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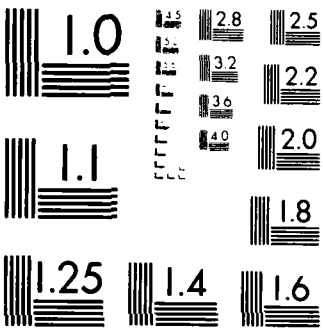

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M-X/MPS

ENVIRONMENTAL

TECHNICAL REPORT

PRELIMINARY FEIS

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PUBLIC FINANCE MODEL

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DEPLOYMENT AREA SELECTION
AND LAND WITHDRAWAL/
ACQUISITION

DEPARTMENT OF THE AIR FORCE

M-X ETR-29

PUBLIC FINANCE MODEL

Prepared for

United States Air Force
Ballistic Missile Office
Norton Air Force Base, California

By

Henningson, Durham & Richardson, Inc.
Santa Barbara, California

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2 October 1981

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DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

Federal, State and Local Agencies

On October 2, 1981, the President announced his decision to ~~com~~plete production of the M-X missile, but cancelled the M-X Multiple Protective Shelter (MPS) basing system. The Air Force was, at the time of these decisions, working to prepare a Final Environmental Impact Statement (FEIS) for the MPS site selection process. These efforts have been terminated and the Air Force no longer intends to file a FEIS for the MPS system. However, the attached preliminary FEIS captures the environmental data and analysis in the document that was nearing completion when the President decided to deploy the system in a different manner.

The preliminary FEIS and associated technical reports represent an intensive effort at resource planning and development that may be of significant value to state and local agencies involved in future planning efforts in the study area. Therefore, in response to requests for environmental technical data from the Congress, federal agencies and the states involved, we have published limited copies of the document for their use. Other interested parties may obtain copies by contacting:

National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22161
Telephone: (703) 487-4650

Sincerely,

JAMES F. BOATRIGHT
Deputy Assistant Secretary
of the Air Force (Installations)

1 Attachment
Preliminary FEIS

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LOCAL GOVERNMENT FINANCE MODEL

1.0 INTRODUCTION

The Public Finance model presents estimates of the public sector financial impacts of the development of the M-X missile system. The text of this report describes the methodological approach employed in the analysis, as well as the details of the model itself.

Just as other socioeconomic methodologies used in this FEIS, the public finance analysis is designed to be in compliance with Executive Order 12049. In summary, this Executive Order requires that a consistent methodology be used to assess alternative impacts such that the results are comparable. Thus, the decisionmaker can better judge the relative impacts at alternative sites and impacts resulting from various alternatives.

The public finance analysis methodology used in this ETR was designed to inform the decisionmaker of relative public finance impacts which could occur should the M-X system be deployed under the different alternatives. The level of detail of this methodology is sufficient for supporting the site selection and land withdrawal decision. However, the results should not be interpreted as being sufficient for making all federal, local and state financial decisions which would be necessary should M-X be deployed.

1.1 METHODOLOGY

GENERALIZED CHARACTERISTICS AND PROJECT OBJECTIVES (1.1.1)

A per capita technique has been selected based on the availability of comparable data across geographical regions and the relative advantages of per capita analysis for financial forecasting. This ETR is designed to aid in decisions related to site selection and land withdrawal for deploying the M-X system.

A comparable data base across geographical regions is provided in the 1977 Census of Governments, Compendium of Government Finances. This data base provides information on expenditure categories by function, and revenues by source for all governmental units within county areas in the Nevada/Utah and Texas/New Mexico ROIs (regions of influence). Availability of the data allows for an analysis of revenue and expenditure patterns for seven major expenditure functions and two revenue sources. As accounting practices vary from county to county, and from state to state, differing line items are accounted for in the general fund and other funds which exist within any governmental unit.

The per capita rate fiscal impact method is an averaging technique for projecting the impact of population change on various governmental unit costs and revenues. The basic assumption is that over the long term, current operating costs and revenues per capita are the best estimates of projected operating outlays. The per capita rate method is the most widely used fiscal impact projection procedure. (See Burchell and Listokin, 1978; Marcus O'Leary and Associates, 1974; Decision Sciences Corporation, 1973). Its use of a readily available, comparable data base also provides a system that can be advantageously adapted to geographic regions.

A disadvantage of the per capita rate method is that it assumes average costs equal marginal costs, thus eliminating the net effects of increased marginal costs and possible diseconomy of scale. Other disadvantages include the assumption of a continuous operations expenditure function, constant historical service levels and demand are projected for the future, changes in the revenue structure are difficult to incorporate, and service capacity issues can not be incorporated. The Public Finance Model presented here compensates by adjustments to the per capita rates for county areas. For each county area considered, selection of an appropriate county population class was based on estimated baseline and M-X-induced population. While the actual per capita rates for individual counties may vary within a population class, the rates presented in this model reflect identical patterns for all counties in a specific class size within the state that the county is located. This method accounts for different service demands and capital formations resulting from population growth during M-X construction.

The case study method is an alternative to the per capita rate model for evaluating fiscal impacts. The method projects future local costs based on specific future service demands determined through local field interviews with respective department heads and school officials. The data requirements for this model, which estimates excess or deficient service capacity and expected local responses, must be obtained through on-site extensive interviewing. Consequently, the major disadvantage of implementing this system is the time, complexity, and cost of data retrieval and synthesis. The advantages of the case study method are reflected in the level of detail of fiscal analysis and its acceptance as a well-informed short-term estimate of public service responses to existing service level demands.

Anticipated M-X-related changes in revenues and expenditures and associated *deficits and/or surpluses due to M-X-related population in-migration* are estimated (1) at an aggregate level for all governmental units within a county area and (2) for the potentially affected school districts within each affected county and (3) at the state level. At the local or county level, the per capita and/or per pupil rates employed reflect the expenditure and revenue patterns of each jurisdiction as classified by the population size of the particular county area under analysis. Data were obtained from the U.S. Bureau of the Census, Census of Governments, 1976/77 and adjusted to 1980 dollars using the implicit price deflator for state and local government purchases of goods and services (CEA, 1980). The resultant impact estimates are presented in constant 1980 dollars. The fiscal estimates in this analysis reflect aggregate levels of revenues and expenditures and should not be interpreted as impacts associated with any specific jurisdiction within the county area under analysis.

The methodology has been developed based on the expenditure categories (administrative, transportation, public safety, social service, education, environmental services) and revenue sources (local revenues, and intergovernmental revenues) as classified by the Bureau of the Census. An implicit assumption is that the tax rates and structures remain constant throughout the period of analysis. Intergovernmental aid (federal revenue sharing, grants-in-aid, in-lieu taxes) to the local jurisdictions are reduced to zero so that the potential level of federal assistance required as mitigations could be estimated. Federal aid in the form of Public Law 81-874 disbursements (aid for schools in federally affected areas) and state aid to local school districts have been included in the analysis. If the M-X system were deployed, the amount of intergovernmental transfers would be a matter of federal-state-local governmental negotiations.

Each expenditure function and revenue source within each jurisdiction is affected in varying degrees by the type of in-migrating population group that is anticipated in the area: construction workers residing in construction camps, military personnel housed on base, and community-based populations. While the community-based population in-migration will affect each expenditure function and revenue source as determined by the specific per capita rate for each category under analysis, the military personnel and construction workers will exert differing influences on expenditure and revenue patterns due to their particular residence and consumption patterns. The revenue and expenditure equations incorporate adjustments to the per capita rates based on anticipated effects these population groups would have upon the particular expenditure function and revenue source under analysis. The weighted per capita factors represent scientist's informed judgment from a range of probability values. By choosing the actual weighting factor in the model, the average effect upon the community was determined from a set of values ranging from no effect (0 percent) to total interaction, represented by 100 percent of per capita rates.

The following sections discuss the four modules developed for analyzing the fiscal effects of M-X deployment:

- Local Government Expenditure and Revenue Module
- Education Module
- Capital Expenditure Module
- State Level Fiscal Effects Module

2.0 LOCAL GOVERNMENT EXPENDITURE AND REVENUE MODULE

2.1 INTRODUCTION

The Local Government Module estimates the aggregate expenditures and revenues of the potentially affected local governmental units (county, city, school district, special district) within a county area for seven major expenditure functions and revenue sources for each county area for the period 1982-1994. Section 2.2 presents the algorithm used in the analysis and the variable definitions. The following discussion presents the assumptions and a general description of the particular expenditure categories and revenue sources that comprise the Local Government Module. In general, projections of local government expenditures and revenues were calculated by multiplying the county-specific per capita figures shown in Tables 2.1-1 and 2.1-2 by the respective population increases for each count Peculiarities from this procedure are detailed below.

ADMINISTRATIVE EXPENDITURES (2.1.1)

Administrative expenditures reflect the managerial and clerical responsibilities of local government to satisfy the level of government demanded by the local community. The increased administrative outlays would be a function of the community growth and any additional demands on the system due to the interaction between M-X related personnel with the community. Since the Air Force base personnel are assumed to have services supplied directly on the base and construction camp personnel interact with the community on an infrequent basis only, the cumulative effect of these population groups on administrative expenditures is assumed to be negligible.

PUBLIC SAFETY EXPENDITURES (2.1.2)

Public safety expenditures are defined as maintenance and operation costs associated with police and fire protection services. Military personnel and dependents who would reside on base are expected to demand a lesser level of service than the community based population, and thus the per capita rate applied to this population group is assumed to be 70 percent less to reflect their particular residence pattern.

SOCIAL SERVICE EXPENDITURES (2.1.3)

Social service expenditures are defined as maintenance and operation costs associated with hospital, health, and public welfare services. Social service outlays are calculated for the community based population and the construction work force. Health facilities and social services will be provided for military personnel, thus demands were not calculated for this population sub-group.

ENVIRONMENTAL SERVICE EXPENDITURES (2.1.4)

Environmental service expenditures are defined as maintenance and operation costs associated with sewage, solid waste, and park and recreation services. Increased environmental service maintenance and operation costs are calculated for the community-based population only.

Table 2.1-1. Local government model, per capita rates for Nevada/Utah counties[1] (FY 1980 dollars).

