Appendices

A. Taxable Income as Calculated within Other Cities’ Income Tax Forms
B. Additional Revenue and Cost Data for Other Cities with an Income Tax
C. Estimating the Role of an Income Tax within Tax Revenue Per Capita for Michigan’s Twenty-five Largest Cities
D. Estimating Property Tax Revenues
E. Estimating Income Tax Revenues
F. Estimating the Distribution of Taxes
G. Use of the City of Ann Arbor 1992 Household Survey
H. Rent Model
I. Impacts on University of Michigan Employees
NONRESIDENTS

(A) FROM UNIFORM CITY INCOME TAX CODE:

141.613 Application of tax to nonresident individuals

Sec. 13. The tax shall apply on the following types of income of a nonresident individual to the same extent and on the same basis that the income is subject to taxation under the federal internal revenue code:

(a) On a salary, bonus, wage, commission and other compensation for services rendered as an employee for work done or services performed in the city. ...

(b) On a distributive share of the net profits of a nonresident owner of an unincorporated business, profession, enterprise, undertaking or other activity, as a result of work done,

(c) On capital gains less capital losses, from sales of, and on the net profits from rentals of, real and tangible personal property, if the capital gains arise from property located in the city.

(B) IN PRACTICE (found in other cities’ forms):

PERCENTAGE OF WAGES FROM CITY:

Determined by: Actual # days worked (total on-job less vacation, holiday, and sick days)
Actual # days worked in city
% of Total days worked that were in city

INCOME:

MULTIPLIED BY % OF DAYS WORKED IN CITY:
Total wages, salaries, commission, tips, sick pay, etc.
Distributions of employee profit sharing plans, retirement stock purchases, etc.

CALCULATED BY BUSINESS ALLOCATION METHOD:
Net Profit (loss) from Business or Profession including Partnerships (Fed sched C; use business allocation method to determine amount in city)

CALCULATED AT 100%:
Sales & Exchanges of Property Located in City (Capital Gains & Losses; for portion occurring after city income tax initiated; Fed sched D)
Rental Income from Property Located in City (Fed sched E)

DEDUCTIONS:
ALL MULTIPLIED BY % OF DAYS WORKED IN CITY:
Employee Business Expenses (Fed form 2106; not all allowed)
Moving Expenses -- into city only (Fed form 3903 & Sched A)
IRA Deduction
Self-employment retirement plan
Alimony paid

INCOME NOT TAXABLE:
Same as for residents, but adding:
Interest, dividends and other forms of intangible income (when such income is part of a business, it shall be considered as business income taxable to nonresidents and reported on Schedule C).
CORPORATIONS

(A) FROM UNIFORM CITY INCOME TAX CODE:

141.614 Excise tax on incomes; taxable net profits of a corporation, definition

Sec. 14. The tax shall apply on the taxable net profits of a corporation doing business in the city, being levied on such part of the taxable net profits as is earned by the corporation as a result of work done, services rendered and other business activities conducted in the city, as determined in accordance with this ordinance. "Taxable net profits of a corporation" means federal taxable income as defined in section 63 of the federal internal revenue code but taking into consideration all exclusions and adjustments provided in this ordinance. No deduction shall be allowed for:

(a) Net operating losses and net capital losses sustained prior to the effective date of the tax.

(b) The city income tax imposed by this ordinance.

141.618 Part of business activity in city; apportionment of net profit

Sec. 18 When the entire net profit of a business subject to the tax is not derived from business activities exclusively within the city, the portion of the entire net profit earned as a result of work done, services rendered or other business activity conducted in the city, shall be determined under either section 19, sections 20 to 24, or section 25.

Sec. 19 The taxpayer may petition for and the administrator may grant approval of ... the separate accounting method. ...

Sec. 20 The business allocation percentage method shall be used if such taxpayer is not granted approval to use the separate accounting method of allocation. The entire net profits of such result of work done, services rendered, or other business activity conducted in the city ascertained by determining the total "in-city" percentages of property, payroll, and "In-city" percentages of property, payroll and sales, separately computed, shall be determined in accordance with sections 21 to 24.

Sec. 25 An alternative method of accounting shall be used if the taxpayer or the administrator determines that the net profits of the taxpayer allocable to the city cannot be justly and equitably determined under the separate accounting method or the business allocation percentage method ...
(B) IN PRACTICE (found in other cities’ forms):

BUSINESS ALLOCATION PERCENTAGE METHOD:

1. Calculate % located in city of:
   Avg net book value of real and tangible personal property plus gross annual
   rentals of real property multiplied by 8.
   Total wages, salaries, commission and other compensation of all employees.
   Gross revenue from sales made or services rendered.

2. Calculate straight average of above percentages (excluding any zeroes).
INCOME:

Taxable income from Fed. From 1120 or 1120S before net operating loss deduction and special
deductions.
PLUS: Gain or loss from sale or exchange of property included above
PLUS: Items not deductible under city's income tax ordinance
LESS: Items not taxable under city's income tax ordinance

TAX LIABILITY:

Income (above) multiplied by allocation percentage
Less applicable portion of net operating loss carryover and/or capital loss carryover
## APPENDIX B

### Additional Revenue and Cost Data for Michigan Cities with an Income Tax

<table>
<thead>
<tr>
<th>RESIDENT:</th>
<th>CITY REVENUE (1995-96):</th>
<th>REVENUE PER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>1995-96 Total Income Tax</td>
<td>Administration</td>
</tr>
<tr>
<td></td>
<td>Total ($)</td>
<td>Income ($)</td>
</tr>
<tr>
<td>LARGE CITIES:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detroit</td>
<td>1,258,000,000</td>
<td>337,000,000</td>
</tr>
<tr>
<td>Grand Rapids</td>
<td>84,260,000</td>
<td>32,330,000</td>
</tr>
<tr>
<td>Flint</td>
<td>78,000,000</td>
<td>26,260,000</td>
</tr>
<tr>
<td>Lansing</td>
<td>89,982,166</td>
<td>25,222,000</td>
</tr>
<tr>
<td>Pontiac</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Saginaw</td>
<td>16,800,000</td>
<td>13,000,000</td>
</tr>
<tr>
<td>Battle Creek</td>
<td>35,000,000</td>
<td>12,500,000</td>
</tr>
</tbody>
</table>

