A MICROSIMULATION ANALYSIS OF CHANGES IN OKLAHOMA'S INDIVIDUAL INCOME TAX CODE

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PREFACE

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CHAPTER I

INTRODUCTION

This study involves the development of microsimulation techniques--computer tax modeling--capable of forecasting aggregate and distributional impacts of changes in the Oklahoma individual income tax law.

Study Orientation

To date, most of the applied economic analyses of state income taxes have centered around attempts to measure growth of collections and have relied on regression techniques. While the present study employs a different methodology, a brief discussion of the earlier regression studies is necessary in order to fully appreciate the advantages of microsimulation.

The pioneering study involving the responsiveness of state tax revenue sources to changes in personal income was by Groves and Kahn (6). Recognizing the importance of discretionary changes in tax law, these authors limited their analysis to states in which no rate changes had occurred.

Wilford (40) criticized Groves and Kahn's failure to include estimates of the rate-revenue elasticity when appropriate. While Wilford did not stress the point, the rate-revenue elasticity is difficult, if not impossible, to estimate for the individual income tax in most states. The difficulty stems from the dearth of data on

distribution of tax payments by income level. Estimation of the average effective tax rates under a progressive individual income requires state data similar to the Internal Revenue's Statistics on Income for a number of years. When the data are available for an extended time period, they must be made consistent with current law if the effects of statutory changes are to be separated from the effects of changes in economic and demographic variables. The difficulties associated with adjusting prior years' collections to current tax law are compounded when federal income tax liability is an allowable deduction in arriving at state taxable income and when federal adjusted gross income is the starting point in calculating state taxable income. In these cases, state tax collections must be made consistent with both current federal and state laws.

Two approaches to handling the problem of the impact of statutory changes on prior years' collections have been attempted. Singer (37, p. 201) introduced the use of dummy variables ". . . whenever there was a change in rates, taxable income, base, or withholding procedures." While this may be a satisfactory method for estimating the effects of statutory changes which are thought, a priori, to be significant, a problem may develop with respect to degrees of freedom when there have been numerous code changes (39, p. 140).

Harris (8) was one of the first to establish a synthetic tax series. Using the federal statistics on income, Harris computed the tax for the mean income in each class for single and for joint returns for ten years based on statutory rates, exemption levels and the standard deduction as of January 1, 1965 (p. 8). The average effective tax rate for each income class was calculated by taking a weighted average of the joint and individual effective tax rates. The weights were the proportion of joint returns and one minus this proportion.

Having determined the effective rates of income class for each of the ten years, Harris calculated the synthetic series by applying these rates to the reported distribution of federal adjusted gross income. The synthetic series was then used to estimate a consistent tax law elasticity coefficient which was used to estimate collections.

One would expect Harris' estimate of the elasticity coefficient to be high since he assumed that all taxpayers claimed the standard deduction (39, p. 139). This shortcoming is a direct result of the absence of state-specific summary statistics. Use of the data collected by the Internal Revenue Service for each state is at best hazardous for the following reasons:

1. state adjusted gross income usually differs from federal adjusted gross income,
2. the federal statistics do not include out-of-state residents who must file state returns,
3. states require exemptions and deductions to be prorated under certain conditions, and
4. state specific tax credits are not reported on the federal form.

In evaluating the above approaches to making allowances for changes in the tax code, Norman and Russell (13, p. 429) noted that since the legal rates were not included as variables in the models, these ". . . models cannot be used to forecast state income tax revenues when legal rates are to be altered or to simulate time streams of income tax revenues under different assumptions about the income tax structure." These authors then developed a model capable of simulating aggregate individual income tax revenues under alternative rate structures. Since Norman and Russell apparently had more state-specific data then did earlier researchers, their model involved stochastic estimations of

the total taxable income and the percentage of taxable income in each of 11 legal taxable income brackets (pp. 432-433). These values were then employed to calculate an average effective tax rate which, when multiplied by their forecast of taxable income, yielded an aggregate collections estimate.

Norman and Russell's approach contained two shortcomings. First, they assumed that taxable income was the same for all returns within each adjusted gross income bracket (p. 430). Thus the possibility existed whereby rate structures could be varied so as to leave the average taxpayer in the same marginal bracket as under the existing law. Should this have happened, their model would have been incapable of capturing the impact of rate changes. Secondly, their approach was limited to alterations in the rate structures.

McLaren (11, p. 73), using data for Minnesota, modified Norman and Russell's approach to predict not only the impact of changes in the legal rate structure but also ". . . the effects of changes in exemption and rent credit policy variables." As in the previous analysis, only an aggregate forecast was made.

The techniques employed in forecasting revenues and the impact of variations in state individual income tax codes prior to the decade of the seventies were limited to regression analysis and to fairly simplistic simulation analysis coupled with regression analysis. There are two shortcomings to the analyses employing these techniques. First, impacts by income class were not forecast. Second, the analyses involved forecasting the impact of changes in a limited number of policy variables.

Given the advent of the high speed computer and the falling cost of computer use, state policymakers should no longer function without

forecasts--both aggregate and by income class--of the impact of deliberated modifications to their individual income tax code. Microsimulation techniques capable of providing these forecasts are both economically and technically feasible.

Overview of Computer Tax Modeling

Computer tax modeling requires observations on a large number of microunits (taxpayers) and computer programs capable of simulating current and proposed individual income tax law. While this technique has been used since the early 1960's for policy analysis at the federal level, few states have systematically performed policy analysis using microsimulation techniques. The microsimulation model developed in this study possesses greater flexibility than have previous models developed at the state level.

The first requirement for microsimulation is the preparation of a microdata data base. This study is based on microdata data bases for tax years 1975 and 1976. These data bases are a result of a stratified systematic sampling of the individual income tax returns filed with the Oklahoma Tax Commission for these years.

Given a representative sample of individual income tax returns, simulation of an income tax structure involves "aging" the individual returns to reflect the level of income, itemized deductions, number of exemptions, etc. for the tax year being forecast. In this study, the data base is aged with each simulation.

Given an aged data base or an aging process, liability for each return is calculated for the forecast year under proposed law. Total and average liability under the proposed law are calculated by income

class and compared to the corresponding forecast magnitudes under current law or under other proposals previously projected.

Objectives

Aggregate and distributional analyses of variations in individual income tax law at the state level have been limited as a result of the lack of state-specific data. This lack of data has prevented the use of microsimulation techniques, a methodology capable of providing these analyses, at the subnational level of government. The present study focuses on remedying this situation with respect to the analysis of variations in Oklahoma's individual income tax law. The specific objectives are to:

1. obtain, validate and summarize information from individual income tax returns filed with the Oklahoma Tax Commission for two consecutive tax years;
2. develop a microsimulation model capable of providing aggregate and distributional analyses of proposed changes in the Oklahoma individual income tax code; and
3. apply this model to an evaluation of proposed changes in the Oklahoma individual income tax code.

Attainment of these objectives will mean that two important strides will have been made. First, Oklahoma's elected representatives will have at their disposal a versatile methodology for tax analysis. Second, researchers throughout the state will have a wealth of tax statistics specific to this state enabling them to request "what if" analyses from a state agency.

Organization of the Study

In Chapter II previous efforts at microsimulation at both the state and federal level are reviewed. The data bases are described in Chapter III, while Chapter IV traces the changes in Oklahoma individual income tax law and the changing role of collections from this revenue source. In Chapter V the microsimulation model is specified. Empirical results are presented in Chapter VI. The results of the study are summarized in Chapter VII.

CHAPTER II

REVIEW OF THE LITERATURE

The development of computer tax models at subnational levels of government is a recent phenomenon. There appears to be a growing interest in their development, as exemplified by a special session on computer tax models at the last National Association of Tax Administrators Conference on Revenue Estimating. The new interest is derived largely from the versatility of this methodology with respect to policy analysis, budgetary considerations and tax incidence studies.

A number of federal agencies and private research groups, particularly the Brookings Institution, were instrumental in the early development of these models. These early developments were centered on analyses at the national level. As one would expect, the U. S. Treasury Department is very active in modeling of income tax simulators.

The next section of this chapter reviews the highlights of the development of computer tax models at the federal level. The following section traces the development of tax models at the state level.

National Simulation Models

The pioneering work on personal income tax simulations was done by Pechman (28). His tax model was based on selected information from 100,000 individual income tax returns filed with the Internal Revenue Service for 1960 (p. 234). Pechman noted that he anticipated three uses

for this tax file: 1) revenue estimation; 2) legislative analysis; and 3) research work.

With respect to budgetary consideration, Pechman (28, p. 234) indicated that, given an estimate of the rate of change of income, the tax model could provide reliable estimates of individual income tax collections. In his seminal work, Pechman assumed that the rate of change of income was the same at all income levels and noted that ". . . it is not much more difficult to assume differential changes in income among income classes, marital statuses, geographic areas, or other characteristics" (p. 237). Pechman noted that the usefulness of tax models would perhaps be of greatest value during the legislative process. The ability to allow for change in several aspects of the tax code at the same time with considerable speed ". . . will be most appreciated by the policymaker when he is involved in the preparation of legislative proposals to alter the tax system" (p. 238).

Finally, Pechman included a list of potential research projects which could more accurately be undertaken with the tax model. These topics varied from built-in flexibility considerations to the estimation of tax expenditures--the revenue impact of tax preferences (exclusions and deductions) allowed in arriving at taxable income. Thus tax expenditures may be viewed ". . . as subsidies to taxpayers in the form of tax reductions" (34, p. 192).

Pechman (29, 30, 31) demonstrated the flexibility of the microdata base in three subsequent publications. In addition to further analysis with an income tax file, two of three articles used a microdata base constructed from two separate data bases (30, 31). Merging of microdata

bases provides information collected by separate agencies and thus allows for greater detail in research endeavors.

Pechman and Okner (30, p. 13), using the MERGE data base, estimated the impact of the "eroding features"--tax preferences--of the federal individual income tax. The use of a microdata base had two advantages over the previous analyses of erosion. First, allowance could now be made for the possibility of a single family or individual receiving tax benefits from several of the eroding features. Second, the analysis could be undertaken by income class.

Pechman (29), returning to the tax file rather than the MERGE data file, estimated the responsiveness of individual income tax collections to changes in income and compared the tax file methodology to the regression analysis of earlier studies. The author concluded that the tax file provides better estimates than the regression equations ". . . as the forecast horizon is extended or if income growth changes abruptly in response to either a business contraction or an inflationary shock" (p. 412)

Pechman and Okner (31), again employing the MERGE data file, centered their attention on the incidence of taxation. Their analysis involved measuring the burden of taxation from both the "sources" and "uses" side. The flexibility of the microdata base was again demonstrated in that ". . . estimates were prepared on the basis of eight sets of incidence assumptions that span the range of opinions currently held by economists" (p. 2).

The Treasury Department is a heavy user of microdata files in their analyses of tax policy. Wyscarver (41, 42) has published two works recently describing the Treasury's efforts in simulating the federal

personal income tax. In extrapolating the 1975 data base to reflect 1978 tax law and income levels, the Treasury used time series techniques to estimate the levels of 11 variables. These variables included the number of returns by filing status, the number and types of exemptions, adjusted gross income, pension payments, net capital gains, investment credit and earned income credit (41, pp. 3-1, 3-2). Given these projected values, the 1975 data base is subject to a two-stage extrapolation process.

With respect to the use of simulators based on microdata files, the state of the art is much farther advanced at the national level than at the subnational level. One obvious reason is that the cost of enlarging and/or merging data bases mounts rapidly once one goes beyond the documents available within a given agency.

State Simulation Models

The first published work on state personal income tax simulation models is that of Perry (32) in 1973. The objective of his study was twofold. First, Perry reported on a survey of states using simulation techniques. The second objective was the development of an income tax simulator for the state of Iowa.

Perry's survey indicated that as of 1972 there was at most one personal income tax simulator employed at the state level. As he noted, ". . . with the exception of New York, all models operate to determine the impact of the proposed changes in the sample year only" (p. 54). In addition, most of the reported simulators involved one-time studies and employed data bases comprised of hundreds of thousands of returns.

As was alluded to earlier, dependency on full data bases is expensive in terms of computer time. Also, the data bases used usually contain information which is selected primarily to fulfill an audit rather than an analysis function. Consequently, sufficient data are seldom available for reliable simulation. Finally, a number of analysts used data bases prepared by the Internal Revenue Service. While most states find the federal magnetic tapes invaluable in their audit procedures, these federal bases do not contain enough state specific information to provide reliable estimates of either aggregate or distributional impacts.

Perry (32) attempted to design a simulation package which would be useful for both policy and budgetary consideration. In addition, the author believed that his model should be easily adaptable to simulating the tax structures of other states. Failure of the author in obtaining the design objectives would obviously result in a lack of interest on the part of the revenue analysts in other states.

Before evaluating Perry's success in developing a multi-purpose simulation package, a brief discussion of his data base is necessary. Regardless of the outcome of his simulation techniques, Perry did make an important contribution in stressing the expense associated with reliance on large data bases.

The Iowa sample contained information from 10,776 returns which had been stratified into 23 adjusted gross income classes. The sampling proportion for each class was 1 percent plus 25 returns. Eleven bits of information were taken from each return (p. 56). No information was given with respect to the accuracy of the estimate of the population collections resulting from the sample.

While Perry's article stressed the importance of drawing current samples, he erred in his sample design. Olson (26, p. 99) noted that sampling theory dictates that the "sampling fraction may range from less than 1 percent in the middle-income brackets to 75 percent or more at the top, open-ended bracket." This variation in the sampling fraction obtains because sample size in each stratum is a function of the level of significance and the margin of error, both of which are determined by the investigator, as well as the coefficient of variation in that stratum. Olson's work is considered in greater detail in the following chapter.

Perry's work (32) contained other flaws which were probably of greater significance than the error in sample design. One objective of a personal income tax simulator is the estimation of future revenues. Perry noted that his simulator was unable to project future years.

> Although some changes in the Iowa tax provisions were made during that period, these changes had little effect on the number of returns filed. However, changes becoming effective in the fiscal years 1967 and 1968 provided Iowa with state withholding, and a sales tax credit caused the number and distribution of returns to shift considerably. Such changes made it impossible to accurately check the projection method in future years (p. 68).

This failure was a direct result of basing future projections on the number of returns in each stratum rather than incrementing income and moving the individual returns through the marginal tax brackets.

Perry's estimating technique involved using the sample of returns in each stratum and applying a weight to all information on each return for all returns in that stratum. For the sample year, the weights are as follows (p. 60):

$$Wi = Ti/Si$$

where

Wi is the weight for the i^{th} stratum,

Ti is the total number of returns in the i^{th} stratum, and

Si is the sample size for the i^{th} stratum.

The sample information on each return is multiplied by the Wi and the results are summed within and over the stratum to provide the population estimates. The estimation technique employed by Perry involved estimating the Ti for future years and then recalculating the Wi. The sample year magnitudes were then multiplied by the new Wi to yield the estimate. The Ti for future years was estimated with least squares trend analysis. As was noted above, changes in the tax law rendered this estimating technique useless. It is ironical that a methodology which was constructed to estimate the revenue impact of tax law changes was so quickly rendered of little value by those very changes.

Perry (32, p. 68) also noted that his approach suffered from the inability to handle changes in the federal tax code. While all states which allow either partial or full federal tax deductibility will have difficulty in estimating the impact of changes in federal law on state collections, Perry's approach was badly flawed in that his entire model was based on federal liability during the base year; that is, he failed to collect sufficient data to forecast federal liability.

Rather than projecting the number of returns by stratum and then multiplying sample year liability by the projected number of returns to arrive at a projection of collections, Perry should have forecast liability for each return in his sample by incrementing income and recalculating liability. The author was aware of this shortcoming.

"Some method of relating components of taxable income in the state of Iowa to national or state projections of personal income should be researched" (p. 70).

While Perry's study had several weaknesses, the effort was not totally wasted. As mentioned above, the development of samples for prior years was an important step. No doubt the simulators could have been redone to allow for income growth. Finally, assuming no significant feedback effects, the ability to make prior years' collections consistent with current law was established.

In 1974 Fromm (5) reported on the development of a computer tax simulator which the state of Ohio had constructed to estimate income tax revenues. The Ohio endeavor represented a significant step forward in many respects. The only major shortcoming of the project was its failure to enlarge the model enough to allow computation of revenue impacts by income class. However, the initial objective was to project fiscal year collections.

The sample used with the Ohio simulator ". . . consists of all returns with adjusted gross income of $40,000 or more and 1.0 percent of all other returns" (5, p. 90). No indication was given as to how well the sample was able to estimate sample year collections.

The Ohio simulator was designed not only to estimate total fiscal year collections but also to serve as a cash flow model capable of generating estimates of total tax liability, total taxes withheld and total estimated tax payments. The estimates based on the model were combined with in-house knowledge of the quarterly ". . . pay-in pattern of withholding and estimated tax payments" (p. 91) to generate these cash flow projections.

The key to the Ohio simulator was an estimate of the rate of growth of federal adjusted gross income. Growth in federal adjusted gross income per return was estimated in two steps. First, under the assumption that aggregate adjusted gross income grew at the same rate as aggregate state personal income, Fromm (5, pp. 90-91) estimated state personal income with a single equation regressing state personal income on a forecasted national personal income. The second step involved as estimate of the number of returns for the forecast year.

