions of 1967 Dollars)

	1970	1975	1980
Symbolic Name	PI(K,4,1)	PI(K,4,2)	PI(K,4,3)
UNITED STATES	93,357	118,890	148,554
MAINE	358	446	563
NEW HAMPSHIRE	300	369	463
VERMONT	158	205	262
MASSACHUSETTS	2,891	3,636	4,559
RHODE ISLAND	416	534	670
CONNECTICUT	1,535	1,926	2,433
NEW YORK	10,029	12,452	15,111
NEW JERSEY	4,012	4,686	5,720
PENNSYLVANIA	5,035	6,469	8,030
DELAWARE	221	289	363
MARYLAND	1,996	2,556	3,233
DISTRICT OF COLUMBIA	242	377	480
MICHIGAN	4,054	5,389	6,716
OHIO	4,825	6,181	7,667
INDIANA	2,167	2,865	3,607
ILLINOIS	6,377	8,159	10,030
WISCONSIN	1,835	2,370	2,937
MINNESOTA	1,913	2,429	3,041
IOWA	1,219	1,587	1,934
MISSOURI	2,169	2,729	3,410
NORTH DAKOTA	245	295	353
SOUTH DAKOTA	250	307	372
NEBRASKA	677	796	947
KANSAS	1,040	1,279	1,573
VIRGINIA	1,762	2,215	2,800
WEST VIRGINIA	496	620	760
KENTUCKY	1,094	1,352	1,682
TENNESSEE	1,449	1,909	2,416
NORTH CAROLINA	1,852	2,248	2,806
SOUTH CAROLINA	762	896	1,129
GEORGIA	2,057	2,672	3,416
FLORIDA	3,180	3,794	4,883
ALABAMA	1,048	1,355	1,687
MISSISSIPPI	576	708	860
LOUISIANA	1,346	1,697	2,101
ARKANSAS	579	747	920
OKLAHOMA	932	1,219	1,517
TEXAS	5,123	6,472	8,170
NEW MEXICO	323	454	573
ARIZONA	762	916	1,171
MONTANA	265	328	391
IDAHO	279	349	429
WYOMING	119	147	177
COLORADO	1,058	1,277	1,604
UTAH	416	551	693
WASHINGTON	1,624	2,065	2,562
OREGON	1,036	1,358	1,713
NEVADA	245	299	398
CALIFORNIA	10,494	14,336	18,507
ALASKA	133	147	184
HAWAII	383	428	531

PRIVATE NONFARM EARNINGS[21]
(Millions of 1967 Dollars)

Symbolic Name	1970 PI(K,5,1)	1975 PI(K,5,2)	1980 PI(K,5,3)
UNITED STATES	454,012	564,881	697,216
MAINE	1,716	2,126	2,644
NEW HAMPSHIRE	1,550	1,957	2,414
VERMONT	902	1,082	1,360
MASSACHUSETTS	14,539	18,098	22,324
RHODE ISLAND	2,333	2,666	3,288
CONNECTICUT	9,015	11,316	13,940
NEW YORK	48,949	60,611	73,442
NEW JERSEY	20,555	24,525	29,676
PENNSYLVANIA	27,689	29,572	36,028
DELAWARE	1,319	1,770	2,180
MARYLAND	8,482	11,138	13,970
DISTRICT OF COLUMBIA	1,289	1,821	2,328
MICHIGAN	24,972	29,593	36,079
OHIO	26,518	33,098	40,371
INDIANA	12,191	15,860	19,694
ILLINOIS	34,363	37,892	45,980
WISCONSIN	9,350	11,826	14,450
MINNESOTA	9,254	10,162	12,648
IOWA	5,098	6,532	7,999
MISSOURI	9,514	12,556	14,783
NORTH DAKOTA	728	840	1,000
SOUTH DAKOTA	768	906	1,086
NEBRASKA	2,541	2,985	3,565
KANSAS	4,308	5,499	6,769
VIRGINIA	7,983	9,891	12,475
WEST VIRGINIA	3,064	3,581	4,283
KENTUCKY	5,384	6,423	7,950
TENNESSEE	6,955	8,699	10,916
NORTH CAROLINA	9,253	10,866	13,488
SOUTH CAROLINA	4,260	4,954	6,191
GEORGIA	8,551	10,151	12,792
FLORIDA	12,439	14,195	18,382
ALABAMA	5,183	6,520	8,063
MISSISSIPPI	2,758	3,340	4,075
LOUISIANA	5,968	7,420	9,036
ARKANSAS	2,987	3,287	4,052
OKLAHOMA	4,075	5,073	6,273
TEXAS	27,241	35,482	43,870
NEW MEXICO	1,401	1,992	2,504
ARIZONA	3,358	5,295	6,766
MONTANA	1,027	1,253	1,462
IDAHO	1,104	1,385	1,713
WYOMING	555	642	760
COLORADO	4,276	5,176	6,520
UTAH	1,717	2,156	2,691
WASHINGTON	7,045	9,153	11,266
OREGON	4,297	5,344	6,606
NEVADA	1,349	1,571	2,064
CALIFORNIA	47,417	64,279	82,141
ALASKA	617	640	773
HAWAII	1,805	1,682	2,086

Symbolic Name:	STATEWIDE ELASTICITIES OF: Corp.Inc.Tax Rev To Total Pers. Inc. EFMV(k)[15]	Pers.Inc.Tax Rev To Total Pers. Inc. EFP(k,1)[16]	Gen.Sales Tax Rev To Total Pers. Inc. EFP(k,2)[17]	Sel.Sales Tax Rev To Total Pers. Inc. EFP(k,3)[18]	Res. Prop. Mkt.Val.To Total Prin. N/FEarnings EFRP(k)[19]	Comm.& Ind. Mkt. Val. To Total Pri. N/F Earnings EFCP(k)[20]
Alabama	2.5	2.2	1.0	0.7	1.19	1.7
Alaska	1.9	0.0	0.0	1.1	.93	1.3
Arizona	3.2	1.6	1.0	0.8	1.02	1.4
Arkansas	2.1	2.4	1.0	1.1	.86	1.6
California	2.5	1.7	1.0	0.8	.93	1.4
Colorado	1.1	1.5	1.0	0.8	.74	0.9
Connecticut	1.5	0.0	1.0	0.7	.98	1.0
Delaware	0.8	1.2	0.0	0.7	.85	0.8
Florida	2.6	0.0	1.0	0.7	.82	1.3
Georgia	2.0	2.0	1.0	0.7	.96	1.4
Hawaii	1.9	1.8	1.0	0.8	.87	1.3
Idaho	2.5	2.1	1.0	1.1	.74	1.3
Illinois	2.1	0.0	1.0	0.8	.81	1.4
Indiana	1.2	2.2	1.0	0.4	.69	0.9
Iowa	1.2	2.2	1.0	0.6	.80	0.8
Kansas	1.0	1.5	1.0	0.6	.89	1.0
Kentucky	1.3	2.0	1.0	0.8	1.03	1.0
Louisiana	2.6	2.3	1.0	0.7	1.28	1.6
Maine	2.5	0.0	1.0	1.6	1.18	1.6
Maryland	1.6	1.3	1.0	0.6	.82	1.1
Massachusetts	1.6	1.8	1.0	0.7	.91	1.2
Michigan	1.7	0.0	1.0	0.7	.76	1.1
Minnesota	2.0	1.8	1.0	0.6	.68	1.3
Mississippi	2.3	2.4	1.0	0.7	.86	1.4
Missouri	1.6	1.8	1.0	0.8	.84	1.3
Montana	4.3	2.1	0.0	0.7	.90	1.5
Nebraska	1.2	0.0	1.0	0.7	.64	1.0
Nevada	1.5	0.0	1.0	1.0	1.18	1.0
New Hampshire	1.8	0.0	0.0	0.9	1.36	1.2
New Jersey	1.9	0.0	1.0	0.7	.88	1.2
New Mexico	2.0	1.3	1.0	0.7	.72	1.3
New York	1.5	1.7	1.0	0.8	.56	1.1
North Carolina	2.5	1.7	1.0	0.8	1.03	1.7
North Dakota	0.8	1.6	1.0	0.8	.72	0.6
Ohio	2.3	0.0	1.0	0.6	.90	1.3
Oklahoma	2.4	1.8	1.0	0.9	1.13	1.8
Oregon	1.3	1.7	0.0	0.8	1.00	0.9
Pennsylvania	1.8	0.0	1.0	0.7	.85	1.3
Rhode Island	1.3	0.0	1.0	0.9	.95	1.1
South Carolina	3.2	2.0	1.0	0.7	.75	1.5
South Dakota	0.7	0.0	1.0	0.7	.64	0.6
Tennessee	1.8	0.0	1.0	0.8	1.05	1.2
Texas	1.5	0.0	1.0	0.7	.94	1.1
Utah	1.5	1.9	1.0	0.8	.75	1.0
Vermont	1.5	2.0	1.0	0.5	.82	1.2
Virginia	2.1	2.0	1.0	0.7	.90	1.4
Washington	2.2	0.0	1.0	0.8	1.05	1.4
West Virginia	2.6	1.7	1.0	0.5	.93	1.5
Wisconsin	1.4	1.6	1.0	0.6	.92	1.0
Wyoming	1.1	0.0	1.0	0.8	1.74	0.8
Dist. of Columbia	1.2	2.3	1.0	0.9	.65	1.1

