FINAL REPORT

TAX FAIRNESS AND EQUITY INTERIM STUDY COMMITTEE

Presented to the Legislative Council
and the Iowa General Assembly
March 1993

Prepared by the Legislative Service Bureau

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February 1993

AUTHORIZATION AND APPOINTMENT

The Tax Fairness and Equity Interim Study Committee was established by the Legislative Council in June 1991 to "review Iowa's individual and corporate income, sales, property, and local tax structures, including property tax exemptions and diversions, and tax credits and expenditures to ensure tax fairness and vertical and horizontal equity. In addition, the review shall include tax abatement and tax increment financing. The Committee will also review state taxation policies regarding retirees living out-of-state. The Committee is authorized to hire a consultant to assist with their work." The Study Committee was required to obtain approval from the Legislative Council to hire and pay a consultant.

Members serving on the Study Committee are:

Ms. Myrt Levin, Chairperson
Senator William Dieleman, Co-Vice Chairperson
Representative John Groninga, Co-Vice Chairperson
Senator Linn Fuhrman
Senator Larry Murphy
Senator Ralph Rosenberg
Senator Maggie Tinsman
Representative Wayne Bennett
Representative Kay Chapman
Representative Minnette Doderer
Representative Stewart Iverson
Ms. Jane Bell, Meyer & Gross Real Estate
Mr. John Keig, Mayor of the City of Muscatine
Mr. Mike Lux, Iowa Federation of Labor, AFL-CIO
Ms. Joanne Stockdale, Northern Iowa Die Casting

COMMITTEE PROCEEDINGS

The Study Committee was originally authorized two meeting days, which were held in 1992, but was subsequently granted five additional days, which were held in 1992. All seven meetings were held at the State Capitol Building in Des Moines.

At the first two meetings held on October 9, 1991, and October 30, 1991, the Study Committee heard from Mr. Carl Castelda, Deputy Director of the Department of Revenue and Finance, who provided a history of and information related to the major state and local taxes. The information provided included the amount of revenues generated from the various taxes, the date the taxes were first enacted, and a review of various changes, exemptions, and credits associated with these taxes. A list of sales and use tax exemptions was also distributed. Also making a presentation before the Study Committee was Mr. Paul Durand of the Legislative Fiscal Bureau, who presented results of studies that had been conducted on Iowa's tax system over the past several years.

Presentations were made at the first two meetings by Mr. Jerry Musser, Johnson County Assessor; and Mr. Carl Castelda, Mr. Ed Henderson, and Mr. Dick Stradley, all of the Department of Revenue and Finance; regarding property taxation in Iowa. The presentations by the county assessor and the Department of Revenue and Finance staff provided an overview of the process of assessment and taxation of real property in Iowa, the various types of real property which are exempt from property tax, and the various tax credits and abatements that are available. The intent of the presentation was to provide the Study Committee members with a better understanding of property taxation in the state.

During the second and third meetings held on January 17, 1992, and January 12,1992, the Study Committee decided on the "Scope of Services" that would be contained in its Request For Proposal (RFP) to be sent to the potential consultants. The Study Committee interviewed three potential consultants before settling on the Policy Economics Group of KPMG Peat Marwick. The contract entered into between the Study Committee and the Consultant specified that the Scope of Services in the RFP would be done in two phases. Phase I was for the development of multitax models, including individual, corporate, and sales tax models. The tax models are incorporated into computer software which will be used by the Legislative Fiscal Bureau and the Department of Revenue and Finance for tax policy analysis. In February 1992, the Legislative Council authorized funding for Phase I. Phase II involved the study of Iowa's state and local tax structure and used the tax models for analysis and comparison purposes. In July 1992, the Legislative Council authorized funding for Phase II.

At the fifth meeting held on September 2, 1992, the Consultant discussed the status of the multitax models and that they should be completed in October 1992.

The Study Committee was provided tables showing the type of information the tax models can provide to the General Assembly concerning existing or proposed tax provisions and how the models would be updated for continued future use. In addition, the Consultant discussed the outline for the tax study and how the tax models would be used to provide data for the tax study. (See the attached description of the tax models.)

The sixth and seventh meetings held on November 11, 1992, and December 18, 1992, were devoted to presentation by the Consultant in regard to its proposed draft report prior to the report being finalized. The Study Committee decided that specific recommendations for change in the tax structure are more appropriately placed with the General Assembly. However, general recommendations for tax policy are discussed in the Consultant's report, as well as options for revenue-neutral tax changes intended to make the tax structure more equitable, or to make the state more competitive with other states. Members of the Study Committee accepted the Consultant's final report. The contract requires that the Legislative Fiscal Bureau approve the tax models. As of the date of the final report the Bureau has not done so because additional modifications are needed. The Study Committee expressed the belief that the tax models should contribute significantly to better analysis of tax proposals for Iowa.

Attached to this final report are the Table of Contents, Executive Summary, and description of the tax models from the Consultant's final report. A copy of the 187-page final report is available upon request at the Legislative Service Bureau.

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A STUDY OF
THE IOWA STATE
AND LOCAL TAX STRUCTURE

Submitted to the:

Tax Equity and Fairness Study Committee
General Assembly of Iowa

Prepared by:

The Policy Economics Group
KPMG Peat Marwick

January, 1993

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EXECUTIVE SUMMARY

Overview of the Iowa Tax System

- Iowa makes substantial use of all three of the major state-local taxes -- income, sales and property taxes -- that comprise a balanced tax system. Iowa's reliance on the personal income tax and property tax is somewhat greater than the average of the fifty states.

- Iowa's reliance on the sales tax is expected to move closer to the U.S. average after the recent increase in the sales tax rate from four to five percent.