The relevant variables on each return in the sample were then incremented by the ratio of per return personal income in the forecast period to the sample period per return personal income (p. 90). The estimated liability for each return was multiplied by the inverse of the sampling proportion and then aggregated to yield the estimate for total collections.

Fromm also presented estimates of the responsiveness of Ohio's income tax collections to growth in income and returns. In his words:

> It can be seen that income elasticity decreases as income rises, and increases as the number of returns increases. The returns elasticity also decreases (in absolute value) as income increases and increases (in absolute value) as the number of returns increases. This all happens because Ohio's income tax is progressive (p. 91).

Since the simulator had been used to forecast only one year, there were not sufficient forecasts to determine the validity of the technique. For the one forecast made, projected collections were 0.9 percent above reported collections. In backcasting one year, the model estimate was 0.6 percent below reported collections (p. 92).

In recent years considerable attention has been given to the impact of indexing the individual income tax structures at both the federal

and state levels. The Advisory Commission on Intergovernmental Affairs (2, p. 10) made the following recommendation in 1976: "The Commission recommends . . . that all states give early and favorable consideration to annual indexation of exemptions, deductions, per capita tax credits, and tax rate brackets." Reliable estimates of the impact of indexation at the state level may be accomplished with the aid of state personal income tax simulators.

The fiscal and distributional impacts of indexation of the Colorado and of the Virginia personal income tax structures have been simulated. The Virginia study (2, p. 78) defined partial indexation to include tying only the exemption value and the standard deduction to the price index while full indexation, in addition to these two components, also indexed the marginal tax brackets. Estimates were made of the revenue impacts of both full and partial indexation for Virginia. The Colorado study (4) estimated the impact of full indexation only.

In the Colorado study federal adjusted gross income was assumed to grow at an annual rate of 8 percent and population at 2.5 percent per year (pp. 141-143). The significant conclusions from the Colorado study are:

1. A slight increase in the overall progressivity of the tax structure would result.

2. The overall effective rate, total liability divided by Colorado adjusted gross income, would fall from 2.85 percent to 2.65 percent.

3. The aggregate revenue impact would increase rapidly over time. The revenue loss for the first year was estimated at 23.8 millions of dollars. For the second through the fourth years, revenue losses were estimated to increase to 54.2, 80.4, and 110.7 millions of dollars (p. 148).

Simulations forecasting the impact of partial versus full indexation were undertaken by the Advisory Commission on Intergovernmental Affairs based on a stratified sample of Virginia taxpayers. The analysis also included the impact of allowing for a lag in the indexation factor.

The no lag simulations involved applying the rate of change of the Consumer Price Index to the indexed components for the tax year being estimated. The second set of estimates allowed for a one-year lag between the CPI and the tax year being estimated. The Virginia study was based on 1972 tax law and the known rates of growth of AGI and the CPI for 1973 and 1974 (2, p. 78).

Several conclusions were drawn with respect to the alternative simulation schemes. First, with respect to aggregate analysis, the second year revenue loss was much larger than the loss during the first year (p. 78). Obviously, one reason for the greater loss was the fact that indexation during the second year is based on a compound rate of growth of the CPI. In this study, since the actual rate of change in the CPI was used and since the rate of increase was much greater in 1974 than in 1973, the second year impact should be larger.

The second aggregate result was that partial indexation accounted for just less than one-half of the revenue loss resulting from full indexation (p. 78). This result was the opposite to what had been estimated at the federal level where the exemption-deduction effect outweighed the bracket effect. This difference was explained by the fact that ". . . the relative width of the tax brackets are (sic) less for lower incomes in the Virginia tax structure than in the federal" (p. 79).

The final reported result compared the lagged simulations with the no lag simulations. In the words of the Commission (2):

> In short, when inflation is rising from year to year a lagged indexing mechanism provides smaller tax reductions than a mechanism with no lag; when the inflation rates decline from year to year, the lagged mechanism provides larger tax reductions than a current year index (p. 80).

Of course, the long-run effects of a lagged versus no lag indexation scheme are of little interest.

As in the Colorado study, analysis of the distributional impacts resulted in the conclusion that the tax structure would become slightly more progressive with indexation, both partial and full. The authors also noted that the impact on those with AGI less than $5,000 or greater than $50,000 was minor (p. 81).

Summary

The search of the literature indicates that the construction of computer tax models at the state level is in its infancy. Insufficient effort has been expended in developing simulation techniques capable of forecasting aggregate and distributional impacts of tax code modification with a minimum of analyst time and of computer usage. If this methodology is to be accepted at the state level, every effort must be made to minimize associated costs and to maximize relevant output.

As detailed in Chapter V, careful planning with respect to sample collection and simulator development yields a methodology capable of analyzing complex law changes at cost levels acceptable to Oklahoma officials.

CHAPTER III

SAMPLE CHARACTERISTICS

Computer tax models are data intensive in that they require observations from a large number of microunits (taxpayers) in order to simulate alternative tax structures. The microdata files described in this chapter were prepared for use in simulation of alternative tax structures. Sufficient data were collected to allow for changes in personal exemption values, standard deduction levels, itemized deductions and rate structures at both the state and federal levels.

Sample Design and Sample Collection

The task of building historical data bases from individual income tax returns filed in the state of Oklahoma began during the summer of 1975. Initially, the hope was to collect stratified systematic samples for 1969-1974. Except for a final consistency check to insure the integrity of the data and a final update, the data for these years have been obtained.

The Oklahoma Tax Commission, recognizing the potential of computer tax modeling, requested that the effort which began in the summer of 1975 be continued the following summer. During the summer of 1976, the 1975 data file, one of two used in the analysis contained in this study, was collected; a program was designed to isolate those 1976 returns which were to be included in that year's sample; and

arrangements were made to complete the 1976 sample during the summer of 1977. The two microdata bases used in this analysis--1975 and 1976--have been subjected to a number of consistency checks and have been updated once in order to add late filers to the sample.

As was mentioned in Chapter II, a number of states have constructed microdata files for either tax impact or fiscal analysis. These samples are characterized by an invariant sampling proportion across the income classes. The use of a constant sampling proportion may have resulted from a lack of an estimate of the variance and mean in each stratum and not from a lack of knowledge on the part of those designing the sampling procedures. This was the situation in Oklahoma during the summer of 1975. Fortunately, estimates of the required sampling statistics were available for the state of Kansas (27).

The statistically correct procedure for determining sample size is given in (3.1) (p. 2):

$$n_j = t^2/a^2 * s_j^2/\bar{X}_j^2 = t^2/a^2 * Z_j^2 \qquad (3.1)$$

where

n_j = required sample size in statum j,

t = value from the t distribution for the desired significance level,

a = the percent margin of error,

s_j = an estimate of the standard deviation of the tax liability in stratum j,

$\bar{X}_j$ = the mean tax payment in stratum j, and

Z_j = the coefficient of variation for tax payments in stratum j.

Equation (3.1) indicates that, given a t value and an acceptable margin of error, the sample size in stratum j is a function of the variance and of the mean tax liability in the j^{th} class. Consequently, one would expect the sampling proportion to vary by income class if for no other reason than the fact that the mean tax payment rises as income increases. Under the ceteris paribus assumption, an increase in the mean tax payment reduces the required sample size.

The required statistics--s_j and $\bar{X}_j$--had never been estimated for Oklahoma. The decision was made to obtain an estimate of these statistics from a pilot sample drawn from the 1974 returns. The pilot study was based on the sampling proportions recommended in the Kansas study, slightly modified.

The recommended sampling proportions resulting from the Kansas study are depicted in Table I. These proportions were modified for several reasons.

The first modification to the recommended proportions involved reducing the sampling proportion in the \$0.01-\$1,999 adjusted gross income class. A sampling proportion of 5.55 percent would have required a sample of approximately 6,224 returns in an income class generating what has been estimated at less than 0.02 percent of total collections. Complete elimination of these classes would not seriously bias the ability to estimate aggregate collections; consequently, the sample proportion for returns with income less than \$2,000 was modified in order to reduce the cost of sampling, keypunching, and insuring data integrity.

One method for reducing the required sample size is to increase the acceptable margin of error. When the margin or error is increased

from 5 percent to 10 percent, the required sampling proportion is reduced to approximately one-fourth of the proportion recommended in Table I. Since the primary objective of the sample is to forecast liability and since a small percentage of total collections is generated by taxpayers in the first class, a sampling proportion of 2 percent, rather than the 5.55 percent recommended by Olson, was used.

TABLE I

SAMPLING PROPORTIONS FOR KANSAS INCOME TAX AFTER FINITE POPULATION CORRECTIONS--1968

Adjusted Gross Income Category	Kansas Sampling Proportion
$ 0.01 - $ 1,999	5.55%
2,000 - 3,999	1.16
4,000 - 5,999	0.52
6,000 - 7,999	0.32
8,000 - 9,999	0.27
10,000 - 12,499	0.30
12,500 - 14,999	0.33
15,000 - 19,999	0.70
20,000 - 29,999	1.11
30,000 - 49,999	2.25
50,000 - 99,999	7.05
100,000 and over	90.00

Source: Edwin G. Olson, "Determining Sample Size for State Tax Impact Studies," Unpublished paper, Kansas State University.

The second problem encountered in attempting to follow the sampling proportions depicted in Table I involved the required fraction of 90 percent in the $100,000-and-above class. Since the income measure

used in this stratification had not been keypunched, all sampling of the 1974 and 1975 returns involved manual techniques. To visually check the stratifying variable on all 900,000-plus returns for any one year would have consumed the entire budget allocation for the summer project. Therefore, the decision was made to stratify 1,000 out of every 5,000 returns. Consequently, a proportion of 20 percent in the $100,000-and-above class was obtained.

Such a large reduction in the recommended proportion in the top income class may have resulted in a biased estimate of total collections in that class. Since there is no way of knowing the total liability in this class without manually searching all of the returns for 1975, a definitive answer is impossible. However, the total sample for 1975 underestimates reported collections by no more than 3.9 percent; consequently, one would tend to reject the hypothesis that the reduction in the recommended proportion for the top income class seriously biased the sample.

The final modification involved the number of income classes. The Kansas study stratified the returns into 11 income classes. In order to more closely follow the technique employed by the Internal Revenue Service in their reporting of data revelant to Oklahoma, the Oklahoma study involved 21 income classes. Of course, this change in the number of classes violated the efficacy of applying the Kansas percentages to the Oklahoma study. Recall, however, that these modified proportions were initially to be used in a pilot study to obtain estimates of the variance and mean liability within each stratum. If necessary, the sample sizes were to be modified later.

Due to a heavy keypunch load during the summer, the information drawn from various segments of the population of 1974 returns was not keypunched until November; consequently, all of the 1974 returns were sampled on the basis of the Kansas study. The 1974 sample underestimated 1974 calendar year collections by approximately 4 percent. Given that a number of returns were missed in the initial sampling because of auditing procedures, the decision was made to continue to use the same sampling proportions for the 1975 returns except for one income class. At the urging of members of the Legislative Council, the sampling rate in the $30,000-$49,999 class was increased to 20 percent in order that they might start work towards a cash flow model. The 20 percent rate was used for all classes above $30,000 under the assumption that most of the estimated tax payments are made by individuals with incomes above this level.

A number of improvements were made in collecting the 1976 sample. The Oklahoma Tax Commission required that, beginning with the 1976 returns, Oklahoma income after adjustments, the variable used in stratification, be keypunched by their data entry division. As a result of this additional expenditure, two important changes to the sampling procedure came about. First, the returns could now be stratified by the computer. Second, the sampling rate in the $100,000-plus class could more easily be increased to 100 percent.

Table II contains the sampling proportions employed in collecting the 1974, 1975, and 1976 samples. The 1974 percentages are included even though the analyses reported herein are not based on this data file. However, the sampling rates for the last two years contained in Table II were based on the 1974 sample except for the $100,000-and-above

class in 1974. Here the proportion was increased to 99 percent after the 1975 sample was drawn. The 1974 sample was the basis for analysis reported elsewhere (33). These sampling rates resulted in a 1975 sample of 16,839 returns and a 1976 sample of 21,604 returns.

TABLE II

SAMPLING PROPORTIONS FOR TAXABLE YEARS 1974-1976

Oklahoma Income Class (000)	Sampling Proportions for Tax Year		
	1974	1975	1976
$ 0 < 1	2%	2%	2%
1 < 2	2	2	2
2 < 3	1	1	1
3 < 4	1	1	1
4 < 5	1	1	1
5 < 6	1	1	1
6 < 7	1	1	1
7 < 8	1	1	1
8 < 9	1	1	1
9 < 10	1	1	1
10 < 11	1	1	1
11 < 12	1	1	1
12 < 13	1	1	1
13 < 14	1	1	1
14 < 15	1	1	1
15 < 20	1	1	1
20 < 25	2	2	2
25 < 30	2	2	2
30 < 50	2.5	20	20
50 < 100	20	20	20
100 Plus	99	20	100

Sample Consistency Checks

All sampling procedures are subject to error. In collecting the 1975 and 1976 samples, three sources of human error were possible. First, taxpayers make errors in completing their returns. The errors may or may not result in an incorrect tax liability calculation. The second source of error is inaccurate transference of the data from the original document to the document from which the data are keypunched. Third, keypunch personnel make errors in punching the data.

In order to maintain the integrity of the data, Fortran programs were written to perform consistency checks on each return included in the samples. The program used in performing the consistency analysis on the 1976 sample contains approximately 900 Fortran statements and performs 22 checks.

While a full explanation of the nature of the consistency checks is unnecessary, a few examples are instructive. The Fortran program checks to insure that the value of exemptions is equal to the number of exemptions times $750. All entries which are subject to prorating are checked to see that they are prorated. Recorded tax is compared to calculated tax. The edit program also produces a summary by type of error.

For those returns containing incorrect entries, all recording and keypunch errors were corrected. Taxpayer errors were corrected so long as the change did not result in a change in tax liability as recorded on the original document. Once these time-consuming and laborious corrections were completed, the data were ready to be summarized in tables similar to the statistics reported by the Internal Revenue Service.

Summary Analysis

While the construction of an individual income simulator for Oklahoma does not require that the samples be summarized, the data were summarized and will be made available to other researchers. In the development stage, at least, completion of detailed summary tables proved to be expensive in terms of manhours and computer processing time.

Initially, the aim was to use a canned program--SAS or SPSS--to prepare the summary tables. One small run and conversations with personnel at Oklahoma State's computer center quickly revealed that a Fortran program would have to be written to summarize the data.

The program used to summarize the 1976 sample contains approximately 2,000 Fortran statements. This package has been written in a general manner so that only a few parameter values need be changed to summarize future years. Of course, the more changes in the tax code or the greater the number of variables included in the sample, the more extensive the required program modifications.

Before summarizing the data, one modification to the short form returns is necessary. Rather than generating two sets of summary tables, the short form returns are converted into their long form equivalents. The conversion process is straightforward in all respects except for the allocation of the total number of exemptions.

This allocation procedure, as undertaken to date, involves assigning taxpayer and spouse exemptions based on filing status and then assuming that all others are dependent children exemptions. For single taxpayers and unmarried heads of households filing short forms,

the first exemption is assigned to the taxpayer while the remainder are assumed to be dependent children. In the case of married joint returns, the first two are assumed to be taxpayer exemptions. The shortcoming of this approach results from the fact that some of the exemptions are no doubt claimed by individuals who are blind and/or over 65 years old. This does not appear to be a serious problem since less than 3 percent of the total number of returns filed were short form returns in 1975 and 1976.

The summary program (hereafter referred to as the simple statistics package) generates tables of totals, averages, standard deviations, and coefficients of variation for the sample and also estimates of the population totals. The population totals are obtained by multiplying each variable (personal exemptions, dependent exemptions, Oklahoma liability, etc.) on each return by the inverse of the sampling proportion for that income class. This procedure yields an estimate of the number of returns and totals for each variable for each income class.

The simple statistics package generates 111 summary tables. The nature of the various tables printed is summarized in Table III. Not all of the data can be made public because of confidentiality requirements since any published data must contain at least three observations per cell. Several income classes in the head-of-household and surviving spouse tables contain fewer than three observations.

Part of the data from the simple statistics package for 1975 and 1976 are presented in Tables IV and V. The estimated individual income tax collections of $153,506,000 for tax year 1975 underestimates reported collections by no more than $6,309,754 or 3.9 percent. Similarly, the estimate for 1976 of $187,137,000 underestimates reported

collections by no more than $4,575,264 or 2.4 percent. The inability to state the exact amount by which estimated collections miss reported collections results from the fact that the Oklahoma Tax Commission includes fiduciary collections with their individual income tax collections. Steps are being taken to break the fiduciary collections out from the individual collections for future tax years.

TABLE III

SUMMARY OF OUTPUT OF THE SIMPLE STATISTICS PACKAGE

Type of Return Tabulated	Type of Summary Statistic Included			
	Totals	Averages	Standard Deviations	Coefficients Of Variation
All Returns	A	A	B	B
All Itemized	A	A	B	B
All Standard	A	A	B	B
All, Standard and Itemized for:				
Full Year	A	A		
Part Year	A	A		
Nonresident	A	A		
Single	A	A		
Married Joint	A	A		
Married Separate	A	A		
Head of Household	A	A		
Surviving Spouse	A	A		

NOTES: A indicates that a table is printed for the sample and for the population.