Weighted Average* 29 188

OTHER CITIES:

| Walker   | 8,792,000 | 5,200,000 | 59 | 509 | 301 | 192,400 |
| Ionia    | 3,000,000 | 1,400,000 | 47 | 500 | 233 | 75,000 |
| Lapeer   | 3,000,000 | 1,600,000 | 53 | 387 | 206 | 99,700 |
| Hudson  | 4,000,000 | 432,000 | 11 | 1,550 | 167 | 15,000 |
| Jackson  | 16,722,174 | 6,017,727 | 36 | 447 | 161 | 140,000 |
| Muskegon | -- | 6,105,000 | -- | -- | 153 | 90,000 |
| Port Huron | 17,454,522 | 5,006,303 | 29 | 518 | 149 | 159,504 |
| Portland | 2,769,560 | 531,032 | 19 | 712 | 137 | -- |
| Grayling | -- | 265,532 | -- | -- | 137 | 26,000 |
| Springfield | 8,414,800 | 706,000 | 8 | 1,507 | 126 | 164,485 |
| Big Rapids | 4,000,000 | 1,400,000 | 35 | 317 | 111 | 48,000 |
| Albion | 3,900,000 | 1,100,000 | 28 | 387 | 109 | -- |
| Hamtramck | 5,848,098 | 1,800,000 | 31 | 318 | 98 | 165,000 |
| Highland Park | -- | 440,000 | -- | -- | 22 | |

50
APPENDIX C

Estimating the Effect of an Income Tax on Tax Revenue Per Capita for Michigan’s Twenty-five Largest Cities

This appendix describes statistical analysis conducted with data from Michigan’s twenty-five largest cities. Our goal was to determine how a local income tax is associated with total tax revenue per capita.

Using multiple regression analysis, we created a model in which the dependent variable is 1990-91 total tax revenue per capita. We utilized a dummy variable for the presence of a local income tax and also included a vector of other independent variables associated with tax revenue per capita. With this model, the resulting coefficient of the dummy variable is the estimate of the average contribution of an income tax to total tax revenue per capita when other variables are held constant.

The regression equation shown below includes: 1990-91 total tax revenue per capita (R); the dummy variable described above (T); 1986 total property assessment per capita (P); 1990-91 millage levels (M); and 1989 median income (I). The Census was the source of all data except millage levels which were obtained from a report prepared by the State of Michigan entitled “The Ad Valorum Property Tax Levy Report.” Three cities (Rochester Hills, East Lansing, and Portage) were not included due to missing property value data.

\[ R = \phi + \alpha T + \beta P + \lambda M + \rho I \]

Coefficient estimates are shown in Table C-1. As discussed within the report, the estimated coefficient for the dummy variable indicates that having an income tax was associated with an average $156 greater 1990-91 tax revenue per capita among Michigan’s twenty-five largest cities when other key variables are held constant. The coefficients for property assessment and income indicate insubstantial effect upon tax revenue per capita when other variables are held constant, and the coefficient for millage indicates that an additional mill is associated with $12.80 greater revenue per capita with
all else equal. The overall equation generated an $R^2$ of .744. We also ran an alternate regression equation in which the median income variable was dropped. The result was consistent -- it estimated $155 as the coefficient for the dummy variable.

### TABLE C-1 Coefficient Estimates

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Estimates</th>
<th>T-Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dummy (Income Tax) α</td>
<td>155.9591</td>
<td>3.363</td>
</tr>
<tr>
<td>Property Value Per Capita β</td>
<td>0.0202</td>
<td>4.371</td>
</tr>
<tr>
<td>Millage Level λ</td>
<td>12.8056</td>
<td>4.415</td>
</tr>
<tr>
<td>Median Income ρ</td>
<td>0.0001</td>
<td>0.039</td>
</tr>
</tbody>
</table>

### APPENDIX D

**Estimating Property Tax Revenues**

This appendix provides a detailed description of the methodology used to develop projections of property tax revenue for the city of Ann Arbor through the year 2006. Projections were not made past 2006 because of likely changes in the annexations law affecting property tax forecasts for that year. Since property tax revenue in a given year is the result of multiplying the current assessed value of property by the current millage rate, we describe: (1) the assessment system and our methodology for projecting assessments by year; and (2) the taxation system, including the changes that would be required if Ann Arbor were to enact a local income tax, and our projections of annual property tax revenue.

**Property Assessment**

Prior to the passage of Proposal A in March 1994, assessment was based upon a property’s state equalized value (SEV), calculated at 50% of market value. Proposal A changed the property assessment system with regard to taxation by requiring the
computation of a taxable value (TV) for every property, to serve as a new base for calculating taxes. The important difference between the TV and the SEV is the manner in which they can increase over time. Whereas the SEV can increase at uncapped rates, the increase in nominal TV is capped at 5 percent or the inflation rate, whichever is lower. The inflation rate is defined as the increase in the Consumer Price Index (CPI). Initial TV assessments were created in December 1994 based on the preceding year’s SEV assessments.

Determining Ann Arbor’s aggregate TV for a given year begins with the preceding year’s combined residential and commercial TV. To this base, assessment additions are added. Additions are defined as increases in value caused by new construction, annexations, and the value of property previously exempt from taxes or not included in the previous assessment. In our calculations, total additions for combined residential and commercial property for each year are projected to equal 1 percent of the previous year’s total TV since historic data reveals that 1 percent is an approximate combined predictor. We divide total additions by the split of 57 percent residential and 43 percent commercial, since this has been the approximate historic composition.

Following additions, adjustments are made to the preceding year’s aggregate TV. Adjustments are defined as appreciation in property value. Though Proposal A limits annual TV appreciation to the CPI (at approximately 2.8 percent as forecasted by the GDP price deflator of the Congressional Budget Office), the total adjustment rate is not expected to equal the CPI because some properties will not experience an increase in TV. Residential property adjustments are predicted to equal 2 percent of the previous year’s residential TV for each year through 2006. Commercial property adjustments are predicted as slightly lower percent, equal to 1 percent of the previous year’s commercial TV for each year through 2006, in light of sluggish commercial growth during the past five years.