TREND DATA *

Symboli. Name:		'70	'75	'80
TYRP	Trend in Yields - Residential Non-Farm Property	1.0	1.0	1.0
TYCP	Trend in Yields - Commercial and Industrial Property	1.0	1.0	1.0
TYFP	Trend in Yields - Farm Property	1.0	1.0	1.0
TEFFP	Trend in Elasticity - Farm Property	1.0	1.0	1.0
TESER	Trend in % State Revenues Going to Education	1.0	1.0	1.0
TFLRE	Trend in % Local Revenue Going to Education	1.0	1.0	1.0

*Estimated

SOURCES OF INPUT - REVENUES

1/ "State-local finances and suggested legislation," Advisory Commission on Intergovernmental Relations, 1971 Edition, Washington, D. C., December 1970, M-7, Page 15, Table 6, Col. 3.

2/ IBID, Col. 2

3/ IBID, Col. 5

4/ IBID, Cols. 2, 3, 4, 5

5/ "Governmental Finances in 1968-69," U. S. Department of Commerce, Bureau of Census, Page 31, Table 17.

6/ "Property Taxes: The 1970 Outlook," The Council of State Governments, by Selma J. Mushkin, Table 2-19.

7/ IBID, Table 2-14

8/ IBID, Table 2-15

9/ Governmental Finances in 1968-69, Page 31, Table 17

10/ IBID, Page 31, Table 17

11/ Property Taxes: The 1970 Outlook, Table 2-19

12/ IBID, Table 2-15

13/ IBID, Table 2-12

14/ "State-Local Revenue Systems And Educational Finance," A report presented to the President's Commission on School Finance, Advisory Commission on Intergovernmental Relations, November 12, 1971, Table 3-1, Col. 2

15/ "Property Taxes: The 1970 Outlook," Table 2-13

16/ IBID

17/ IBID, Table 3-20

18/ IBID, Table 3-20

19/ IBID, Table 2-12

20/ IBID, Table 2-12

21/ U. S. Department of Commerce, Office of Business Economics

22/ U. S. Office of Education Elementary and Secondary School Survey (ELSEGIS II)

23/ "Local Governments in Metropolitan Areas," 1967 Census of Governments, U. S. Department of Commerce, Bureau of the Census, Table II, Page 226.

APPENDIX II

FEEDBACK PROCESSES AND THEIR USE IN MODELING THE FINANCING OF PRIMARY AND SECONDARY EDUCATION

There are several methodologies which can be followed when building computer simulation models. One can focus upon the randomness of process, one can look at processes as stepping from event to event through time. One can construct econometric models or one can explicitly represent the dynamics of the process.

For the purposes of analyzing the fiscal impact of alternative policies and programs upon the educational delivery system, the dynamic nature seemed most important. When examining dynamics, two concepts become evident: (1) the level-rate characteristic of dynamic processes and (2) feedback relationships.

LEVEL - RATE CHARACTERISTICS

All variables can be classified as being in either of two categories, levels or rates. Levels define the state of a system. Levels are those variables that exist at a point in time. They would exist if all actions were to cease. They are the balance sheet variables. In education, the number of students in a grade, the number of teachers, the size of school buildings, or the fund balances of a school system are all levels. Rates define action. They are the variables that bring about change. If all action ceases the rates no longer exist. Accountants put rates in cash flow and profit and loss statements. In an educational system students entering or leaving a grade or dropping out of school are rates. The hiring, promotion and retiring of teachers, and the construction of classrooms are also

rates. Models which represent the levels and rates, but which place little emphasis upon feedback are called flow models.

FEEDBACK RELATIONSHIPS

The other important element of a dynamic process are feedback loops. Feedback loops are most useful in describing socio-economic systems. They can be used to explain growth behavior and cyclical characteristics of such systems when portrayed through time.

A feedback loop is formed when circular causation exists. (i.e., Variable A affects other variables which in turn affect variable A.) A feedback process is sometimes called chicken and egg phenomenon because every variable affects every other variable. For example, a local school system with a reputation for delivering high quality services tends to attract a community of families who value quality education for their children. They reinforce their approval for heavy educational expenditures by voting for sufficient school taxes. However if the tax burden of increasing debt load upon a community becomes too great then future bond sales or tax increases become impaired.

Feedback models also incorporate the level-rate mechanisms of flow models. Depending upon the purpose at hand, the time period over which the dynamics of a system is to be studied, and the understanding and data to support the study, the emphasis will shift between a focus upon flows or a focus upon feedback. It should be noted that the prototype model constructed for the Commission is primarily a flow

model. Yet it is clear that some important feedback structures are not now included.

FEEDBACK PROCESSES IN THE FINANCING OF ELEMENTARY AND SECONDARY EDUCATION

The dynamics of education finance are influenced by feedback processes. Feedback is an ubiquitous phenomenon in the social-managerial-political world of educational finance. Feedback exists whenever a decision sets in motion forces which bring about changes which affect the decision as it is subsequently made. It has been claimed that most if not every decision is made within such a feedback context.