County	Property Tax Revenues (PCPRPTX[2])	Other Tax Revenues (PCOTTX)	Service Charges Revenues (PCSERV)	Inter-Government Transferal Revenues (PCIGREV)	Administration Expenses (PCADM)	Public Safety Expenses (PCPS)	Social Service Expenses (PCSOC)	Trans-Portation Expenses (PCTRANS)	Education Expenses (PCEDUC)	Environmental Service Expenses (PCENVIR)	Miscel-laneous Expenses (PCMISC)
Beaver, Utah	278.3	45.7	143.7	393.6	42.2	47.9	70.4	67.9	519.3	51.1	62.5
Clark, Nevada	337.7	189.9	274.4	418.1	89.7	145.1	138.5	73.9	514.4	126.6	131.9
Eureka, Nevada	463.6	83.03	328.5	585.0	130.7	192.9	245.6	144.8	629.9	67.5	48.7
Iron, Utah	278.3	45.7	143.7	393.6	42.2	47.9	70.4	67.9	519.3	51.1	62.5
Juab, Utah	278.3	45.7	143.7	393.6	42.2	47.9	70.4	67.9	519.3	51.1	62.5
Lincoln, Nevada	463.6	83.0	328.5	585.0	130.7	192.9	245.6	144.8	629.9	67.5	48.7
Millard, Utah	278.3	45.7	143.7	393.6	42.2	47.9	70.4	67.9	519.3	51.1	62.5
Nye, Nevada	321.8	100.2	274.4	354.8	84.4	102.9	120.0	75.2	465.6	75.2	127.9
Salt Lake, Utah	240.7	61.3	118.5	410.3	41.4	66.6	25.6	41.2	508.1	76.9	71.0
Utah, Utah	240.7	61.3	118.5	410.3	41.4	66.6	25.6	41.2	508.1	76.9	71.0
Washington, Utah	278.3	45.7	143.7	393.6	42.2	47.9	70.4	67.9	519.3	51.1	62.5
White Pine, Nevada	321.8	100.2	274.4	354.8	84.4	102.9	120.0	75.2	465.6	75.2	127.9

T3511/10-2-81/F

[1] All per capita rates are considered constant for the period 1982-1994.

[2] Symbols for variables represented in the model.

Source: 1977 Census of Governments, Compendium of Government Finances, U.S. Department of Commerce, Bureau of the Census.

Table 7.1-2. Local government model, per capita rates for Texas/New Mexico counties[1] (FY 1980 dollars).

County	Property Tax Revenues (PCPRPTX[2])	Other Tax Revenues (PCOTTX)	Service Charges Revenues (PCSERV)	Inter-Government Transferral Revenues (PCIGREV)	Administration Expenses (PCADM)	Public Safety Expenses (PCPS)	Social Service Expenses (PCSOC)	Trans-portation Expenses PCTRANS)	Education Expenses (PCEDUC)	Environmental Service Expenses (PCENVIR)	Miscel-laneous Expenses (PCMISC)
Bailey, Texas	377.3	43.4	179.5	235.1	55.7	32.0	110.4	74.9	474.8	27.0	60.5
Castro, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Chaves, N. Mex.	125.8	34.2	149.5	526.6	33.5	60.3	55.5	44.7	503.6	66.1	72.4
Cochran, Texas	377.3	43.4	179.4	235.1	55.7	32.0	110.4	74.9	474.8	27.0	60.5
Curry, N. Mex.	125.8	34.2	149.5	526.6	33.5	60.3	55.5	44.7	503.6	66.1	72.4
Dallam, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Deaf Smith, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
De Baca, N. Mex.	158.7	15.0	107.1	706.6	58.0	52.9	44.3	67.5	652.3	50.7	61.6
Hale, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Harding, N. Mex.	158.7	15.0	107.1	706.6	58.0	52.9	44.3	67.5	652.3	50.7	61.6
Hartley, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Hockley, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Lamb, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Lubbock, Texas	259.0	46.3	185.2	354.9	36.2	77.2	71.1	52.2	395.8	112.0	100.0
Moore, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Oldham, Texas	377.3	43.4	179.5	235.1	55.7	32.0	110.4	74.9	474.8	27.0	60.5
Parmer, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Potter/Randall, Tex.	288.1	47.2	168.3	299.1	39.7	51.8	74.6	56.2	451.8	66.3	62.3
Quay, N. Mex.	102.9	22.4	92.3	548.7	35.6	51.4	36.9	47.5	503.9	44.8	46.2
Roosevelt, N. Mex.	102.9	22.4	92.3	548.7	35.6	51.4	36.9	47.5	503.9	44.8	46.2
Sherman, Texas	377.3	43.4	179.5	235.1	55.7	32.0	110.4	74.9	474.8	27.0	60.5
Swisher, Texas	246.8	37.0	157.1	309.7	33.7	34.8	76.3	50.5	430.8	72.9	51.6
Union, N. Mex.	158.7	15.0	107.1	706.6	58.0	52.9	44.3	67.5	652.3	50.7	61.6

T3512/10-2-81/F

[1] All per capita rates are considered constant for the period 1982-1994.

[2] Symbols for variables represented in the model.

Source: 1977 Census of Governments, Compendium of Government Finances, U.S. Department of Commerce, Bureau of the Census.

TRANSPORTATION EXPENDITURES (2.1.5)

Transportation expenditures are defined as maintenance and operation costs associated with highway facilities, county roads, and city streets. Construction worker population in-migration, and Air Force population in-migration residing onbase are expected to demand a lesser level of service than the community-based population, thus the per capita rate applied against these two groups is assumed to be 70 percent less to reflect their particular residence pattern.

EDUCATIONAL SERVICE EXPENDITURES (2.1.6)

Educational service outlays are calculated by multiplying the total number of pupils associated with total population in-migration (community, construction, and Air Force population) by educational expenditures per pupil. Rates per pupil are presented in Section 3. The estimates presented assume that service standard levels (pupil-teacher) ratios remain constant throughout the period analyzed.

MISCELLANEOUS EXPENDITURES (2.1.7)

Construction camp and onbase personnel are expected to contribute negligible demands and are not included in the calculations.

PROPERTY TAX REVENUES (2.1.8)

Property tax revenues have been lagged one year to reflect actual receipt of revenue based on prior year assessment levels. Construction camp residents and onbase resident military personnel are assumed not to contribute to this revenue source, as property tax free housing would be provided for these population groups.

OTHER TAX REVENUES (2.1.9)

Other tax revenues include sales, income (where applicable), and other miscellaneous tax revenues. Construction worker population in-migration would have a greater effect than community-based populations upon other tax revenues due to their higher incomes. Per capita rates were adjusted upward by 16 percent to reflect their differing consumption patterns (Old West Regional Commission, 1975). Military personnel and their dependents would have the use of base facilities, thus tax revenues from Air Force personnel would be less than for other in-migrating population groups. The per capita rates employed in this case are assumed to be 75 percent less.

SERVICE CHARGE REVENUES (2.1.10)

Service charge revenues are defined as license fees, permit fees, fines, and other fee revenues. Air Force population in-migration living onbase and construction worker population in-migration, due to their residence patterns, contribute to service charges, but to a lesser extent. Per capita rates applied to these populations are assumed to be 75 percent less than that of the community-based population to reflect the particular residence characteristics.

INTERGOVERNMENTAL REVENUES (2.1.11)

Intergovernmental revenues, except for educational purposes, in the Public Finance Model are assumed to be equal to zero for the local jurisdictions. This assumption was made to provide a "worst case" scenario. It is assumed that if M-X were deployed, the amount of intergovernmental transfers would be a matter of federal-state-local governmental negotiations.

When a certain proportion of all pupils are dependents of federal employees, military, or employees working under a federal government contract, local schools receive federal educational funds under Public Law (PL) 81-874. There are different per capita rates for different categories of pupils, and three categories (i.e., 3a, 3b, and 3c) were used in making projections of PL 81-874 revenues which would result if the M-X system were to be deployed. The 3a pupils are dependents of federal employees, military, or employees working on a federal government contract who reside and work on federally-owned property. The 3b pupils are dependents of federal employees and military personnel who reside in local communities and work on federally-owned property. The 3c pupils are dependents of employees who work under a federal government contract on federal property and reside in local communities. The per capita rates used in this analysis were $524, $262, and $236 for 3a, 3b, and 3c pupils, respectively. The rates were applied to the projected distribution of in-migrating populations, detailed in ETR-37.

2.2 LOCAL GOVERNMENT EXPENDITURE AND REVENUE MODULE: ALGORITHMS AND DEFINITIONS

OUTPUT VARIABLES (2.2.1)

EXPENDITURES

$$ADM_{ij} = PCADM_{ij} * CMPOP_{ij}$$

$$PS_{ij} = (PCPS_{ij} * CCPOP_{ij}) + (PCPS_{ij} * CMPOP_{ij}) + (PCPS_{ij} * AFPOP_{ij} * WEIGHT1)$$

$$SOC_{ij} = (PCSOC_{ij} * CMPOP_{ij}) + (PCSOC_{ij} * CCPOP_{ij})$$

$$ENVIR_{ij} = PCENVIR_{ij} * CMPOP_{ij}$$

$$TRANS_{ij} = (PCTRANS_{ij} * CMPOP_{ij}) + (PCTRANS_{ij} * CCPOP_{ij} * WEIGHT1) + (PCTRANS_{ij} * AFPOP_{ij} * WEIGHT1)$$

$$EDUC_{ij} = PUP_{ij} * PPEXP_{ij}$$

$$MISC_{ij} = PCMISC_{ij} * CMPOP_{ij}$$

$$TTEXP_{ij} = ADM_{ij} + PS_{ij} + SOC_{ij} + ENVIR_{ij} + TRANS_{ij} + EDUC_{ij} + MISC_{ij}$$

$$BTEXP_{ij} = (PCADM_{ij} + PCPS_{ij} + PCSOC_{ij} + PCENVIR_{ij} + PCTRANS_{ij} + PCEDUC_{ij} + PCMISC_{ij}) * BPOP_{ij}$$

REVENUES

$PRPTX_{ij} = PCPRPTX_{i,j-1} * CMPOP_{i,j-1}$

$OTTX_{ij} = (PCOTTX_{ij} * CMPOP_{ij}) + (PCOTTX_{ij} * CCPOP_{ij} * WEIGHT\ 2) + (PCOTTX_{ij} * AFPOP_{ij} * WEIGHT\ 3)$

$SERV_{ij} = (PCSERV_{ij} * CMPOP_{ij}) + (PCSERV_{ij} * CCPOP_{ij} * WEIGHT3) + (PCSERV_{ij} * AFPOP_{ij} * WEIGHT3)$

$ZLOCREV_{ij} = PRPTX_{ij} + OTTX_{ij} + SERV_{ij}$

$ZIGREV_{ij} = (PPREVS_{ij} * PUP_{ij}) + (ASTUDT * PUPM_{ij}) + (BSTUDT * PUPC_{ij}) + (CSTUDT * PUPCC_{ij})$

$TTREV_{ij} = ZLOCREV_{ij} + ZIGREV_{ij}$

$ZIMP_{ij} = TTREV_{ij} - TTEXP_{ij}$

$BTREV_{ij} = (PCPRPTX_{ij} + PCOTTX_{ij} + PCSERV_{ij} + PCIGREV_{ij}) * BPOP_{ij}$

where:

ADM_{ij} = M-X related administrative expenditures for county i, year j.