- On a per capita basis, Iowa's state and local tax revenues are six percent below the U.S. average. Measured as taxes in relation to personal income, the state's overall tax effort is slightly higher than the national average. Iowa state and local taxes equalled 11.6 percent of personal income compared to a U.S. average of 11.5 percent in 1990.

- State and local taxes in Iowa are generally regressive. The Iowa tax system is less regressive than that of South Dakota. The distribution of the state-local tax burden is similar in Iowa, Minnesota, and North Carolina. In contrast to these states, South Dakota does not have a personal income tax.

Criteria for Evaluation of Iowa Tax Policy Options

- Several criteria should be considered in evaluating tax policy options. The criteria set forth in this study are equity, economic efficiency (neutrality), competitiveness, revenue adequacy, revenue responsiveness and stability, accountability, simplicity and ease of administration, and exportability.

- In assessing tax policy options, trade-offs will inevitably arise among the criteria. Policymakers face the difficult task of deciding how to weight the various criteria in determining a tax structure that is appropriate for the State of Iowa.

Sales Tax

- The Iowa sales and use tax is relatively broad-based compared to other states. The five percent sales tax rate is close to the average for all states with a sales tax.

- The sales tax burden is regressive. For example, the effective tax rate (tax as a percentage of income) is 4.34 percent for families with incomes of $10,000 - $20,000 but is 1.38 percent for families with income over $200,000.

- Approximately 39 percent of the total sales and use tax liability projected for tax year 1993 is derived from taxation of business purchases. In this regard, the Iowa sales tax (as well as those of other states) deviates from the pure public finance concept of a sales tax as a retail-level tax on final consumption.

- Cascading or multiple taxation of final consumption is one implication of including business purchases in the sales tax base. As these taxes become embedded in the price of final products sold to Iowa residents, effective tax rates on some products can exceed the statutory tax rate. Furthermore, items that are statutorily exempt, such as health care, actually bear an indirect sales tax cost from the taxation of business purchases.

- Several illustrative policy options are presented in the report to demonstrate the policy simulation capabilities of the Peat Marwick Iowa Sales Tax Model. It should be emphasized that these options are illustrative only and are not Peat Marwick recommendations for change.

- One option would broaden the sales tax base to include exempt personal consumption purchases such as motor fuel, newspapers and subscription magazines, interstate and international telephone services, travel agent services, and residential trash hauling. This option would raise potential revenue of $150 million in 1993 at the five percent rate. On a revenue-neutral basis, the revenue gain could be used to reduce the sales tax rate to 4.5 percent.

- Another option would broaden the base to include services primarily purchased by businesses, such as computer services, legal, accounting, engineering and architectural services. The potential 1993 revenue effect is $152 million, again a 4.5 percent sales tax rate on a revenue-neutral basis. This option would increase the cascading effect of multiple taxation by taxing more business purchases and would make the Iowa sales tax less neutral in its impact on economic activity.

Personal Income Tax

- The personal income tax is the major revenue instrument for introducing progressivity into state and local tax systems. Under the Iowa personal income tax, effective tax rates range from 1.60 percent on families in the $10,000 - $20,000 income class to 5.88 percent on families with income over $200,000. The average effective tax rate for all families is 3.55 percent.

- Three fundamental structural issues emerge upon review of the current Iowa personal income tax. These issues are:

  - the equity implications of current state policy relating to the standard deduction and personal exemption;

- the impact of the married separate filing system on tax filing complexity;

- the impact of high nominal tax rates on competitiveness.

- The Iowa standard deduction and personal exemption values have not kept pace with the more generous levels enacted at the federal level in the Tax Reform Act of 1986. As a result, the Iowa income tax is less progressive than the federal income tax.

- The married separate filing system complicates taxpayer compliance and tax administration by encouraging income splitting by married couples. Most states and the federal government use a joint return system with different rate and bracket schedules for single and married filers designed to minimize the disadvantage of a marriage penalty for filing a joint return.

- Iowa's top marginal tax rate is the fourth highest in the United States which may contribute to the perception, not consistent with the comparative tax statistics, that Iowa is a very high tax state. In reality, the overall tax burden in Iowa approximates the national average, and for the income tax burden by itself, the state ranked twelfth in 1991.

- One option for Iowa is to follow the federal income tax structure and simply levy a state tax as a percentage of federal tax liability. A revenue-neutral option of this type would require a rate of 34 percent of federal liability. Although this tax structure would be far simpler than current law by itself, there are disadvantages to be considered as well. The sharp increase in liabilities for families over $75,000 of income could raise serious competitiveness concerns. The implicit top marginal tax rate of 10.54 percent (.34 times the top federal rate of 31 percent) - would be the highest in the country. Accountability and autonomy in setting tax policy at the state level would also be reduced.

- An option that would provide state policy autonomy and still address the issues of equity, simplification and competitiveness would be to base the Iowa personal income tax on federal taxable income. Progressivity would be increased through the higher standard deduction and personal exemption. The joint return system would simplify tax filing as would use of the federal taxable income starting point. This set of structural changes would allow Iowa to set its own tax rates on taxable income. For example, it would be possible to reduce marginal tax rates on a revenue-neutral basis and achieve a top tax rate of 8.0 percent.

Corporate Taxes

- Iowa, along with forty four other states, uses a tax based upon net income as its general business tax.

- The three industries that pay the largest shares of corporate income and franchise tax

liability are: manufacturing - $89.3 million (32.9 percent); finance and real estate -$59.6 million (21.9 percent); and wholesale and retail trade - $51.9 million (19.1 percent).