As has been shown in corporate decision-making, an understanding of feedback processes is important for being able to explain and predict processes of growth, of stabilization, and of fluctuation. (Forrester, Industrial Dynamics, M.I.T. Press, 1961). In addition, it has been argued that when dealing with complex systems, such as elementary and secondary education financing, setting a policy which will persist for ten-twenty-or-fifty years ought to be based upon a sound knowledge of feedback processes. Failure to consider feedback within complex socio-economic systems can produce results which are unexpected,

ineffective, or directly contrary to the intention of the policy. That is, such complex systems have shown to be in some cases counter-intuitive. (Jay W. Forrester, "Counter-Intuitive Behavior of Social Systems," Technology Review, January 1971, Vol. 73, No. 3, pp. 52-68). The purpose of this section is to identify some of the central feedback processes which appear to exist within the elementary and secondary educational system.

THE GROWTH OF PERCEIVED EDUCATIONAL NEEDS

Central to understanding the great growth of articulated formal educational needs and financial support is the fact that educational quality is usually measured by the resources applied to formal education, and not by any measure of the impact of these inputs on students and society. For a long time educational input measures such as student-teacher ratios, the costs per pupil, and the condition of the physical plant have been used as proxies of educational quality.

One hypothesis is that the process of growth of education inputs is tied to perceived educational needs and financial support of education. As illustrated in Figure 1, the level of the financing of education establishes the level of educational resources available. As funding of education increases, such education resources as teachers, space, equipment, and educational materials all increase relative to students. With increased resources more special purpose programs are inaugurated. Educational programs are extended to younger children and more specialized offerings are brought into the curriculum to deal with individual

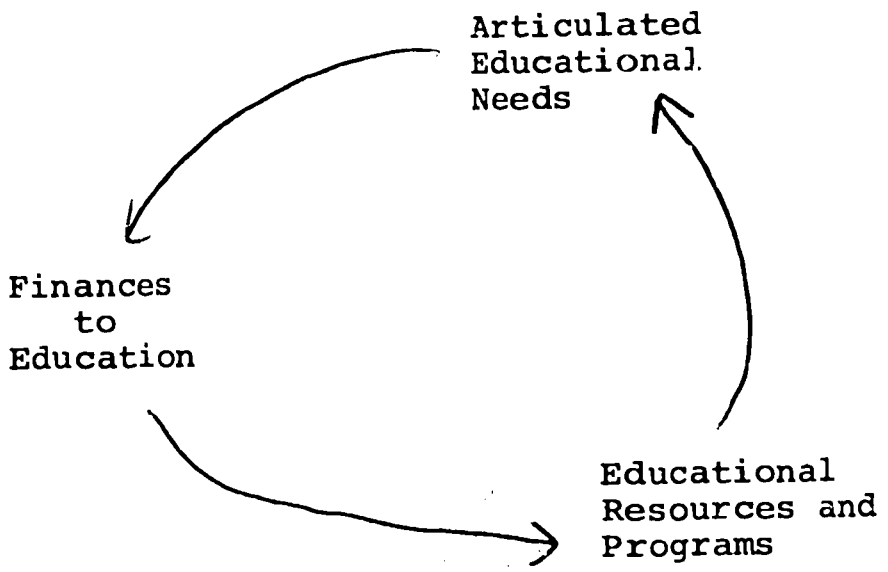


FIGURE 1: Feedback Loop Producing Growth in Educational Need and Financial Support

learning disabilities and to meet the interests of students. In the past the nation has supported ever increasing growth in educational budgets because of the widely accepted belief that a good education is a prerequisite for a good job.

As educational resources increase it is always possible to find new educational needs which require even more resources. Typically some school districts have had more interest in education and/or more fiscal capacity to provide considerably more educational resources than others. But mutual beliefs in the equality of educational opportunities and the method of measuring educational quality by the resource per pupil means that there is pressure to expand educational resources so as to close the gap between low spending school districts.

There is also pressure for some school districts to catch up to their neighboring school districts which are continually setting new educational goals and needs and funding the resources to meet these goals and needs.

The operation of the feedback structure shown in Figure 1 illustrates this phenomenon: Perceived education needs continue to expand. As new educational needs are perceived they are financed by those communities most striving for or trying to maintain a quality image. As these new needs are financed, additional resources and programs are added. But then even further educational needs are discovered! Thus

financing of education continually tends to grow and resulting increases in resources and programs leads to even further needs being discovered and additional financing requirements.

Something, however, does inhibit the continuous growth of educational expenditures and perceived needs. Conceivably, if this growth were not to cease, then eventually educational expenditures would absorb all of the Gross National Product. Two mechanisms whereby educational expenditures are constrained are shown in Figure 2. In the mechanism on the left in Figure 2, the educational expenditures affect required financing and thus the tax rate. Then as taxpayers decide that perceived educational needs are less important than non-educational needs, they simply decide to cease putting tax money into education. In the second mechanism, on the right of Figure 2, the growth in educational needs is constrained through measures of educational outcomes as a function of educational inputs. The marginal impact of resources is evaluated and administrators or legislators evaluate the worth of proposed additional educational funding. As the effectiveness of various programs and resources is evaluated, reallocation of fiscal resources take place. Educational programs will be redesigned and administrators and legislators start to place ceilings on educational expenditures and educational needs become filled only in relation to filling of non-educational needs.

There will always be some upward pressures for increased educational expenditure since it is always possible to identify needs. But, the total amount of educational expenditures will be tied to the efficiency