$BTEXP_{ij}$ = Total baseline expenditures for county i, year j.

$BTREV_{ij}$ = Total baseline revenues for county i, year j.

$EDUC_{ij}$ = M-X related education expenditures for county i, year j.

$ENVIR_{ij}$ = M-X related environmental service expenditures (sewerage, natural resources, parks and recreation) for county i, year j.

$MISC_{ij}$ = M-X related miscellaneous expenditures for county i, year j.

$OTTX_{ij}$ = M-X related other tax revenues (sales, income, other) for county i, year j.

$PRPTX_{ij}$ = M-X related property tax revenues for county i, year j.

PS_{ij} = M-X related public safety expenditures for county i, year j.

$SERV_{ij}$ = M-X related service charges and miscellaneous revenues for county i, year j.

SOC_{ij} = M-X related social service expenditures (public welfare, hospital, health) for county i, year j.

$TRANS_{ij}$ = M-X related transportation expenditures (highways and streets) for county i, year j.

$TTEXP_{ij}$ = M-X related total expenditures for county i, year j.

$TTREV_{ij}$ = M-X related total, all revenues, for county i, year j.

$ZIGREV_{ij}$ = M-X related intergovernmental revenue contributions, state and federal, for county i, year j.

$ZIMP_{ij}$ = M-X related total net impact, surplus or deficit, for county i, year j.

$ZLOCREV_{ij}$ = M-X related total, all local revenues, for county i, year j.

INPUT VARIABLES (2.2.2)

$AFPOP_{ij}$ = Air Force population in-migration, residing onbase, for county i, year j.

ASTUDT = Educational revenues per pupil from Public Law 81-874, associated with military school age dependents and shelter and base construction, assembly, and checkout school age personnel residing onbase ($524 per pupil).

$BPOP_{ij}$ = Baseline population in county i, year j.

BSTUDT = Educational revenues per pupil from Public Law 81-874, associated with military school age dependents residing in the community ($262 per pupil).

$CCPOP_{ij}$ = Construction worker population in-migration, residing both in construction camps and onbase, for county i, year j.

$CMPOP_{ij}$ = Community based population in-migration for county i, year j.

CSTUDT = Educational revenues per pupil from Public Law 81-874; calculated for school age dependents of M-X contractor employees living in the community ($236 per pupil)

$PCADM_{ij}$ = Administration expenditures, per capita, for county i, year j.

$PCEDUC_{ij}$ = Education expenditures, per capita, for county i, year j.

$PCENVIR_{ij}$ = Environmental service expenditures (sewerage, parks and recreation, natural resources) per capita, for county i, year j.

$PCIGREV_{ij}$ = Intergovernmental revenues (state and federal contributions) per capita, for county i, year j.

$PCMISC_{ij}$ = Miscellaneous expenditures, per capita, for county i, year j.

$PCOTTX_{ij}$ = Other tax revenues (sales, income, other) per capita, for county i, year j.

$PCPRPTX_{ij}$ = Property tax revenues, per capita, for county i, year j.

$PCSERV_{ij}$ = Service charges and miscellaneous revenue, per capita, for county i, year j.

$PCSOC_{ij}$ = Social Service expenditures (health, hospital, public welfare), per capita, for county i, year j.

$PCPS_{ij}$ = Public Safety expenditures (police, fire, correction), per capita, for county i, year j.

$PCTRANS_{ij}$ = Transportation expenditures (highways, streets), per capita, for county i, year j.

$PPEXP_{ij}$ = Education expenditures, per pupil, for county i, year j.

$PPREVS_{ij}$ = Educational revenues per pupil, state contributions, for county i, year j.

PUP_{ij} = Total number of pupils associated with total population in-migration for county i, year j.

$PUPC_{ij}$ = Pupils of military personnel, and civilian operations workers' school age dependents residing in the community, for county i, year j.

$PUPCC_{ij}$ = Number of pupils of base-construction and shelter construction worker population in-migration, residing in the community, for county i, year j.

$PUPM_{ij}$ = Number of pupils of military personnel, residing onbase, for county i, year j.

WEIGHT 1 = Weighting factor reflecting decreased level of public service demands associated with Air Force population in-migration residing onbase, and construction worker population in-migration residing in construction camps. These population groups are assumed to demand 70 percent less of the services normally demanded by community based population in-migration for services such as public safety and transportation related items.

WEIGHT 2 = Weighting factor (16 percent) reflecting increased level of consumption demand associated with construction worker population in-migration. The factor is applied against the construction worker in-migration when calculating their influence on increased local tax payments (other than property taxes).

WEIGHT 3 = Weighting factor (25 percent) reflecting decreased service change revenues associated with Air Force population in-migration, residing onbase, and construction worker population in-migration residing in construction camps. This factor is also used in reducing military personnel influences on other tax revenues (tax revenues other than property taxes).

3.0 EDUCATION MODULE

3.1 INTRODUCTION

The Education Module estimates the aggregate expenditures and revenues of the potentially affected school districts for each county area from 1982 through 1994. The module is a subset of the local government module but is also presented separately to highlight the importance of educational systems to the communities. The impact expenditures estimated in the education module are similar to those reported in the local government module, while the education revenues constitute a percentage of total local government revenues. Section 3.2 presents the algorithm used in the analysis and the variable definitions. The following discussion presents the assumptions and a general description of the expenditure and revenue categories that comprise the Education Module.

REVENUES (3.1.1)

Total baseline revenues are calculated as the sum of baseline state and federal educational revenue contributions and local educational revenues. State and federal revenues are determined by multiplying the state (includes the federal contribution) educational revenues per pupil for each county directly by the number of baseline pupils. Baseline local educational revenues are derived from the baseline per capita local education revenue multiplied by baseline population. The local per capita and per pupil rates are presented in Tables 3.1.1-1 and 3.1.1-2.

Revenues accruing to the local school districts due to M-X activities are calculated for the three primary sources available - federal aid (PL 81-874), state aid, and local sources. (Federal education revenue contributions have been discussed earlier, in Section 2.1.11.)

State educational revenue sources are calculated by multiplying the total number of additional pupils generated by M-X by the state educational revenues per pupil rate as presented in Tables 3.1.1-1 and 3.1.1-2. State revenue disbursements to local school districts are based on a detailed function of assessed value per capita and student enrollment. Alternatively, the resultant disbursements can be categorized as total revenues per pupil, similarly as other state allocated revenues can be classified on a per capita basis (e.g., sales tax revenue per capita, income tax revenue per capita). The definition of state revenues per pupil for this analysis is adopted from the 1977 Census of Governments, School District Finances.

Local educational revenues are a sum of related tax collections (sales, property tax, motor vehicle tax), thus are a function of the respective population groups contributing to the local tax base. The ratio of total pupils to total population inmigration will vary from year to year, dependent on the levels of community population, base population, and construction camp population. The greater the proportion of base and construction population (higher level of single persons with no children) to community population, the smaller would be the ratio of pupils per population, compared to the given baseline condition. Consequently, the baseline per capita estimate is adjusted by the direct M-X-related pupil/population ratio to reflect the yearly pupil and population changes that occur during the M-X impacted time period. The adjusted per capita local revenue is applied to the

Table 3.1.1-1. Education module, per capita and per pupil rates for Nevada/Utah counties (FY 1980 dollars).[1]

County	Category			
	Total Expenditures Per Pupil (PPEXP[2])	State Revenues Per Pupil (PPREVS)	Local Revenues Per Capita (PCREVL)	Local Revenues Per Pupil (PPREVL)
Beaver, Utah	1,729	1,055	252	674
Clark, Nevada	1,876	1,144	212	732
Eureka, Nevada	2,365	1,443	212	922
Iron, Utah	1,641	1,001	252	640
Juab, Utah	1,947	1,188	252	759
Lincoln, Nevada	2,020	1,232	212	788
Millard, Utah	1,729	1,055	252	674
Nye, Nevada	1,866	1,138	212	728
Salt Lake, Utah	1,660	1,013	252	647
Utah, Utah	1,660	1,013	252	647
Washington, Utah	1,641	1,001	252	640
White Pine, Nevada	1,866	1,138	212	728

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[1] All per capita and pupil rates are considered constant for the period 1982-1994.

[2] Symbols for variables represented in the model.

Source: U.S. Department of Commerce, 1977, Census of Governments, Finances of School Districts.

Table 3.1.1-2. Education module, per capita and per pupil rates for Texas/New Mexico counties (FY 1980 dollars).[1]

County	Category			
	Total Expenditures Per Pupil (PPEXP[2])	State Revenues Per Pupil (PPREVS)	Local Revenues Per Capita (PCREVL)	Local Revenues Per Pupil (PPREVL)
Bailey, Texas	1,650	941	174	709
Castro, Texas	1,650	941	174	709
Chaves, N. Mexico	1,730	1,505	55	225
Cochran, Texas	1,650	941	174	709
Curry, N. Mexico	1,730	1,505	55	225
Dallam, Texas	1,650	941	174	709
Deaf Smith, Texas	1,551	884	164	667
De Baca, N. Mexico	2,194	1,909	69	285
Hale, Texas	1,516	864	160	652
Harding, N. Mexico	2,368	2,060	75	308
Hartley, Texas	1,551	884	164	667
Hockley, Texas	1,551	884	164	667
Lamb, Texas	1,551	884	164	667
Lubbock, Texas	1,516	864	160	652
Moore, Texas	1,551	884	164	667
Oldham, Texas	1,605	915	160	690
Parmer, Texas	1,650	941	174	709
Potter/Randall, Texas	1,516	864	160	652
Quay, N. Mexico	1,798	1,564	57	234
Roosevelt, N. Mexico	1,798	1,564	57	234
Sherman, Texas	1,650	941	174	709
Swisher, Texas	1,650	941	174	709
Union, N. Mexico	1,934	1,683	61	251

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[1] All per capita and per pupil rates are considered constant for the period 1982-1994.