The current year total TV is equal to the sum of the previous year’s total TV, total additions, and total adjustments. The portion of the total TV attributable to new construction within the geographic area of the Downtown Development Authority (DDA) is subtracted from the total TV to yield the “city’s TV.” This is because the tax revenues based on the DDA are diverted to the DDA and are not retained by the city. DDA new construction is predicted to be a constant amount of $42,219,400.

**Property Tax Revenues**

Ann Arbor’s millage rates are determined each year by a vote of the City Council. The total millage for a given year is comprised of separate millage rates earmarked for different budget items including: general operating fund, employee benefits, refuse collection, transportation, debts, streets, and parks. For the fiscal year 1996-97, the separate rates total 16.8015 mills, including the general operating millage of 6.4515.

As described in the report, the city charter calls for eliminating the general operating millage if a city income tax is enacted. In effect, the income tax would substitute for this
specific millage. In our Scenario 2 and 3 calculations, we assumed this policy switch would begin in 1998 and that 1996-97 millage rates would apply through the year 2006. Thus, in scenarios where Ann Arbor does enact an income tax, total property taxes are assumed to equal 10.35 mills (16.8015 less 6.4515) until year 2006. In scenarios where the city does not enact an income tax, total property taxes are assumed to remain at 16.8015 mills until year 2006. We calculated total property tax revenue for each year by applying total millage rates to the total city TV.
APPENDIX E

Estimating Income Tax Revenues

This appendix describes the methodology used to develop projections of income tax revenue for the city of Ann Arbor through the year 2006. Estimates were generated for city residents, incoming commuters, and businesses.

Residents and Incoming Commuters Through Year 1995

Data for estimating city resident income through the year 1995 came from the three sources described below. Data for estimating incoming commuter income was based on two of these sources.

Census: 1989 Data

Income data for both residents and incoming commuters were obtained from the 5% Public Use Microdata Systems (PUMS) of the 1990 Census (in which 1989 data are reported). The 5% PUMS is a sample of 5 percent of the American population which is given a longer form of the 1990 Census. This form requests person-level data for each household member, asking items such as income, educational attainment, age, work status, and commuting behavior. The data are then weighted up to reflect the entire population. This is considered to be the best estimate obtainable of the American population for the survey’s range of data items.

For the purposes of this study, the city of Ann Arbor was selected from the national database (the Census geographic lines are aligned with the city lines). Since the proposed income tax would be levied on all residents of Ann Arbor, regardless of where they work, tables were run for all residents of the city who have income. Additionally, since Ann Arbor’s income tax also would be levied on those who work in Ann Arbor but reside elsewhere (at one-half the resident rate), we utilized the database to generate income data for these incoming commuters.

Since the Census data referred to 1989 income, we utilized a second source of data as a proxy for growth from 1989 to 1994. This source, described below, was income data associated with the Ann Arbor School District.


Income data for all residents within the Ann Arbor school district lines were obtained from the State of Michigan Department of Treasury for the eleven years ending in 1994. This geographical division is larger than the city lines and thus includes income that exceeds that of city residents. We estimate that total school district income is approximately 15 percent greater; however, we utilized its approximation of Ann Arbor resident income as a means of bringing the 1989 Census data up to 1995. This was done in two stages: First, the eleven years of school district data (1984-1994) were utilized to generate an estimate
of Ann Arbor income trend growth in real terms plus an estimate of the city’s cyclical response to changes in annual unemployment levels. This regression analysis is described fully below. The resulting trend growth and cyclical factors were utilized in combination with a CPI inflation factor to project 1994 school district income to 1995. Second, the overall nominal growth in school district data from 1989 to our projection for 1995 (+28.8 percent) was applied to the 1989 Census data (for residents within the Ann Arbor city lines plus incoming commuters) to project 1995 income.

Ann Arbor State Income Taxes: 1995 Data
State income tax return data were utilized to compare 1995 Ann Arbor resident reported income with our separate estimate of 1995 income described above. The Tax Analysis Division of Treasury was able to gather data from 1995 state income tax returns filed in the eight zip codes that encompass the city of Ann Arbor. Four of those zip codes are only partially in the city (48103, 48104, 48105, 48108). The data from these four zip codes were sent to the Department of Management and Budget’s (DMB) Michigan Information Center. There the tax returns were run through a street address database to determine whether or not they fell within the city of Ann Arbor. About 75 percent of the addresses could be determined to fall in or out of the city limits. The other 25 percent could not be determined. Typically the match could not be made because of a mistyped address on the part of the State. Therefore, we assumed that the addresses that could not be matched were random, meaning that the 25 percent we did not know had the same characteristics as the 75 percent we did know (i.e., they have the same income distribution, and they fall in and out of the city in the same portions). By multiplying the data by the following weight we were able to estimate precisely the amount of taxable income for each of the four partial zip codes that fall within the city of Ann Arbor.

WEIGHT = % of matches in Ann Arbor of those matched for the entire zip code

By aggregating the weighted partial zip codes with the zip codes that fall entirely in the city we have a very precise estimate of 1995 income data for the city of Ann Arbor. In addition to overall city income, the Treasury was also able to identify the 1995 Michigan Income Tax data for homeowners in the city. The Treasury has a list of residents who filed homestead exemption affidavits for a home in the City of Ann Arbor. This list should include nearly all Ann Arbor homeowners who have claimed a homestead exemption. This exemption is nearly always claimed and is unrelated to the income tax homestead property tax credit which is often underclaimed. Social Security numbers were taken from this list and were run against the income data from the eight Ann Arbor zip codes to determine a very precise estimate of the income distribution of homeowners in the city.

State income tax data for 1995 had to be translated into estimates of city taxable income. First, federal adjusted gross income (AGI) was taken as the basis of taxable income. Then Michigan tax return additions were added. These additions represent other state taxable income such as capital gains, interest income, and dividend income. Also Michigan tax return subtractions were excluded. These subtractions represent state income that is not taxable such as income from U.S. government obligations, military pay, income
attributable to another state, and certain types of retirement benefits. The subtractions and additions are adjustments for state taxable income; however, they provide a very close estimate of adjustments that would need to be made to determine city taxable income.