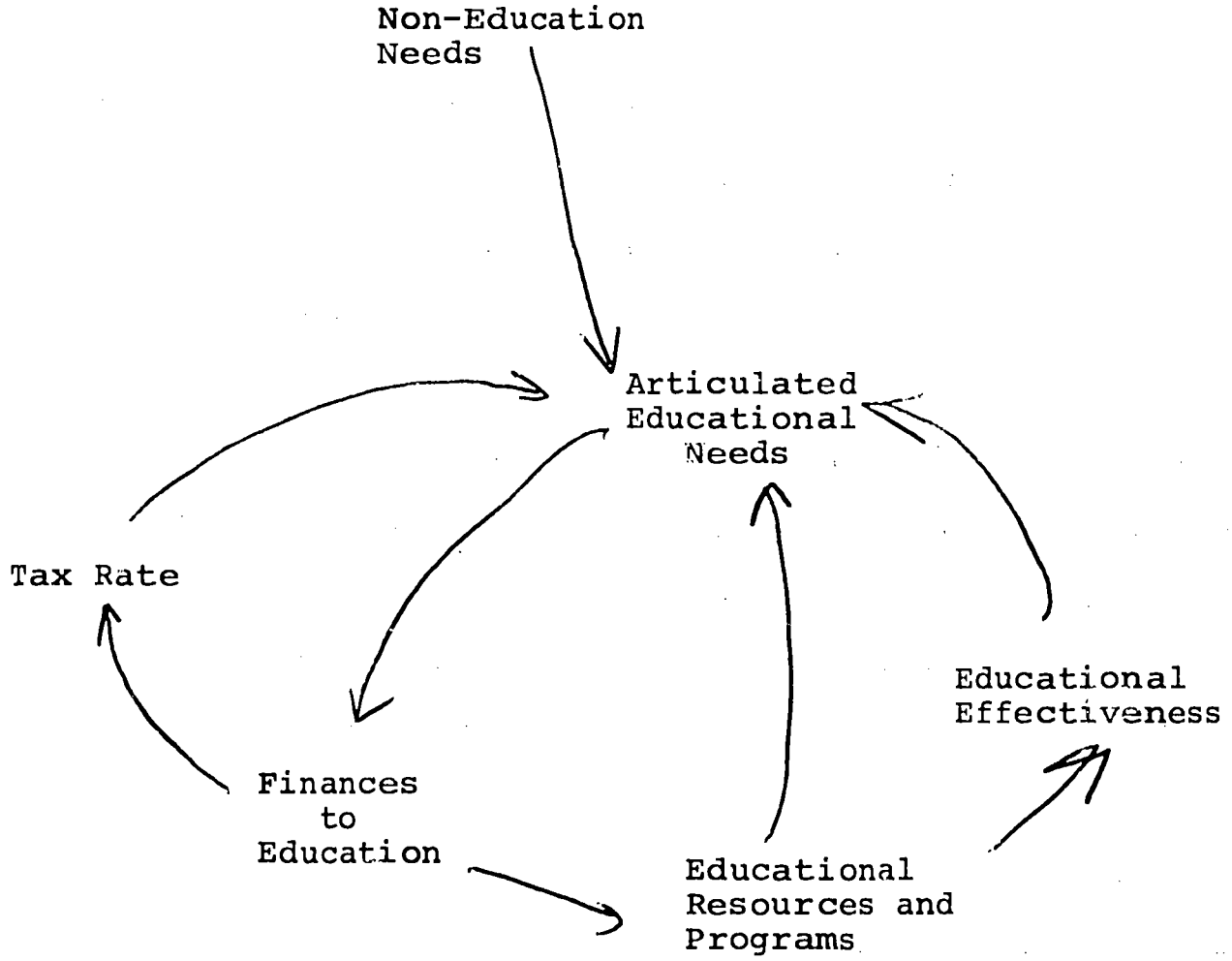


FIGURE 2 : Tax Feedback Structure Controlling Growth in Educational Needs and Financial Support

and effectiveness of the use of educational resources. Accordingly the level of educational expenditure will depend a great deal upon the mechanisms which control educational expenditures and which allocate resources among alternative educational programs. Some mechanisms that control expenditures will result in waste and ineffficiency and an improper level of expenditure. Other mechanisms will engender efficiency and effectiveness.

The mechanisms which control educational expenditures are not well understood. However, these control mechanisms need to be studied and the effect of them upon educational effectiveness, efficiency and budget levels is very important. For example, if the primary control of expenditure levels is the tax burden as perceived by the taxpayer, one can foresee inefficiency and ineffectiveness. As the taxpayer looks at his total tax bill for education and he merely states his unhappiness, his unhappiness will have difficutly being translated into effective allocation of resourcss at the school district or building level. Legislators who can control budgets are likely to be so far removed from the classroom that they will be unable to determine proper educational management. The introduction of program planning and budgeting begins to make the resource management process more susceptible to management because at least the cost of alternative programs is shown. Within such a budgeting framework, managers, legislators, and taxpayers can decide how they would like their money spent. For example, for the same amount of money a taxpayer or a legislator or administrator can decide whether Latin or Remedial Reading is to be

offered. However, neither taxpayer discontent nor program planning and budgeting systems answer many of the issues of efficient and effective educational management. For example, we do not know if funds are spent best on educating four-year-olds in formal classrooms or on the twelfth grade. We do not understand the proper length of the school day. We are not sure if the grade system is sensible. We as yet lack good evidence on the effect of the tenure system upon educational efficiency and effectiveness. We do not know if students can be used as teachers. Methods of evaluating educational effectiveness are not yet developed which have proven effectiveness and wide acceptance. Yet, answering these questions has major impact upon educational financing, efficiency and effectiveness.

DISPLACEMENT OF EDUCATIONAL FINANCE

When considering alternative financing schemes for elementary and secondary education in the United States, one of the most important questions is whether or not increased funding from federal and state governments will increase funds to education or displace funds currently provided by local government. If displacement does take place, then the increased funding must be judged not upon the effects of increased money in education, but rather upon other criteria.

Figure 3 shows the basic feedback structure whereby increased state and federal funding possibly might displace local funding to education. This structure is very similar to that of Figure 2 except that each separate level of government, local, state and federal, has been identi-

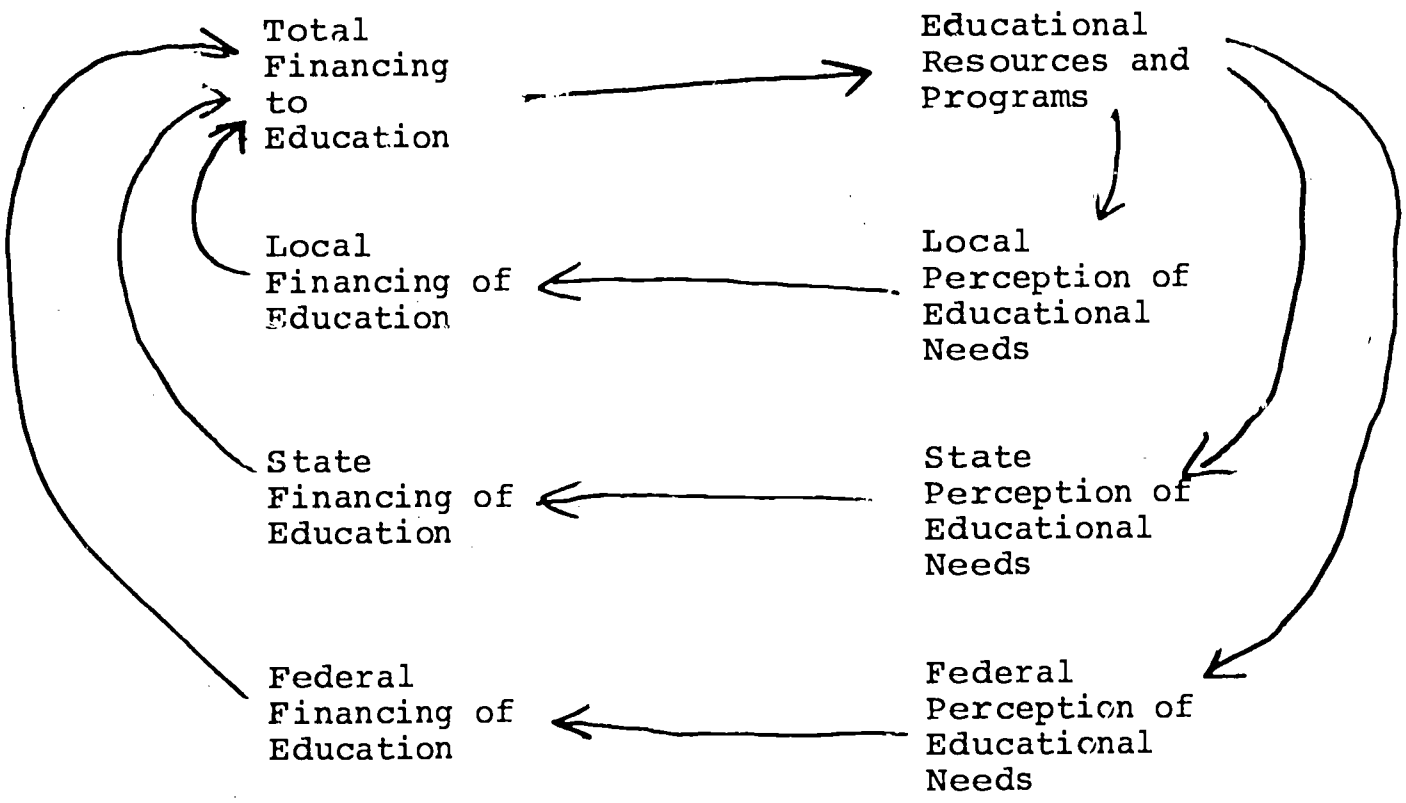


FIGURE 3: Mechanisms of Displacing Educational Financing from One Government Level to Another

fied separately. The total financing to education is the sum of financing provided by local, state and federal sources. Then the total financing provides for total resources and programs. These resources and programs are then examined and needs for additional programs are then examined and needs for additional programs or cutbacks in programs are perceived at the local, state and federal level. Given the perception of needs for increases or cutbacks in education, local, state and federal governments alter their financing plans.