[2] Symbols for variables represented in the model.

Source: U.S. Department of Commerce, 1977 Census of Governments, Finances of School Districts.

community population, thus indicating the level of local educational revenue contributions. This revenue source, additionally, has been lagged one year, to reflect the method of revenue tax collection and dollar availability to local governments.

EXPENDITURES (3.1.2)

Total educational expenditures are calculated as the sum of baseline expenditures plus total M-X impacts. Total baseline and M-X impact expenditures are derived by multiplying the total per pupil educational expenditure rate with total baseline pupils for the former and with pupils associated with total population in-migration for the latter. The per pupil rates used in the analysis are presented in Tables 3.1.1-1 and 3.1.1-2.

3.2 SCHOOL DISTRICT/COUNTY SPECIFIC EDUCATION ALGORITHM AND VARIABLE DEFINITIONS

OUTPUT VARIABLES (3.2.1)

BASELINE REVENUE

$$BSREV_{ij} = BPUP_{ij} * PPREVS_{ij}$$

$$BLREV_{ij} = BPOP_{ij} * PCREVL_{ij}$$

$$BTTREV_{ij} = BSREV_{ij} + BLREV_{ij}$$

M-X REVENUE

$$PFED_{ij} = (ASTUDT * PUPM_{ij}) + (BSTUDT * PUPC_{ij}) + (CSTUDT * PUPCC_{ij})$$

$$STATE_{ij} = PPREVS_{ij} * PUP_{ij}$$

$$LOCAL_{ij} = PCREVLOC_{i,j-1} * CMPOP_{i,j-1}$$

$$TOTAL_{ij} = PFED_{ij} + STATE_{ij} + LOCAL_{ij}$$

TOTAL REVENUE

$$TOTREV_{ij} = BTTREV_{ij} + TOTAL_{ij}$$

EXPENDITURES

$$BTTEXP_{ij} = BPUP_{ij} * PPEXP_{ij}$$

$$ZMXEXP_{ij} = PUP_{ij} * PPEXP_{ij}$$

$$TOTEXP_{ij} = BTTEXP_{ij} + ZMXEXP_{ij}$$

NET IMPACT

$BMPACT_{ij} = BTTREV_{ij} - BTTEXP_{ij}$

$ZMPACT_{ij} = TOTAL_{ij} - ZMXEXP_{ij}$

$TOTIMP_{ij} = BMPACT_{ij} + ZMPACT_{ij}$

where:

$BLREV_{ij}$ = Baseline local educational revenue contributions for county i, year j.

$BMPACT_{ij}$ = Total educational baseline impact (surplus or deficit) for county i, year j.

$BSREV_{ij}$ = Baseline state and federal educational revenues contributions for county i, year j.

$BTTREV_{ij}$ = Total baseline educational revenues for county i, year j.

$BTTEXP_{ij}$ = Total baseline educational expenditures for county i, year j.

$LOCAL_{ij}$ = Local education (M-X-induced) revenue contributions, county i, year j.

$PFED_{ij}$ = Educational revenue contributions from the federal government associated with Public Law 81-874 for county i, year j.

$STATE_{ij}$ = State education (M-X-induced) revenue contributions, county i, year j.

$TOTAL_{ij}$ = Total education revenues (M-X-induced) federal, state, and local contributions, county i, year j.

$TOTEXP_{ij}$ = Total, all educational expenditures, baseline plus M-X induced expenditures for county i, year j.

$TOTIMP_{ij}$ = Total, all educational impacts, baseline plus M-X impacts for county i, year j.

$TOTREV_{ij}$ = Total, all educational revenues, baseline plus M-X-induced revenues for county i, year j.

$ZMPACT_{ij}$ = Total educational M-X-induced impacts for county i, year j.

$ZMXEXP_{ij}$ = Total M-X-induced educational expenditures for county i, year j.

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1. All school districts are considered as county school districts except for Curry County, New Mexico, designated as Clovis Independent School District; and Dallam and Hartley counties in Texas, designated as Dalhart Independent School District.

INPUT VARIABLES (3.2.2)

$AFPOP_{ij}$ = Air Force population in-migration, residing onbase, for county i, year j.

ASTUDT = Educational revenues per pupil from Public Law 81-874 associated with military school age dependents residing on federal property and shelter and base construction, assembly, and checkout dependents residing on federal property ($524 per pupil).

$BPOP_{ij}$ = Baseline population in county i, year j.

$BPUP_{ij}$ = Baseline pupils in county i, year j.

BSTUDT = Educational revenues per pupil from Public Law 81-874 associated with military school age dependents residing in the community ($262 per pupil).

$CMPOP_{ij}$ = Community based population in-migration for county i, year j.

CSTUDT = Educational revenues per pupil from Public Law 81-874 associated with school age dependents of M-X-related contractor personnel ($236 per pupil).

$PCREVL_{ij}$ = Baseline educational revenues per capita, local contributions, for county i, year j.

$PPREVL_{ij}$ = Baseline educational revenues per pupil, local adjusted contributions, for county i, year j.

$PPEXP_{ij}$ = Educational expenditures per pupil for county i, year j.

$PCREVLOC_{ij}$ = Local educational revenues per capita for county i, year j.

$PPREVS_{ij}$ = Educational revenues per pupil, state contributions, for county i, year j.

PUP_{ij} = Total pupils associated with total population in-migration for county i, year j.

$PUPC_{ij}$ = Pupils of military personnel, residing offbase, and civilian operations workers' school age dependents for county i, year j.

$PUPCC_{ij}$ = Pupils of M-X contractor personnel in-migrating to the community, for county i, year j.

$PUPM_{ij}$ = Pupils of military personnel, residing onbase, for county i, year j.

4.0 CAPITAL EXPENDITURE MODULE

4.1 MODEL STRUCTURE AND DESCRIPTION

Nine categories of capital expenditure requirements for local governments in the deployment areas are estimated. These expenditures are for police, fire, general government, health care, library, street, wastewater, water distribution, and educational service facilities. In each case these costs are derived from estimates of the related investment in each region of analysis. All capital expenditure requirements are presented in 1980 dollars. Table 4.1-1 presents the factors that determine the specific capital investment requirements. The street and transportation system investment costs are reduced to 77 percent of the total investment requirements to reflect the fact that private developers would pay for the initial capital costs for providing the minor streets that serve residential and some commercial areas. The reduction to 77 percent of total investment is determined from the ratio of minor street system length per linear foot to the sum of collector, minor and arterial system length per linear foot. The estimates presented assume that facilities would be constructed to meet long-term infrastructure needs required by the existent population in 1994. Capital expenditure would be a one-time investment, accommodating potential future growth with the complete construction of a given facility over a short period of time. The factors contributing to increased costs per capita would be inflation and cost for materials and labor. These factors are included in the model as adjustments to the per capita parameters, with the capital investment output represented in adjusted 1980 dollars. Much of the estimated peak-year demands are assumed to be supplied by temporary facilities, which would reduce these costs substantially. The estimates presented basically reflect average costs which assume that service standard levels are not allowed to deteriorate to substandard levels.

4.2 ALGORITHM AND VARIABLE DEFINITION

Public Facilities

$$POLFAC_{ij} = CMPOP_{ij} * PCPOL_{ij}$$

$$FREFAC_{ij} = CMPOP_{ij} * PCFRE_{ij}$$

$$ADMFAC_{ij} = CMPOP_{ij} * PCADM_{ij}$$

$$HLTHFAC_{ij} = CMPOP_{ij} * PCHLTH_{ij}$$

$$LIBFAC_{ij} = CMPOP_{ij} * PCLIB_{ij}$$

Street System

$$ART_{ij} = ARTL_{ij} * ARTCST_{ij}$$

$$COL_{ij} = COLL_{ij} * COLCST_{ij}$$

$$MNR_{ij} = MNR_{ij} * MNRCST_{ij}$$

$$TOTSTR_{ij} = (ART_{ij} + COL_{ij} + MNR_{ij})\ WEIGHT\ A$$

Table 4.1-1. Rates used in calculating the local government capital expenditures requirements (FY 1978 dollars)[1].

Public Utilities[2]	
Police	Population living in communities x $48 per capita
Fire	Population living in communities x $39 per capita
Government Administration	Population living in communities x $24 per capita
Health Care	Population living in communities x $286 per capita
Libraries	Population living in communities x $50 per capita
Street System[3]	
Arterials	Street length x $45 per linear foot
Collectors	Street length x $35 per linear foot
Minor Streets	Street length x $25 per linear foot
Utility[3]	
Residential	
Sanitary and Wastewater	Single- family units x $1,000 per unit
	Multiple-family units x $400 per unit
	Mobile homes x $600 per unit
Water	Single-family units x $650 per unit
	Multiple-family units x $260 per unit
	Mobile homes x $390 per unit
Nonresidential	
Sanitary and Wastewater	Residential sanitary/wastewater costs x 0.40
Water	Residential water costs x 0.20
System Wide	
Sanitary and Wastewater	Residential plus nonresidential sanitary/wastewater costs x 0.40
Water	Residential plus nonresidential water costs x 0.20
Schools[3]	
Facility Development	Pupils x 98 sq ft per pupil x $47 per sq ft[2]

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[1] The table represents capital expenditures in 1978 dollars. The M-X Environmental Technical Report, "Community Infrastructure Model" (ETR-28), implicitly converts the amounts to 1980 dollars, with additional adjustment of 20 percent for anticipated construction costs increase.

[2] Murphy/Williams Urban Planning and Housing Consultants, 1978. Socioeconomic Impact Assessment: A Methodology Applied to Synthetic Fuels, U.S. Department of Energy.

[3] HDR Sciences calculation, in coordination with local contractors; it does not include cost of land.

Utilities

$RSS_{ij} = SFU_{ij} * SFUCS_{ij} + MFU_{ij} * MFUCS_{ij} + MHU_{ij} * MHUCS_{ij}$

$RWTR_{ij} = SFU_{ij} * SFUCW_{ij} + MFU_{ij} * MFUCW_{ij} + MHU_{ij} * MHUCW_{ij}$

$NRSS_{ij} = RSS_{ij} *$ Weight B

$NRWTR_{ij} = RWTR_{ij} *$ Weight C

$SWSS_{ij} = (RSS_{ij} + NRSS_{ij}) *$ Weight D

$SWWTR_{ij} = (RWTR_{ij} + NRWTR_{ij}) *$ Weight E

$TOTUTL_{ij} = RSS_{ij} + RWTR_{ij} + NRSS_{ij} + NRWTR_{ij} + SWSS_{ij} + SWWTR_{ij}$

Schools

$EDFAC_{ij} = PUP_{IJ} * SFPUP_{ij} * CSTSF_{ij}$

where,

$ADMFAC_{ij}$ = Costs for general administrative facilities, county i, year j.