Results
The series of income estimates derived from the three sources described above are displayed in Table E-1. The 1995 estimate associated with Michigan Income Tax Data is equal to only 81.5 percent of the 1995 estimate generated by projecting forward the 1989 Census data. We associate this difference with underreporting of income within tax returns. Generally, the Census data represent what individuals think they made in income during the preceding year, which would be taxable if reported. The state income tax data represent the taxable income that was in fact reported; this is the only income the city can tax. The 81.5 percent level of reporting agrees with national averages and we therefore project it to hold in the future. Thus, our projection of 1995 income for Ann Arbor city residents is based on the $1,965 million estimate derived from state income tax data. We believe this estimate is conservative since a local income tax would require payroll withholding for the majority of city residents -- those working in Ann Arbor -- and thus may generate increased levels of reporting.

For incoming commuters, we assume that full reporting will occur since all Ann Arbor employers would be required to process and report payroll withholding of the income tax. Our $1,454 million estimate of 1995 income for incoming commuters is based on 1989 Census data projected to 1995 based on trends observed in Ann Arbor School District income data. One-half of incoming commuter income is included within total taxable income for the city of Ann Arbor as a means of generating one base to which the resident rate can be applied.

| Table E-1: Income Estimates for Individuals (Millions of Current Dollars) |
|-----------------------------|-------------------|----------------|----------------|----------------|----------------|----------------|
| DATA SOURCES:               |        |        |        |        |        |        |
| School District             | 1,748  | 1,859  | 1,939  | 1,805  | 1,802  | 2,045  |
| MI Tax -- City Residents    |        |        |        |        |        |        |
|                           | 1,965  |        |        |        |        |        |
| Census -- City Residents    | 1,873  |        |        |        |        |        |
| Census -- Nonresidents      | 1,129  |        |        |        |        |        |
| FINAL ESTIMATES:            |        |        |        |        |        |        |
| City Residents              | 1,965  |        |        |        |        |        |
| Nonresidents at 50%         | 727    |        |        |        |        |        |
| Total Taxable Income        |        |        |        |        |        | 2,692  |

As mentioned above, we performed regression analysis utilizing eleven years of Ann Arbor School District income data (1984-1994) in order to generate income estimates for the years 1996-2006. Estimated growth factors were applied to the 1995 income projections:

The original model:

In order to estimate the Ann Arbor income we outlined an exponential model relating Ann Arbor income to the independent variables of national income, unemployment, and time. The functional form of this model is:

\[ Y = ke^{\alpha t} GDP^\beta \left( \frac{U}{U^*} \right)^\gamma \]  

(1.1)

The variables:

In equation (1.1), \( Y \) denotes Ann Arbor real income, GDP is national real output, and \( U \) national unemployment rate. \( \hat{U} \) represents the estimated natural rate of unemployment. The coefficients (\( \alpha, \beta, \) and \( \gamma \)) correspond to the respective population parameters. All nominal variables were converted to real terms using the GDP implicit price deflator.

The log-linear model and alternative models:

The model was transformed by taking the natural logarithm on both sides of equation (1.1) so that we were able to use linear point-estimation methods.

\[ \ln Y = \ln k + \alpha t + \beta \ln GDP + \gamma \ln \left( \frac{U}{U^*} \right) \]  

(1.2)

The coefficient \( \alpha \), which is the partial derivative of \( \ln Y \) with respect to \( t \), is the trend rate of growth of overall Ann Arbor income. The \( \beta \) represents the relationship between Ann Arbor income and the real national income. The coefficient \( \gamma \) captures the impact of cyclical unemployment on Ann Arbor income.

Although we started with this original model, we also examined two alternative models. The first excludes the national income term, \( GDP \). The second, excludes the unemployment term, \( \left( \frac{U}{U^*} \right) \).
The alternative models are:

\[ \ln Y = \ln k + \alpha t + \gamma \ln \left( \frac{U}{U} \right) \]  
\[ \ln Y = \ln k + \alpha t + \beta \ln \text{GDP} \]  

(1.3)  
(1.4)

Collinearity:

With our original model (1.2), none of the estimated slope coefficients were statistically significant at the 0.05 significance level. Our estimates for the \( \alpha \) and \( \beta \) ran counter to expectations in that our model produced negative coefficients where we expected positive ones. It is not surprising that we experienced multicollinearity in our data, considering that we had only eleven observations for Ann Arbor personal income within a period of fairly steady growth.

We still obtained unexpected and insignificant estimates after regressing the log of Ann Arbor (real) income on time and real national income (1.4). However, the regression of equation (1.3) had a good fit as well as highly significant coefficients with the expected signs. Therefore, we opted for the later regression and discarded the others.

Autocorrelation:

Using the Durbin-Watson test statistic and plotting the residuals revealed positive autocorrelation in all of the previous models. For the regression using the equation (1.3) model, the DW was 1.0413 and the p-value 0.0024 (H\(_0\): \( \rho = 0 \)).

The autocorrelation problem was corrected by running a Feasible Generalized Least Squares (FGLS) regression of equation (1.3). The estimate of the first-order autocorrelation coefficient, \( \hat{\rho} \), was 0.4.

Estimation results:

\[ \ln Y = 21.09 + 0.0304 t - 0.461 \ln \left( \frac{U}{U} \right) \]  
\[ t \text{ ratios: } (251.572) \ (3.856) \ (-3.158) \]  
\[ R^2 = 0.9380 \]  
\[ n = 13 \]

This means that the trend rate of real growth of Ann Arbor income is 3.04 percent per year, while the cyclical elasticity is 0.46. We describe the implications of this cyclical elasticity below.
Income Projection Results:

Using our estimates of the trend growth rate and the cyclical factor, listed in Table E-2, we were able to project resident and incoming commuter income for the years 1996-2006 by extrapolating from our estimates of 1995 income. Simply, we applied: (1) the trend growth rate, estimating the growth in Ann Arbor income to be 3.04 percent every year in real terms; (2) the -.46 cyclical factor associated with assumptions of unemployment as a portion of a constant 5.5 percent natural unemployment level; and (3) an annual CPI inflation factor of 2.8 percent as projected by the Congressional Budget Office. We applied this process to business income as well. As described in Chapter 6 of the report, 1992 business income data were obtained from the Economic Census. We then projected business income for years 1993-2006 utilizing the factors above.