It is entirely possible that the different levels of government will have quite different perceptions of educational needs for two reasons. First of all, the distance from the classroom in a particular school district will generate quite different perceptions of the educational goals and needs. People at local, state and federal levels who perceive the needs and who have control over the allocation of funds may well have different values as to societal goals and educational goals.

With these different perceptions, the following scenario is possible. As state or federal funding of education increases, educational resources and programs increase beyond the level that local governments and taxpayers feel is proper. Local governments then spend money elsewhere and thereby reduce the amount of money spent on education.

As local governments reduce their spending on education and if state and federal governments feel that the resources and programs are still inadequate, they may very well increase spending for education, which

will only result in a further reduction of local contribution since the local government feels that with the increased state and federal support, educational resources and programs exceed needs. Thus, differing perceptions of needs and increased state and federal funding could well displace local financing of education rather than increase resources and programs in education.

The inverse interaction can also take place. If local school districts have higher aspirations or use funds differently from ways desired by state and federal governments, then state and federal governments may feel there is no need to fund education to the same degree, so funds are reduced. But as this funding is reduced, local governments will exert additional control over resources as they replace the state and federal reduction. The result may be continued decreases in state and federal funding, as control and responsibility shifts to the local level.

It is the above types of complex interrelationships which have not been included in the model but about which much more investigation and study should be made. These interrelationships become more important as the planning horizon increases from one decade to several decades.

APPENDIX III

1. The Feasibility of Coordinating State and Federal Educational Finance Planning.

2. Case Study - California

   by William E. Ioup
   Jimmy Sutton

3. Case Study - Pennsylvania

   by Clifford D. J. Lawrence
   Philip Mulvihill
   S. L. Sklar

1. THE FEASIBILITY OF COORDINATING STATE AND FEDERAL EDUCATIONAL FINANCE PLANNING

1.1 PURPOSE AND OBJECTIVES

The basic rationale for undertaking these projects was to demonstrate both the need for and the value of coordinated forward planning activities at the state and federal level. Initially, five State Departments of Education were asked if they wished to enter into a contractual relationship with the Commission to undertake the development of a prototype model for educational finance planning consistent with the concepts being used to develop a national educational finance planning model. Two states, California and Pennsylvania accepted the Commission's offer, and a working relationship between the Commission and the staffs of these two Departments of Education was established. The terms of the working relationships set forth in each contract were carried out as follows:

> A staff analyst was provided by the Commission to work full time on the project from June 1, 1971 to September 30, 1971, and half time from October 1, 1971 to February 29, 1972.
>
> The California and Pennsylvania Departments of Education assigned a staff member to work full time on the project from June 30, 1971 to February 29, 1972. The Commission undertook the responsibility for providing the state staff members with sufficient training so the model could be modified and run by the states after Commission support was terminated.
>
> The Commission staff, in conjunction with the two Departments of Education developed an initial set of objectives. The models were structured to meet these objectives.
>
> The Commission drew up a list of data requirements. The State Departments of Education made determinations as to the availability of the data with the imposed time constraints and undertook the necessary collection activities.

The State Departments of Education provided data processing support and systems support to prepare the available data for input into the model.

The Commission developed and tested a prototype model. They prepared documentation for use of the model and they evaluated the validity of the model output and made suggestions for improvement of the model.

The President's Commission on School Finance provided funding to each state for each of these projects.

1.2 SUMMARY FINDINGS AND CONCLUSIONS

As a result of these two development efforts it was demonstrated that coordinated state and federal educational finance planning is both feasible and desirable. The model objectives articulated by the individual states' Departments of Education personnel were found to be either similar or complementary to those employed in the National Educational Finance Planning Model. The data requirements of the state and federal educational finance planning models were also markedly similar. Even though more detailed data were found to be required for effective planning at the state level, these data were available in sufficient detail in the states included in this project.

It also became increasingly obvious that if coordinated federal-state educational finance planning was undertaken on a wide scale, one of the desirable outgrowths would be improved data comparability among states. However, the most important conclusion to be drawn was that there is a basic need for this type of coordinated planning activity. The growing federal-state partnership supporting public education requires that the impact of policies or programs being proposed both at state and federal levels, be pretested. However, we believe that such pretesting should consider the interactions of complementary or competing policies or programs which exist at both levels. We also believe that the trend toward 'full state funding' places the burden of educational finance planning at

the state level. Unless all states employ comparable methods for measuring potential outcomes of proposed changes in the ways of financing or delivering education, we believe that the ability of federal planners to evaluate comparative impact of their support to states will continue to be impaired.

1.3 SIMILARITY AND DIFFERENCES IN MODEL OBJECTIVES

The state and federal Educational Finance Planning Model objectives are similar. Basically each of these models can be used for:

Testing of assumptions with regard to various forecasts;

Testing funding changes;

Testing distribution models;

Testing program changes.

No major differences were found in states' model objectives. However, differences were found in the amount of emphasis that was placed on these objectives. For instance, state planners are more often concerned about testing the impact of migration rate assumptions on population forecasts and in testing the impact of nonpublic enrollment rate assumptions on public school enrollment forecasts.

State planners also emphasized the need for more precise measures of economic activity and more complete descriptions of the mix of taxes employed in the state. They stated that these models should describe present or proposed state-aid formulae with a high level of precision, and have a capability to measure the impact of new statewide taxes on revenue availability. Finally, the planners noted the importance of having sufficient detail in the model to describe the cost of delivering specific state categorical programs such as vocational education, regional programs, bilingual programs, programs for the mentally retarded and preschool programs.

1.4 SIMILARITY AND DIFFERENCES IN DATA REQUIREMENTS AND DATA AVAILABILITY

In comparing the types of data that were used in each of the state models with each other and with the types of data used in the National Model it became obvious that although the data requirements were comparable, the quantity and quality of the data made available was significantly different.

For instance, both states made use of U.S. Bureau of Census population counts, fertility rates and survival rates. But in each state various attempts at estimating migration rates were made. Neither state used these population forecasts directly in the projection of enrollments. In both cases school participation rates for age and grade were not developed. Enrollment projections were generally made considering past trends in enrollments. Both states projected non-public enrollments independently of public enrollments and no direct consideration was given to total school age population. Both states had collected some detail on the size of existing target groups, but these target groups were uniquely defined in each state.

One of the two states collected detailed data on ages, experience levels and salaries of all certified teaching professionals in the state, whereas the other state depended on the state N.E.A. affiliate to collect such data. In neither case was this data analyzed to determine the key predictors of teacher supply or instructional costs. Key predictors such as hiring rates, termination rates and average salaries by age-experience level had to be developed as part of these projects data analyses efforts.