ART_{ij} = Arterial street costs, county i, year j.

$ARTCST_{ij}$ = Cost per linear foot, arterials, county i, year j.

$ARTL_{ij}$ = Length of arterial streets required, linear feet, county i, year j.

COL_{ij} = Collector street costs, county i, year j.

$COLCST_{ij}$ = Cost per linear foot, collectors, county i, year j.

$COLL_{ij}$ = Length of collector streets required, linear feet, county i, year j.

$CMPOP_{ij}$ = Community based population in-migration, county i, year j.

$CSTSF_{ij}$ = Cost per foot, school facilities, county i, year j.

$EDFAC_{ij}$ = Educational facility development cost, county i, year j.

$FREFAC_{ij}$ = Costs for fire protection facilities, county i, year j.

$HLTHFAC_{ij}$ = Costs for health care facilities, county i, year j.

$LIBFAC_{ij}$ = Costs for library facilities, county i, year j.

$POLFAC_{ij}$ = Costs for police facilities, county i, year j.

MFU_{ij} = Multiple family units required, county i, year j.

MHU_{ij} = Mobile home units required, county i, year j.

$MFUCS_{ij}$ = Cost for sanitary sewage facilites per multiple family unit, county i, year j.

MNR_{ij} = Minor road street costs, county i, year j.

$MNRCST_{ij}$ = Cost per linear foot, minor roads, county i, year j.

$MNRL_{ij}$ = Length of minor roads required, linear feet, county i, year j.

$MUFCW_{ij}$ = Cost for water facility system per multiple family unit, county i, year j.

$MHUCS_{ij}$ = Cost for sanitary sewage facilities per mobile home unit, county i, year j.

$MHUCW_{ij}$ = Cost for water facility system per mobile home unit, county i, year j.

SFU_{ij} = Single family units required, county i, year j.

$SFUCS_{ij}$ = Cost for sanitary sewage facilities per single family unit, county i, year j.

$SFUCW_{ij}$ = Cost for water facility system per single family unit, county i, year j.

$PCADM_{ij}$ = Per capita rate for administrative facilities, county i, year j.

$PCHLTH_{ij}$ = Per capita rate for health care facilities, county i, year j.

$PCFRE_{ij}$ = Per capita rate for fire protection facilities, county i, year j.

$PCPOL_{ij}$ = Per capita rate for police facilities, county i, year j.

$PCLIB_{ij}$ = Per capita rate for library facilities, county i, year j.

PUP_{ij} = Total pupil in-migration, county i, year j.

$NRSS_{ij}$ = Nonresidential sanitary sewage costs, county i, year j.

$NRWTR_{ij}$ = Nonresidential water system development costs, county i, year j.

RSS_{ij} = Residential sanitary sewage costs, county i, year j.

$RWTR_{ij}$ = Residential water system development costs, county i, year j.

$SFPUP_{ij}$ = Square footage requirements, per pupil, county i, year j.

$SWSS_{ij}$ = Systemwide development cost for sanitary sewage facilities, county i, year j.

$SWWTR_{ij}$ = Systemwide development cost for water system development, county i, year j.

$TOTSTR_{ij}$ = Total street system costs for county i, year j.

$TOTUL_{ij}$ = Total utility cost requirements for county i, year j.

WEIGHT A = Weighting factor of 77 percent to reflect the ratio of public vs. private investment for streets and roads.

WEIGHT B = Estimate of the nonresidential sanitary sewage facility cost as a percentage of the residential cost - 40 percent.

WEIGHT C = Estimate of the nonresidential water system development cost as a percentage of the residential cost - 20 percent.

WEIGHT D = Estimate of the systemwide sanitary sewage development cost as a percentage of total residential and nonresidential cost - 40 percent.

WEIGHT E = Estimate of the systemwide water sytsem development cost as a percentage of total residential and nonresidential cost - 20 percent.

5.0 STATE PUBLIC FINANCE MODELS

The purpose of this section is to present the data and analytical relationships used to estimate the impacts of M-X deployment on state government revenues and expenditures in Nevada, Utah, Texas, and New Mexico. Section 5.1 presents the results of a time-series econometric analysis of the relationships among state government revenues and expenditures and their key determinants--state earnings and population. Section 5.2 presents the data from which these regression equations were estimated.

5.1 REVENUE AND EXPENDITURE EQUATIONS

This analysis derives relationships between revenues and wage and salary payments, on the one hand, and between expenditures and population on the other. On the revenue side, the approach used is to disaggregate state government revenues by type, focusing on those revenues which are most responsive to state earnings changes. Impact analyses can then be performed based on projected M-X-related earnings in the state and the econometrically derived relationships between state earnings and revenues. Not all revenues at the state level are closely related to state income or earnings. Certain types of revenues, such as severance taxes on mineral and energy resources, are related to the supply, price, and rate of extraction of these resources in the state. Intergovernmental transfers from the federal government, in the form of categorical or block grants or revenue sharing, are determined by individual program considerations, and need not be closely related to changes in income. Amusement tax revenues--including, in Nevada, gaming and casino tax revenues--primarily are determined by the level of tourism, and therefore are more closely related to factors outside the state economy than to state earnings.

At the same time, factors other than income affect the level of tax revenues received by state governments from various revenue sources, even when these sources are closely related to state income. The tax rate and tax base legislated in each state are the key determinants of the amount of revenue received for any given change in state income. In addition, economic factors, such as changes in fuel prices and other transportation costs, are likely to affect state motor fuels tax revenues. To the extent that changes occur in these and other nonincome variables, state revenues would change, and consequently these variables must be held constant in the analysis.

A number of alternative model specifications are possible based on these and other considerations. The approach used in this analysis is to estimate revenue equations with the most straightforward econometric techniques available, while still eliminating potential sources of bias or uncertainty in the estimates.

In each of the four states analyzed, general sales tax revenues were modeled as functions of total wage and salary payments in the state. Some difficulties were encountered because of state tax rate changes during the period of analysis (1960-1979). These problems were handled using dummy variables. Motor fuels tax revenues also were treated as responsive to changes in state earnings, and were modeled as

functions of state wage and salary payments in each of the four states. In addition, fuel prices were found to be important determinants of motor fuels tax revenues in each of the four states, with the consumer price index for gasoline used as the fuel price variable.

In addition, Utah and New Mexico have state individual income taxes. This revenue source is highly responsive to wage and salary changes in both of these states. State income tax revenues are modeled as functions of total wage and salary payments in each of the two states.

The income variable used is total wage and salary payments in each state. Alternative income variables are available, particularly aggregate state personal income or total state labor and proprietors' income by place of work. Since the purpose of the analysis is to estimate state-level expenditure and revenue effects of M-X deployment, and most M-X related income generated in the states would be wage and salary income, the wage and salary payments variable was chosen as the key exogenous or right-hand-side variable in the state revenue equations. Capital income such as rent, profit, and corporate dividends also would be generated by M-X deployment. However, such capital income is likely to be dispersed over a broad region, and would not be limited to the deployment states themselves. Labor income, on the other hand, is much more likely to accrue to persons either permanently or temporarily residing in the four states--construction workers, assembly and checkout workers, operations personnel, and workers indirectly employed by M-X. The choice of personal income or total labor and proprietor's income as the primary determinant of state revenues would have added additional detail to the state models estimated. Such detail would not, however, alter the fact that most state M-X-related income would be wage and salary payments. The approach used here--estimating revenues directly as a function of wage and salary payments--provides a useful simplification.

On the expenditure side, the analysis is conducted in highly aggregated form. Total state government expenditures are assumed to be primarily determined by state population. This highly aggregated analysis yields close fits between expenditures and population in the states analyzed.

The revenue and expenditure data from which these regression relationships were estimated are from the U.S. Bureau of the Census, Census of Governments, for the period 1960-79. The key explanatory variables of wage and salary payments are taken from the U.S. Bureau of Economic Analysis, Regional Economic Information System. State population is from state sources wherever these sources differ from U.S. Bureau of the Census estimates. Data sources used in the regression analysis are explained more fully in Section 5.2, and the actual data used in the regressions are presented there as well.

The revenue and expenditure data used in this analysis have been deflated to FY 1980 dollars using the implicit price deflator for state and local government purchases. The other value data used in the models--wage and salary payments variables--have been deflated to FY 1980 dollars using the implicit price deflator for gross national product. The mix of state purchases and revenues varies from state to state, though detailed price indices for each state do not exist. The use of

the state and local government purchases deflator represents the best price measure available. The implicit price deflator for gross national product is used because it is the broadest measure of price level changes available.

The regression equations were estimated using the Statistical Analysis System, developed at North Carolina State University. Ordinary least squares estimating procedures were used, with corrections made for serial correlation as appropriate.

NEVADA (5.1.1)

Two Nevada state revenue sources are treated in this analysis as responsive to state earnings. These two sources are general sales tax revenues and motor fuels tax revenues. Amusement tax revenues such as casino and gaming taxes have been excluded from this analysis because of the high proportion of these revenues attributable to tourists from outside the state. It is possible that some of the newly in-migrant workers and their dependents coming into the state of Nevada would generate gaming tax revenues. Exclusion of these tax sources from this analysis produces a downward bias in the revenue estimates. At the same time, many sales tax revenues received by Nevada also are the result of purchases by tourists to the state. Consequently, estimating sales tax revenues as a function of state earnings may bias revenue impacts upward. In order to arrive at a balance between these two potential sources of bias, this analysis includes the general sales tax revenues as endogenous revenue sources, but excludes amusement and gaming taxes. The same is true to some extent for motor fuels tax revenues, since some of these revenues would be attributable to tourist expenditures in the state, and not just to incomes earned by state residents. It is not possible to distinguish between these two potential revenue sources for motor fuels tax revenues. Sales and motor fuels tax revenue impacts are estimated in this analysis because of the likelihood that they are more closely related to state earnings than are other revenue sources--particularly amusement tax revenues.