- By its nature, corporate income tax liability is highly concentrated. Companies with assets greater than $20 million (15.2 percent of total corporate taxfilers) account for 60.2 percent of liability.

- Iowa is one of only two states that apportions income to the state based solely on business sales. If Iowa were to substitute a three factor formula based upon an equal weighting of property, payroll and sales, it is estimated that 1993 liability would increase by $4.4 million. Although the total revenue impact is relatively small, substantial shifting of liability between firms would occur.

- Currently Iowa is one of five states that allows corporations to deduct federal corporate income tax in calculating state corporate income tax liability. If the fifty percent federal tax deduction were disallowed, state corporate tax liability in 1993 would be increased by $83.4 million. Alternatively, as a revenue-neutral offset, tax rates could be reduced so that the current top rate of twelve percent could be decreased to 8.9 percent.

- Approximately 52.6 percent of corporate taxfilers (19,450 out of 36,944) had no Iowa tax liability in 1990. Approximately 77 percent of the corporations with no tax liability were firms with assets of less than $2.5 million.

Property Tax

- The property tax is the single largest source of state and local tax revenue in Iowa. However, reliance on the property tax has declined from 46.2 percent of state-local tax receipts in 1975 to 35.1 percent in 1990.

- In 1991, the value of property (excluding government owned property) exempted from taxation totaled $4,078 billion or 5.6 percent of statewide net taxable value. The value of property subject to partial exemption totaled $915 million or 1.2 percent of taxable value.

- The distribution of the burden of the property tax depends upon assumptions regarding how business and residential rental taxes are shifted. The theory of property tax incidence is not settled in the economics literature. Given the incidence assumptions that are specified in this study, the Iowa property tax is shown to be regressive.

- With respect to residential property taxes, the effective tax rate on families in the $10,000 - $20,000 income class is 4.9 percent compared with 0.7 percent in the over $200,000 class. This analysis assumes that the property tax on rental property is shifted to renters.

- Property tax credits somewhat moderate the regressivity of the property tax in Iowa. The low-income credit is more targeted than the homestead or agricultural credits in accomplishing this objective.

- Owners of exempt property receive benefits from public services that are financed by higher tax rates on taxable property. One approach to deal with this issue is to levy a charge on exempt property owners for the services they receive. A "basic city services" levy of $4.57 per $1000 of valuation on exempt nongovernmental property is estimated to yield about $29 million.

Directions for Tax Reform in Iowa

- The State may wish to explore various reform options, such as basing Iowa tax on federal taxable income, to make the Iowa personal income tax fairer, simpler, and more competitive. The relatively low standard deduction and personal exemption, the married separate filing system and the structure of high nominal tax rates are all concerns in the Iowa tax law that could be examined with the models provided by the State.

- Consideration could also be given to sales tax options that would broaden the tax base by including in the base currently exempt goods and services purchased by households.

- Iowa's top corporate income tax rate is the highest in the United States but this overstates the real state corporate tax burden. One option that could be considered would be repeal of the 50 percent corporate deduction for federal taxes, coupled with a lower top tax rate of 8.9 percent, on a revenue-neutral basis.

- With respect to the property tax, consideration could be given to imposing a charge for local services provided to exempt property.

- As Iowa elected officials and citizens address the issues related to tax reform in the future, they will be able to draw upon credible and objective information about revenue and equity impacts of a wide range of tax policy options. The Peat Marwick Iowa Multitax Simulation Models provide the State of Iowa with an extensive policy simulation capability that is not surpassed by any other state.

PREFACE

This report was prepared by the Policy Economics Group of KPMG Peat Marwick for the Tax Equity and Fairness Study Committee of the General Assembly of Iowa. The primary objective of the report is to provide the State of Iowa with a comprehensive framework for analyzing state and local tax policy issues and options during the decade of the 1990s.

In order to accomplish this objective, the Policy Economics Group developed a set of microsimulation tax models of the Iowa tax structure. These tax models, which are powerful tools for analyzing tax structures and the impact of tax policy changes, were used to quantify the revenue and distributional impacts of a wide range of illustrative tax policy options. The focus of the analysis is upon the four major tax instruments relied upon by Iowa state and local governments -- the personal income tax, sales and use tax, property tax, and corporate income and franchise taxes. The final chapter of the study provides an analysis of the overall tax incidence or burden of the tax systems of Iowa and selected states and demonstrates the capabilities of the Iowa Tax Simulation Models for analyzing complex multitax policy packages. In setting the foundation for the examination of tax policy issues, the study also provides an analysis of the economy and demography of the state, a comparative overview of the Iowa tax system, and a statement of criteria for evaluation of Iowa tax policy options.

The Peat Marwick Iowa Tax Models that were developed to perform the quantitative analysis in this study have been provided to the State of Iowa. The Policy Economics Group has conducted on-site training for state staff so that Iowa policymakers will be able to use these powerful new tools to design and analyze tax policy alternatives in the future.

Numerous individuals in the State of Iowa provided valuable assistance to this study. As chairperson of the Study Committee, Myrt Levin guided our efforts in working with Committee members and provided useful feedback. Many individuals provided useful data and information, including Paul Durand of the Legislative Fiscal Bureau; Michael Goedert of the Legislative Service Bureau; and Richard Jacobs, Joyce Bergamo, Connie Caligiuri, Jim Cruchelow, Gene Eich, Jim Moyle, Chuck Stewart, and Rita Winsor of the Department of Revenue and Finance.

Dr. Thomas Pogue of the University of Iowa had principal responsibility for the preparation of Chapter 7 - Analysis of Property Taxation in Iowa. Dr. John Due of the University of Illinois prepared the Addendum to Chapter 4 - Analysis of the Sales Tax.