Each state used unique definitions to categorize other types of personnel. In one state, noncertified instructional personnel were categorized along with other nonprofessionals, whereas in the other state these paraprofessionals were identified separately. Although each state maintained data on pupil-teacher ratios, there was a lack of comparability of definition of classroom teachers and of enrollments. In no case had attempts been made to project probable classroom size or probable numbers of paraprofessionals employed.

In the area of capital outlays one state inventoried all school buildings by age, cost and condition, whereas the other state only kept count of numbers of classrooms available and in use. Information as to the level of existing bonded debt was not readily available.

In comparing the similarity and differences in developing state revenue projections, it was learned that each state had a significantly different mix of taxes in use. One state made forecasts of anticipated tax revenues by using economic indicators for specific regions in the state. The other state had used a survey technique for estimating revenue over the next three budget years. This state had just passed a personal income tax and no good method for prediction of this new revenue source had yet been developed.

In an analysis of a Commission sponsored survey of thirty-four representatives of the Council of Chief State School Officers regarding data adequacy, the responses generally indicated that state educational planners do not have access to comprehensive ongoing information depicting trends in school age population, participation

in various educational offerings, school organization, private enrollments, and target populations to be served. These state officials thought that comprehensive ongoing sources of data did not generally exist to depict states' fiscal capacity and tax effort by revenue source, trends in shares of revenues being made to education, trends in new educational demands for the same revenues, and trends in costs of delivering education. They also thought that there existed deficiencies in data describing levels of educational services being provided, cost differentials among school districts, and cost differentials between special programs. But in spite of these perceived data gaps, the state officials indicated that a strengthening of the data collection efforts, not a revamping, was the major need and we concur. For the most part we were able to assemble the kind of information needed to do educational finance planning with a reasonable amount of effort. If a more systematic approach to the assembly and analysis of this data were instituted we believe the task would have been significantly easier.

these twelve regions when subdivided into three types of residence provided a more convenient and manageable model structure. Economic growth indicators were available by OBE region and a main objective of the model was to highlight relative disparities by type of district and <u>not</u> by specific district

In the Pennsylvania Model four types of residence categories were chosen: Metropolitan Center City; Metropolitan, Other; Suburban or Small Community; and Rural. All 538 school districts were judgmentally classified by State Department of Education personnel. Pennsylvania recently combined all of its school districts into twenty-nine intermediate units. To accommodate future planning needs, the districts were aggregated into intermediate units by the type of residence.

1.5 SIMILARITY AND DIFFERENCES IN THE LEVEL OF AGGREGATION EMPLOYED

In the National Educational Finance Planning Model the level of aggregation was primarily determined by the availability of standards for categorizing school districts by type of residence. The categorization most widely used in available national data bases was the standard metropolitan statistical area (SMSA). It provided for classification of areas of the Nation into three type of residence categories:

City portions of SMSAs;

Portions of SMSAs not in central cities;

Non-SMSA areas.

The regional groupings chosen in the National Model were either states or groups of states. Because the educational finance system had unique statewide characteristics, state detail was developed in describing the revenue sector of the National Model. However, because sufficient detail about school districts was not available to describe educational needs by type of residence within states, the regional categories used by the Bureau of Census were adopted.

In the California Model the same three types of residence categories were used. School districts in California were classified using the judgment of State Department of Education personnel. However, the regional categories used were Office of Business Economics regions for the state. Rather than trying to maintain school district identity,

1.6 SIMILARITIES AND DIFFERENCES IN MODEL FORMULATION

Generally, all three models are 'flow' models, but each model has been tailored to data availability. The greatest differences between the models exist in the revenue and distribution sectors.

Basically, the National Model develops statewide state and local revenues, aggregates these revenues regionally, and distributes state and local revenues to schools by types of residence. This distribution is performed by using regional educational revenue source characteristics for each type of residence within that region. In addition, the federal share of educational revenues is prorated onto the total and disparities between educational revenues provided and projected educational expenditures are then computed.

In the Pennsylvania Model educational expenditures are computed first, then local educational revenues are computed, followed by a computation of the state educational subsidy using the state aid formula. Total educational revenues are derived and disparities developed. Finally, statewide revenue is projected and the percentage of state revenue required to meet the state aid subsidy is computed.

In California, all local revenues are computed for OBE regions and prorated to schools by type of residence characteristics. However, statewide revenues are aggregated from individual OBE region projections and educational revenues are distributed using formula applied to the thirty-six school areas. Disparities are then computed as in the National Model.

2. THE CALIFORNIA EDUCATION PLANNING MODEL

2.1 AN OVERVIEW

The model is divided into eight basic sectors. These sectors are:

- Population and Enrollment;
- Teacher Demand;
- Teacher Cost;
- Other Personnel Demand and Cost;
- Capital Expenditure;
- Revenue;
- Distribution.

Each of these sectors is formulated specifically to deal with an important aspect of the composite school financial picture. The inter-relation of these sectors provides the dynamics for the model.

The model, in its entirety, utilizes projected population to generate enrollment and enrollment, in turn, to predict teacher demand. Subsequent model sectors are developed based on basic program teachers required and exogenous variables such as economic series.

The population and enrollment sector utilizes population projections made by state demographers for the age groupings 0-2, 3-4, 5, 6-9, 10-13, 14 15-19 and over 19 for the years 1975 and 1980 (utilizing historical 1970 data for a base line). For each of these age categories, participation rates were generated for certain enrollment categories. The enrollment categories used were preschool, kindergarten, grades 1-6, grades 7-8 and grades 9-12 where appropriate data were available. The

participation rates are used with projected age group populations to predict enrollments. To assure reasonable validity, these predictions are to be compared with independently generated enrollment projections. Participation tables for nonpublic schools and for special target groups are then utilized to project their enrollments for the same time horizon.

The Teacher Demand Sector utilizes the enrollment of each group to project the demand for teachers by that group. Student-teacher ratios for each enrollment category (excluding nonpublic, for which the teachers are not supported by public funds) are used to generate the number of teachers required.

With the projection of the number of teachers required, appropriate salary projections and enrollment group salary differentials are used in the Teacher Cost Sector to project teacher salaries.

From total teacher demand, suitable ratios for other employees and their salaries are used to predict other personnel demand and cost by other categories.

The Other Current Expenditures Sector accounts for the remainder of current expenditures. The prime categories for these expenditures are:

- Maintenance;
- Operations;
- Health Services;
- Transportation;
- Fixed Charges.

Capital expenditures are determined from increased enrollments, intra-cell migrations factors, and anticipated expenditures to meet earthquake requirements.

The Revenue Sector considers revenues raised from property tax and seven other major revenue sources to the general fund. The revenues from these taxes are based on the estimated retail value of land and certain other economic indicators for the state.

In the Distribution Sector, the revenues are disbursed according to existing minimum foundation or proposed power equalization formulae and disparities calculated.

2.2 TYPES OF OUTPUT

For each year or for five year intervals, the model is capable of generating the following output.

POPULATION

School age population can be generated by age group and cell. As an alternative, total school age population can be generated.

TOTAL ENROLLMENT

Enrollment by the following five grade levels will be generated for each type of residence within region: Preschool; Kindergarten; 1-6; 7 & 8; 9-12.