The estimated Nevada state government revenue and expenditure equations are presented in Table 5.1.1-1. The relationship between Nevada general sales tax revenues and Nevada wage and salary payments is quite satisfactory. Nevada general sales tax revenues are explained quite well simply by Nevada wage and salary payments over the period of analysis. The R^2 for the simple relationship between Nevada general sales taxes (in FY 1980 dollars) and Nevada wage and salary payments (also in FY 1980 dollars) is 0.92. The estimated coefficient of 0.0367 for Nevada wage and salary payments was found to be significant at greater than the 0.01 level of confidence. The estimates are corrected for first order auto-correlation, with a serial correlation coefficient (rho) estimated at 0.48. The value of the estimated coefficient on Nevada wage and salary payments implies that for each $1,000 increase in wage and salary payments in Nevada, general sales taxes would increase by $36.70.

The motor fuels tax revenues equation for Nevada also produced highly significant coefficients, although the estimated R^2 was somewhat lower (0.72). The estimated coefficient of 0.0110 on Nevada wage and salary payments implies that for each increase of $1,000 in state earnings, Nevada motor fuel tax revenues would increase by $11. The gasoline price variable (CPIGAS) was found to be significant at the 0.01 level of confidence or greater, as was the earnings variable, with a negative coefficient. Increases in fuels prices, as measured by the index of gasoline prices,

Table 5.1.1-1. Nevada state government revenue and expenditure equations.

General Sales Tax Revenues

$$NVGSTX = -21240 + 0.0367\ NVWSP$$
$$(2.44)^* \quad (14.8)^*$$

$R^2 = 0.92$
rho = 0.48

Motor Fuels Tax Revenues

$$NVMFTX = 32395 + 0.0110\ NVWSP - 234.1\ CPIGAS$$
$$(12.8)^* \quad (6.61)^* \quad (6.05)^*$$

$R^2 = 0.72$
D.W. = 1.67

Total Expenditures

$$NVTOTEX = -136462 + 1446\ NVPOP$$
$$(3.46)^* \quad (18.4)^*$$

$R^2 = 0.95$
rho = 0.45

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Notes: T-statistics are in parentheses:
* indicates significance at 0.01 level of confidence or greater. See Table 5.1.4-2 for definitions of variables shown. Estimation period is 1960-79 (20 observations). Estimated using ordinary least squares when "D.W." is shown; corrected for autocorrelation when "rho" is shown.

Sources: HDR Sciences, based on data from U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, and Nevada State Planning Coordinators Office.

decrease the quantity of fuels demanded, thereby decreasing fuel tax revenues. The Durbin-Watson statistic calculated for this equation indicates that it is unlikely that the data are serially correlated. As a consequence, no correction for serial correlation was made to this estimate.

Total state government expenditures in Nevada in FY 1980 dollars were found to follow very closely Nevada population. The R^2 on this simple linear relationship is 0.95, with a first order serial correlation coefficient estimate of 0.45. The estimated coefficient on Nevada population is highly significant, and the value of 1446 for this estimated coefficient implies an increase in total state expenditures of $1,446 for each person added to the Nevada state population.

UTAH (5.1.2)

Three revenue equations have been estimated for the state of Utah. These are general sales tax revenues, motor fuels tax revenues, and income tax revenues. The estimated equations and related statistics are presented in Table 5.1.2-1. The table also presents the total expenditures equation estimated for Utah.

Utah general sales tax revenues were found to be very closely related to Utah wage and salary payments, after adjustment for a change in the sales tax rate during the period of analysis. State sales taxes were increased from 3 percent to 4 percent on 1 April 1969 (tax change information for Utah is based on a personal communication, Mr. Kenneth Cook, Sales Tax Auditing Division, Utah State Tax Commission, 18 September 1981). The effect of this increase in the tax rate is to change the slope of the relationship between tax revenues and wage and salary payments. A dummy variable (UTGSD1) therefore is assigned the value of Utah wage and salary payments (UTWSP) for 1970 (the first full year after the tax increase) through 1979, and the value 0 in other years. Both the coefficient on wage and salary payments and that on the dummy variable are highly significant statistically. The coefficient on wages and salaries is 0.0407, while the estimated dummy variable coefficient is 0.0074. Since the 4 percent tax rate remained in effect beyond the sample period, the proper interpretation of these results is that sales tax revenues would increase $40.70 plus $7.40 or $48.10 for each $1,000 increase in state wage and salaries. The estimated equation explains 98 percent of the variation in Utah general sales tax receipts during 1960-1979. The estimates presented in Table 5.1.2-1 have been corrected for first-order serial correlation, with a correlation coefficient estimate of 0.46.

Motor fuels tax revenues in Utah are explained by an equation containing Utah wage and salary payments, the index of gasoline prices, and a dummy variable to account for a tax rate change from 7 cents to 9 cents per gallon after 1978. The estimated coefficients on all explanatory variables are highly significant statistically. As with Utah sales taxes, the dummy variable--though not zero only in the last year of the sample period--is defined as an adjustment to the slope of the equation, rather than the intercept term. The dummy variable is equal to state wages and salaries in 1979, and zero otherwise. The coefficient on wages and salaries and the coefficient on the dummy variable together imply an increase of $8.60 plus $3.40 (or $12.00) in motor fuels tax revenues for each $1,000 increase in Utah wages and salary payments. The R^2 of the estimated equation is 0.71, significantly lower than that for the sales tax revenue equation, and indicates the

Table 5.1.2-1. Utah state government revenue and expenditure equations.

General Sales Tax Revenues

$$UTGSTX = -29005 + 0.0407\ UTWSP + 0.0074\ UTGSD1$$
$$(1.84)^{*} \quad (10.0)^{*} \qquad (4.61)^{*}$$

$R^2 = 0.98$
rho = 0.46

Motor Fuels Tax Revenues

$$UTMFTX = 60121 + 0.0086\ UTWSP - 246.3\ CPIGAS + 0.0034\ UTMFD1$$
$$(12.5)^{*} \quad (4.31)^{*} \qquad (4.34)^{*} \qquad (5.48)^{*}$$

$R^2 = 0.71$
rho = 0.57

Income Tax Revenues

$$UTINTX = -42222 + 0.0271\ UTWSP + 0.0084\ UTIND1$$
$$(2.87)^{**} \quad (6.52)^{*} \qquad (7.33)^{*}$$

$$+0.067\ UTIND2 + 0.0114\ UTIND3$$
$$(4.00)^{*} \qquad (5.64)^{*}$$

$R^2 = 0.99$
D.W. = 1.98

Total Expenditures

$$UTTOTEX = -2453591 + 2820\ UTPOP$$
$$(16.2)^{*} \quad (20.7)^{*}$$

$R^2 = 0.96$
rho = 0.58

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Notes: T-statistics are in parentheses:
* indicates significance at the 0.01 level of confidence or greater.
** indicates significance at the 0.10 level of confidence or greater.
See Table 5.1.4-2 for definitions of variables shown. Estimation period is 1960-79 (20 observations). Estimated using ordinary least squares when "D.W." is shown; corrected for auto correlation when "rho" is shown.

Sources: HDR Sciences, based on data from U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, Utah Population Work Committee, and Utah State Tax Commission.

likely omission of additional explanatory variables. The estimates have been corrected for first-order serial correlation, with an estimated autocorrelation coefficient of 0.57.

The equation for Utah individual income tax revenues contains state wage and salary payments and three dummy variables for tax rate and tax base changes during the period 1960-79. Individual income tax rates were changed in 1965 (affecting 1966 revenues) and in 1976 (affecting 1977 revenues). The tax base was changed in 1973 (affecting 1974 revenues) so that it would conform more closely to the federal income tax base. All three of these changes affect the slope of the relationship between revenues and wage-and-salary payments, rather than its intercept. Each dummy variable consequently is assigned the value of Utah wages and salaries during the period that particular tax structure was in effect. The structure associated with dummy variable UTIND3 is extended beyond the sample period. This implies a change in individual income tax revenues of $27.10 plus $11.40 or $38.50 for each increase of $1,000 in state wage and salary payments. The estimated equation explains 99 percent of the variation in constant-dollar income tax revenues. No serial correlation is evident in the data (D.W. = 1.98).

Total expenditures in Utah are predicted in constant dollar terms as a function of Utah population. Utah population is highly significant statistically in this relationship (the t-statistic is 20.7, significant at greater than the 0.01 level of confidence) and the R^2 of the equation is 0.96. The first order serial correlation present in the data also is significant, and the equation has been estimated including an adjustment for this serial correlation with a correlation coefficient of 0.58. The estimated value of 2,820 indicates that each additional person added to Utah's population would induce an increase of $2,820 (FY 1980 dollars) in total state expenditures.

TEXAS (5.1.3)

Table 5.1.3-1 presents estimated sales tax revenues, motor fuels tax revenues, and total expenditure equations for the state of Texas.

Texas general sales tax revenues are determined by state wages and salaries, including three dummy variables to account for tax changes from 1960 through 1979. Texas had no general sales tax until 1962, when a 2 percent tax was imposed. This rate was raised to 3 percent in October 1968, and to 3.25 percent in October 1969. Alcoholic beverages--including beer and wine--previously exempt from sales tax were included at this time. In July 1971 the tax rate was raised to 4 percent, and this rate remains in effect (personal communications, Mr. R. Murphree, Sales Tax Department, Texas State Comptroller of Public Accounts, 18 September 1981). Since all of these changes influence the slope of the equation, each dummy variable is assigned the value of the wage-and-salary variable during the years each tax rate is in effect. All estimated coefficients are highly significant, and have the expected signs and magnitudes. The dummy variables are defined so that none are applicable beyond the sample period. This implies that the impact of an increase in state wages and salaries beyond the sample period is determined entirely by the estimated coefficient on TXWSP. Thus, an increase of $1,000 in state wage and salary payments is estimated to raise general sales tax revenues by $29.50. The estimated equation explains the variations in sales tax revenues extremely well (R^2 = 0.99) with no evidence of serial correlation (D.W. = 1.69). The equation was estimated

Table 5.1.3-1. Texas state government revenue and expenditure equations.

General Sales Tax Revenues

$$TXGSTX = \underset{(86.9)^*}{0.0295\ TXWSP} - \underset{(19.6)^*}{0.0295\ TXGSD1} - \underset{(19.7)^*}{0.0140\ TXGSD2} - \underset{(8.89)^*}{0.0072\ TXGSD3}$$

$R^2 = 0.99$
D.W. = 1.69

Motor Fuels Tax Revenues

$$TXMFTX = \underset{(48.7)^*}{653269} + \underset{(4.25)^*}{0.0026\ TXWSP} - \underset{(7.22)^*}{1410\ CPIGAS}$$

$R^2 = 0.84$
D.W. = 1.33

Total Expenditures

$$TXTOTEX = \underset{(21.7)^*}{-13271212} + \underset{(33.1)^*}{1785\ TXPOP}$$

$R^2 = 0.98$
D.W. = 1.34

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Notes: T-statistics are in parentheses:
* indicates significance at 0.01 level of confidence or greater.
See Table 5.1.4-2 for definitions of variables shown. Estimation period is 1960-79 (20 observations). Estimated using ordinary least squares.