TECHNICAL APPENDIX I
DESCRIPTION OF THE INDIVIDUAL TAX MODEL

The Policy Economics Group's individual tax model is specifically designed to produce the information required to conduct a comprehensive quantitative analysis of the individual income tax and an overall analysis of the incidence of the entire tax system. The model's microsimulation technique operates using the same principles as the models used by the U.S. Treasury Department.

The Policy Economics Group's current model offers a number of improvements over the original version, which was delivered to Iowa in 1989. Most notable is the fact that the current model is operated through a user-friendly interactive menu system and runs on an IBM compatible 486 PC. These features permit access to a wider range of analysts, including those with little or no previous computer experience.

Overview of the Model

The individual tax model is a "microsimulation model." "Micro" refers to both the type of data in the model and how the model is used. Microsimulation is the ideal tool for modeling the individual income tax system because the economic decisions represented by the model's equations are made by individuals or households each facing differing economic and therefore tax situations. The model simulates the tax calculations made by individual taxpayers. The model calculates tax liabilities for thousands of taxpayers (individuals, families, and unincorporated business taxpayers alike--the "micro" units of the Iowa economy) that are representative of the entire population of the state. Once the calculation of tax liability for each sample taxpayer is determined, the results are summed across all taxpayers and the overall revenue and distributional impact is determined.

The scope and quality of the underlying database, combined with the ability to simulate quickly and accurately the economic characteristics and effects of tax changes, distinguish microsimulation models from less rigorous, and therefore less accurate, research methods that rely on limited data (e.g., the simple attribution of national data patterns or a "representative taxpayer approach").

Through a variety of statistical procedures (e.g., sampling, merging of various data sets, and procedures for error detection and correction), the microsimulation models developed by the Policy Economics Group provide reliable estimates of not only how an existing set of tax relationships change as an individual's behavior changes, but also how changes in taxpayer behavior affect revenue flowing to the state treasury. It also provides an analysis of the distribution of the individual income tax as well as the overall tax burdens. The database for the individual tax model is extrapolated to the years 1992 through 1997 so that a complete forecast of tax revenues can be conducted and changes in the tax system can be analyzed over time.

The individual tax microsimulation model can be used to provide estimates of a variety of "what if' policy scenarios and allows policymakers to analyze alternative tax policy changes. This capability provides a very powerful and useful tool for evaluating the policy tradeoffs among a range of tax policy alternatives.

Database Development

The primary factor in determining the accuracy and statistical validity of the model's results is the database development. Iowa's database has very comprehensive coverage, both in terms of the population and the range of data, which include income, expenditure, demographic, financial and tax data.

The database was developed based on a sample of State income tax returns matched to the federal Individual Master File (IMF) and Individual Returns Transaction File (IRTF) for Iowa. Specific procedures were developed to ensure that the confidentiality of the tax return data was protected while at the same time the statistical validity of the sample was ensured.

In addition to constructing a database of tax return information, these data were merged with U.S. Census data, to create household units, and with Consumer Expenditure Survey data, to allow for the comprehensive analysis of tax incidence, including income tax, property tax, sales tax and others.

The following steps were followed in developing the individual tax model database:

- Acquiring the IMF/IRTF files from the IRS;
- Drawing a stratified random sample of State tax returns using software for statistical data sampling and matching to the IRS files;
- Verifying the data in the sample and correcting any detected errors;
- Merging the tax data with U.S. Census data and U.S. Consumer Expenditure Survey data;
- Imputing additional data items and records to the file, such as property and sales tax data and information on non-residents and part-year residents; and
- Extrapolating the database to future years.

The Policy Economics Group, working with the Legislative Fiscal Bureau and the

Department of Revenue and Finance, carried out each of these tasks in developing the individual tax database for the Iowa Legislative Fiscal Bureau.

Merge with Census Data

In order to undertake the comprehensive analysis of the Iowa tax system, one needs not only information on individuals that currently file income tax returns but also those who do not currently file tax returns. While these individuals might not pay income tax they surely pay other taxes, either directly or indirectly. These other taxes include the sales and use taxes, other consumption taxes and property taxes. Therefore it is not sufficient to rely on tax return data; other information that accounts for all current and potential taxpayers is needed. In addition, a more appropriate unit for analysis when considering the overall incidence of the tax system is the household rather than the individual, particularly when the effect of these other taxes is considered. Also, there are often demographic or economic data not reported on tax returns that would be useful for analysis, such as exempt income sources, transfer payments, etc.

To address these deficiencies the tax return data was merged with U.S. Census data for the state of Iowa. This enables the user to:

- account for the entire population of Iowa;
- conduct analysis by household as well as individual; and
- categorize taxpayers by a wider number of characteristics;

The basic idea behind *file merging (matching, linking)* is to combine one file, the tax declarations file, with another file, the census file, to form a composite file, the microsimulation database file containing all the data items from the two original files. This is accomplished by selecting pairs of records to match based on data items which are common to both files.

Exact matching of tax return records with census records based on a unique identifier, such as the social security number, cannot be implemented due to confidentiality restrictions which preclude legal linking of records. Even if this were permitted the time consideration in dealing with such large files and the expense of handling the large number of exceptions that would inevitably occur would be prohibitive. For these reasons, we employed a statistical merging process to construct the individual tax model database.

In the case of the individual tax database construction, the merging process is complicated somewhat by the fact that the data from each source generally represent different types of economic units. The income tax return data are grouped by tax units, individuals or married couples who may or may not have any dependents, and the census data are grouped by family units or households, each of which could possibly contain several income tax units. However both microdata files that were used for the database construction represent the entire population or at least a major subset of the population. In the case of Iowa the census data represent the entire population of the state and the tax return file a major subset of the

population, all income tax filers.