B indicates that the table contains sample information only.

TABLE IV

ESTIMATED TOTALS FOR 1975 RETURNS (DOLLARS IN THOUSANDS)

Oklahoma Income After Adjustments	Number of Returns	Federal Tax Deduction	Oklahoma Taxable Income	Oklahoma Tax After Credits
$ 0 < 1	52,350	$ 534	$ 2,210	$ 11
1 < 2	55,950	1,004	7,832	41
2 < 3	57,600	1,954	31,940	171
3 < 4	55,200	5,039	60,119	383
4 < 5	54,700	8,405	93,696	690
5 < 6	52,900	12,849	125,980	1,057
6 < 7	48,800	14,657	151,739	1,442
7 < 8	45,900	17,138	172,709	1,931
8 < 9	42,300	17,045	184,939	2,230
9 < 10	40,400	17,968	200,058	2,544
10 < 11	39,200	18,567	222,982	2,978
11 < 12	36,700	18,233	241,675	3,615
12 < 13	33,600	17,674	241,099	3,657
13 < 14	31,500	16,925	250,879	3,918
14 < 15	29,200	15,620	256,615	4,421
15 < 20	105,500	61,392	1,165,230	24,189
20 < 25	50,300	31,918	775,394	21,837
25 < 30	23,000	16,391	444,511	15,187
30 < 50	22,470	18,717	620,734	25,864
50 < 100	,7640	9,741	395,348	19,863
100 Plus	2,250	3,576	309,383	17,476
Totals	887,460	$325,350	$5,955,073	$153,506

TABLE V

ESTIMATED TOTALS FOR 1976 RETURNS (DOLLARS IN THOUSANDS)

Oklahoma Income After Adjustments	Number of Returns	Federal Tax Deduction	Oklahoma Taxable Income	Oklahoma Tax After Credits
$ 0 < 1	54,750	$ 262	$ 1,942	$ 11
1 < 2	57,400	806	8,393	44
2 < 3	60,800	2,068	34,711	190
3 < 4	58,700	5,462	65,629	423
4 < 5	54,600	8,428	99,341	723
5 < 6	52,800	12,768	132,220	1,140
6 < 7	49,900	15,393	157,099	1,559
7 < 8	46,900	16,992	173,520	1,954
8 < 9	42,300	17,959	192,463	2,373
9 < 10	39,500	17,964	203,069	2,653
10 < 11	37,300	17,709	223,043	3,311
11 < 12	36,200	18,910	235,129	3,616
12 < 13	33,500	17,183	246,621	3,806
13 < 14	31,400	16,785	253,618	4,253
14 < 15	30,500	16,920	272,495	4,944
15 < 20	117,900	67,742	1,327,020	28,079
20 < 25	64,000	39,712	977,030	27,018
25 < 30	31,200	21,058	609,876	20,886
30 < 50	30,235	24,660	826,582	34,059
50 < 100	9,505	12,425	491,625	24,475
100 Plus	2,586	4,178	382,281	21,620
Totals	941,976	$354,885	$6,913,709	$187,137

Summary

Collection and summarization of the samples discussed in this chapter are significant because researchers interested in the size distribution of Oklahoma liability finally have state specific data and because the existence of these samples make feasible the construction of computer tax models capable of estimating the distributional impacts of tax law modifications.

Data from returns for two tax years--1975 and 1976--are summarized. The samples underestimate reported collections by approximately 3.9 percent and 2.4 percent for 1975 and 1976, respectively.

CHAPTER IV

INCOME TAX LAW AND HISTORICAL COLLECTIONS

Simulation of a tax structure is based on the tax law applicable for the year being simulated. The first section of this chapter contains a discussion of the historical development of Oklahoma tax law since 1971. In the last part of the chapter the changing role of individual income collections is traced.

Oklahoma's Individual Income Tax Law

The major provisions of the current individual income tax code were enacted in 1971 (15). The provisions of the 1971 law and the changes in the law since that time are detailed below.

Beginning with the 1971 law the starting point in arriving at Oklahoma taxable income is federal adjusted gross income. While a detailed accounting of the derivation of federal adjusted gross income (AGI) is unnecessary, changes in the federal tax code may influence the size of federal AGI and thus Oklahoma taxable income.

Federal AGI, as defined in the Internal Revenue Code, is basically gross income reduced by ordinary and necessary business and trade expenses incurred by professional individuals and by unincorporated businesses. Two other significant exclusions from gross income are moving expenses and excludable sick pay if included in wages.

Oklahoma AGI is based on federal AGI and is used in calculating the Oklahoma standard deduction. The necessary major adjustments to federal AGI in calculating Oklahoma AGI are summarized in Table VI.

TABLE VI

ADJUSTMENTS TO FEDERAL ADJUSTED GROSS INCOME IN ARRIVING AT OKLAHOMA ADJUSTED GROSS INCOME

Federal AGI		
Plus	1.	State and local interest
	2.	Out-of-state losses
	3.	Employee business expenses deducted 100 percent on the federal form but not totally applicable to Oklahoma
Minus	1.	Exempt interest income
	2.	Out-of-state income from real or tangible property
	3.	Non-taxable income
	4.	Oil and gas depletion allowance
Equals		
Oklahoma AGI		

To arrive at Oklahoma AGI, federal AFI is increased by: 1) state and local interest not otherwise exempt by Oklahoma law; 2) out-of-state losses; 3) employee business expenses which have been deducted 100 percent on the federal return but for which only a portion is applicable to Oklahoma. The last addition must be prorated by the ratio of income earned in Oklahoma to total income earned.

The second step in deriving Oklahoma AGI involves subtractions from federal AGI. These subtractions include the following: 1) interest income explicitly exempted by the provisions of the United States or Oklahoma constitutions; 2) out-of-state income from real or tangible property; 3) non-taxable income (e.g., Oklahoma teachers retirement income, Oklahoma public employees' retirement income, Oklahoma turnpike bonds and personal service income earned in other states by part-year residents); and 4) a depletion allowance of 22 percent of income based on the cost of the oil and gas deposit. Out-of-state personal service income necessitates the prorating of exemptions and deductions to arrive at Oklahoma taxable income.

Prior to the 1971 law, the allowable portions of the value of exemptions and of deductions were subtracted from Oklahoma AGI to arrive at Oklahoma taxable income. Since 1971, the Oklahoma Tax Commission has included the income cencept of Oklahoma income after adjustments on the tax form. The new concept, undefined in Oklahoma law, is now the measure from which exemptions and deductions are subtracted to yield Oklahoma taxable income.

Table VII summarizes the items subtracted from Oklahoma AGI in calculating Oklahoma taxable income. Calculation of Oklahoma income after adjustments is included as an intermediate step since the tax simulator developed in Chapter V employs this concept.

The derivation of Oklahoma income after adjustments entails reducing Oklahoma adjusted gross income by a maximum of $100 per taxpayer for interest on savings accounts and time deposits paid by Oklahoma banks, credit unions and savings and loan associations. The first $1,500 of income received by members of the armed forces are also excluded from

Oklahoma taxable income. Contributions to a political party or candidate of an amount not to exceed $100 per taxpayer may also be deducted from Oklahoma adjusted gross income.

TABLE VII

SUMMARY OF DERIVATION OF OKLAHOMA TAXABLE INCOME FROM OKLAHOMA ADJUSTED GROSS INCOME

Oklahoma AGI	
Minus Exclusion of a Portion of:	1. Interest income 2. Military pay 3. Political contributions
Equals	
Oklahoma Income after adjustments	
Minus Prorated Value of:	1. Exemptions 2. Deductions A. Standard or B. Itemized 3. Federal tax deduction
Equals	
Oklahoma Taxable Income	

Oklahoma income after adjustments is the state income concept which most closely parallels federal adjusted gross income in that this is the amount from which the value of exemptions and deductions is subtracted to yield taxable income. Taxable income on the Oklahoma return is

derived by subtracting the sum of the value of exemptions and deductions from Oklahoma income after adjustments.

Since some taxpayers have income which is taxable in other states, the total value of exemptions and deductions must be prorated to arrive at the allowable portion. In addition, the federal tax deduction is subtracted at this point. The total federal tax deduction must also be prorated to yield the allowable portion.

In calculating the total value of exemptions, the taxpayer is allowed a $750 personal exemption. In addition the spouse and dependent exemptions are $750. There is also a $750 aged and/or blind exemption for the taxpayer and spouse.

The Oklahoma taxpayer has the option of claiming the non-business deductions (e.g., charitable contributions, interest paid, medical expenses, etc.) claimed on the federal form or claiming the Oklahoma standard deduction. Taxpayers must take the Oklahoma standard deduction if they use the federal zero bracket amount (standard deduction). The Oklahoma standard deduction is the larger of $1,000 ($500 for married separate returns) or 15 percent of Oklahoma adjusted gross income with a maximum of $2,000 ($1,000 for married separate returns).

The sum of the total value of exemptions and deductions is fully allowed if the taxpayer is a full-year resident. For non-residents or part-year residents with out-of-state personal service income, this sum is prorated by the ratio of Oklahoma AGI to federal AGI.

The second subtraction from Oklahoma income after adjustments involves the allowable portion of federal income tax liability. Prior to 1971, Oklahoma law allowed for full deductibility of federal tax. Between 1971 and 1975, no portion of federal liability was deductible.

From 1975 through and including 1978, the federal tax deduction was the first $500 plus 5 percent of the excess of this amount with a maximum of $1,700 (21). The 1979 law provided taxpayers with the option of full deductibility and one set of tax tables or zero deductibility and the pre-1979 tables (17).

The federal tax deduction is also subject to prorating by the ratio of Oklahoma adjusted gross income to federal adjusted gross income. Proration is required here regardless of the reason for the differential between the adjusted gross incomes.

The sum of the prorated exemptions and deductions plus the prorated federal tax deduction is subtracted from Oklahoma income after adjustments to yield Oklahoma taxable income. The taxable income amount is the magnitude used in entering the relevant tax table to determine Oklahoma liability prior to credits (or gross Oklahoma liability).

With the passage of the 1979 income tax law, Oklahoma taxpayers now may use one of two progressive tax schedules depending upon whether or not the taxpayer claims a federal tax deduction (17). If the taxpayer opts for Method One under the 1979 law and does not claim a federal tax deduction, Oklahoma liability is calculated from the relevant schedule in Table VIII. These schedules were initially contained in the 1971 law. If the taxpayer selected Method Two under the 1979 law, federal tax liability is fully deductible and Oklahoma liability is based on the pertinent schedule in Table IX.

The "gross Oklahoma liability" is met through payment at the time of filing, withholding, estimated tax payments or one of a number of tax credits. On calendar 1979 income there are a total of eight tax

credits. Of these eight, only two are refundable when the credit exceeds the amount of liability. Table X contains a summary of these credits.

TABLE VIII

TAX SCHEDULES UNDER METHOD ONE

Single and married separate returns		Joint and surviving spouse returns	
Taxable Income	Marginal Rate	Taxable Income	Marginal Rate
$ 0 - 1,000	1/2%	$ 0 - 2,000	1/2%
1,000 - 2,500	1	2,000 - 5,000	1
2,500 - 3,750	2	5,000 - 7,500	2
3,750 - 5,000	3	7,500 - 10,000	3
5,000 - 6,250	4	10,000 - 12,500	4
6,250 - 7,500	5	12,500 - 15,000	5
7,500 and above	6	15,000 and above	6

Source: 68 O.S. Supp. 1979, Sec. 2355.

The property tax credit, which has an effective date of January 1, 1975, was the first Oklahoma credit which was refundable regardless of liability (20). This 1974 law provided for a credit against the indificual income tax for the amount of property tax paid in excess of 1 percent of gross income with a maximum credit of $200. Only those with gross income less than $6,000 are eligible.

When the legislature passed the conservation excise tax of 1977, a separate act was passed whereby a direct credit against income tax

TABLE IX

TAX SCHEDULES UNDER METHOD TWO

Single and married separate returns		Joint, head-of-household and surviving spouse returns	
Taxable Income	Marginal Rate	Taxable Income	Marginal Rate
$ 0 - 1,000	1/2%	$ 0 - 2,000	1/2%
1,000 - 2,500	1	2,000 - 5,000	1
2,500 - 3,750	2	5,000 - 7,500	2
3,750 - 5,000	3	7,500 - 9,000	3
5,000 - 6,250	4	9,000 - 10,500	4
6,250 - 7,500	5	10,500 - 12,000	5
7,500 - 9,250	6	12,000 - 13,500	6
9,250 - 11,250	7	13,500 - 15,000	7
11,250 - 13,250	8	15,000 - 17,000	8
13,250 - 15,250	9	17,000 - 23,000	9
15,250 - 17,500	10	23,000 - 29,000	10
17,500 - 21,000	11	29,000 - 38,000	11
21,000 - 27,000	12	38,000 - 48,000	12
27,000 - 33,000	13	48,000 - 58,000	13
33,000 - 39,000	14	58,000 - 69,000	14
39,000 - 43,000	15	69,000 - 81,000	15
43,000 - 49,000	16	81,000 - 94,000	16
49,000 and above	17	94,000 and above	17

Source: 68 O.S. Supp. 1979, Sec. 2355.

liability was provided for a portion of the excise taxes on minerals, petroleum, natural gas and castinghead gas (23). The law provides that all unreimbursed excise tax paid in excess of 7.085 percent on these products shall be allowed as a direct credit against income tax liability. The main qualifier was that the contract between the producer and purchaser must have been in force as of December 31, 1976. Since the effective date of the conservation excise tax was January 1, 1978, refunds under this bill have not yet been made. As with the property tax credit, this credit is not limited to the tax liability.

TABLE X

TAX CREDITS ALLOWED UNDER OKLAHOMA LAW

Gross Oklahoma Liability	
Minus	1. Property tax credit 2. Conservation excise tax credit 3. Credit for tax paid another state 4. Credit for gas used in manufacturing 5. Solar energy devise credit 6. Water treatment facilities credit 7. Air pollution control credit 8. Child care credit
Equals	
Net Oklahoma Liability	

The remaining credits are limited to the extent of the liability during the year in which claimed. In some cases the taxpayer is allowed to carry forward any unused credit.

The credit for tax paid another state by a resident individual on personal service income taxed by Oklahoma is limited to the extent of Oklahoma liability. This credit is the lesser of the tax paid the other state or Oklahoma liability multiplied by the ratio of other state personal service income to Oklahoma adjusted gross income.

Taxpayers operating manufacturing establishments in Oklahoma are granted a direct credit against income taxes for gas used in manufacturing (18). The taxpayer is allowed a credit of three mills per thousand cubic feet (MCF) of natural gas used or consumed for all consumption in excess of 25,000 MCF. The provisions of the act were effective May 1, 1971. Any unused portion of the credit may be carried forward.

The 1977 legislature provided for a credit for resident taxpayers on the cost of a solar energy devise installed in the principal private residence (24). The credit is 25 percent of the installed cost of the devise with a maximum credit of $2,000. Any unused portion of the credit may be carried forward for a maximum of five years. The act applies to all taxable years ending after December 31, 1977, and expires for all taxable years after December 31, 1987.

Effective May 1, 1967, taxpayers were allowed a direct credit not to exceed 20 percent of the cost of installing water treatment facilities (16). The credit is allowed until the full cost of the installation is recovered but is not to exceed the amount of liability during any tax year. In the same year the legislature passed a similar direct credit for installation of air pollution control devices (14).

Following the lead of the federal government, the 1977 legislature enacted a child care credit. The law provides that for taxable years beginning after December 1975 the full-year and part-year resident taxpayer is entitled to a direct credit of not more than 20 percent of the federal child care credit (22). The credit is to be prorated by the ratio of Oklahoma adjusted gross income to federal adjusted gross income and may not exceed liability. The law did not include a carry forward provision.

Individual Income Tax Collections

Since 1950, individual income tax collections have steadily increased as a percent of total state tax collections. This trend is reflected in the data presented in Table XI.

TABLE XI

THE CHANGING ROLE OF INDIVIDUAL INCOME TAX COLLECTIONS: SELECTED YEARS (DOLLARS IN MILLIONS)

Fiscal Year	Collections From All Taxes	Individual Income Tax Collections	Individual As % of All Taxes
1978	$1,167.4	$255.3	21.9%
1975	779.3	151.7	19.5
1970	427.7	50.6	11.8
1965	301.5	26.7	8.9
1960	230.6	16.4	7.1
1955	178.2	10.6	5.9
1950	135.3	7.7	5.7

Source: Robert L. Sandmeyer, Dale Wasson, and Rudy I. Greer, Report: A Study of Oklahoma State Taxes, Oklahoma State University (February 1979), Table III-2, p. 26.

During the 29 year period included in Table XI, the percentage of total Oklahoma tax collections accounted for by the individual income tax has risen from 5.7 percent to 21.9 percent. There are basically two prima facie explanations for the expanding role of this revenue source. First, the individual income tax is a progressive tax and therefore collections are more responsive to income growth than are collections from selective and general sales taxes. The total revision of the income tax code for the tax years ending after December 31, 1970, is the second explanation. While not reported in Table XI, fiscal 1972 collections exceeded fiscal 1971 collections by 71.9 percent.