NONPUBLIC ENROLLMENT

Nonpublic enrollments for same grade categories by type of residence within region.

SPECIAL EDUCATION

For each of the grade categories, the number of students in target group programs will be identified. These groups are:

Educable - Mentally Retarded;

Trainable - Mentally Retarded;

Physically Handicapped;

Socially and Emotionally Disturbed;

Gifted.

VOCATIONAL EDUCATION

Number of students in vocational educational schools by type of residence within region.

PUBLIC ENROLLMENT

Enrollment in each of the five grade categories by type of residence within region.

NUMBER OF TEACHERS

TOTAL TEACHERS' SALARIES

Total cost of teachers' salaries by type of residence within region.

STATE REVENUES

The total state revenues generated by:

Property Tax;

Inheritance & Gift Taxes;

Personal Income Tax;

Insurance Tax;

Bank and Corporation Tax;

Liquor and Cigarette Taxes;

Sales Tax;

Other.

The distribution of education revenues to each type of residence within region.

LOCAL REVENUES

(a) Market property values for each type of residence within region.

(b) Local education revenues from the real estate tax.

DISPARITY

The disparity between revenue and expenditure for each type of residence within region.

OTHER CURRENT EXPENDITURES

Each of the following can be generated by the model:

Maintenance;

Operations;

Health Services;

Transportation;

Fixed Charges;

Other.

As an alternative, the output can be restricted to just instructional and non-instructional costs.

FACILITY REQUIREMENTS (pupil stations)

Facility capacity for the specific time period and newly built capacity can be printed out for type of residence within region.

TOTAL CAPITAL EXPENDITURES AND DEBT SERVICE

Capital expenditure on new buildings, other capital expenditures and debt services can be generated for each type of residence within region.

PUPILS TRANSPORTED

Per cent of pupils transported to total enrollment for each type of residence within region.

FEDERAL MONIES

Total federal support for the state and the distribution of this to each type of residence within region.

3.2 PENNSYLVANIA EDUCATIONAL FINANCE PLANNING MODEL

3.2.1 LEVEL OF AGGREGATION

The Pennsylvania Education System is organized into three levels which is composed of:

- 538 local administrative units which are responsible for the day to day operations;
- 29 intermediate units which provide consultative and educational services to the administrative units within their borders;
- A State Education Department which assures that school authorities are providing minimum levels of education and provides assistance in building and maintaining educational programs.

For the purposes of the model it was decided that the administrative units were too numerous to be the basic unit. Instead it was decided to aggregate administrative units within each intermediate unit by four possible residence categories. Accordingly the maximum possible 'basic units' that could be used in this scheme is 116.

The definitions of residence categories used are as follows:

RESIDENCE CATEGORY 1

Metropolitan Center City: - Administrative units within the thickly settled urban core of a larger standard metropolitan area.

RESIDENCE CATEGORY 2

Metropolitan, Other : - Administrative units bordering the central cities that are the densely populated fringe of the urban core.

RESIDENCE CATEGORY 3

Non-Metropolitan, Suburban or Small Communities: -

(a) Administrative units near urban areas that are not a part of the urban fringe;

(b) Administrative units in small communities detached from urban areas and serving as a center for surrounding rural areas.

RESIDENCE CATEGORY 4

Non-Metropolitan, Rural: -

(a) Administrative units where the population is composed mainly of farming population or small communities.

(b) Large county-wide or combined administrative units in mainly rural counties.

Because certain Intermediate units did not contain administrative units in all residence categories only 73 'basic units' were necessary in order to describe the state's school systems.

3.2.2 DATA COLLECTED AND EMPLOYED

The following is a listing of the data collected and analyzed by the Pennsylvania Department of Education for use in the model. The listing is organized by the level of aggregation for which the data is applicable.

DATA COLLECTED FOR EACH 'BASIC UNIT:'

- Population for single years of age, 0-19, total female population, 15-44 (1970);
- Net migration rates for ages 0-9, 10-14, 15-19 and females 15-44 (1970, projected 1980);
- Ratio of nonpublic enrollment to total enrollment (1970/1980);
- Pupil-teacher ratio (1970/1980);
- Number of teachers (1970) presently employed within each age group.

Age groupings are defined as follows: less than 25, 25-29 inclusive, 30-39 inclusive, 40-49 inclusive, 50-59 inclusive, greater than 59.

- Mean teachers' salaries for each of the above age groupings (1970).
- Cost ratios
  - -- Federal program administration costs to total federal revenues
  - -- Supervisors salaries to teachers salaries
  - -- Other instructional salaries to teachers salaries
  - -- Secretarial salaries, etc. to teachers salaries
  - -- Instructional expenses to teachers salaries
  - -- Total pupil personnel expenditures to total instructional expenses

-- Total occupancy and equipment utilization expenses to total instructional expenses.

-- Total fixed charges to total instructional expenses

-- Federal program administration costs to total federal revenues

-- Supervisors salaries to teachers salaries

-- Other instructional salaries to teachers salaries

-- Secretarial salaries, etc. to teachers salaries

-- Instructional expenses to teachers salaries

-- Total pupil personnel expenditures to total instructional expenses

-- Total operation and maintenance expenses to total instructional expenses

-- Total occupancy and equipment utilization expenses to total instructional expenses

-- Total fixed charges to total instructional expenses

-- Total food services to total instructional expenses

-- Total student activities to total instructional expenses

-- Total community services to total instructional expenses

-- Total health services to total instructional expenses

- Ratio of pupils transported to total enrollment
- Transportation cost per pupil
- Age, number and status classification for school buildings
- Personal income (1970, 1980)
- Property market values
- Millage on market value (1969-70) plus annual increase in millage
- Other local school revenues as a percentage of local property taxes (1969-70)

- Percentage in poverty (Title 1) 1970
- Federal revenue as percentage of the sum local revenues and state distributed funds
- State sparcity/density payments per weighted enrollment

STATEWIDE DATA COLLECTED BY TYPE OF RESIDENCE:

- Fertility rates for women 15-44 (1970/1980)
- School participation rates by single years of age (1970)
- Ratio of special education enrollments to total enrollments (1969/70)
- Ratio of hirings of teachers for the six age groupings to total hirings (1970/71)
- Ratio of withdrawals from teaching for each age-grouping of teachers (1970/71)
- Per-pupil cost of school building construction (1970)
- Ratio of other capital-expenditure to new construction cost
- Ratio of capital expenditure funded out of current expenditure

DATA COLLECTED AT STATE-LEVEL:

- Survival rates for age groups 0-9, 10-14, 15-19, and for women 15-44 (1970)
- Age/grade enrollment rates (1970/1980)
- Average interest rate
- Corporation tax revenues (1970/1975)
- Consumption tax revenues (1970/75)
- Personal income tax revenues (1970/75)
- Other state taxes revenues (1970/75)
- Non-tax revenues (1970/75)

3.2.3 MODEL SECTORS AND THEIR INTERACTION

The model is divided into two sectors; educational needs and educational revenues. These sectors when compared through time generate a profile of fiscal disparities.

THE EDUCATIONAL NEEDS SECTOR

This sector of the model is partitioned into eight sections:

- Population
- Enrollments
- Teacher demand
- Teacher supply and cost
- Other personal requirements and costs
- Other current expenditures
- Capital expenditures
- Debt service

This sector develops a population forecast in age-level detail sufficient to provide a forecast of school age population. The process uses birth rates, survival rates and net migration rates.