The first step in the merge process is to identify the individuals or groups of individuals in the census file that comprise each tax unit, whether or not the unit actually files a tax return or pays any tax. The exact criteria for identifying tax units were established according to the exact legal provisions of the Iowa individual income tax. In general it included all single and married adults and any under-age income earners that may be subject to income tax. In this process the weighted number of potential tax units equals the number of actual taxpayers taking into account the number of tax units that would actually be non-taxable according to the personal income tax law.

The next step was to identify the unique or similar items appearing on both files. Typical items that often appear on both files include: age, sex, number of children, and possibly certain measures of income. Where there was not an exact match, items were matched in an indirect way or for a portion of the population. For example, pension income on the tax declaration file could indicate that the individual is at least a certain number of years old or the child credit can be used to determine for large families the number of children. Once these steps are complete we applied a mathematical optimization technique to statistically merge the individual records from the tax and non-tax data files.

This technique was implemented using a sophisticated computer program which compares each record in one file with each record in the other file and calculates a "penalty" based on the differences between the particular characteristics of each record such as: filing status, number of dependents, types and level of income, home ownership, etc. The program then uses an optimization algorithm to assign each record from one file with a record from the other file to ensure the best overall fit.

Additional Imputations to the Database

There were a number of additional imputations that were conducted in producing the database, including:

- information for non-residents and part-year residents;
- a number of income and deduction items, such as pensions, and various business expenses for partnerships and sole proprietorships;
- consumer expenditures;
- potential itemized deductions for returns using the standard deduction; and the value of real property subject to Iowa property tax.

A complete explanation of the method used to input these items is included in the Description of the Iowa Individual Tax Model Database prepared for the State of Iowa

Legislative Fiscal Bureau, by the Policy Economics Group in December 1992.

Extrapolation of the Database

The base year database represented taxpayers who filed returns in 1990. This database was extrapolated to 1993 for the analysis in this report.

The quality and reliability of the extrapolation procedure is essential for properly capturing the composition and characteristics of the taxpaying population. It is also important in isolating the effects of changes in tax liability due to changes in the tax law and changes due to economic or demographic factors. To address these needs, which we have encountered in virtually all of our projects, the Policy Economics Group has developed a sophisticated methodology and accompanying software extrapolating the individual model database.

The database extrapolation begins with a forecast of the overall economic conditions for the chosen years. Forecasts of the growth and composition of the population, the unemployment rate, changes in real incomes, Price increases, interest rates and other important economic and demographic data are used to create specific aggregate targets and to calculate growth rates for the important data items contained in the database. The Policy Economics Group's proprietary extrapolation software does the difficult work of translating aggregate variables into microeconomic tax variables. Translating forecasts of macroeconomic data into microeconomic data requires separately adjusting each record in the database. Records must be altered so that the chosen aggregate targets are achieved, but the profile of each taxpayer is not radically changed.

Using this extrapolation procedure ensures that the aggregate targets are achieved in a consistent manner and that nominal and real growth are properly accounted for. The extrapolation process adjusts (1) the value of data items, and (2) the statistical weight given each record in order to ensure the proper balance. More simplistic methods of extrapolation often fail to take this important aspect into account.

The methodology employed by the Policy Economics Group contains three important steps:

(1) The levels of individual variables are adjusted by the average growth in the most closely related target variable.

(2) The statistical weight assigned each record is changed by an adjustment factor that captures the growth in the number of taxpayers.

(3) An optimization procedure is used to adjust the statistical weight on each record so that aggregate targets are met while minimizing the change in the weight of each individual record.

Despite its internal complexity, the extrapolation software is delivered in a user-friendly environment. Only the target variables and growth rates need to be calculated outside the model. The extrapolation utility is executed through the same menu system as the rest of the model.

Structure of the Individual Tax Model

The structure of the individual model is built around the detailed micro-database of individual and household records. The detailed nature of the database and the fact that it can account for decisions made at the individual taxpayer level provides the flexibility to analyze a wide array of policy issues. It also allows the model to isolate the effects of changes in the economy on tax liability from changes in the tax law.

The individual tax model has four main functions:

(1) Allow the user to specify the detailed provisions of the income tax law that will be used to calculate tax liability.

(2) Calculate the income tax, property tax, sales tax and other taxes paid by each taxpayer based on the individual income tax provisions and the change in effective tax rates of other taxes.

(3) Determine the total amount of income tax and other taxes by summing each individual's liability.

(4) Produce a series of detailed reports or output tables presenting the results of the simulation.

The Policy Economics Group's enhanced model accomplishes these tasks through a series of computer programs implemented using FORTRAN and HyperPAD, an interactive menu system that runs on and IBM compatible 486 PC. Using the menu system, the user specifies the detailed tax provisions -- tax rates and brackets, exemption amounts, indexing rules, behavioral responses, etc. The level of detail in the database allows the model to estimate the effects of very technical and detailed provisions of the tax law. It also allows the model to determine the distributional effects of the tax system.

The model is designed so that the user evaluating a given policy option can compare it to current law, or to some alternate package of reforms. For ease of comparison, the model computes two sets of tax liabilities, a "Plan X" and a "Plan Y" in each run. A common simulation is to set the rules of Plan X at current law and use Plan Y to make a change in one of the rules while keeping the rest the same. In this manner the user can isolate the effect of one particular change in the tax from all the rest. The user can also compare two completely different tax packages to determine the overall effect of a proposed tax reform.

Once the information that establishes the tax law has been received the model begins to read through all the records in the database, about 140,000 records representing the entire population. The heart of the individual tax model is the tax calculator. This part of the model applies the tax policy parameters specified by the user to the detailed income and demographic data from the database to calculate the tax liability for each individual record in the database.