Summary

As reported in Table XI, the individual income tax accounted for 21.9 percent of total state tax collections during the fiscal year ending June 30, 1978. Relative to fiscal 1950, receipts from this source have experienced a 33-fold increase while collections from all other taxes have risen by less than 9-fold.

In comparing the 1979 provisions to the 1971 provisions, the significant changes center around federal tax deductibility and the tax credits. Except for these two areas, the current code is basically as written in 1971 when Oklahoma went to the federal base.

CHAPTER V

THE OKLAHOMA INDIVIDUAL INCOME TAX MICROSIMULATION MODEL

In devising the computer tax model for estimating the fiscal and distributional impacts of modifications to Oklahoma's individual income tax code, three objectives are of foremost concern. First, the program is formulated in a general manner so as to minimize the need for reprogramming for alternative simulations. Second, output from a given simulation is generated in such a way as to minimize computation time. Consequently, portions of the output are optional and must be specifically requested. Third, also on an optional basis, the forecast distributional impacts of a given simulation are compared with forecasts under any other set of parameter values for which a disk-stored data base of average liabilities by income class has been estimated. The purpose of the present chapter is to specify the tax model, to specify data limitations, and to explain the nature of the output of the model.

The Tax Model

In formulating the computer tax model, the primary concern is with a specification which allows for alternative scenarios with a minimum of analyst intervention. In accomplishing this objective, the model must follow very closely the provisions of 1979 tax law. At the same time,

potential requests from policy makers with respect to alternative tax law are anticipated and are built into the model.

The basic identities of the simulation model are defined as:

$$OAGI_{ijf} \equiv FAGI_{ijf} + NEMI_{ijf} + OSL_{ijf} + ME_{ijf} + EBE_{ijf} - EII_{ijf} - OIRTP_{ijf} - NTI_{ijf} \quad (5.1)$$

$$OIAA_{ijf} \equiv OAGI_{ijf} - IE_{ijf} - MPE_{ijf} - PCE_{ijf} \quad (5.2)$$

$$OTI_{ijf} \equiv OIAA_{ijf} - (VEX_{ijf} + OSD_{ijf}(\text{or } ID_{ijf}) + FTD_{ijf})PF_{ijf} \quad (5.3)$$

$$OTBC_{ijf} \equiv OTI_{ijf} * OTR_{ijf} \quad (5.4)$$

$$OTAC_{ijf} \equiv OTBC_{ijf} - OTC_{ijf} \quad (5.5)$$

where

$OAGI_{ijf}$ = Oklahoma adjusted gross income for i^{th} individual in the j^{th} income class in forecast period f,

FAGI = Federal adjusted gross income,

NEMI = Municipal interest not otherwise exempt,

OSL = Out of state losses,

ME = Moving expenses for taxpayers leaving the state,

EBE = Employee business expenses which have been deducted 100 percent on the federal form but are not fully applicable to Oklahoma,

EII = Interest income explicitly exempt by provisions under United States or Oklahoma Constitutions,

OIRTP = Out of state income from real or tangible property,

NTI = Nontaxable income,

OIAA = Oklahoma income after adjustments,

IE = Interest income exempt by Oklahoma law,

MPE = Military pay exclusion,

PCE = Political contribution exclusion,

OTI = Oklahoma taxable income,

VEX = Value of exemptions,

OSD = Oklahoma standard deduction,

ID = Itemized deductions,

FTD = Federal tax deduction,

PF = Prorating factor,

OTBC = Oklahoma tax before credits,

OTR = Oklahoma tax rate,

OTAC = Oklahoma tax after credits, and

OTC = Oklahoma tax credits.

In describing the above mentioned variables over time, a number of simplifying assumptions will be made due to data limitations:

1. There exists an equal proportionate growth in federal adjusted gross income across the entire income distribution. The model can be modified to allow for differential rates of growth by income class, but not by type of income.

2. The ratio of Oklahoma adjusted gross income to federal adjusted gross income is assumed invariant over the forecast period. This assumption is necessary because no data are available for the variables on the right side of Equation 5.1 except for federal adjusted gross income. Since there are no maximum limitations on any of these variables, the assumption of a constant ratio appears to be more realistic than would the assumption of a constant difference.

3. The difference between Oklahoma adjusted gross income and Oklahoma income after adjustments is assumed constant. An invariant

difference rather than an invariant ratio is assumed because of the maximum limits imposed on the three variables subtracted from Oklahoma adjusted gross income in deriving Oklahoma income after adjustments in Equation 5.2.

4. While the behavior of the standard deduction over time presents no problem, the behavior of itemized deductions over time is more difficult to determine. Itemized deductions are assumed to increase at the same rate as does federal adjusted gross income.

Given these assumptions, the behavior equations are defined as:

$$FAGI_{ijf} = (1 + r)FAGI_{ijs} \tag{5.6}$$

$$OAGI_{ijf} = FAGI_{ijf} * (OAGI_{ijs}/FAGI_{ijs}) \tag{5.7}$$

$$OIAA_{ijf} = OAGI_{ijf} - (OAGI_{ijs} - OIAA_{ijs}) \tag{5.8}$$

$$OSD_{ijf} = STPER * OAGI_{ijf};\ STMIN \leq OSD_{ijf} \leq STMAX \tag{5.9}$$

$$VEX_{ijf} = NEX_{ijs} * OKEXVL_{ijf} \tag{5.10}$$

$$ID_{ijf} = (1 + r)ID_{ijs} \tag{5.11}$$

$$FTI_{ijf} = FAGI_{ijf} - NEX_{ijs} * FEXVL_{ijf} - FZB_{ijf}\ (\text{or } ID_{ijf}) \tag{5.12}$$

$$FT_{ijf} = FTI_{ijf} * FTR_{ijf} \tag{5.13}$$

$$FTD_{ijf} = FTDMIN_{ijf} + FTDPER_{ijf} * FT_{ijf}$$
$$\text{subject to } FTD_{ijf} = FT_{ijf} \text{ if } FT_{ijf} \leq FTDMIN_{ijf} \tag{5.14}$$
$$\text{or } FTD_{ijf} = FTDMAX_{ijf} \text{ if } FTD_{ijf} > FTDMAX_{ijf}$$

where

s = The sample year,

f = The forecast year,

r = The compound rate of growth of federal adjusted gross income and of itemized deductions,

STPER = The percentage used in calculating the Oklahoma standard deduction,

STMIN = The floor on the Oklahoma standard deduction,

STMAX = The maximum Oklahoma standard deduction,

NEX = The number of exemptions,

OKEXVL = Oklahoma exemption value,

FTI = Federal taxable income,

FEXVL = Federal exemption value,

FZB = Federal zero bracket amount,

FT = Federal tax liability from the federal tax tables,

FTD = Federal tax deduction allowed in calculating Oklahoma taxable income,

FTDMIN = The amount of federal tax liability which is fully deductible,

FTDPER = The percentage to be used in calculating the federal tax deduction, and

FTDMAX = The maximum federal tax deduction.

Simulation of Oklahoma tax collections is driven by--requires an estimate of--the rate of growth of federal adjusted gross income from the base or sample year through the forecast year. This estimate of the rate of growth of federal adjusted gross income initiates the simulation of liability on each return in the microdata base as is apparent from Equation 5.6. In addition, the same estimated rate of change is contained in Equation 5.11 where itemized deductions are calculated for the forecast year.

The approach taken in this study in estimating the rate of growth used in driving the simulator is identical to that employed by Fromm (5). As discussed in Chapter II, Fromm, using state personal income as a proxy for federal adjusted gross income, estimated state personal income and the number of returns to be filed in the forecast period. He then calculated an average personal income by dividing forecast period state personal income by the forecast number of returns. Having calculated the corresponding average for the sample year, Fromm then used the rate of change in this average income as a proxy for the rate of change of federal adjusted gross income in simulating the Ohio microdata base. This is the approach taken in Chapter VI.

Since the analysis contained herein does not require a forecast of the state personal income or of state population for any year later than 1978 and since state personal income and state population for 1978 have been reported, these variables are not forecast. In future applications of this simulator, forecasts of these variables should be available from the state econometric model currently being refined at Oklahoma State University (9).

Tax Model Design Philosophy

As mentioned in the introduction to this chapter, the flexibility of a computer tax model, in specification of parameter values and in the nature of output, should be of primary concern in designing the computer program. Without careful attention to these requirements, the model becomes expensive to simulate and to maintain as tax law changes.

Simulator Input

Generalization of a microsimulator requires that major policy components of the tax code be included in the program as variable names rather than as constants. In simulating changes in these components, the specific values are read into the computer from a set of parameter cards. When simulating a state tax structure in which federal liability is deductible, the most often modified components of the federal code should also be inputted via parameter cards.

Table XII contains a listing of all components of both the federal and Oklahoma tax codes which are treated as input parameters in the Oklahoma simulator. The mnemonic names, as listed in the previous section, are repeated in column one of Table XII. In addition to those items in Table XII, the upper limits of each state tax schedule along with the corresponding marginal tax rates are read from input cards. This approach permits simulation of alternative tax structures without program modification and without expending computer processing time to translate the computer program into machine language (compilation time).

In addition to the provisions of the law, the following inputs for simulation are read from data cards:

1. The year for which liability is forecast.
2. The sample data base employed.
3. The rate of growth of income and of itemized deductions used in extrapolation.
4. The number of records read.
5. Indexation factors used in indexing the:
    a. Oklahoma value of exemptions;
    b. Oklahoma standard deduction;

c. upper limits of the state marginal tax brackets; and

d. minimum and maximum federal tax deduction.

6. The number of tables printed.

7. The number of data base records for which all sample period and forecast period information is printed.

8. Binary indicators which control the following:

a. writing of a disk-stored array of average liabilities by income class;

b. reading of a previous disk-stored array of average liabilities by income class;

c. printing of the federal tax tables; and

d. printing of tables of totals and averages for sample information only.

A brief explanation for the inclusion of each of these seems appropriate.

The forecast year parameter value is used in printing the various table headings which may be requested with each simulation run. This option is discussed below in the output section.

The simulator used for the analyses reported on in this study is constructed so that either the 1975 or the 1976 microdata base may be used in any of the simulations. This added flexibility allows for estimation of the impact of a proposed law change with known income, exemption and deduction values. Consequently, the sample year is inputted as a parameter value.

Inclusion of the rate of growth on income and of itemized deductions as parameter values is obviously required in that this rate of growth of income drives the simulation model. Specification of these variables as constants within the program would require program modifications and compilation for each simulation.

TABLE XII

FEDERAL AND OKLAHOMA TAX CODE COMPONENTS WHICH ARE INPUTTED VIA PARAMETER CARDS

Mnemonic Name	Description
Federal Code:	
1) FEXVL	Federal exemption value
2) FZB	Federal zero bracket amounts
Oklahoma Code:	
1) STPER	Percentage used in calculating the Oklahoma standard deduction
2) STMIN	Oklahoma standard deduction floor
3) STMAX	Maximum Oklahoma standard deduction
4) OKEXVL	Oklahoma exemption value
5) FTDMIN	Amount of federal tax liability which is fully deductible
6) FTDPER	Percentage used in calculating the federal tax deduction
7) FTDMAX	Maximum federal tax deduction

In order to minimize the number of data based necessary for testing and running simulations, 21 carefully selected tax records are placed at the front of each sample data base. These 21 records were selected in such a way that testing of specific simulation runs is minimized. Consequently, the parameter value controlling the number of records read allows testing from the full microdata base without running the entire base.

Since indexation schemes are in vogue, the simulator is constructed such that any one or all of the fixed dollar provisions of Oklahoma law may be tied to the rate of change in the cost of living via data card input. Estimation without indexation is carried out by setting the four indexation parameters to zero.

Items 6-8 of the previous listing are control variables in the output section. The rationale for including these is discussed in the following section.

Simulator Output

The output section of the simulator can be divided into three parts. The first part includes a listing of all of the parameter values contained on the data cards. Checking of parameter values from a computer printed page is much easier than checking the data cards. This section also prints the sample period and forecast period values for any specified number of records on the data base. The number of records printed in this section is controlled by specifying the desired number. Finally, printing of state and federal tax tables is included in the first section.

The second part of the output section prints summary tables of totals and averages for the sample as well as the population. Since the concern is with the population estimates except when testing the simulator, the sample summary tables are suppressable with a binary indicator.

The summary tables include forecast totals and averages for the 21 income classes used in summarizing the samples as presented in Chapter III. After restructuring a given return for the forecast year,

the forecast values--i.e., federal adjusted gross income, Oklahoma income after adjustments, Oklahoma liability, etc.--are multiplied by the inverse of the sampling proportion and accumulated into one of the 21 income classes. Having restructured all of the returns in the sample, the totals are divided by the forecast number of returns in that class to yield the forecast averages. The forecast period weights are the inverse of the sampling proportions.

The number of tables calculated and hence capable of being printed is optional. The maximum number of summary tables generated by the simulator is 11. The number printed is controlled with an input value which stops calculation and printing upon completion of the specified table number. All tables preceding and including the specified table are printed.

Table XIII contains a listing, by type of return, of the 11 summary tables which the simulator is capable of producing for any forecast. To reiterate, for each return classification in Table XIII, a table of totals and of averages is printed.

The third portion of the output section is totally optional but at the same time is the heart of the simulator in that this section prints the comparative analysis. Except in those cases in which only an aggregate revenue impact estimate is desired, one would not anticipate omitting the final section.

As was alluded to earlier in this chapter, the microsimulator is capable of comparing the forecast average liability for the 21 classes in each of the 11 tables with the corresponding averages under any other scenario for which a disk-stored data base of average liabilities has been generated.

TABLE XIII

TABULAR OUTPUT FROM THE COMPUTER TAX MODEL

Table Number	Type of Return Included
1	All
2	Itemized
3	Standard
4	Full-year resident
5	Single and married separate
6	Married joint, surviving spouse, and head-of-household
7	Single
8	Married joint
9	Married separate
10	Head-of-household
11	Surviving spouse

The comparative analysis section contains the following estimates for the 21 income classes of each table:

1. Number of returns,
2. Average liability under previously estimated law
3. Average liability under proposed law
4. Dollar change in average liability
5. Percent change in average liability
6. Total liability under previously estimated law
7. Total liability under proposed law
8. Percent of total revenue impact in each class
9. Cumulative percent of total revenue impact by income class

Since this section compares the forecast averages generated during a given simulation with previously generated averages, the same input

value which controls the number of summary tables printed also controls the number of comparative tables generated during that simulation.

Summary

In Chapter II the point was made that previous endeavors at the state level involving microsimulator construction either were limited to estimation of the aggregate revenue impact of alternative tax law or were constructed such that additional programming was required for each simulation run. The simulator developed in this chapter estimates both aggregate and distributional impacts of proposed law changes with a minimum of program modification. In addition, the simulator is flexible in terms of the extent of the analysis.

This flexibility is built into the simulator by using variable names throughout and then specifying parameter values on data cards. This approach is followed with respect to provisions of the federal and state codes as well as for several anticipated proposed law modifications; for example, indexation of fixed dollar exemptions and deductions. Not only does this approach save programming costs but it also reduces compilation time.

In an effort to conserve on computer time, the extent of the analysis is also controlled by limiting the number of tables for which totals and averages are estimated by income class. Thus the simulator is structured so as to minimize both compilation and execution time.

Finally, in order to minimize hand calculations and to reduce the time interval between receipt of a requested change and completion of the estimates, the simulator has the capability of comparing the results of a specific proposal with estimates under either current law or any

other proposal previously estimated. As a result of these efforts, rather involved modifications to Oklahoma's individual income tax code can be programmed, estimated, and compared to previously estimated proposals in a matter of minutes.

CHAPTER VI

MICROSIMULATION RESULTS

In Chapter IV, the salient features of the Oklahoma individual income tax code were discussed. The microsimulation model was developed in Chapter V. The purpose of the present chapter is the simulation, under alternative tax structures, of the data bases summarized in Chapter III.

The precision with which the distribution of liability for tax year 1976 is forecast by extrapolating the 1975 data base is presented in the first section. In the second section budgetary and distributional impacts of altering the fixed dollar exemptions and deductions are considered. Section three contains an analysis of the 1975 and 1979 law changes. In the fourth section, the income tax code is indexed to the consumer price index. The final section contains a forecast of 1979 fiscal year collections.

Extrapolation of the 1975 Data Base

In estimating the aggregate liability as well as the distributional impacts of alternative tax structures, a given year's sample must be projected into the future. This procedure, as employed by the U. S. Treasury, is explained in Chapter II. The technique outlined below follows the Ohio approach rather than the Treasury approach since,

currently, sufficient time series data are not available to use regression techniques in forecasting the variables forecast by the Treasury.

Fromm (5), in estimating aggregate collections for the state of Ohio, assumed that per return adjusted gross income grows at the same rate as per return state personal income. Consequently, one must forecast state personal income and the number of returns, form the ratio of forecast year average state income to the corresponding sample year magnitude, and increment adjusted gross income on each return by the resulting percentage change.