Sources: HDR Sciences, based on data from U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, and Texas State Comptroller of Public Accounts.

both with a constant term and without it. The constant term is excluded from the results shown in Table 5.1.3-1 because it was not statistically significant at the 0.10 level of confidence or greater.

Texas motor fuels tax revenues are estimated as a function of wage and salary payments and the consumer price index for gasoline. The coefficient on wage and salary payments is highly significant statistically, and its value of 0.0026 indicates that a $1,000 increase in wage and salary payments would be associated with a $2.60 increase in motor fuels tax revenues. The coefficient on the CPI for gasoline is negative, as was the case in both Nevada and Utah, implying that tax revenues generally are negatively related to the price of fuels. The R^2 on this estimated relationship is 0.84.

Total expenditures at the state level in Texas are, as for the other states, estimated as a function of Texas population. The R^2 of 0.98 indicates a very close fit based on this simple relationship. The estimated coefficient on Texas population is highly significant statistically, and its estimated value of 1,785 indicates that each incremental person added to the state population would induce an average of $1,785 (FY 1980 dollars) in total state expenditures.

NEW MEXICO (5.1.4)

Equations for New Mexico general sales tax revenues, motor fuels tax revenues, income tax revenues, and total expenditures are presented in Table 5.1.4-1. The general structure of these relationships follows closely that of the estimated equations for the other states.

General sales tax revenues in New Mexico are estimated as a function only of New Mexico wage and salary payments, with both the dependent and independent variable expressed in FY 1980 dollars. This relationship was estimated both with and without a constant term, though the formulation with the constant term was rejected. With the constant term included in the equation, the value of the estimated coefficient on New Mexico wage and salary payments (in FY 1980 dollars) is 0.099. This is well beyond the average proportionate relationship between New Mexico general sales taxes and wage and salary payments historically. This high coefficient resulted from the estimated negative intercept term which was large in absolute value. The relationship shown in Table 5.1.4-1 is the estimated equation without a constant term, and the resulting estimated coefficient on New Mexico wage and salary payments is much more in line with the recent historical relationship between sales tax revenues and wage and salary payments. The estimated coefficient is highly significant statistically, and its value of 0.0566 implies that a $1,000 increase in New Mexico wage and salary payments would be associated with a $56.60 increase in New Mexico general sales tax revenues. The relationship is highly serially correlated. The estimates have been corrected for this autocorrelation, with an estimated first order serial correlation coefficient of 0.80.

Motor fuels tax revenues in New Mexico are estimated as a function of New Mexico wage and salary payments and the CPI for gasoline, as was the case in the other states. The estimated coefficient on New Mexico wage and salary payments is of the same general order of magnitude of that in the other states, and its value of 0.0062 implies a $6.20 increase in motor fuels tax revenues for each $1,000 increase in New Mexico wage and salary payments. The negative coefficient on gasoline

Table 5.1.4-1. New Mexico state revenue and expenditure equations.

General Sales Tax Revenues

$$NMGSTX = \underset{(13.7)^*}{0.0566}\ NMWSP$$

rho = 0.80

Motor Fuels Tax Revenues

$$NMMFTX = \underset{(10.3)^*}{67570} + \underset{(2.22)^*}{0.0062}\ NMWSP - \underset{(2.12)^*}{104.0}\ CPIGAS$$

$R^2 = 0.23$
rho = -0.37

Income Tax Revenues

$$NMINTX = \underset{(8.97)^*}{0.0136}\ NMWSP + \underset{(1.59)}{17808}\ NMIND1 - \underset{(3.13)^{**}}{33306}\ NMIND2$$

rho = 0.54

Total Expenditures

$$NMTOTEX = \underset{(5.10)^*}{-1909270} + \underset{(8.20)^*}{2854}\ NMPOP$$

$R^2 = 0.79$
rho = 0.73

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Notes: T-statistics are in parentheses:
* indicates significance at 0.01 level of confidence or greater.
** indicates significance at 0.10 level of confidence or greater.
See Table 5.1.4-2 for definitions of variables shown. Estimation period is 1960-79 (20 observations), except income tax is 1967-79 (13 observations). Estimated using ordinary least squares, corrected for autocorrelation. No R^2 is calculated when estimates are corrected for autocorrelation and no constant term is present in the equation.

Sources: HDR Sciences, based on data from U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, University of New Mexico, Bureau of Business and Economic Research, and New Mexico Taxation and Revenue Department.

prices also is consistent with findings for the other states. Both coefficients are significant statistically at the 0.01 level of confidence or greater. The equation accounts for only a relatively small fraction of the variation in constant dollar motor fuel tax revenues in New Mexico, however, with an R^2 of only 0.23. This R^2 is extremely low for a time series analysis, and implies the omission of important explanatory variables from the equation. The data were found to be subject to second order serial correlation, and appropriate adjustments were made during estimation. The estimated correlation coefficients are 0.68 and -0.37.

New Mexico individual income tax revenues have been subject to substantial policy-induced fluctuations from 1960 through 1979. In 1970, compliance methods were improved and tax with-holding was introduced. In 1977 and 1978, surpluses in the state general fund were reduced through the implementation of tax rebates (not tax rate reductions) of $44.8 million and $46.9 million, respectively. In addition, various programs were initiated in the early 1970s to retard income tax revenue growth. These programs included a smaller income tax rebate and a medical-dental rebate of $5 per exemption (personal communication, Mr. Jeff States, New Mexico Taxation and Revenue Department, 18 September 1981). The time series on income tax revenue in New Mexico contains corporate as well as individual tax revenues from 1960 through 1966, though these two revenue types are disaggregated thereafter.

A New Mexico individual income tax revenue equation has been estimated over the sample period 1967-79, thereby excluding the first seven observations for which individual and corporate tax revenues were aggregated. In addition to the key explanatory variable of state wage and salary payments, a dummy variable is included for 1977 and 1978 to account for the tax rebates of approximately equal size in these years. Because these were single year rebates rather than tax rate changes, this dummy variable is defined as an *adjustment to the intercept rather* than the slope of the equation. Another dummy variable is introduced to deal with the with-holding, compliance, and other changes effective after 1970. Though conceptually this dummy variable should be an adjustment to the slope of the equation, the high correlation between this variable and the wage and salary payments variable produced poor results. Since the greatest effect of these changes occurred in 1970, this multicollinearity was overcome by defining the dummy variable as an intercept adjustment for 1970 only.

The estimated equation for New Mexico income tax revenues is displayed in Table 5.1.4-1. The dummy variable for 1970 is not significant at the 0.10 level of confidence, though the 1977-78 dummy passes this significance test. The coefficient on wage and salary payments is highly significant. Its value implies an increase of $13.60 in individual income tax revenues for each $1,000 increase in wage and salary payments. Using ordinary least squares, the estimated equation is characterized by an R^2 of 0.95, but appears to be highly serially correlated. The results in Table 5.1.4-1 have been corrected for this autocorrelation, with an estimated serial correlation coefficient of 0.54. The equation was estimated with and without a constant term, though the constant was dropped due to its lack of significance.

Total expenditures in New Mexico are explained in a fashion similar to that for the other states. Expenditures in FY 1980 dollars are estimated as a simple function of New Mexico population. The estimated coefficient of the New Mexico population

is highly significant statistically, and is very similar in magnitude to the estimated coefficient for Utah. Coefficients for Nevada and Texas are both significantly lower than those for New Mexico and Utah. However, the R^2 on this total expenditures equation, 0.79, is lower than was generally the case for the other states. The first order serial correlation coefficient is estimated to be a relatively high 0.73.

Table 5.1.4-2 defines each of the variables used in the four state government revenue and expenditure models. These definitions are disaggregated by endogenous as opposed to exogenous variables--that is, variables explained by the equations (endogenous) and variables taken as given by these equations (exogenous).

5.2 DATA USED IN THE ANALYSIS

This section presents the historical data used to estimate the state government revenue and expenditure equations for Nevada, Utah, Texas, and New Mexico presented in section 5.1. These data cover the period 1960-1979, 20 annual observations.

The source of the state government revenue and expenditure data is the Census of Governments annual publications for state governments published by the U.S. Bureau of the Census. These data are presented in Tables 5.2-1 for Nevada and Utah, and 5.2-2 for Texas and New Mexico.

The exogenous or predetermined variables for the state government revenue and expenditure models are state wage and salary payments, U.S. price variables, and state population. These data are presented in Table 5.2-3. The price deflators are presented on the basis of FY 1980 = 100. These deflators are used to convert the current-year or nominal data into constant-year FY 1980 dollars. The deflator used for state revenues and expenditures is the state and local government purchases implicit price deflator. The wage and salary payments variables were deflated using the U.S. gross national product implicit price deflator. The state population variables are the estimates prepared by state agencies where those state estimates differ from U.S. Bureau of the Census estimates. The source of the wage and salary payments data is the U.S. Bureau of Economic Analysis, Regional Economic Information System. Price variables are compiled by the U.S. Bureau of Economic Analysis in the case of implicit price deflators, and the consumer price index for gasoline is published by the U.S. Bureau of Labor Statistics. Population figures for Nevada, Utah, and Texas were supplied by the Nevada State Planning Coordinator's Office, the Utah Population Work Committee, and the U.S. Bureau of the Census, respectively. Population figures for New Mexico are from the University of New Mexico, Bureau of Business and Economic Research, New Mexico Statistical Abstact, 1977, with more recent data obtained from the New Mexico Department of Employment Security.

Table 5.1.4-2. Definitions of variables in state government revenue and expenditure equations for Nevada, Utah, Texas, and New Mexico.