The calculations are done much the same as a taxpayer would do them.

- Amounts and types of income are calculated and parameters consulted to determine the taxable portions.
- Allowable deductions are subtracted and taxable income calculated.
- Parameters are consulted for the tax rate schedule and tax liability is determined.

The calculator not only simulates how a taxpayer fills out his or her tax form, but also how he or she may be expected to react to changes in the tax law. Examples of behavioral responses applied in Policy Economics Group models are :

- Reduced levels of charitable giving in response to lower Federal tax rates
- Reduced levels of new Individual Retirement Account contributions in response to new deductibility rules.
- A switch away from consumer debt and to home mortgage debt in response to phaseout of the consumer interest deduction.

After the model calculates the tax liability for a particular record in the database, it stores the information and goes on to the next return until the entire database has been processed. Total income tax liability is determined by multiplying each individual liability by the record's statistical weight and summing the results.

TECHNICAL APPENDIX II
DESCRIPTION OF THE SALES AND USE TAX MODEL

The Iowa sales and use tax model was specifically designed to be used by the State in the detailed economic analysis of the revenue and distributional effects of the sales, use, and excise taxes.

Overview

The sales tax model is designed to forecast the revenue yield from the sales and use tax on various consumer and business purchases. The model can simulate detailed tax law changes and therefore produce revenue estimates for those changes. The model separately accounts for consumer purchases and business purchases, distinguishing between products and industries. The taxes by product show how much tax is generated on the sale of particular products or services, regardless of the buyer. The taxes by industry show how much tax is generated by each industry in all their purchases of products or services. The model is designed so that the tax effects of any individual industry's purchase of any particular product or service can be examined.

The model also assists in the distributional analysis of the sales tax system. The model explicitly accounts for the share of these taxes that are exported through purchases by visitors and sales to out-of-state customers. In addition it determines how much of the tax is passed forward to state residents in the form of higher prices or passed backward in the form of reduced return to capital and labor. This analysis, combined with the individual tax database allows the user to analyze how the tax borne by state residents is distributed among family types and income classes.

Database Development

The sales and use tax database is centered around a detailed input-output table which captures all the important flows of goods and services between industries and to consumers. Use of the input-output table is the only reliable method for separately determining: (1) the tax paid by consumers on consumption purchases; (2) the tax paid by business on capital purchases; and (3) the tax paid by business on non-capital purchases. In addition, it enables the model to trace through the effect of taxes paid on business purchases on final consumer prices.

Since in general, state specific input-output tables are not available, an important part of the database construction centers around the development of a state specific input-output table based on U.S. and state level data. The industry and asset classifications are aggregated to correspond to the 100 industries and commodities for use in the sales and excise tax

model.

Inter-industry Flows. The first step in the database construction is to use the U.S. input-output table to calculate production function for each industry in the state. These technical coefficients indicate the mix of intermediate inputs that each industry needs to produce a given unit of output. This information is used along with data on the level and mix of output in the state to develop a state specific input-output table.

The detailed information on the level and mix of state payroll and output by sector is typically obtained from the Annual Survey of Manufactures, the U.S. Census Bureau's County Business Patterns, and state government agencies. The level of output and intermediate business purchases of each commodity by each industry determined by multiplying the outputs of each of the state industries by the technical coefficients from the input-output table. A special adjustment is then applied to account for state-specific wage differentials among industries.

Capital Purchases. Capital purchases by industry are determined in a similar manner but with a different data source. The U.S. Department of Commerce has assembled data that show investment by industry by capital asset class for years through 1991. This capital flow table (CFT) shows total investment by some 62 industries and 50 capital assets. These data are used to construct a set of technical coefficients that show each asset's share of each industry's investment dollar.

Investment by industry is estimated from the Annual Survey of Manufactures data for the specific state and from U.S. average investment-output ratios by non-manufacturing industry from Compustat. An average ratio from the most recent five years (through 1991) is used. These data show the dollar amount of capital spending and the dollar amount of product shipments (output) by industry. The resulting estimates of investment by industry were allocated by commodity according to the technical coefficients from the capital flow table.

Personal Consumption. The starting point for constructing the personal consumption vector for the database is the consumption mix from the U.S. input-output table adjusted by the personal income in the state.

The state-specific consumption mix is calculated based on the average U.S. consumption mix and a set of commodity-specific income elasticities. The income elasticities are applied to the state's average per capita income relative to that of the U.S.

Additional information is then used to refine the consumption vector, including: the state Census of Retail Trade and the Consumer Expenditure Survey (C.E.S.) produced by the U.S. Bureau of Labor Statistics. The latter source is used to split individual consumer purchases by commodity classification into sub-classifications where necessary.

Tax data. Detailed information on state sales and excise collections by industry in conjunction with the statutory coverage of the tax are compared to gross output (or sales) to determine the actual coverage of the tax, by industry and by commodity. Using this information parameters describing the coverage of the tax are calculated to enable the simulation of various policy changes which eliminate exemptions or extend the coverage of the tax to include new goods or industries.

Extrapolation

The state's forecast of state personal income, employment, and the overall price level are used to extrapolate the database to future years. This extrapolation procedure is conducted within the a consistent input/output framework to assure the proper relationship between the level of output by sector and the level and mix of intermediate and capital purchases by businesses.

The first component of the extrapolation procedure uses the growth in employment, by sector, along with the overall inflation rate to adjust in-state business activity by sector. These growth factors are applied gross output, intermediate business purchases, and business capital purchases on a sectorial basis.