The approach taken here results in an estimate of both aggregate liability and liability for 21 income classes for tax year 1976, the last tax year for which a complete sample is available. These estimates are based on the following assumptions:

1. The distribution of returns by filing status is invariant over the forecast period.
2. The forecast period weights are the same as the sample period weights.
3. The rate of growth of income is the same regardless of income level.

Division of 1975 Oklahoma personal income by the number of returns filed for tax year 1975 yields an average of $16,138. Reported state personal income for 1976 divided by an estimate of the number of returns to be filed in 1976 based on the assumption that the number of returns filed grows at the same rate as state population results in an average of $17,442. The ratio of the latter average to the former provides an increment to adjusted gross income of 8.08 percent.

Simulation of the 1975 microdata file under the assumed rate of growth of income of 8.08 percent and of returns filed of 2.0 percent

yields an aggregate liability forecast of $183,963,000. This forecast falls short of the 1976 sample estimate of $187,137,000 by $3,174,000, or 1.70 percent. Table XIV contains the estimated total and average liability by income class as well as the percent deviations from the corresponding magnitudes generated by the 1976 sample. Unless otherwise noted, the returns are stratified by Oklahoma income after adjustments.

TABLE XIV

EXTRAPOLATED TOTAL AND AVERAGE LIABILITY FOR 1976 AND PERCENT DEVIATIONS FROM 1976 SAMPLE

Oklahoma Income Class (000)	Extrapolated for 1976		Percent Deviation from Sample	
	Total Liability (000)	Average Liability In Class	Total Liability	Average Liability
$ 0 < $ 1	$ 10	$ 0	0.0%	0.0%
1 < 2	34	1	-22.7	0.0
2 < 3	168	3	-11.6	0.0
3 < 4	327	7	-22.7	0.0
4 < 5	719	13	- 0.6	0.0
5 < 6	1,062	21	- 6.8	- 4.5
6 < 7	1,479	31	- 5.1	0.0
7 < 8	1,749	40	-10.5	- 4.8
8 < 9	2,315	55	- 2.4	- 1.8
9 < 10	2,639	68	- 0.5	+ 1.5
10 < 11	2,963	79	-10.5	-11.2
11 < 12	3,670	98	+ 1.5	- 2.0
12 < 13	4,093	119	+ 7.5	+ 4.4
13 < 14	4,143	131	- 2.6	- 3.1
14 < 15	4,547	157	- 8.0	- 3.2
15 < 20	27,556	235	- 1.9	- 1.3
20 < 25	27,122	442	+ 0.4	0.0
25 < 30	20,130	664	- 3.6	- 0.8
30 < 50	34,141	1,143	+ 0.2	+ 1.5
50 < 100	23,629	2,634	- 3.5	+ 2.3
100 Plus	21,466	7,882	- 0.7	- 6.1

Looking first at the percent deviations for total liability by income class, the extrapolation procedure underestimates total liability in 16 of the 21 income classes. The two largest errors, each of 22.7 percent, are in income classes below $4,000. Large errors in these classes do not significantly influence the estimate of total liability since the lower income classes account for such a small percentage of total liability. The error deviation exceeds 10 percent in two other classes, the $7,000-$8,000 class and the $10,000-$11,000 class. For those classes in excess of $15,000 which account for 85 percent of total liability, the largest error is -3.6 percent in the $25,000-$30,000 class. The average error for these six income classes if -1.5 percent.

With respect to the extrapolated averages, the one class with a percent deviation in excess of 10 percent falls in the $10,000-$11,000 class. The only other deviation in excess of 5 percent is the -6.1 percent error in the $100,000-plus class. Since total liability in this class is underestimated by only 0.7 percent, the technique employed overestimates the number of returns in the open-ended income class.

The overestimation of the number of returns in the top class results either from incrementing income too much on those returns just below $100,000 in the sample period or from a lower rate of growth in returns filed for this class than is assumed. In either case, the procedure should yield acceptable estimates when performing simulations under alternative tax laws.

Analysis of Alterations in Fixed Dollar Exemptions and Deductions

In order to have a benchmark against which to measure the impact of altering the fixed dollar exemptions and deductions, the 1976 data base is simulated with alternative fixed dollar limits without increments to income and to itemized deductions. Consequently, the impacts are measured relative to the averages which would have obtained had no arithmetic errors been made in filling out the 1976 returns.

Simulation of the data base as described above yields estimated collections of $187,143,000 as compared to the $187,137,000 reported in the summary table of Chapter III. In addition, the estimated number of returns included in the simulations reported in this chapter is 935,871 as compared to the 941,976 reported above. Returns with zero income and returns on which both itemized and standard deductions are claimed are excluded from the analysis. The widest difference in average liability is $3, found in the $25,000-$30,000 class.

Value of Exemptions

Since 1971 Oklahoma law has provided for a personal exemption allowance of $750 for the taxpayer, the spouse and dependents. There are also provisions for those who are blind and/or over 65. The total number of exemptions claimed for tax years 1975 and 1976 were 2,410,605 and 2,510,992, respectively.

Personal exemptions and deductions are provided at the state and federal levels ". . . to allow for non-income difference among taxpayers that would affect their capacity to pay taxes" (35, p. 191). There are

two arguments advanced for granting exemptions in calculating taxable income. The first rests on the assumption that a certain level of income is necessary for subsistence and that this subsistence level should not be taxed (12, p. 271). The ability-to-pay principle provides the basis for the second approach. Low income individuals do not have the ability to pay and hence should not be taxed (p. 271). There is a significant difference in the two approaches since ". . . the former approach calls for the granting of such an allowance to all taxpayers, while the latter calls for it to vanish as income rises" (p. 271).

Regadless of the rationale for reducing income based on the number and types of exemptions, this provision has significant impacts. Exemption of a fixed dollar amount results in effective rates which are less than the nominal rates (34, p. 6). The effective rate rises rapidly for incomes just beyond the exemption level (12, p. 272). This rapid rise in progressivity is more applicable to the federal code than to Oklahoma law due to the relatively high federal first bracket rate. A second impact involves the revenue impact of altering the exemption level. When the exemption value is elevated to increase the absolute amount of income to be excluded from taxation, the addition applies to all taxpayers; consequently, the aggregate revenue impact exceeds that necessary to increase the exclusion for the poor (34, p. 11).

In order to ascertain the fiscal and distributional impacts of varying the dollar value of exemptions, the 1976 microdata file is simulated with exemption values of $900, $1,000, and $1,100. The aggregate revenue impacts under these increased exemption values are $8,933,307, $14,668,333, and $20,110,589, respectively.

The impact by income class is summarized in Table XV. Several significant feastures of the Oklahoma tax code become obvious in analyzing these results. Even though the average liability in the second income class is positive, taxpayers in this class do not, on the average, experience any reduction. There are three reasons for the failure of average liability to fall even though the exemption value increases from $750 per dependent to $1,100 per dependent:

1. Many of the nonresident and part-year resident returns fall into this income class; consequently, the additional deduction has to be prorated by the ratio of Oklahoma adjusted gross income to federal adjusted gross income.

2. Most of the full-year returns found in this class already have zero liability; therefore, the additional exemption value has no impact.

3. The marginal tax rate is only one-half of one percent.

Table XVI depicts the percentage of the total impact accruing to various income classes. As was alluded to above and is highlighted in Table XVI, changes in the exemption level results in a large revenue impact primarily because of the relief to the non-poor. Approximately 87 percent of the reduction accrues to taxpayers with Oklahoma income after adjustments in excess of $10,000.

While there is serious controversy over the income concept which should be used in measuring the progressivity of a tax structure (7, 36), the measurement used here is the effective tax rate; i.e., the total Oklahoma liability in each class divided by total Oklahoma adjusted gross income in the corresponding class. The overall effective tax rate falls from 1.68 percent under 1976 law to 1.60 percent, 1.55 percent, and 1.50 percent as the value of exemption is increased. When comparing the $750 exemption level to the $1,100 level, the largest percent reduction occurs in the $0 to $5,000 class where the effective rate falls from

.184 percent to .125 percent, or a 32.07 percent reduction. In comparison, the effective rate in the $100,000-plus class falls by only .88 percent, or from 4.532 percent to 4.492 percent.

TABLE XV

DOLLAR AND PERCENT REDUCTIONS IN AVERAGE OKLAHOMA LIABILITY RESULTING FROM RAISING THE EXEMPTION VALUE

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Oklahoma Liability Assuming an Exemption Value of:					
	$900		$1,000		$1,100	
	Dollar	Percent	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$ 0	0.0%	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0	0	0.0
2 < 3	1	33.3	1	33.3	1	33.3
3 < 4	1	14.3	2	28.6	2	28.6
4 < 5	2	15.4	3	23.1	4	30.8
5 < 6	3	14.3	4	19.1	6	38.6
6 < 7	4	12.9	6	19.4	8	25.8
7 < 8	4	9.8	7	17.1	10	24.4
8 < 9	6	10.7	9	16.1	12	21.4
9 < 10	6	9.1	10	15.2	14	21.2
10 < 11	7	8.0	12	13.6	16	18.2
11 < 12	9	9.0	15	15.0	20	20.0
12 < 13	10	8.7	16	14.0	22	19.1
13 < 14	11	8.2	19	14.1	26	19.7
14 < 15	13	8.0	22	13.5	30	18.4
15 < 20	18	7.5	30	12.6	41	17.2
20 < 25	26	6.2	43	10.2	59	14.0
25 < 30	30	4.5	49	7.3	68	10.1
30 < 50	30	2.7	49	4.4	69	6.2
50 < 100	31	1.2	51	2.0	71	2.8
100 Plus	32	0.4	53	0.6	74	0.9

TABLE XVI

PERCENT DISTRIBUTION OF TOTAL REDUCTION IN LIABILITY RESULTING FROM HIGHER EXEMPTION VALUES

Oklahoma Income Class (000)	Percent of Total Change in Class Resulting from Increasing the Exemption Value to:		
	$900	$1,000	$1,100
$ 0 < $ 5	2.55%	2.33%	1.97%
5 < 10	11.60	11.00	11.16
10 < 15	18.63	19.05	18.85
15 < 20	23.76	24.11	24.04
20 < 30	29.09	29.17	29.31
30 < 50	10.15	10.10	10.37
50 < 100	3.30	3.30	3.36
100 Plus	.93	.93	.95

Yet another concern in ascertaining the impact of altering the exemption value involves the calculation of the percent of total liability paid by each income class. Again, when comparing the 1976 provision with an exemption of $1,100, the percent of total liability in the lowest class--$0 to $5,000--falls from .725 percent to .553 percent. This percentage is lower under the $1,100 level for all income classes through the $20,000 under $30,000 class. The taxpayers in the $100,000-plus class would pay 12.83 percent of total collections with the higher exemption, whereas this group accounts for only 11.55 percent under 1976 law.

The Standard Deduction

The arguments put forward with respect to the rationale for exemptions and the conclusions cited with respect to the impact of

exemptions on progressivity and on collections apply also to the standard deduction. However, the impact of the standard deduction is more complicated in that, to a limited extent, the standard deduction is a function of income.

Oklahoma law provides for a standard deduction of $1,000 or 15 percent of Oklahoma adjusted gross income, with a maximum of $2,000. These provisions are applicable to all but married separate returns on which these dollar magnitudes are reduced by 50 percent.

The flat rate standard deduction of $1,000 ($500 on married separate returns) places a floor on the deduction and, relative to a percent standard deduction similar to that provided for by Oklahoma law prior to 1971, benefits those taxpayers with adjusted gross income below $6,667. The percent deduction feature of current law applies to individuals with income between $6,667 and $13,333. As income rises beyond $13,333 the maximum standard deduction becomes less significant and results in an increasing effective tax rate. For returns with income in excess of $13,333, the taxpayer is able to reduce the effective rate by itemizing deductions. However, for most taxpayers, their itemized deductions would have to exceed the federal zero bracket amount (standard deduction) rather than the maximum Oklahoma standard deduction since Oklahoma law does not permit the taxpayer to take the federal zero bracket amount on the federal return and them itemize deductions on his Oklahoma return. Therefore, a taxpayer with itemized deductions of $3,000 must limit his deduction to $2,000 at the state level.

As noted above, there are three components to the Oklahoma standard deduction: 1) the minimum, 2) the percentage, and 3) the maximum. The first set of simulation results included here involve varying the

minimum and maximum limits while assuming the percentage invariant. The minimum deduction remains one-half of the maximum.

Simulation of the 1976 microdata base with limits of $2,250, $2,500, and $3,000 yields fiscal impacts of $1,535,000, $3,100,516, and $5,297,371, respectively. The effective rate falls from the 1976 law level of 1.68 percent to 1.67 percent, 1.65 percent, and 1.63 percent, respectively. Dollar and percent reductions by class are recorded in Table XVII. Unlike the results of the previous section, not all taxpayers experience a reduction in liability. Obviously, those returns claiming itemized deductions above the maximum standard limit do not realize any reduction. Increasing the maximum and minimum limits to $2,250 and $1,225, respectively, has no impact on those returns falling between $7,000 and $13,000. As the limits rise, these taxpayers are afforded some relief; however, this relief is concommitant with larger and larger reduction for those with income in excess of $13,000. Relief for this group depends more upon the percent component of the standard deduction than upon the minimum and maximum limits as long as the maximum limit is less than $3,000.

With respect to the distribution of the total reduction in liability, the average and above-average taxpayers reap an even larger percent of the tax relief than with increments to the exemption level. The percent of the total impact accruing to the various income classes is given in Table XVIII. Those taxpayers in the $15,000 to $30,000 income classes receive in excess of 64 percent of the total reduction in all three simulations reported in Table XVIII. As expected, the returns reporting income in excess of $50,000 receive less than 1 percent of the reduction.

TABLE XVII

DOLLAR AND PERCENT REDUCTIONS IN AVERAGE OKLAHOMA LIABILITY RESULTING FROM HIGHER MAXIMUM AND MINIMUM LIMITS FOR THE STANDARD DEDUCTION[a]

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Liability Assuming a Maximum Standard Deduction of:					
	$2,250		$2,500		$3,000	
	Dollar	Percent	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$0	0.0 %	$ 0	0.0 %	$ 0	0.0 %
1 < 2	0	0.0	0	0.0	0	0.0
2 < 3	0	0.0	1	33.3	1	33.3
3 < 4	0	0.0	1	14.3	2	28.6
4 < 5	1	7.7	2	15.4	3	23.1
5 < 6	1	4.8	3	14.3	5	23.8
6 < 7	1	3.2	3	9.7	6	19.4
7 < 8	0	0.0	2	4.9	5	12.2
8 < 9	0	0.0	1	1.8	4	7.1
9 < 10	0	0.0	0	0.0	1	1.5
10 < 11	0	0.0	0	0.0	0	0.0
11 < 12	0	0.0	0	0.0	0	0.0
12 < 13	0	0.0	1	0.9	1	0.9
13 < 14	1	0.7	1	0.7	1	0.7
14 < 15	4	2.5	5	3.1	5	3.1
15 < 20	6	2.5	10	4.2	14	5.9
20 < 25	5	1.2	10	2.4	20	4.7
25 < 30	4	0.6	8	1.2	16	2.4
30 < 50	2	0.2	4	0.4	9	0.8
50 < 100	1	0.01	2	0.1	3	0.1
100 Plus	1	0.01	1	0.01	1	0.01

[a]The minimum limit is one-half of the maximum limit.

When the concern is with the taxpayers falling between $6,667 and $13,333 income limits, increases in the percent component of the state standard deduction provides the desired tax relief. Analysis of alterations in this component is carried out under three alternative allowances--20 percent, 25 percent, and 30 percent. The minimum and

maximum limits are held at the levels provided for under the code. Dollar and percent reductions by income class are found in Table XIX.

TABLE XVIII

PERCENT DISTRIBUTION OF TOTAL REDUCTION IN LIABILITY RESULTING FROM INCREASING THE MINIMUM AND MAXIMUM LIMITS OF THE STANDARD DEDUCTION[a]

Oklahoma Income Class (000)	Percent of Total Change in Class Resulting from Increasing the Maximum Standard Deduction to:		
	$2,250	$2,500	$3,000
$ 0 < $ 5	3.55%	7.36%	6.44%
5 < 10	6.69	14.33	19.00
10 < 15	10.00	7.01	4.11
15 < 20	46.08	38.00	31.16
20 < 30	28.96	28.68	33.57
30 < 50	3.94	3.90	5.14
50 < 100	.62	.61	.54
100 Plus	.17	.08	.05

[a]The minimum limit is one-half of the maximum.

The aggregate revenue loss of increasing the standard deduction to 20 percent is estimated at $1,678,600. Similarly, the reduction in revenue from further increases to 25 percent and 30 percent are $2,576,500 and $3,040,500, respectively. The effective rates corresponding to these percentages are 1.67 percent, 1.66 percent, and 1.65 percent.