Name of Variable	Definition
Endogenous Variables	
NVGSTX	Nevada general sales tax revenues, in FY 1980 dollars.
NVMFTX	Nevada motor fuels tax revenues, in FY 1980 dollars.
NVTOTEX	Nevada total expenditures, in FY 1980 dollars.
UTGSTX	Utah general sales tax revenues, in FY 1980 dollars.
UTMFTX	Utah motor fuels tax revenues, in FY 1980 dollars.
UTINTX	Utah income tax revenues, in FY 1980 dollars.
UTTOTEX	Utah total expenditures, in FY 1980 dollars.
TXGSTX	Texas general sales tax revenues, in FY 1980 dollars.
TXMFTX	Texas motor fuels tax revenues, in FY 1980 dollars.
TXTOTEX	Texas total expenditures, in FY 1980 dollars.
NMGSTX	New Mexico general sales tax revenues, in FY 1980 dollars.
NMMFTX	New Mexico motor fuels tax revenues, in FY 1980 dollars.
NMINTX	New Mexico income tax revenues, in FY 1980 dollars.
NMTOTEX	New Mexico total expenditures, in FY 1980 dollars.
Exogenous Variables	
NVWSP	Nevada wage and salary payments, in FY 1980 dollars.
NVPOP	Nevada population.
UTWSP	Utah wage and salary payments, in FY 1980 dollars.
UTPOP	Utah population.
UTGSD1	Sales tax change dummy variable, 1970-79 = UTWSP, 0 otherwise.
UTMFD1	Motor fuels tax change dummy variable, 1979 = UTWSP, 0 otherwise.
UTIND1	Income tax change dummy variable, 1966-73 = UTWSP, 0 otherwise.
UTIND2	Income tax change dummy variable, 1974-75 = UTWSP, 0 otherwise.
UTIND3	Income tax change dummy variable, 1976-79 = UTWSP, 0 otherwise.
TXWSP	Texas wage and salary payments, in FY 1980 dollars.
TXPOP	Texas population.
TXGSD1	Sales tax change dummy variable, 1960-61 = TXWSP, 0 otherwise.
TXGSD2	Sales tax change dummy variable, 1962-68 = TXWSP, 0 otherwise.
TXGSD3	Sales tax change dummy variable, 1969-71 = TXWSP, 0 otherwise.
NMWSP	New Mexico wage and salary payments, in FY 1980 dollars.
NMPOP	New Mexico population.
NMIND1	Income tax change dummy variable, 1970 = 1.
NMIND2	Income tax change dummy variable, 1977-78 = 1, 0 otherwise.
CPIGAS	Consumer price index for gasoline, 1967 = 100.

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Source: HDR Sciences. For data sources, see Tables 5.2-1, 5.2-2, and 5.2-3.

Note: Revenue and expenditure data are converted to FY 1980 dollars using the implicit price deflator for state and local government purchases. Wage and salary payments data are converted to FY 1980 dollars using the implicit price deflator for gross national product.

Table 5.2-1. Endogenous state government revenue and expenditure data, Nevada and Utah, 1960-1979 (millions of dollars).

	Nevada			Utah			
Year	General Sales Tax Revenues	Motor Fuels Tax Revenues	Total Expenditures	General Sales Tax Revenues	Motor Fuels Tax Revenues	Income Tax Revenues	Total Expenditures
1960	12.9	8.1	80.2	28.6	20.8	16.2	191.5
1961	13.8	8.0	89.2	29.4	20.8	15.4	218.5
1962	15.2	9.7	106.8	36.8	22.0	16.9	229.1
1963	19.5	12.6	120.8	41.2	23.1	18.7	257.1
1964	21.3	13.9	151.3	47.7	23.3	20.1	284.8
1965	23.0	13.5	167.0	51.3	24.2	22.5	338.7
1966	23.4	15.3	177.3	53.8	25.6	38.0	374.1
1967	23.4	15.8	193.9	55.8	26.8	39.9	398.0
1968	34.5	16.8	210.9	58.4	28.5	43.3	423.7
1969	44.2	18.2	226.3	65.2	31.2	50.9	455.4
1970	54.7	24.1	266.5	91.0	37.8	61.3	527.9
1971	65.7	26.7	295.0	101.3	40.8	61.9	592.4
1972	60.0	25.5	340.6	117.7	44.5	74.1	670.4
1973	69.4	25.3	382.2	135.9	48.3	88.5	687.3
1974	82.6	24.9	420.9	149.5	47.6	90.0	746.0
1975	89.7	25.8	499.3	174.4	48.4	104.9	895.4
1976	100.3	27.4	589.9	195.9	51.9	140.6	1,072.4
1977	115.7	29.6	632.8	226.9	54.7	158.3	1,177.3
1978	142.7	31.9	774.1	259.2	58.8	188.9	1,299.9
1979	175.7	34.7	861.5	290.0	74.1	226.0	1,464.3

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Source: U.S. Bureau of the Census, Governments Division. State Government Finances, selected years, Washington, D.C.

Table 5.2-2. Endogenous state government revenue and expenditure data, Texas and New Mexico, 1960-1979 (millions of dollars).

	Texas			New Mexico			
Year	General Sales Tax Revenues	Motor Fuels Tax Revenues	Total Expenditures	General Sales Tax Revenues	Motor Fuels Tax Revenues	Income Tax Revenues	Total Expenditures
1960	0	185.3	1,304.7	40.9	24.8	7.1	221.4
1961	0	189.1	1,331.7	35.9	24.9	7.4	243.2
1962	148.7	198.2	1,473.2	37.4	25.6	12.8	258.0
1963	180.5	206.3	1,585.0	42.8	26.7	14.2	297.7
1964	204.7	218.3	1,754.9	57.8	27.9	13.1	318.7
1965	222.0	229.2	1,793.1	63.1	28.6	16.2	353.8
1966	240.8	242.2	2,056.3	67.0	29.8	19.1	412.2
1967	259.4	246.9	2,337.0	68.0	30.7	11.6	435.4
1968	279.7	264.3	2,621.4	71.6	29.3	15.1	454.4
1969	440.6	294.0	2,870.1	82.7	34.4	19.6	478.3
1970	552.6	312.3	3,344.9	85.7	42.5	35.7	544.3
1971	635.6	333.8	3,926.8	119.1	45.3	35.8	609.1
1972	827.4	355.8	4,330.0	136.3	49.2	44.1	665.1
1973	926.2	385.4	4,498.1	153.5	51.9	49.5	715.9
1974	1,130.6	389.9	5,027.0	182.2	54.0	57.9	795.1
1975	1,272.4	395.2	6,106.5	218.3	57.7	56.6	908.0
1976	1,484.1	427.3	7,386.1	243.2	60.7	58.2	1,071.4
1977	1,695.8	444.1	7,829.4	257.2	64.8	26.6	1,137.0
1978	2,031.7	477.7	8,553.5	328.8	69.5	46.0	1,329.3
1979	2,185.0	489.5	9,665.1	369.8	72.5	68.6	1,578.2

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Source: U.S. Bureau of the Census, Governments Division. State Government Finances, selected years, Washington, D.C.

Table 5.2-3. Exogenous data used in state government revenue and expenditure analysis, 1960-1979.

Year	Price Deflators: Gross National Product	Price Deflators: State and Local Government Purchases	Price Deflators: Consumer Price Index for Gasoline	Wage and Salary Payments (millions of dollars): Nevada	Wage and Salary Payments: Utah	Wage and Salary Payments: Texas	Wage and Salary Payments: New Mexico	Population (thousands of persons): Nevada	Population: Utah	Population: Texas	Population: New Mexico
	FY 1980 = 100[1]	1967 = 100									
1960	39.6	31.3	92.5	599.7	1,242.7	11,864.5	1,238.4	285	900	9,624	951
1961	40.0	32.1	91.4	659.3	1,334.7	12,374.0	1,260.3	297	936	9,820	965
1962	40.7	33.2	91.9	813.6	1,450.3	18,099.9	1,328.1	316	958	10,053	979
1963	41.4	34.1	91.8	928.7	1,524.1	13,733.2	1,365.1	337	974	10,159	989
1964	42.0	34.9	91.4	1,010.5	1,578.9	14,789.2	1,459.5	360	978	10,270	1,006
1965	42.9	35.9	94.9	1,076.6	1,650.7	15,852.2	1,545.0	386	991	10,378	1,012
1966	44.3	37.7	97.0	1,135.7	1,770.0	17,624.0	1,601.4	404	1,009	10,492	1,007
1967	45.6	40.0	100.0	1,201.3	1,848.3	19,505.5	1,665.4	410	1,019	10,599	1,000
1968	47.6	42.3	101.4	1,362.3	1,995.5	21,834.8	1,783.9	429	1,029	10,819	994
1969	50.1	45.4	104.7	1,564.0	2,169.2	24,368.2	1,948.0	480	1,047	11,045	1,011
1970	52.8	49.0	105.6	1,724.6	1,376.3	26,232.9	2,085.4	489	1,066	11,237	1,017
1971	55.4	52.4	106.3	1,900.1	2,608.5	27,937.3	2,264.3	510	1,095	11,422	1,045
1972	57.7	55.3	107.6	2,086.7	2,896.5	30,691.1	2,536.8	527	1,128	11,618	1,076
1973	61.0	59.1	118.1	2,369.6	3,227.0	34,434.4	2,812.9	552	1,150	11,832	1,099
1974	66.3	64.9	159.9	2,590.0	3,628.3	39,151.0	3,138.7	574	1,179	12,017	1,119
1975	72.5	71.0	170.8	1,823.8	3,971.7	43,633.5	3,506.0	590	1,203	12,238	1,144
1976	76.2	75.8	177.9	3,189.4	4,500.6	49,720.7	3,966.6	613	1,232	12,599	1,172
1977	80.7	80.8	188.2	3,733.4	5,131.1	56,402.1	4,494.0	637	1,270	12,806	1,196
1978	86.6	86.8	196.3	4,543.1	5,898.9	65,551.2	5,137.8	678	1,317	13,047	1,212
1979	93.9	93.9	265.6	5,295.4	6,714.6	75,993.8	5,837.3	722	1,367	13,380	1,241

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[1]FY 1980 values of these indices are calculated as simple average of four quarters, 1979.4 - 1980.3. FY 1980 value of gross national product price deflator is 173.29; for state and local government purchases, FY 1980 value is 180.8.

Sources: For price data, Council of Economic Advisors, Economic Report of the President, 1981, Washington, D.C., pp. 236, 237, and 291. For wage and salary payments, U.S. Bureau of Economic Analysis, Regional Economic Information System, August 1980. For population data, as follows: Nevada, Nevada State Planning Coordinators Office; Utah, Utah Population Work Committee; Texas, U.S. Bureau of the Census; New Mexico, University of New Mexico, Bureau of Business and Economic Research. Price deflators reported in Economic Report of the President are compiled by U.S. Bureau of Economic Analysis. Consumer Price Index for gasoline is compiled by U.S. Bureau of Labor Statistics.

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