An aggregate forecast of personal income is used to adjust personal consumption expenditures contained in the consumption vector of the input/output table, maintaining the proper mix of consumption.

Model Structure

The sales tax model calculates tax liability for detailed product and service classifications under alternative economic and legislative assumptions. The model uses the detailed economic and tax data to analyze taxable and potentially taxable transactions in a given state. The capabilities of the model include:

- Estimating indirect tax revenues consistent with alternative economic forecasts for any year, future and historical;
- Simulating the revenue effects of different tax rates and tax bases for consumer purchases, business intermediate purchases and investment purchases;
- Estimating tax burdens by industrial sectors; and
- Calculating effective tax rates on consumer goods for use in the distributional analysis of the tax burden across households.

Although the primary focus of the model is the sales and use taxes, the model has the

capability to simulate other excise taxes such as those of alcoholic beverages, tobacco, and fuels, at both the state and the federal level.

The model uses the detailed parameters specifying the tax rates and coverage for each of the commodities and industries to explicitly calculate the sales tax and other consumption tax revenues. The model includes all the major flows of goods and services among industries and households in the economy. It separately calculates and accounts for the taxes paid directly by consumers in-state, by non-residents, by businesses on their purchases of intermediate inputs, and by business on their capital purchases.

The model first calculates the direct effects of all the taxes paid under the sales, use and excise tax systems. It then uses the detailed information on inter-industry flows to calculate the indirect effects, consistent with the shifting assumptions chosen along with tax policy parameters. The indirect effects are traced through the inter-industry flow matrix to determine the effect that the taxation of intermediate inputs (such as manufacturing raw materials, office supplies, etc.), has on the final price of the goods to the consumer. The direct and indirect effects are combined to estimate the effective tax rate for each commodity.

Like the individual and corporate tax models, the sales tax model calculates the tax revenues under two alternative scenarios, generally referred to as "Plan X" and "Plan Y". Typically Plan X will replicate current law and Plan Y an alternative, although two alternative laws may also be analyzed.

The model operates on an IBM-compatible personal computer through a user-friendly menu system. This enables the user to easily change and analyze alternative tax base and rate assumptions. It produces a series of output tables that can be printed or stored in the computer.

TECHNICAL APPENDIX III
DESCRIPTION OF THE CORPORATE TAX MODEL

Overview of the Model

The Policy Economics Group's Corporate Tax Model is a microsimulation computer model designed to analyze the change in business tax liability resulting from alternative tax policies. The "micro" in microsimulation means that the computer model uses data from tax returns on a return-by-return basis (microdata) rather than aggregate economic data (macrodata). The advantage that microdata has over macrodata is that with the former, one can analyze distributional effects of tax policies that is not possible with the latter.

The "simulation" in microsimulation means that the model user can calculate (simulate) the economic and distributional effects and the total business tax liability associated with any set of tax laws. These tax laws can be either actual current law or a set of proposed changes to the current law.

There are three major components of the model. They are: (1) the database of business tax return information; (2) the computer model, written in the Fortran computer language, that does the actual tax calculations; and (3) the menu system that allows the user to easily control the tax law and other parameters under which the model runs.

Database Development

The database used in the model contains representative microdata and is constructed by merging corporate income and franchise tax information provided by the State with U.S. tax return information from the Internal Revenue Service for both corporate and noncorporate businesses. The result is a database consisting of both Iowa and U.S. tax information that represents businesses operating in the State. Each record on the database represents a set of Iowa taxpayers. These Iowa taxpayers are characterized by industry, type of business organization (corporation, Subchapter S corporation, partnership, or sole proprietorship), size of receipts and assets, and apportionment class.

The database used by the model is comprised of tax return "records". Each record represents one or more taxpayers with similar characteristics (e.g., industry, business receipts, net income). Each record contains all the information necessary to calculate the tax liability of the taxpayers the record represents.

The database is constructed from several sources of Iowa and U.S. business tax return information. The primary data source is cross-tabulations provided by the Department of Revenue and Finance. This information is supplemented with data from U.S. tax returns. The Statistics of Income branch of the U.S. Treasury annually publishes data on corporate, sole

proprietorship, and partnership tax returns. This information is merged with the corporate income and franchise tax data to produce a database of tax returns representing all Iowa businesses.

As a final adjustment, certain nontax data items are "imputed" to the database of Iowa business tax returns. Nontax data items are simple economic or financial information that is not reported on the tax return. To impute a data item means to assign a value for the data item to each tax return based upon some statistically associated tax return entry or established tax entry relationship. The data items imputed to the Iowa database are payroll, total compensation, and expenditures for capital.

Corporate Income Tax Data

The Legislative Fiscal Bureau maintains corporate income and franchise tax information taken directly from tax returns. This information is in the form of "cross-tabulations". Cross-tabulations show the distribution of data items by specific categories.

Cross-tabulations result in a matrix of distributional and aggregate control totals. The matrix consists of a large number of "cells". Each cell is defined by industry and total gross receipts class. Each cell contains totals for the number of firms and dollar amounts for the variables on the franchise tax database. These control totals are instrumental in targeting the database used by the model to actual Iowa levels of revenue, income, assets, and other data needed for tax computations, including the number of corporations.

U.S. Corporate Tax Database

The Statistics of Income Branch (SOI) of the U.S. Internal Revenue Service publishes the *Corporation Source Book*, a statistically derived, stratified sample of approximately 89,900 federal returns selected from the approximately 3.3 million active corporate returns filed for the 1985 income year. The data consist of tax return information on income, deductions, credits, and tax liability. Also included on the file are balance sheet data on assets, liabilities, and net worth. In addition to corporations filing Federal Forms 1120 and 1120A, information for Subchapter S corporations is available.