TABLE XIX

DOLLAR AND PERCENT REDUCTIONS IN AVERAGE OKLAHOMA LIABILITY RESULTING FROM INCREASING THE PERCENT COMPONENT OF THE STANDARD DEDUCTION

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Liability With a Standard Deduction Percent of:					
	20%		25%		30%	
	Dollar	Percent	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$0	0.0%	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0	0	0.0
2 < 3	0	0.0	0	0.0	0	0.0
3 < 4	0	0.0	0	0.0	0	0.0
4 < 5	0	0.0	1	7.7	3	23.1
5 < 6	1	4.8	4	19.1	7	33.3
6 < 7	4	12.9	8	25.8	11	35.5
7 < 8	5	12.2	10	24.4	11	26.8
8 < 9	7	12.5	12	21.4	12	21.4
9 < 10	8	12.1	9	13.6	9	13.6
10 < 11	8	9.1	8	9.1	8	9.1
11 < 12	5	5.0	5	5.0	5	5.0
12 < 13	3	2.6	3	2.6	3	2.6
13 < 14	0	0.0	0	0.0	0	0.0
14 < 15	0	0.0	0	0.0	0	0.0
15 < 20	0	0.0	0	0.0	0	0.0
20 < 25	0	0.0	0	0.0	0	0.0
25 < 30	0	0.0	0	0.0	0	0.0
30 < 50	0	0.0	0	0.0	0	0.0
50 < 100	0	0.0	0	0.0	0	0.0
100 Plus	0	0.0	0	0.0	0	0.0

The impact of varying the percent deduction is to grant the tax reduction precisely in those classes receiving little or no benefit from alterations in the minimum and maximum standard limits. Analysis of the 30 percent simulation indicates that only 5.4 percent of the total reduction accrues to those taxpayers with Oklahoma income after adjustments of less than $5,000. The bulk of the tax relief, 75.6 percent, is

granted to those taxpaying units falling between $5,000 and $10,000. Only 19 percent of the total reduction goes to returns with income in excess of $10,000.

Analysis of the 1974 and 1979 Tax Law Changes

Chapter IV contains a description of the changes in the individual income tax code since 1970. In this interval there were two significant changes in the code. The first change became effective for the 1975 tax year and allowed partial deductibility of accrued federal taxes. The second change became effective for tax year 1979 and provided for full deductibility of accrued federal taxes but at the same time changed the tax tables so as to reduce the revenue impact.

These changes are analyzed with the 1976 microdata file. As with the previous analysis with respect to measuring the impact of altering the fixed dollar exemptions and deductions, the simulations are undertaken without increments to income and itemized deductions. Again, this approach is preferred in order that a benchmark be available. The question being answered is: What impact would these code changes have had on 1976 tax year liability?

The 1974 law provided for full deductibility of the first $500 of federal liability plus 5 percent of the excess over $500 with a maximum deduction of $1,700. As reported in Chapter III, this provision resulted in additional deductions, after prorating, of $325,350,000 and $354,885,000 for tax years 1975 and 1976, respectively.

In 1979 the legislature, perhaps as a reaction to a Republican-sponsored initiative petition, modified the income tax code to again allow for full deductibility of federal liability. Because of the

magnitude of the revenue impact, estimated at $60,114,959 for tax year 1976 under the assumptions enumerated above, the lawmakers changed the tax tables to recoup a large portion of the anticipated loss.

The estimated impact of the partial deductibility provision of the 1975 law is -$13,643,779. This represents a 6.4 percent reduction in total liability and results in the effective rate falling from 1.80 percent to 1.68 percent. In comparison, simulation based on full deductibility combined with the higher rates and the additional brackets yields an estimated revenue loss of $25,583,001 for tax year 1976. The 1979 reduction, which would have approximately twice as large as the 1975 reduction had it become effective in 1976, would have reduced the effective rate from 1.80 percent to 1.45 percent. Relative to 1976 law, the 1979 law change results in a reduction in the overall effective rate from 1.68 percent to 1.45 percent.

Distributional impacts of both law changes are summarized in Table XX. The largest percent reductions in liability under the 1975 revision accrue to those with income below $15,000. In contrast, taxpaying units in the $12,000-$30,000 class are recipients of the larger percent reductions under 1979 law. The 1979 changes have little impact on the simulated liability for taxpayers with income below $10,000. The small or zero reductions for these classes are explained by the fact that the 1975 revision provides most of the relief possible on these returns as long as additional relief is to be provided via federal income tax deductibility.

While the 1979 revision provides a larger percent reduction for all taxpaying units falling above the $10,000-$11,000 class, those units with income in excess of $100,00 do not receive as much of a reduction

relative to the reduction provided under 1975 law as do those in the remaining classes in this range. Obviously, the rate structure prevents the reinstitution of full federal tax deductibility from becoming a "rich man's" law change.

TABLE XX

DOLLAR AND PERCENT REDUCTIONS IN AVERAGE LIABILITY RESULTING FROM THE 1975 AND 1979 REVISIONS IN OKLAHOMA'S INDIVIDUAL INCOME TAX LAW

Oklahoma Income Class (000)	Reduction in 1976 Average Liability Under: 1975 Law Change[a]		1979 Law Change[b]	
	Dollar Reduction	Percent Reduction	Dollar Reduction	Percent Reduction
$ 0 < $ 1	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0
2 < 3	0	0.0	0	0.0
3 < 4	1	14.3	0	0.0
4 < 5	3	23.1	0	0.0
5 < 6	5	23.8	0	0.0
6 < 7	7	22.6	1	3.2
7 < 8	9	22.0	2	4.9
8 < 9	10	17.9	6	10.7
9 < 10	12	18.2	7	10.6
10 < 11	15	17.1	13	14.8
11 < 12	15	15.0	16	16.0
12 < 13	15	13.0	22	19.1
13 < 14	18	13.3	27	20.0
14 < 15	19	11.7	33	20.3
15 < 20	24	10.0	50	20.9
20 < 25	34	8.0	86	20.3
25 < 30	40	6.0	118	17.6
30 < 50	49	4.7	131	11.6
50 < 100	79	3.1	191	7.4
100 Plus	99	1.2	156	1.9

[a]Relative to 1974 law.

[b]Relative to 1978 law.

Table XXI contains the percent distribution of the revenue impacts reported above for the two law changes. While the $20,000-$30,000 class receives the largest percentage of the relief under both revisions, this percentage is 50 percent larger under the more revent modification. Taxpayers falling in the classes below the $20,000 class receive 56.6 percent of the total reduction under the 1975 provisions but only 39.9 percent as estimated under the 1979 code. Approximately 18 percent of the total reduction under the 1975 change flows to those with income in excess of $30,000. In contrast, the same group receives 24 percent of the estimated liability reduction under the 1979 law. The percent distribution of total collections under the various laws are more useful in assessing the impact on the progressivity of the tax structure than are these percent reductions.

TABLE XXI

DISTRIBUTION OF REVENUE LOSS RESULTING FROM THE 1975 AND 1979 TAX LAW REVISIONS

Oklahoma Income Class (000)	Percent of Reduction Resulting from the:			
	1975 Law Change		1979 Law Change	
	Percent in Class	Cumulative Percent	Percent in Class	Cumulative Percent
$ 0 < $ 5	1.6%	1.6%	0.0%	0.0%
5 < 10	14.2	15.8	2.6	2.6
10 < 15	20.1	35.9	14.3	16.9
15 < 20	20.7	56.6	23.0	39.9
20 < 30	25.1	81.7	35.9	75.8
30 < 50	10.9	92.6	15.5	91.3
50 < 100	5.5	98.1	7.1	98.5
100 Plus	1.9	100.0	1.6	100.0

The distribution of estimated 1976 total liability by class under 1974, 1975 and 1979 tax law are presented in Table XXII. Unlike the 1975 revision which results in reductions in the percentages for all classes through and including the $20,000-$30,000 class, the 1979 change places an increased burden on taxpayers falling in the first two income classes. Only three classes beginning with the $10,000-$15,000 class carry a reduced percentage of total liability under the 1979 law. Comparison of the percent distribution of liability under 1974 and 1979 law indicates that the tax load shifts from those units with income between $5,000 and $30,000 to those falling outside of these limits. These percentages must be interpreted with care so as not to conclude that effective rates rise in any of the classes.

TABLE XXII

PERCENT DISTRIBUTION OF 1976 OKLAHOMA LIABILITY UNDER 1974, 1975, AND 1979 TAX LAW

Oklahoma Income Class (000)	Percent of Total 1976 Liability Under: 1974 Tax Code	1975 Tax Code	1979 Tax Code
$ 0 < $ 5	0.78%	0.73%	0.83%
5 < 10	5.71	5.09	5.52
10 < 15	11.31	10.67	10.09
15 < 20	15.45	15.06	13.79
20 < 30	26.62	25.65	24.03
30 < 50	17.67	18.17	18.59
50 < 100	12.56	13.07	14.02
100 Plus	10.87	11.55	13.13

The effective tax rates for tax year 1976 under the three codes discussed immediately above are listed in Table XXIII. Except for the first income class, the effective rates under the 1979 provisions are less than under 1975 law. The 1975 revision reduces the effective rate by as much as 21.8 percent in the second income class and by as little as 1.3 percent in the highest income class. The largest percent reduction in the effective rate resulting from the 1979 changes is 19.1 percent for those in the $20,000-$30,000 class.

TABLE XXIII

EFFECTIVE RATES FOR 1976 UNDER 1974, 1975, AND 1979
OKLAHOMA INDIVIDUAL INCOME TAX CODES

Oklahoma Income Class (000)	Effective Tax Rates for 1976: Under 1974 Law	Under 1975 Law	Under 1979 Law
$ 0 < $ 5	0.21%	0.18%	0.18%
5 < 10	0.67	0.55	0.52
10 < 15	1.07	0.94	0.77
15 < 20	1.51	1.37	1.08
20 < 30	2.25	2.10	1.70
30 < 50	3.20	3.07	2.71
50 < 100	4.06	3.88	3.60
100 Plus	4.59	4.53	4.45
Overall	1.80	1.68	1.45

Analysis of Alternative Indexation Schemes

Interest in the impact of inflation on real income and on tax liability has increased in the United States as the rate of change in the general price level has increased over the last decade. While several nations have taken steps to revalue business accounts to adjust for the effects of inflation on business profits (10) and to protect dollar marginal tax brackets, exemption values, deduction limits and tax credits (38), the federal government and state governments in the United States have been slow in altering tax codes to automatically protect taxpayers from inflation-induced rising tax liabilities.

Aaron (1) notes that tax liabilities are altered in three ways as a result of inflation.

> First, it may alter real factor incomes. Second, it affects the measurement of taxable income. Third, it changes the real value of deductions, exemptions, credits, ceilings and floors, bracket widths, and all other tax provisions legally fixed in nominal terms (p. 193).

The analyses reported on below center around measuring the revenue impacts of maintaining the real values of the fixed dollar exemptions, deductions and bracket widths. In analyzing the interaction between inflation and Oklahoma's progressive individual income tax, two simulations are necessary. First, the impact of alternative rates of growth of income on total collections are forecast for 1977 and 1981. Second, the fixed dollar exemptions and deductions and the marginal tax brackets of the 1975 law and of the 1979 law are indexed to the CPI.

The analysis of the impact of inflation on tax liability for 1977 and 1981 follows the presentation of the Advisory Commission on Intergovernmental Relations (2, pp. 43-46). These estimates are based on the following assumptions:

1. Zero population growth.

2. Invariant growth rate of nominal income regardless of sample income class.

3. A rate of growth of real income of 4 percent.

The projections are presented in Table XXIV. The tax file is first simulated at a 4 percent increase in income for 1977 over 1976--the sample year. This simulation yields estimated collections of $174.8 million and an effective rate of 1.51 percent. The 1.51 percent effective rate estimate is the basis for forecasting the impact of inflation in that collections at higher rates of growth in income are then compared to collections at this effective rate.

TABLE XXIV

EFFECT OF INFLATION ON LIABILITY OF THE OKLAHOMA INCOME TAX FOR 1977 AND 1981 (DOLLARS IN MILLIONS)

Annual Change In Income	Income Tax Liability	Effective Rate of Tax	Liability At Constant Effective Rate	Inflation Induced Collections	
				Amount	Percent
		1977			
4%	$174.8	1.51%	$174.8	$ 0.0	0.0%
6	181.5	1.53	177.1	4.4	3.0
8	188.4	1.57	181.5	6.9	3.7
10	195.4	1.60	184.9	10.4	5.4
12	202.5	1.62	188.3	14.2	7.0
		1981			
4	238.1	1.76	238.1	0.0	0.0
6	285.7	1.92	262.2	23.5	8.2
8	340.0	2.01	287.9	53.1	15.3
10	401.3	2.24	315.5	85.8	21.4
12	469.8	2.34	345.3	124.5	26.5

Assuming an increase in income of 6 percent for 1977, liability is estimated at $181.5 million, with an effective rate of 1.53 percent. If one assumes that the rate of growth of real income is to be 4 percent and if one endeavors to protect taxpayers from erosion of their real income, then a constant effective rate is required. Consequently, the effective rate associated with the 4 percent real income growth must be multiplied by Oklahoma income after adjustments generated by the 6 percent growth rate. This multiplication yields a constant effective rate liability of $177.1 million. The $4.4 million excess of liability at 6 percent income growth over the constant effective rate estimate of $177.1 million is the purely inflation-induced component of total collections.

The impact of income changes in excess of 6 percent for 1977 indicates the growing contribution that inflation makes to total collections. When income grows at 12 percent a year, liability exceeds the constant effective rate estimate by 7 percent.

The estimates presented in the lower half of Table XXIV for 1981 are generated in a similar manner. First, the liability at an annual rate of growth of income of 4 percent is estimated at $238.1 million. The associated effective rate is 1.76 percent. If per return income grows at 10 percent per year while real income increases at only 4 percent, 21.4 percent of 1981 revenues would be inflation induced.

As was discussed at the beginning of this section, taxpayers can be shielded, to a certain extent, from rising liabilities which result from inflation by indexing the fixed dollar exemption and deductions and the marginal tax brackets. When indexing these provisions, a lag between the tax year and the period over which the rate of change in

the CPI to be used for indexation occurs is administratively required. For example, the Oklahoma Tax Commission prefers to have tax forms for a given tax year ready for the printer in late August of that tax year. Since, for most taxpayers, the tax year ends on December 31, the rate of change for the year ending on December 31 cannot be used to index that year's brackets and deductions. For all practical purposes, the rate of change used for indexation could be for no later than the 12-month period ending on July 31 of the tax year.

For the first indexation scheme, a lag of one year is assumed. The microdata file is simulated under zero rate of growth of income but with the indexed components tied to the 9.14 percent change in the Consumer Price Index for calendar 1975. The impact of indexation on the dollar magnitude of the fixed exemptions and deductions is presented in Table XXV. Provisions one and two apply to both the 1975 and 1979 code. The last component is applicable only to the 1976 code. Table XXVI contains the 1976 upper bracket limits while the 1979 upper bracket limits are presented in Table XXVII. Please recall that the fixed pay amounts for each marginal bracket change as the upper limit of the preceding bracket increases.

Before discussing the simulation results, an analysis of the impact of indexation of the above mentioned fixed dollar components of the 1979 code on hypothetical taxpayers is useful in an attempt to determine the extent to which this indexation scheme impacts on the effective tax rate when real income is held constant. Table XXVIII contains calculated liability, with and without indexation, under 1979 Oklahoma law and 1976 federal law for a hypothetical family of four claiming the standard

TABLE XXV

FIXED DOLLAR EXEMPTIONS AND DEDUCTIONS WITHOUT AND WITH INDEXATION

Fixed Dollar Provision	Dollar Value of Provision	
	Without Indexation	With Indexation
1. Standard Deduction		
Upper Limit	$2,000	$2,183
Lower Limit	1,000	1,091
2. Value of Exemption	750	819
3. Federal Tax Deduction		
Minimum	500	546
Maximum	1,700	1,855

TABLE XXVI

IMPACT OF INDEXATION ON THE UPPER LIMITS OF THE 1976 MARGINAL TAX BRACKETS

Upper Limits of the Marginal Tax Brackets for:			
Married Joint and Surviving Spouse Returns		Single and Married Separate Returns	
Without Indexation	With Indexation	Without Indexation	With Indexation
$ 2,000	$ 2,183	$1,000	$1,091
5,000	5,457	2,500	2,729
7,500	8,186	3,750	4,093
10,000	10,914	5,000	5,457
12,500	13,643	6,500	6,821
15,000	16,371	7,500	8,186

deduction. Both income and the fixed dollar provisions of the Oklahoma code are incremented by 9.14 percent.

TABLE XXVII

IMPACT OF INDEXATION ON THE UPPER LIMITS OF THE 1979 MARGINAL TAX BRACKETS

Upper Limits of the Marginal Tax Brackets for:			
Married Joint, Surviving Spouse and Head-of-Household Returns		Single and Married Separate Returns	
Without Indexation	With Indexation	Without Indexation	With Indexation
$ 2,000	$ 2,183	$ 1,000	$ 1,091
5,000	5,457	2,500	2,729
7,500	8,186	3,750	4,093
9,000	9,823	5,000	5,457
10,500	11,460	6,250	6,821
12,000	13,097	7,500	8,186
13,500	14,734	9,250	10,095
15,000	16,371	11,250	12,278
17,000	18,554	13,250	14,461
23,000	25,102	15,250	16,644
29,000	31,651	17,500	19,100
38,000	41,473	21,000	22,919
48,000	52,387	27,000	29,468
58,000	63,301	33,000	36,016
69,000	75,307	39,000	42,565
81,000	88,403	43,000	46,930
94,000	102,592	49,000	53,479

Without indexation, the hypothetical taxpayer portrayed in Table XXVIII experiences an increase in Oklahoma liability of $32, or 27.12 percent. The effective rate rises from .79 percent to .92 percent. Indexation of the Oklahoma provisions reduces the dollar increase in

liability to only $3. In addition, the effective rate in 1977 with indexation is less than the effective rate for 1976.