We utilized this model for both Scenarios 2 and 3, as described in the report. It is the unemployment variable that simulates an economic downturn and thus the difference in income projections. First, for Scenario 2, we assumed the economy would perform as it has in the recent past and that the current 5.6 percent level of unemployment would be maintained in all years through 2006. Then, for Scenario 3, we simulated the contractionary effects of an economic slowdown by assuming higher unemployment in future years as listed within Table E-3. In contrast to a steady national unemployment rate of 5.6 percent under Scenario 2, the national unemployment rate for Scenario 3 is estimated to grow to 7.6 percent by the year 2002 and remain at this level for the last five of the nine years. We intentionally assumed a deep and lasting recession to see how the cyclical loss in revenues would affect the Ann Arbor city budget.

TABLE E-3
Unemployment Rates (%) Assumed

<table>
<thead>
<tr>
<th>Year</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>5.6</td>
<td>6.0</td>
</tr>
<tr>
<td>1999</td>
<td>5.6</td>
<td>6.4</td>
</tr>
<tr>
<td>2000</td>
<td>5.6</td>
<td>6.8</td>
</tr>
<tr>
<td>2001</td>
<td>5.6</td>
<td>7.2</td>
</tr>
<tr>
<td>2002</td>
<td>5.6</td>
<td>7.6</td>
</tr>
<tr>
<td>2003</td>
<td>5.6</td>
<td>7.6</td>
</tr>
<tr>
<td>2004</td>
<td>5.6</td>
<td>7.6</td>
</tr>
<tr>
<td>2005</td>
<td>5.6</td>
<td>7.6</td>
</tr>
</tbody>
</table>

TABLE E-2: Estimates of Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Estimates</th>
<th>T-ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trend Rate of Growth</td>
<td>α = .0303639</td>
<td>t=3.158</td>
</tr>
<tr>
<td>Cyclical Factor</td>
<td>γ =-.4609491</td>
<td>t=-3.8757</td>
</tr>
</tbody>
</table>

\[ \ln Y = \ln k + \alpha t + \gamma \ln \left( \frac{U}{U} \right) \]
Estimating Population

Population estimates are required for calculating the number of personal exemptions per year, to be subtracted from taxable income at a given exemption amount.

The model:

A time series model for population estimates was developed relating the Ann Arbor population with the national population and time. The functional form is an exponential model:

\[ P = ke^{\alpha t} P_N^\beta \quad (2.1) \]

In this model, \( P \) represents the Ann Arbor population; \( P_N \) national population; and \( t \) the time trend variable.

The log-linear model and alternative models:

We transformed the equation (2.1) by taking the logarithm of both sides of the equation:

\[ \ln P = \ln k + \alpha t + \beta \ln P_N \quad (2.2) \]

Based on this model, we developed two alternative models excluding the \( \ln P_N \) term in the first and the time trend term in the second:

\[ \ln P = \ln k + \alpha t \quad (2.3) \]
\[ \ln P = \ln k + \beta \ln P_N \quad (2.4) \]

Collinearity:

Estimation of (2.2) gives us unexpected estimates of the slope coefficients, in particular of \( \beta \). Again, we experienced multicollinearity with our data. Alternative estimations of models (2.3) and (2.4) were done.

Autocorrelation:

Using the Durbin-Watson test statistic and residuals plotting revealed serious positive autocorrelation problems in all the population models. For our regression equation (2.3) the DW was 0.1225. For equation (2.4) the DW was 0.1313. The p-value for both equations was 0.001 (H0: \( \rho = 0 \)).
As with the income estimations, we fixed this autocorrelation problem by running a FGLS regression for the population model of equations (2.3) and (2.4). In this case, our estimates for the first-order autocorrelation coefficient, \( \hat{\rho} \), were 0.815 and 0.83, respectively.

**Estimation results:**

\[
\ln P = 11.191 + 0.011 \, t \quad (2.3^*)
\]

- t ratios: (133.34) (4.899)
- \( R^2 = 0.9784 \)
- \( n = 23 \)

\[
\ln P = -10.1961 + 1.125 \ln P_N \quad (2.4^*)
\]

- t ratios: (-2.752) (5.829)
- \( R^2 = 0.9817 \)
- \( n = 23 \)

Equation (2.3\(^*\)) shows that the estimated Ann Arbor population growth rate over the studied period was approximately 1.1 percent. Equation (2.4\(^*\)) shows that Ann Arbor population rose at a slightly higher rate than the national population over the sample period. We projected population figures and thus exemption counts by applying this 1.1 percent growth estimate to 1990 Census figures for three populations: (1) total Ann Arbor residents; (2) incoming Ann Arbor commuters; and (3) Ann Arbor residents age 65+ who are entitled to an additional personal exemption.
APPENDIX F

Estimating the Distribution of Taxes

This appendix describes the methodology used in estimating how different population segments would be affected if an Ann Arbor income tax were to be enacted. Population segments include: homeowners; renters, incoming commuters; seniors; and students.

The 5% PUMS sample of the 1990 Census was the primary source of data utilized for these estimates. In addition to income and other person-level data, the PUMS sample provides data on household characteristics such as property value, monthly rent, utility costs, and mortgage payments. Various subgroup data on income and property values were tabulated, and distributional impacts were determined by looking at small increments of income (in $1000 or $2000 ranges) for each subgroup of interest.

We verified the reliability of Census data for property assessments by comparing it with actual aggregate data obtained from the city of Ann Arbor Assessor’s Office. As shown in Table F-1, when the Census data is projected to 1995 terms, it is within 4 percent of the actual city data.

<table>
<thead>
<tr>
<th>Source</th>
<th>1990 Census</th>
<th>Actual City Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 Census</td>
<td>42,080,000</td>
<td>43,732,061</td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td>3.9%</td>
</tr>
</tbody>
</table>

The methods for bringing the 1990 Census data up to 1995 dollars are described following a list of defined Census terms:

**Definition of Terms from Census Data Estimates**

**Commuters:** Place of work is Ann Arbor but place of residence is not Ann Arbor. Includes those living in Michigan (but outside Ann Arbor) and those living out of state.