Each record in the *Corporation Source Book* is "weighted" so that U.S. aggregate data can be calculated by multiplying the dollar amounts of income, tax, assets, etc. by the weights and summed. The *Corporation Source Book* is recognized as the best publicly available source of corporate tax return data. The Congressional Joint Committee on Taxation and the U.S. Treasury Department use versions of the *Corporation Source Book* in their research and revenue estimating practices. The statistical approach used in creating an Iowa data file parallels the work done by these organizations in this area.

The publicly released Corporation Source Book contains 5,819 actual data records. In

order to create microdata records and impart greater variability onto the database, the Policy Economics Group has statistically disaggregated the *Corporations Source Book* data file into over 100,000 records. This is done by calculating coefficients of variation by industry and size of total asset from Compustat[1] data. Compustat data is income statement, tax, financial, and balance sheet information for publicly held companies. Each record on the *Corporation Source Book* is disaggregated into 30 records based upon the variability observed in the Compustat data.

Additional data not on the original file are imputed to the Policy Economics Group U.S. corporate database, including employment, wages, employee benefits, and alternative minimum tax data. It is from this database that records are selected to represent Iowa tax returns in the database for the model.

Model Corporate Database

The database used in the model is constructed by merging information from the Iowa database with the U.S. Corporate Database. There are two reasons for the merge: (1) to create microdata records that accurately represent Iowa businesses; (2) to enhance the Iowa database with information on income and expenses.

As was discussed above, the U.S. database consists of microdata records. In general, the merging procedure can be thought of as selecting records from the U.S. database that have the same characteristics (as defined by the cross-tabulations) as Iowa tax returns. These selected records may or may not be actual Iowa taxpayers -- but they do have all the characteristics of an Iowa taxpayer and therefore can accurately represent Iowa taxpayers. These records are then enhanced with information from the Iowa database to produce a database representing Iowa businesses.

The model is designed not only to calculate the distributional effects of the current law corporate and franchise taxes, but also to calculate the distributional effects of alternative tax laws. These alternative tax laws may involve a different tax base than capital and surplus. For example, a corporate income tax would require a calculation of corporate profits, and a value-added tax would require a calculation of value-added.

Noncorporate Database

Information about noncorporate businesses is imperative to a microsimulation model designed to analyze alternative tax policies that may tax corporate and noncorporate businesses under a single tax structure. In particular, any analysis of a value-added tax (which generally taxes corporate and noncorporate businesses alike) must calculate the effects of such a tax on

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[1] Compustat is a registered trademark of Standard & Poor's Compustat Services, Inc.

noncorporate business entities.

Tax return microdata on noncorporate businesses are very scarce in most states. Some aggregate, national information is maintained by the SOI, with the most recent data being for tax year 1988. Through the late 1970's, the SOI did publish tax return data on noncorporate business on a state-by-state basis. However, waning demand for such information and tight SOI budgets eliminated these state-specific studies. These SOI publications remain the best publicly available source of noncorporate tax return data, and they will be used to construct a database of Iowa noncorporate businesses.

A database of tax return information for Iowa sole proprietorships was constructed from several SOI publications. The procedure can be outlined as follows:

- Start with 1990 sole proprietorship income statement data from U.S. sources (Form 1040, Schedule C) by industry for businesses with positive net income and businesses with negative net income;

- Using historical Iowa-to-U.S. relationships, factor-down the U.S. data so that it represents Iowa sole proprietorships, only;

- Using historical information about the receipt size distribution of U.S. sole proprietorships, disaggregate each record into 9 records;

An Iowa partnership database was constructed in a similar fashion.

Database Imputations

Many tax policy analyses require data not found on either the Iowa tax return or the U.S. income tax return. In such cases, data must be "imputed" to the database. Data imputation is a process whereby nontax information is allocated to each record on the database. The allocation procedure requires the establishment of a relationship between the data item to be imputed and a tax return data item.

For example, suppose that advertising expenses are not reported separately on the tax return. Further suppose that economic analysis shows that advertising expenses are 10 percent of total expenses. One can then impute advertising expenses to each database record by multiplying total expenses by 10 percent.

Three key variables were imputed to the Iowa database: (1) total payroll; (2) total compensation including fringe benefits; and (3) expenditures on new capital equipment. All three variables are used in the analysis of a value-added tax.

Structure of the Corporate Tax Model

The model inputs the data one taxpayer at a time and then essentially replicates the calculations made by that taxpayer to minimize tax liability or maximize after-tax income, consistent with the business tax law being simulated. The model then aggregates the results for all business to determine overall effects.

The model is composed of two tax calculators, designated as the X calculator and the Y calculator. The X and Y designations are a conventional means of distinguishing the two calculators in the model. It was the convention used by the U.S. Treasury Department in developing the first large-scale microsimulation model.

The two tax calculators represent alternative tax laws. Although the calculators can represent any tax system, the X calculator usually represents current law and the Y calculator usually represents an alternative tax policy option. By using two calculators, the model can compare and contrast the economic, distributional, and revenue effects of the alternative tax systems.

Each calculator has its own set of changeable tax parameters, including the marginal tax rates, income brackets, deductions, credits, etc. These parameters are set by the user through the menu system. Data from one taxpayer are read in and processed through the two calculators in a way that is conceptually very similar to the way a firm would fill out its tax return. After a record's tax liability is determined using each of the two calculators, the desired income and tax information is stored and tabulated. The remaining records are then processed and their respective income, deductions, and tax liability are determined.

Once all the data have been processed through the two tax calculators, the tax parameter file and the results of the simulation are written to a file on the computer's hard disk that can be permanently stored for future reference. The results are printed out in easy-to-read tables.