TABLE XXVIII

IMPACT OF INDEXATION ON A HYPOTHETICAL FAMILY OF FOUR CLAIMING THE STANDARD DEDUCTION UNDER THE 1979 TAX CODE

	Calculation of Oklahoma Liability		
	For 1976	For 1977	
		Without Indexation	With Indexation
Income	$15,000	$16,371	$16,371
Value of Exemptions	3,000	3,000	3,274
Standard Deduction	2,000	2,000	2,183
Federal Tax Deduction	1,552	1,985	1,985
Taxable Income	8,448	9,386	8,929
Lower Limits of Marginal Bracket	7,500	9,000	8,186
Marginal Tax Rate	3%	4%	3%
Liability	118	150	121
Effective Rate	.79	.92	.74

Source: Calculated from provisions of 1979 Oklahoma law and 1976 federal law.

While, at first glance, it appears that the indexation scheme reported in Table XXVIII results in a falling effective rate, such is not the case. The unindexed federal code results in our hypothetical taxpayer experiencing a 27.90 percent increase in federal liability which is fully deductible in calculating Oklahoma taxable income. Relative to the value of exemptions and the standard deduction, the federal tax deduction increases faster than do the indexed provisions.

Returning to the simulation results, aggregate and distributional impacts of indexing each of the fixed dollar provisions as well as for simultaneous indexation of all fixed dollar provisions are discussed below. The impacts are forecasts under 1976 and 1979 Oklahoma law and 1976 federal law. The estimates are for tax year 1976; consequently, the 1976 microdata file is simulated under zero rate of growth of income while the indexed components are tied to the 9.14 percent change in the CPI for 1975.

Indexation of the marginal tax brackets, as contained in the 1976 code and as listed in Table XXVI above, results in a reduction in total liability from $187,146,000 to $176,845,000, or 5.48 percent. In contrast, indexation of the marginal brackets contained in the 1979 code reduces aggregate liability from $161,652,000 to $148,408,000, or 8.14 percent. The absolute reduction of $10,301,000 under 1975 providions is $2,853,000 less than the impact of indexing the same provisions of the 1979 code. The effective rate under 1975 law falls from 1.68 percent without indexation to 1.59 percent when only the marginal brackets are indexed. Under 1979 law, indexation of the brackets reduces the effective rate from 1.45 to 1.33 percent.

The distributional impacts for the 21 income classes are presented in Table XXIX. The dollar and percent reductions are larger under 1979 law than under 1976 law for all classes in excess of $20,000. This anticipated result is best explained by considering the maximum reduction for a hypothetical taxpayer under both laws.

A married taxpayer with Oklahoma taxable income of $125,000 pays $6,990--$390 plus 6 percent of taxable income in excess of $15,000--under 1976 law without indexation. With indexation, the liability for

the same taxpayer is $6,943.39--the sum of $425.65 plus 6 percent in excess of $16,371. The reduction for our hypothetical taxpayer is $46.61 under pre-1979 law.

TABLE XXIX

ESTIMATED IMPACT OF INDEXING THE MARGINAL TAX BRACKETS UNDER 1976 AND 1979 LAW

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Liability Under 1976 Code		Dollar and Percent Reductions in Average Liability Under 1979 Code	
	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0
2 < 3	0	0.0	0	0.0
3 < 4	0	0.0	0	0.0
4 < 5	0	0.0	1	7.7
5 < 6	1	4.8	1	4.8
6 < 7	2	6.5	2	6.7
7 < 8	3	7.3	3	7.7
8 < 9	5	8.9	3	6.0
9 < 10	5	7.6	5	8.5
10 < 11	7	8.0	7	9.3
11 < 12	8	8.0	7	8.3
12 < 13	10	8.7	8	8.6
13 < 14	11	8.2	9	8.3
14 < 15	13	8.0	12	9.2
15 < 20	20	8.4	20	10.6
20 < 25	36	8.5	39	11.6
25 < 30	44	6.6	60	10.8
30 < 50	44	3.9	82	8.3
50 < 100	44	1.7	128	5.4
100 Plus	45	0.5	265	3.2

Under 1979 law without indexation, the hypothetical taxpayer of the previous paragraph faces a liability of $15,945--$10,675 plus 17 percent of taxable income in excess of $94,000. Assuming indexation of the marginal brackets, liability for this individual is $15,460--$11,650.89 plus 17 percent of taxable income in excess of $102,592. Indexation results in a maximum reduction in liability of $485.

Returning again to Table XXIX, the average reduction of $45 in the top income class is very near the maximum possible reduction calculated above at $46.61. On the other hand, the average reduction in the top class under 1979 law of $265 is only 54.64 percent of the maximum reduction of $485. The maximum reduction in liability under 1979 law is not approached in the simulation results because the full federal tax deductibility provision reduces average taxable income below the maximum marginal bracket of $94,000. Of the fixed dollar provisions indexed in this study, indexation of the marginal brackets is by far the most costly.

Indexing the minimum and maximum limits of Oklahoma's standard deduction results in estimated revenue impacts of -$1,204,201 and -$1,380,895 under 1976 and 1979 law. Under 1976 law, indexation of this provision reduces the overall effective rate from 1.68 percent to 1.67 percent. The corresponding effective rates under 1979 law are 1.45 percent and 1.44 percent.

The dollar and percent reductions by income class are summarized in Table XXX. The results are, of course, similar to those presented earlier with respect to altering the standard deduction limits. While taxpayers with incomes between $7,000 and $13,000 receive no reduction under the scheme reported on here, these classes would eventually

receive benefits assuming that the standard deduction is indexed over a number of years.

TABLE XXX

ESTIMATED IMPACT OF INDEXING THE STANDARD DEDUCTION UNDER 1976 AND 1979 LAW

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Liability Under 1976 Code		Dollar and Percent Reductions in Average Liability Under 1979 Code	
	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0
2 < 3	0	0.0	0	0.0
3 < 4	0	0.0	0	0.0
4 < 5	1	7.1	0	0.0
5 < 6	1	4.4	1	4.4
6 < 7	1	2.9	1	3.0
7 < 8	0	0.0	0	0.0
8 < 9	0	0.0	0	0.0
9 < 10	0	0.0	0	0.0
10 < 11	0	0.0	0	0.0
11 < 12	0	0.0	0	0.0
12 < 13	0	0.0	0	0.0
13 < 14	2	1.3	2	1.6
14 < 15	6	3.1	6	3.9
15 < 20	8	2.8	9	3.9
20 < 25	10	1.9	10	3.0
25 < 30	10	1.2	16	2.2
30 < 50	11	0.8	18	1.5
50 < 100	10	0.4	21	0.8
100 Plus	12	0.2	27	0.4

NOTE: Standard returns only.

As with the analysis of indexing the marginal brackets, the larger average dollar reduction occurs under the 1979 provisions. The

explanation is this case rests solely on the higher marginal tax rates of the 1979 code.

The higher marginal rates of the 1979 code also explain the differential revenue impact of tying Oklahoma's value of exemptions to the CPI. The estimated aggregate impacts under the two codes are -$4,052,780 and -$4,673,234, respectively. Under 1976 provisions, the effective rate falls from 1.68 percent to 1.64 percent. The corresponding overall effective rates under 1979 law are 1.45 percent and 1.41 percent.

Table XXXI contains the dollar and percent reductions by income class. The largest percent reduction resulting from indexation of exemption value alone accrues to those in the $4,000 under $5,000 class under 1976 law and to those in the $3,000 under $4,000 class under 1979 law. The smallest percent reduction is found in the highest income class.

Indexation of the limited federal tax deduction as provided by the 1976 code results in a revenue loss estimate of $957,434. The effective tax rate falls from 1.68 percent to 1.67 percent. Since full deductibility of federal liability is allowed under the 1979 law, indexation of this provision carries no meaning. More correctly, the new law provides for automatic increments to this deduction since federal liability rises as income rises.

While not presented here, the distributional impacts of indexation of the 1976 provision for federal tax deductibility were estimated. The first class impacted is the $8,000 under $9,000 class in which average liability falls by $1. The largest dollar reduction occurs in the $100,000-plus class and is estimated at $9. The largest percent

reduction of 1.8 percent goes to those taxpayers falling in the $8,000 under $9,000 class.

TABLE XXXI

ESTIMATED IMPACT OF INDEXING THE VALUE OF EXEMPTION UNDER 1976 AND 1979 LAW

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Liability Under: 1976 Code		1979 Code	
	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0
2 < 3	0	0.0	0	0.0
3 < 4	0	0.0	1	14.3
4 < 5	1	7.7	1	7.7
5 < 6	1	4.8	1	4.8
6 < 7	2	6.5	1	3.3
7 < 8	2	4.9	2	5.1
8 < 9	3	5.4	2	4.0
9 < 10	3	4.6	3	5.1
10 < 11	3	3.4	4	5.3
11 < 12	4	4.0	4	4.8
12 < 13	5	4.4	4	4.3
13 < 14	5	3.7	5	4.6
14 < 15	6	3.7	6	4.6
15 < 20	8	3.4	9	4.8
20 < 25	12	2.8	13	3.9
25 < 30	14	2.1	17	3.1
30 < 50	14	1.2	21	2.1
50 < 100	14	0.5	26	1.1
100 Plus	15	0.2	34	0.4

Estimation of the revenue impact of indexing all of the fixed dollar provisions of a given revenue code requires a separate simulation since one cannot simply sum the estimated impacts of indexing each provision

separately. Summation of the individual impacts overstates the aggregate impact because indexation of any one provision can result in a zero taxable income on some returns and, therefore, indexing the remaining provisions has no effect. Indexation of all of the fixed dollar provisions discussed thus far in this section is referred to as full indexation.

Full indexation of the fixed dollar provisions of the 1975 code results in a reduction in aggregate liability of $16,120,718 and in a reduction in the overall effective tax rate from 1.68 percent to 1.54 percent. Under 1979 law, total liability falls by $18,692,318 while the overall effective rate is reduced from 1.45 percent to 1.28 percent.

The distributional impacts are depicted in Table XXXII. The largest percent reduction in average liability, under both laws, accrues to the $2,000 under $3,000 class. This class does not show a reduction when any one of the provisions is indexed in isolation. The cumulative effect of indexing all three provisions provides a $1 reduction in liability for this class. As with previous analyses, the smallest percent reduction is afforded the top income class. The distribution of the aggregate reduction in liability by income class is summarized in Table XXXIII. While full indexation of both tax structures results in the largest percent of the reduction going to those taxpayers in the $20,000 under $30,000 class, full indexation of the pre-1979 code grants a larger percent of the total revenue impact to all classes below and including this class. On the other hand, full indexation of the 1979 code results in more of the total reduction accruing to the $30,000 and above classes. These classes receive 16.37 percent of the total impact under the 1976 code and 28.77 percent when the 1979 code is fully indexed.

TABLE XXXII

ESTIMATED IMPACT OF INDEXING ALL FIXED DOLLAR EXEMPTIONS AND DEDUCTIONS UNDER 1976 AND 1979 LAW

Oklahoma Income Class (000)	Dollar and Percent Reductions in Average Liability Under: 1976 Code		1979 Code	
	Dollar	Percent	Dollar	Percent
$ 0 < $ 1	$ 0	0.0%	$ 0	0.0%
1 < 2	0	0.0	0	0.0
2 < 3	1	33.3	1	33.3
3 < 4	1	14.3	1	14.3
4 < 5	2	15.4	2	15.4
5 < 6	4	19.1	4	19.1
6 < 7	5	16.1	5	16.7
7 < 8	5	12.2	5	12.8
8 < 9	8	14.3	6	12.0
9 < 10	9	13.6	8	13.6
10 < 11	11	12.5	10	13.3
11 < 12	13	13.0	10	11.9
12 < 13	15	13.0	12	12.9
13 < 14	18	13.3	15	13.9
14 < 15	23	14.1	20	15.4
15 < 20	33	13.8	31	16.4
20 < 25	53	12.5	54	16.0
25 < 30	62	9.2	80	14.4
30 < 50	62	5.5	104	10.5
50 < 100	62	2.4	154	6.7
100 Plus	68	0.9	298	3.6

Once a tax structure is indexed, the absolute dollar change in the fixed dollar provisions increases each year. The increase in the estimated revenue impact of full-indexation of Colorado's tax structure was stressed by Dunn (4). In analyzing the impact of full indexation of the 1979 Oklahoma code through 1981, the 1976 data file is simulated for three tax years--1977, 1979, and 1981--under an assumed annual rate of growth of income and of price level change of 8.0 percent. That is, real pre-tax income is assumed constant.

TABLE XXXIII

PERCENT DISTRIBUTION OF ESTIMATED IMPACT OF FULL INDEXATION UNDER 1976 AND 1979 LAW

Oklahoma Income Class (000)	Percent Accruing to Class Under: 1976 Code Percent In Class	1976 Code Cumulative Percent	1979 Code Percent In Class	1979 Code Cumulative Percent
$ 0 < $ 5	1.42%	1.42%	1.22%	1.22%
5 < 10	8.61	10.03	6.77	7.99
10 < 15	16.44	26.47	11.86	19.85
15 < 20	24.14	50.61	19.56	39.41
20 < 30	33.02	83.63	31.82	71.23
30 < 50	11.62	95.25	16.82	88.05
50 < 100	3.66	98.91	7.83	95.88
100 Plus	1.09	100.00	4.12	100.00

The aggregate revenue impacts as well as the overall effective tax rates are depicted in Table XXXIV. During the first year of analysis, full indexation reduces total collections by 10.1 percent of the nonindexed estimate of $188,328,000. By the end of the fifth year of full indexation, the absolute dollar impact of full indexation is $138,393,000, or 40.7 percent of unindexed collections. Of course, forecast collections continue to rise. Comparing 1979 to 1977, unindexed collections are forecast to increase by 35.1 percent from $188,328,000 to $254,397,000. During the same interval, indexed collections rise by only 9.47 percent.

One comment with respect to the relatively small rate of growth of collections under full indexation between 1977 and 1979 is in order. As with the hypothetical taxpayer discussed above, the estimates in

Table XXXIV are based on 1979 Oklahoma law and, therefore, provide for full federal tax deductibility. So long as the federal fixed dollar exemptions, deductions, and marginal brackets are unindexed, the federal income tax deduction increases more rapidly than do the indexed provisions of the Oklahoma structure. This result follows from the progressive nature of the federal personal income tax.

TABLE XXXIV

ESTIMATED IMPACT OF FULL INDEXATION OF 1979 LAW WITH NO CHANGE IN REAL INCOME FOR 1977, 1979, AND 1981

	1977	1979	1981
Effective Rates			
Without Indexation	1.57%	1.82%	2.08%
With Indexation	1.42%	1.32%	1.23%
Total Liability (000)			
Without Indexation	$188,328	$254,397	$340,014
With Indexation	169,386	185,427	201,621
Revenue Impact			
Dollar Reduction (000)	$ 18,942	$ 68,970	$138,393
Percent Reduction	10.1%	27.1%	40.7%

In order to compare the impact of indexing the Oklahoma tax structure to the analysis of the Virginia code as presented by the Advisory Commission on Intergovernmental Relations (ACIR) (2), a partial indexation simulation is required. This analysis involves indexing the standard deduction and the value of exemptions simultaneously

and comparing the impact to the impact of indexing only the marginal brackets. Since the relative significance of these two indexation schemes is to a major extent a function of the speed with which taxpayers move through the marginal rates, the 1976 data base is simulated under both the 1976 code and the 1979 code.

These microsimulations are undertaken without incrementing income but with the relevant components indexed at 9.14 percent, the increase in the CPI for 1975. This approach allows comparative analysis with known collections. Under 1976 law indexation of the standard deduction and the value of exemptions results in a revenue loss of $5,406,765. As was reported earlier in this chapter, indexation of the marginal brackets carries a revenue impact of -$10,301,000. Thus, the bracket effect of indexation exceeds the deduction-exemption effect as was the case for Virginia. When compared to indexation of the federal code, just the opposite is true. To quote the ACIR (10):

> This result is different from that for the Federal individual income tax for which the exemption-deduction effect accounts for the bulk of the inflation induced tax increase. The difference occurs because the relative width of tax brackets are (sic) less for lower incomes in the Virginia tax structure than in the Federal (p. 79).

Oklahoma's maximum rate under the 1976 law is reached at $15,000. Thus, as taxable income increases from $2,000 to $15,000, the taxpayer moves through all the marginal rates. In comparison, under 1976 federal law, a taxpayer does not reach the maximum marginal rate until taxable income exceeds $200,000.

The brackets contained in the 1979 law are wider at higher income levels and more narrow at middle income levels; consequently, the new law provides an interesting test of the significance of the deduction-exemption effect relative to the bracket effect under wider brackets.