**Residents:** Place of residence is Ann Arbor, regardless of place of work.

**Seniors:** Ann Arbor residents aged 65 or over.
Owners: Ann Arbor residents who own their homes with a mortgage or loan or who own their homes free and clear. Household income was used to estimate tax changes for owners, since property values are assessed at the household level.

Renters: Ann Arbor residents who rent for cash, have no cash rent, or live in group quarters.

Students: Ann Arbor residents under age 35 who are currently enrolled in school, who have more than a high school diploma, and who rent or live in group quarters. Student owners and older students were excluded from this category because their tax burdens will be different from those of the “typical” undergraduate or graduate student. Since the number of students does not grow as the population does, the population growth rate was not applied to the student population.

Personal Income: Income measure utilized for Students and Commuters. Represents total person’s income minus non-taxable income (social security income and public assistance income). For Students, income includes wages or salary income plus all other types: non-farm self-employment, farm self-employment, interest, dividends, net rental, retirement, and all other. For Commuters, income includes only wages or salary. Income was reported in 1989 dollars and inflated to 1995 dollars.


Income Tax: Computed using the formula \((Y-600F)t\), where \(Y\) = Taxable income in 1995 dollars, \(F\) = average household size, 600 = expected exemption level, \(t\) = expected tax rate (.01 for Ann Arbor residents, .005 for commuters).

Property Tax: Computed using the formula \((PV/2)*0.0064515\), where \(PV\) = 1989 reported property value in Census data brought up to 1995 dollars, \(PV/2\) = State Equalized Value (SEV), and 0.0064515 = millage that would be dropped under income tax plan. Of note, 1989 Census property values allowed us to calculate SEV by taking one-half of property values. As described below, however, we converted SEV to TV in the course of projecting values to 1995.
Methods for Bringing Census Data up to 1995 Dollars

**Population:** Using the projections estimates that the population of Ann Arbor has been growing at approximately 1.1 percent per year, 1990 Census population estimates were multiplied by $(1.011)^5 = 1.0562$.

**Income:** Income projection estimates were available for the Ann Arbor School District, which as mentioned is larger than the political boundaries of the city but which serves as a close approximation of Ann Arbor income growth. Between 1989 and 1995, nominal income for the school district grew at a rate of 28.789. This same growth rate was applied to the Census data, multiplying 1989 income data by $1.287892654$.

**Property Value:** To bring 1990 property values up to 1995 estimates, average changes in actual residential taxable value estimates were used where available. These figures were available from the city of Ann Arbor for 1993-1995. To move back to 1990, an additions rate of 1 percentage point per year was added to CPI figures. Thus, from 1990 to 1991, residential assessed value increased by $(4.2+1.0)=5.2$ percent. From 1991 to 1992, it increased by 4.0 percent, and from 1992 to 1993 it increased by 4.0 percent. Increases from 1993 to 1994 and from 1994 to 1995, based on actual city averages, were 6.0 percent and 2.5 percent respectively. Note that the increase to 1995 was the first year in which TV was utilized instead of SEV. Thus, the overall increase in property values from 1990 to 1995 was $(1.052)(1.04)(1.04)(1.06)(1.025) = 1.236$. 

66
APPENDIX G

Use of the City of Ann Arbor 1992 Household Survey

The Income Tax Feasibility Study prepared by the City of Ann Arbor in 1993 derived much of its demographic information about the residents of Ann Arbor from data collected as part of the city’s 1992 Household Survey (conducted by the Information Services Department of the City of Ann Arbor.) Although the survey provides useful information for estimating the impact of a local income tax on particular resident groups -- specifically owners, renters, seniors, and students -- the additional data sources consulted for this report significantly enhance the picture. Therefore, the data from the 1992 Household Survey have been examined primarily for the purpose of reviewing past analyses of the feasibility of an Ann Arbor income tax, and seeing how and where our present estimates diverge.

The 1993 City of Ann Arbor Income Tax Feasibility Study used the 1992 Household Survey as a primary source of data to calculate the annual average change in tax payments for owner, renter, senior, and student households. That study found that the average homeowner would see a reduction in taxes, while the average renter and nonresident would see an increase. Our study used the household survey data to confirm the demographic findings, but for reasons discussed below found the household data insufficient for determining changes in tax payments.

For the most part, our results regarding household demographics concurred with those described in the 1993 report. We did however, rerun the data and account for nonrespondents in the survey sample (decreasing the true sample size from 3607 to 2913), which changed the percentage of total Ann Arbor households sampled from 8.2 percent to 6.6 percent. The 1993 report had treated the group of nonrespondents as part of the usable sample. Therefore we recalculated the household breakdowns according to whether they were owned or rented, and housed by seniors or students. These figures are included in the tables to follow.

In terms of identifying household characteristics of Ann Arbor residents, the 1992 Household Survey provides a solid foundation. But there are limitations to the household survey data in terms of using it for an analysis of income tax feasibility. The household survey data lack three important components that are key to addressing the “income tax versus property tax” issue:

- **Property tax figures**
  
The household survey does not include questions regarding property tax payments or value of home. The survey does inquire as to whether an owner’s monthly payment includes property tax, but there is no means of determining what the amount of that payment is.
Nonresident information
The Ann Arbor household survey is a survey of Ann Arbor residents. For the purpose of examining the income tax feasibility, information is also needed regarding nonresidents of Ann Arbor who either work in Ann Arbor and/or derive other income from Ann Arbor. With a shift to the income tax these nonresidents would begin to pay an Ann Arbor income tax (at one-half the resident rate) on their “Ann Arbor generated” income. Data on these individuals obviously are not available from the household survey, but are key to the income tax study.

Individual-level data
Due to the nature of the survey, it acquires household level data. This limits the ability to analyze the effect of a tax change on individuals (looking at income, age, residency, student status, owner/renter status, etc.) The use of state tax records and Census data allows our study to identify the impact of a tax shift at an individual level.

This report, in an effort to avoid some of the holes created by relying heavily on household data such as that provided by the 1992 Household Survey, arrives at findings using actual income data and estimated property tax information drawn from Census data. In addition to utilizing a greater amount of data on which to base tax impact findings, we also avoided making several assumptions regarding students, residency, and seniors made in the 1993 study.