The forecast of school age population is then converted into enrollment, by grade levels for public, nonpublic, and special categories. The conversion of school age population to enrollments considers not only the percentages of each age category enrolled in specific grades. It also considers the proportion of those enrolled in each grade who attend public and nonpublic schools.

A desired teacher demand is then estimated using public school enrollment forecasts and desired teacher-student ratios by grade level. The desired teacher-student ratios are currently provided as independent input variables.

Additional model formulation could make them dependent upon financial ability constraints.

A pool of existing teachers is maintained by age levels. These estimates consider various rates of entry and exit from the profession at each age level and promotion rates from one level to the next. When the pool of teachers exceeds demand no change in number of teacher's employed is made. However, when demand exceeds this pool the number of teachers required is made available from an assumed infinite supply of teaching eligibles. The distribution of new teachers over the age levels is made by prorating the hirings by the hiring ratios supplied.

Teachers costs are computed by applying the estimated mean salary for each age level to the appropriate number of teachers in each level. Other current expenditures are estimated by applying various expenditure ratios to the total teachers' salaries and other expenditures. Pupil transportation services are computed on the basis of pupils transported.

Demand for new school buildings is calculated by considering the necessity for replacement due to age and increased enrollment. An inventory of school building capacity by age is maintained. When capacity exceeds a certain age that capacity is replaced. School building capacity is then adjusted to accommodate increased enrollments. Total construction cost is calculated by multiplying per-pupil cost of construction by required increases in capacity.

Debt service expenditure is estimated as a factor related to current capital outlays, principal repayments, and interest payments.

Total borrowings in a current year are calculated as a proportion of total capital expenditures, the remaining capital expenditure is assumed to be met from the current revenue. Current year borrowings are then computed into a uniform payment annunity over an average repayment span at a specified interest rate. An annunity schedule for past borrowings is updated by current year borrowings and interest and principal repayments are aggregated for the current year.

THE EDUCATIONAL REVENUES SECTOR

The educational revenues sector is partitioned into five sections:

-- State revenue to describe personal income and sales tax, corporate income tax, and other revenue.

-- Local revenue to describe property taxes, and other sources of revenue.

-- State and local contributions to the educational system.

-- Distribution of revenue.

-- Federal participation.

The driving force behind this sector is a personal income series developed by the Pennsylvania State Planning Board. This series was originally constructed on a county basis and adjusted for use in the model to the 'basic unit.'

The way in which the personal income series are used is as follows:

-- A change in personal income over its base year value is computed.

-- This change is multiplied by an elasticity factor related to a particular tax base or tax revenue series.

-- This product is added to the base year's tax base or tax revenue to derive the estimate.

The local revenue sector computes yearly market values of all property taxed for school purposes for each 'basic unit'. Personal income series and elasticity factors are used to develop these market value projections. Local educational revenues are then computed by applying estimated millage on market values and by factoring in percentages of local educational revenues derived from other sources.

The State Revenue Sector first computes weighted enrollments for (WADM) for each 'basic unit' by considering cost differentials for kindergarten, elementary school and high school programs.

The statuatory weights used are:

Kindergarten, .5;
Elementary, 1.0;
High School, 1.36.

Aid ratios are developed for each of the 73 'basic units' using the states percentage equalizing formula. General purposes equalizing grants are computed using the aid ratios and per pupil costs of instruction. Transportation grants, poverty payments, density sparcity payments and other state aids are also developed. The total obligated statewide educational revenue requirement is computed by

aggregating all of these state aids.

State and local revenues for each basic unit are then inflated by the percentage of federal funds expected.

This total of federal, state and local educational revenues is compared to required educational expenditures and disparities are derived.

Finally, state general revenues are projected on a statewide basis and the percentage of required state aid to education is computed.

3.3 TYPES OF OUTPUT

For each year or for five year intervals, the model will be capable of generating the following output.

POPULATION

School age population for individual years of age (0-19) can be generated by intermediate unit. As an alternative, total school age population can be generated.

TOTAL ENROLLMENT

Enrollment by the following five grade levels will be generated for each intermediate unit:

Pre-kindergarten
Kindergarten
1 - 6
7 & 8
9 - 12

NONPUBLIC ENROLLMENT

Nonpublic enrollments for same grade categories by intermediate unit.

SPECIAL EDUCATION

For each of these grade categories above the number of students in the following programs by intermediate unit will be generated:

Educable - Mentally Retarded
Trainable - Mentally Retarded
Physically Handicapped
Socially and Emotionally Disturbed
Gifted

VOCATIONAL-TECHNICAL

Number of students in vocational-technical schools by intermediate unit.

PUBLIC ENROLLMENT

Enrollment in each of the five grade categories by administrative unit.

NUMBER OF TEACHERS

Number of teachers within these age categories by intermediate unit.

Less than 25
25 - 29 inclusive
30 - 39 inclusive
40 - 49 inclusive
50 - 59 inclusive
Greater than 59

TOTAL TEACHERS' SALARIES

Total cost of teachers' salaries by administrative unit.

OTHER CURRENT EXPENDITURES

Each of the following can be generated by the model:

Federal Program Administration Costs
Supervisors' Salaries
Other Instructional Salaries
Secretarial Salaries
Other Instructional Costs
Costs for Administrative Salaries - Education
Costs for Administrative Salaries - Other
Pupil Personnel Costs
Costs for Operations and Maintenance
Occupancy and Equipment Utilization
Fixed Costs
Costs for Food Services
Costs for Student Activities

Costs for Community Services
Costs for Health Services
Transportation Costs

As an alternative, the output can be restricted to just instructional and non-instructional costs.

FACILITY REQUIREMENTS

Facility capacity for the specific time period and newly built capacity will be printed out for each intermediate unit.

TOTAL CAPITAL EXPENDITURE AND DEBT SERVICES

Capital expenditure on new buildings, other capital expenditures and debt services will be generated for each intermediate unit.

PUPILS TRANSPORTED

Per cent of pupils transported to total enrollment for each intermediate unit.

FEDERAL MONIES

Total federal support for the state and the distribution of this to each intermediate unit.

STATE REVENUES

The total state revenues generated by:

Personal Income Tax
Consumption Taxes
Non-Tax Revenue
Corporate Taxes
Other Taxes

The distribution of education revenues to each of the intermediate units.

LOCAL REVENUES

- Market property values for each intermediate unit
- Local education revenues from the real estate tax

DISPARITY

The disparity between revenue and expenditure for each intermediate unit and state total.

BIBLIOGRAPHY

1. Armitage, Peter; and Smith, Cyril. "The Development of Computable Models of the British Educational System and Their Possible Uses," Mathematical Models in Educational Planning. Paris: Organization for Economic Co-operation and Development, 1967.

2. Forrester, Jay. Industrial Dynamics. Cambridge, Mass.: M.I.T. Press, 1961.

3. Correa, Hector. Quantitative Methods of Educational Planning. Scranton, Penn.: International Textbook Company, 1969.

4. Thonstad, Tore. Education and Manpower: Theoretical Models and Empirical Applications. Toronto: University of Toronto Press, 1968.

5. Kleindorfer, George B.; and Roy, Lalit M.S. A Model for Educational Planning in East Pakistan. Islamabad, Pakistan: Ford Foundation, 1969.

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