The estimated impact of indexing the exemption value and the standard deduction under 1979 law is -$6,007,779. As reported earlier, the impact of indexing only the marginal brackets is forecast at -$13,154,000. The exemption-deduction effect continues to be much less than the bracket effect.

Assuming 1976 law, the bracket effect is 1.89 times as large as the exemption-deduction impact. The corresponding ratio under 1979 law is 2.16. Thus, the new rates contained in the 1979 law appear not to be of significance when the focal point is the relative importance of alternative indexation schemes. Caution should be exercised since this conclusion is based on an indexation scheme for only one year. As alluded to above, the 1979 law reduces the width of the marginal brackets starting with the $7,500 bracket in the married-joint table. One would expect that over time, as more taxpayers move through the more narrow middle brackets into the wider upper brackets, the relative importance of the bracket effect will diminish.

Forecasting Fiscal 1979 Collections

While the primary reason for developing the microsimulation tools discussed in this paper is the estimation of distributional impacts of tax law changes, the technique can also be used to forecast fiscal year collections. When projecting fiscal year collections, there is a time lag of three years between the most recent sample and the calendar year generating the majority of the forecast fiscal year revenue. Consequently, the 1975 data base is used to project fiscal 1979 collections.

Since most of fiscal 1979 collections are from income earned in 1978, the 1975 data base is simulated to forecast calendar 1978 collections. This estimate is then converted to a fiscal year forecast by multipying the 1978 calendar forecast by the ratio of 1976 fiscal collections to 1975 calendar collections.

Tax year 1978 collections are forecast using the same technique outlined above in the section on extrapolation. As above, the number of returns is assumed to grow at the same rate as state population. Between 1975 and 1978 Oklahoma's population increased by 6.08 percent. Using the reported 1978 personal income figure and forming the ratio of 1978 average personal income of $21,267 to 1975 average personal income of $16,138 yields an increment to income of 31.78 percent.

Simulation of the 1976 data base with income growth of 31.78 percent and return growth of 6.08 percent results in 1978 tax year forecast of liability of $283,027,000. The ratio of 1976 fiscal collections to 1975 calendar liability is 1.17451 ($180,294,300/ $153,506,000). Multiplying the calendar 1978 forecast of $283,027,000 by 1.17451 yields a fiscal 1979 individual income tax collections estimate of $332,418,042.

For fiscal 1979 individual and corporate income tax collections as recorded by the state Budget Office were $408,869,789.[1] Allocation as to individual and corporate is based on the ratio of net individual collections to net income tax collections as reported by the Oklahoma Tax Commission (25, p. 14). For fiscal 1979, the individual income tax accounted for 77.95 percent of total net income tax collections. Thus,

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[1]Provided by the state Budget Office.

net individual collections for fiscal 1979 were $318,714,000. The simulator then overforecasts collections by $13,704,042 ($332,418,042 - $318,714,000), or 4.3 percent.

Summary

In this chapter the estimates of the fiscal and distributional impacts of alternative structures are presented. The simulation technique appears to provide satisfactory forecasts of both distributional and fiscal impacts.

When the 1975 microdata base is simulated at an 8.08 percent rate of growth of income and a 2.0 percent rate of growth in the number of returns filed, the resulting aggregate estimate of 1976 liability falls short of recorded liability by 1.7 percent. With respect to the distribution of this total liability, the procedure underestimates total liability in 16 of the 21 classes. However, in those classes in excess of $15,000, the average error is -1.5 percent.

Simulation of the 1976 data base for 1976 under assumed exemption values of $900, $1,000, and $1,100 yields aggregate revenue loss estimates of $8,933,307, $14,668,333, and $20,110,589, respectively. The reduction in the overall effective tax rate is from 1.68 percent to 1.60 percent, 1.55 percent, and 1.50 percent. The largest percent reduction in effective tax rate is for those taxpayers in the zero to five thousand class while the smallest percent reduction accrues to those taxpayers with Oklahoma income after adjustments in excess of $100,000.

The impact on the overall effective rate for 1976 is estimated for higher standard deduction limits of $2,250, $2,500, and $3,000. The

current law provision which fixes the minimum standard at 50 percent of the maximum is retained. Under these assumptions, the overall effective rates are estimated at 1.67 percent, 1.65 percent, and 1.63 percent. Thus a 50 percent increase in the standard deduction limit reduces the effective rate from 1.68 percent to 1.63 percent and carries an aggregate revenue loss of $5,297,371.

Increasing the maximum standard deduction from $2,000 to $3,000 benefits primarily those taxpayers with income less than $30,000. Only 5.73 percent of the $5,297,371 revenue impact goes to taxpayers with income in excess of $30,000.

Varying only the second component of the standard deduction, the percentage of AGI, concentrates the tax relief in those classes between $4,000 and $13,000. For example, when this component is increased from 20 percent to 30 percent, 75.6 percent of the aggregate reduction of $3,040,500 is received by taxpaying units with income between $5,000 and $10,000. In addition, the overall effective rate falls from 1.68 percent to 1.65 percent.

The two law changes since 1971 have granted additional relief by varying the amount of federal liability which is deductible rather than changing either the value of exemptions or the standard deduction. The revenue impacts of the laws becoming effective in 1975 and 1979 are projected at -$13,643,779 and -$25,583,001 for tax year 1976. The 1975 law reduces the effective rate from 1.80 percent to 1.68 percent. Simulation of the 1979 provisions for 1976 yields an effective rate estimates of 1.45 percent.

A larger percentage of the estimated revenue loss under 1975 law accrues to those units earning less than $15,000 than is true under the

1979 revision. These taxpayers are the recipients of 35.9 percent of the reduction granted by the 1974 revision while this group receives only 16.9 percent of the relief provided under the 1979 modifications.

While the Oklahoma code does not provide for indexation, several indexation schemes are analyzed. Prior to estimating the impact of indexation, the 1976 microdata file is simulated at four alternative rates of growth of income and these estimates are compared to the constant effective rate collections resulting from increasing income by 4 percent per year. The difference between collections resulting from a given rate of growth of income and the amount resulting from applying the effective rate associated with a 4 percent income growth is the inflation induced component of total liability. A 10 percent increase in income between 1976 and 1977 yields an aggregate liability estimate of $195.4 million while the constant effective rate estimate is $184.9 million. The constant effective rate estimate is 5.4 percent less than the 10 percent income growth estimate. Similar estimates for 1981 indicate that if income grows at an annual rate of 10 percent per year, collections exceed the constant effective rate estimate by $85.8 million. Thus, 21.4 percent of forecast 1981 liability is inflation induced.

Oklahoma law contains several fixed dollar magnitudes which could be tied to an appropriate price index. The 1976 code contained one more fixed dollar deduction--the limited federal tax deduction--than does the 1979 code.

Of the fixed dollar provisions of both laws, tying the marginal tax brackets to the CPI is by far the most expensive in terms of revenue loss. Indexation of the 1976 marginal brackets reduces estimated 1976 collections by 5.48 percent while indexation of the marginal rates

contained in the 1979 code results in an 8.14 percent reduction in 1976 liability. This indexation scheme yields an effective rate estimate of 1.59 percent whereas the effective rate without indexation is 1.68 percent. Similar analysis under the provisions of the 1979 law indicates that the effective rate falls from 1.45 percent to 1.33 percent.

The revenue loss estimates of indexing the minimum and maximum standard deduction as contained in both the 1976 and 1979 laws are $1,204,204 and $1,380,895, respectively. Under 1976 law, the effective rate falls from 1.68 percent to 1.67 percent; similarly, under the 1979 provision, the effective rate falls from 1.45 percent to 1.44 percent.

The final fixed dollar exemption common to both tax laws is the $750 value of exemptions. The revenue loss estimates for tax year 1976 are $4,052,780 under 1976 law and $4,673,234 under 1979 law. With respect to the overall effective rate, indexation of the exemption value lowers the effective rate from 1.68 percent to 1.64 percent under 1976 law and from 1.45 percent to 1.41 percent under 1979 law.

Indexation of all of the fixed dollar deductions and of the marginal tax brackets yields revenue loss estimates for 1976 of $16,120,178 and $18,692,318 under 1976 and 1979 law, respectively. The overall effective rate falls from 1.68 percent to 1.54 percent under the 1976 provisions and from 1.45 percent to 1.28 percent under 1979 law. The larger reduction under 1979 provisions is a result of the higher marginal brackets and the higher marginal tax rates.

A majority, 50.61 percent, of the reduction resulting from full indexation of the 1976 code goes to those taxpayers with income below

$15,000. The same group of taxpayers receives only 39.41 percent of the relief when the 1979 code is indexed.

Yet another indexation analysis involves estimating the growing revenue impact over time. Assuming an 8 percent increase in income, total collections, without indexation, are estimated at $188,328,000, $254,397,000, and $340,014,000 for tax years 1977, 1979, and 1981, respectively. Full indexation, assuming an 8 percent increase in the CPI, reduces these estimates by 10.1 percent, 27.1 percent, and 40.7 percent for the corresponding tax years.

The final indexation analysis involves comparison of indexation of the marginal brackets to indexation of the exemption value and of the standard deduction. The estimates here are similar to those for Virginia in that the bracket effect exceeds the exemption-deduction effect under both tax codes. Just the opposite has been estimated with respect to indexation of the federal code.

The final section of this chapter involves the estimation of 1979 fiscal year collections. The simulator estimate of fiscal year 1979 collections exceeds the reported collections by 4.3 percent.

CHAPTER VII

SUMMARY AND EVALUATION

In the first section of this chapter the objectives, procedures and results of this study are summarized. The concluding section contains an evaluation, plus suggestions for extension of the analysis.

Summary

The specific objectives of this study were to:

1. obtain, validate and summarize information from individual income tax returns filed with the Oklahoma Tax Commission for two consecutive tax years;

2. develop a computer tax model capable of providing aggregate and distributional analyses of proposed changes in the Oklahoma individual income tax code; and

3. apply the model to an evaluation of proposed changes in the Oklahoma individual income tax code.

This section summarizes the results of the steps taken in accomplishing these objectives.

In Chapter III two microdata bases were described. Based on stratified, systematic sampling of the returns filed with the Oklahoma Tax Commission for tax years 1975 and 1976, these data bases were both within the desired 5 percent margin of error. The 1975 sample contained information from 16,839 returns while the 1976 sample included information from 21,604 returns.

To insure the integrity of the data, each return in both samples was subjected to consistency analyses performed with Fortran programs checking 22 arithmetic operations. Where appropriate, arithmetic errors were corrected. Taxpayer errors were corrected when doing so did not alter the reported liability.

Fortran programs generating 111 summary tables were written to summarize the samples. These tables were based on type of deduction, residency status and filing status.

In Chapter V the computer tax model capable of estimating the fiscal and distributional impacts of modifications to Oklahoma's individual income tax code was described. The model was designed to minimize both the need for analyst intervention in simulating alternative scenarios and the amount of computer time required to simulate a proposed change and to compare that forecast with other forecasts under either existing law or previously proposed modifications to the tax code. Attainment of these objectives resulted in a model based on 1979 tax law with allowances made for potential requests from Oklahoma's elected representatives.

The model was designed to be driven by an estimate of the per return rate of growth of federal adjusted gross income from the sample year through the forecast year. In the absence of a time series of federal adjusted gross income consistent with a given year's tax law, a proxy--the rate of growth of the per return state personal income--was employed. The rate of growth of state population served as a proxy for the rate of growth in the number of returns. Since reported data were available for the years forecast in this study, state personal

income and state population were not projected. In future work, these variables will be forecast with the state econometric model.

Using the 1975 data base, the proxy rate of growth of income, and the reported rate of growth of population, the forecasted 1976 tax year liability fell short of the 1976 tax year sample estimate by $3,174,000. While this aggregate estimate was off by only 1.7 percent, total liability by income class was underestimated by approximately 23 percent in two of the four income classes under $4,000. Errors of this magnitude in the lower income classes did not significantly influence the estimate of total liability. The average error for the six income classes above $15,000, accounting for 85 percent of total liability, was -1.5 percent. The errors in the average liability estimates exceeded 5 percent in two of the 21 income classes.

Impact analyses were performed for variations in the value of exemptions and the standard deduction. The revenue loss estimate for tax year 1976 of increasing the exemption value from the current state level of $750 to the current federal value of $1,000 was $14,668,333. Adoption of the federal exemption allowance would have reduced the overall effective tax rate from 1.68 percent to 1.50 percent. While the percent reductions were higher for lower income taxpayers, a majority of the aggregate tax relief was estimated to accrue to non-poor units. Approximately 87 percent of the estimated revenue loss was to those taxpaying units with Oklahoma income after adjustments in excess of $10,000.

Analyses similar to the above were performed with respect to increasing the three components of the standard deduction. The expected revenue loss from increasing the maximum and minimum limits for the

standard deduction to $3,000 and $1,500 was $5,297,371. Distributional impacts were similar to those reported in the previous paragraph in that most of the tax reduction accrued to taxpayers with income exceeding $10,000. However, there were income classes in which average liability was unaffected.

Since 1971 there have been two significant changes in Oklahoma's individual income tax code. A 1975 modification provided for partial deductibility of federal income tax with a maximum deduction of $1,700. The second change, effective for the 1979 tax year, provided the taxpayer the option of full deductibility of federal income tax, with the resulting taxable income taxed at a maximum marginal tax rate of 17 percent; or zero deductibility of federal liability, with a maximum marginal tax rate of 6 percent. Only the former option was analyzed in Chapter VI. The 1976 data base was used to ascertain the impacts of these modifications on 1976 tax year liability.

When measured in terms of 1976 tax year liability, the revenue loss estimates of the two modifications were $13,643,779 and $25,583,001. Of these aggregate impacts, 35.9 percent of the reduction provided by the 1975 change accrued to taxpaying units with incomes below $15,000 while the same group received only 16.9 percent of the relief provided by the 1979 revision.

In comparing the percent distribution of total liability under 1971-1974 law with that under 1979 law, the analysis indicated that the tax load was shifted from those units with income between $5,000 and $30,000 to those falling outside of these limits. With respect to simulated 1976 liability, units with incomes below $5,000 paid 0.83 percent of total collections under the 1979 provisions, relative to

0.78 percent under 1971-1974 law. The corresponding figures for the $100,000-plus class were 10.87 percent and 13.13 percent.

The indexation analyses centered around measuring the revenue impacts of maintaining the real values of the fixed dollar exemption value, the standard deduction limits and the bracket widths. These estimates were based on 1976 income levels, the rate of change in the CPI for 1975, and the provisions of both 1975 and 1979 law.

The simulated aggregate impacts of indexing the fixed dollar deductions provided under 1975 and 1979 law were reductions in tax collections of $5,406,765 and $6,007,779, respectively. By way of contrast, indexation of the marginal brackets reduced simulated 1976 liability by $10,301,000 under the 1975 provisions and by $13,154,000 assuming 1979 law. Thus, the effect of indexing the marginal tax brackets exceeded the effect of indexing the exemption and deduction limits by 1.89 times under 1975 law and by 2.16 times under 1979 law.

The final simulation involved a prediction of fiscal 1979 collections. The simulator forecast was $332,418,042 as compared to reported collections of $318,714,000. Thus, the simulated forecast exceeded reported collections by $13,704,042, of 4.3 percent.

Evaluation

The high speed computer now makes possible the application of microsimulation techniques at the state level. While these techniques are data-intensive and hence expensive in terms of data base requirements, the resulting analyses have been well received by policymakers in Oklahoma.

Given the limited resources available at various stages of the preparation of this study, there are several areas in which further research would deepen and broaden this initial effort. This author enthusiastically supports the following refinements.

Two possible improvements of the aging process employed in this paper exist. First, equations similar to those estimated by the U. S. Treasury (41) could be estimated for Oklahoma and an aging process similar to that undertaken at the Office of Tax Analysis could be used. Alternatively, projections currently being made at the federal level with respect to the rate of growth of federal AGI, number of returns, number of exemptions, etc., could be used in aging the Oklahoma microdata base.

Perhaps the most fruitful suggestion for additional research lies in merging the most recent state data base with one of the several data bases currently available from federal agencies. A successful merge should not only improve tax policy analysis but also make feasible broader analyses such as tax incidence studies. Only a few of the potential benefits for state individual income tax policy analysis are considered here.

Information taken from federal individual income tax forms combined with data included in the state data base would improve state policy analysis in at least two respects. First, the components of federal adjusted gross income are included in the federal data base but are not included in the state data base since the starting point on the Oklahoma return is federal adjusted gross income. Possession of this information would not only improve the forecasts of federal adjusted gross income but also make possible "what if" analysis with respect to changes in the

federal code. Reinstitution of full federal tax deductibility dictates that Oklahoma analysts should improve their predictions of federal adjusted gross income and of federal liability.

A combined data base would also permit a more sophisticated treatment of itemized deductions which are currently the same under the state and federal tax codes. On the state return, only the total of itemized deductions is reported while the federal data base contains the component parts. A data base incorporating these components and the relevant Oklahoma data would improve forecasts of federal liability and of Oklahoma taxable income by allowing state analysts to incorporate changes in the federal code at the time the code is revised.

Research endeavors, in addition to their stated purposes, often open doors for future research. Hopefully, this dissertation is not an exception.

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