First, we do not assume that students are nonresidents. For the purpose of looking at income taxes, students working in Ann Arbor, regardless of their official state residency status, will be expected to pay 1 percent on their Ann Arbor income. We assume it unlikely that a student working a job in Ann Arbor would list an address other than his/her Ann Arbor address on the W-2 form. Presumably, checks are sent to Ann Arbor addresses. This assumption does not correspond to the 1993 study which treated all student income as taxable at only one-half the resident rate.

Another group that the 1993 study treats differently than does our report is the senior group. In terms of definition, the 1993 study refers to individuals over 60 years as “seniors.” Our report, which does not depend on the 1992 Household Survey question (asking to list number of adults over 60 in household), uses the more standard 65 and over as a definition of senior status.

More importantly we question the assumption made in the 1993 report that senior households can be excluded from income tax calculations “because of the prevalence of retirement, pension, and social security income which is exempt from local income tax.” Census data allow us to identify specifically what percentage of seniors are still working and what share of their income will be taxable. We find that 12 percent of Ann Arbor seniors (65 years and above) report some wages and salaries.
The following summarizes information drawn from the 1992 Household Study:

I. Total Number of Households

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>2913</th>
</tr>
</thead>
<tbody>
<tr>
<td>divided by:</td>
<td></td>
</tr>
<tr>
<td>Sample as a % of Total Households</td>
<td>6.6%</td>
</tr>
<tr>
<td>Total number of Households in Ann Arbor</td>
<td>43,988</td>
</tr>
</tbody>
</table>

II. Number of Owner/Renter Households

<table>
<thead>
<tr>
<th>Owners as % of Households</th>
<th>47%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Renters as % of Households</td>
<td>53%</td>
</tr>
<tr>
<td>multiplied by: # of households</td>
<td>43,988</td>
</tr>
<tr>
<td># of owners in 'AA'</td>
<td>20,674</td>
</tr>
<tr>
<td># renters in 'AA'</td>
<td>23,313</td>
</tr>
</tbody>
</table>

III. Owner Household Breakdown

<table>
<thead>
<tr>
<th>Seniors (60+) as % of Households</th>
<th>18.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students as % of Households</td>
<td></td>
</tr>
<tr>
<td>multiplied by: % Seniors who own</td>
<td>68.7%</td>
</tr>
<tr>
<td># Seniors who own</td>
<td>20.3%</td>
</tr>
<tr>
<td>multiplied by: # of households</td>
<td>43,988</td>
</tr>
<tr>
<td>% Students who own</td>
<td></td>
</tr>
<tr>
<td>of households</td>
<td>43,988</td>
</tr>
<tr>
<td># Senior owner households</td>
<td>5,651</td>
</tr>
<tr>
<td>Owner households</td>
<td>2,340</td>
</tr>
</tbody>
</table>

IV. Renter Household Breakdown

<table>
<thead>
<tr>
<th>Seniors as % of Households</th>
<th>19.7%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students as % of Households</td>
<td>26.2%</td>
</tr>
<tr>
<td>multiplied by % Seniors who rent</td>
<td>31.3%</td>
</tr>
<tr>
<td># Seniors who rent</td>
<td>79.7%</td>
</tr>
<tr>
<td>multiplied by: # of Households</td>
<td>43,988</td>
</tr>
<tr>
<td># Senior Renter Households</td>
<td>2,712</td>
</tr>
<tr>
<td># Student Renter Households</td>
<td>9,185</td>
</tr>
</tbody>
</table>
Appendix H

Rent Model

The rental market in Ann Arbor is one that seems most affected by shifts in supply and demand not induced by taxes but by interest rates and general investment incentives. Major changes in rental prices have been caused by shifts in supply rather than by changes in the cost structure of rentals. Meanwhile, changes in property taxes have been relatively few and fairly small. Indeed, little correlation has been shown between changes in taxes and changes in rent in real terms.

Data from the city and the University of Michigan allow us to go back only six to seven years -- not enough to run a reliable regression analysis. Through the use of a price index, however, we can get an idea of percentage changes in rent during this period (see Table H-1). The rent in dollars denotes our calculation of Ann Arbor average rent from 1990 to 1996, while the price index is taken from the national CPI information. Our calculation of the real rent index involves the division of rent in dollars by the price index, with the year 1990 as the base year.

Table H-1: Comparing Local Rent Index and National Price Index

<table>
<thead>
<tr>
<th>Year</th>
<th>Rent ($)</th>
<th>Price Index</th>
<th>Real Rent Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>401.25</td>
<td>104.35</td>
<td>100.00</td>
</tr>
<tr>
<td>1991</td>
<td>414.30</td>
<td>108.47</td>
<td>99.33</td>
</tr>
<tr>
<td>1992</td>
<td>420.31</td>
<td>111.48</td>
<td>98.05</td>
</tr>
<tr>
<td>1993</td>
<td>423.66</td>
<td>114.38</td>
<td>96.32</td>
</tr>
<tr>
<td>1994</td>
<td>446.29</td>
<td>116.95</td>
<td>99.24</td>
</tr>
<tr>
<td>1995</td>
<td>454.92</td>
<td>119.56</td>
<td>98.95</td>
</tr>
<tr>
<td>1996</td>
<td>473.71</td>
<td>122.24</td>
<td>100.78</td>
</tr>
</tbody>
</table>

Source: University Housing Office, University of Michigan; City of Ann Arbor.

Table H-2: Vacancy Rates of Rental Housing around UM Campus

<table>
<thead>
<tr>
<th>Year</th>
<th>Rooms</th>
<th>Efficiencies</th>
<th>1-Bdm</th>
<th>2-Bdm</th>
<th>3 &amp; 4 Bdms</th>
<th>5 &amp; 6 Bdms</th>
<th>Overall Rate</th>
<th># of realtors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990^</td>
<td>10.0%</td>
<td>14.0%</td>
<td>3.4%</td>
<td>2.7%</td>
<td>3.9%</td>
<td>3.6%</td>
<td>7.0%</td>
<td>24</td>
</tr>
<tr>
<td>1991</td>
<td>7.0%</td>
<td>4.8%</td>
<td>6.7%</td>
<td>3.0%</td>
<td>5.8%</td>
<td>2.1%</td>
<td>4.8%</td>
<td>33</td>
</tr>
<tr>
<td>1992</td>
<td>4.8%</td>
<td>2.8%</td>
<td>3.4%</td>
<td>0.2%</td>
<td>2.5%</td>
<td>6.0%</td>
<td>2.8%</td>
<td>36</td>
</tr>
<tr>
<td>1993</td>
<td>2.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>33</td>
</tr>
<tr>
<td>1994</td>
<td>2.3%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.5%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>29</td>
</tr>
<tr>
<td>1995</td>
<td>2.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>33</td>
</tr>
<tr>
<td>1996</td>
<td>2.2%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>83*</td>
</tr>
</tbody>
</table>

Notes:
^ The category of 3 & 4 bdms (bedrooms) is termed "3 bdm & larger apts",
whereas the category of 5 & 6 bdms is termed "whole houses"
*# of property owners and managers registered with the Off-Campus Housing Program.

Source: University Housing Office, University of Michigan.
The overall vacancy rate mentioned in Table H-2 is the average vacancy rate of all rental housing registered with the University. In Figure H-1 below, we observed a correlation between the vacancy rate and real rent index. From this, we might expect that the vacancy rate plays a role to influence the real rent, as will be discussed in the formal models later.

![Figure 1: Vacancy Rates and Real Rent Index, 1990-1996](image)

Analysis of the data is complicated by the fact that a supply shift occurred from 1985 to 1991 which dramatically changed the rental situation in the city. As time has passed, however, demand has caught up with supply. As a result, real rent fell during the early 1990s and then rose again. The data in Tables H-1 and H-2 indicate that the movement of vacancy rates and the real rent index mirror one another. Using 1990 as the base year, the real rent index declines each year to a low of 96.3 in 1993. In 1994, the index jumps nearly three points to a level of 99.2 which remains almost the same (99.0) for 1995. By 1996, the rent index is at 100.2 which is almost exactly where it began. The trend for vacancy rates was quite similar in that it too declined from a high of seven percent in 1990 to a low of zero percent in 1993. Ann Arbor’s vacancy rate increased minimally in 1994 and has hovered around zero through 1996. Figure H-1 illustrates the correlation between vacancy rates and rental rates.

We utilized two models to analyze the demand for rentals and how it changes. The first model is called the “market clearing model,” in which price flexibility with no vacant rental housing is assumed. While this assumption may run contrary to what is expected in reality, this model is useful because it captures important variables such as rental, interest and tax rates, as well as population and housing prices.
The demand side (Equation 1) involves rental housing demand as a negative function of rental rates (R), while the city population (Pop), and housing prices (H_p) are positive functions upon the demand for rent.

\[ \text{RH}_d = f (R, \text{Pop}, H_p) \quad \text{(Eq. 1)} \]

On the supply side (Equation 2), we assume a positive impact of rental rates (R) upon the rental housing supply (RH_s), while interest rates (I) and property taxes (T_p) negatively impact the supply of rental units.

\[ \text{RH}_s = g (R, I, T_p) \quad \text{(Eq. 2)} \]

Based upon this model, we attempted to run a regression analysis of the data listed in the appendix. The two equations used for the regression are followed by a graphical illustration.

\[ \text{RH}_d = a_0 - a_1 R + a_2 \text{Pop} + a_3 H_p \quad \text{(Eq. 3)} \]
\[ \text{RH}_s = b_0 + b_1 R - b_2 I - b_3 T_p \quad \text{(Eq. 4)} \]

Figure H-2: The Market Clearing Model

Using the assumption of a market clearing model, rental housing demand and supply will equal one another. In other words, Equation 3 and 4 will be equal, and the following regression model will emerge (Equation 5).

\[
R = (a_0 - b_0 / a_1 + b_1) + (a_2 / a_1 + b_1) \text{Pop} + (a_3 / a_1 + b_1) H_p \\
+ (b_2 / a_1 + b_1) I + (b_3 / a_1 + b_1) T_p 
\quad \text{(Eq. 5)}
\]

However, given that most variables possess a similar trend in the past six years, we believe there are multicollinearity problems within this analysis. More data is required to solve these problems.
Another way to look at how taxes might impact rent would be to evaluate the relationship between vacancy rates and changes in rental prices. In this case, the change in the real rent index \((dR / R)\) is a negative function of the vacancy rate \((V)\), as shown in Equation 6 and Figure H-2. When vacancies were high, up to 1993, real rent fell. When vacancies were low, after 1993, real rent rose.\(^1\)

\[
(dR / R) = - f (V) \quad \text{(Eq. 6)}
\]

![Figure H-3: The Vacancy Model](image)

This is not as direct a method of understanding the effects of property taxes upon rental rates. Still, it may be more salient in explaining changes in the demand for rental units in general. Perhaps there can be a method of applying this scheme to speak to the tax issue. The argument is that, in the short term, rental prices may not change dramatically. With increased profitability accorded to the renting business, however, it is possible that the supply of rental units will increase. This in turn drives rental prices down to a “market-clearing” level in the long term as demand and supply converges. However, with imperfect market information, such an equilibrium is difficult to determine empirically.

\(^1\) An article from the November 1996 issue of Ann Arbor Observer states that twelve new apartment complexes were built between 1986 and 1991 which added almost 3000 new rental units. During that period, vacancy rates in Ann Arbor rose from less than one percent to as much as seven percent. As the growth in supply declined after 1991, vacancy rates also decreased back to levels below one percent by 1994. With declining vacancy rates, one sees a trend towards increased rental prices. Given the competitiveness of the market, rental rates seem on average to increase at a rate similar to inflation if vacancy rates are very low. This is an excellent example of the vacancy rate model of rents as opposed to the market clearing model which involves interest rates and taxes.
This analysis, therefore, while not complete, leads us to the conclusion that property owners will reap the immediate benefit of a tax shift, while renters would lose out at least during the short term. Whether these changes will persist in the long term is difficult to gauge, given uncertainty with regard to market demand and supply. Still, with no market intervention, the demand and supply of rental housing, as well as the rental rates, will tend to converge close to the “market-clearing” level that may prevent renters from losing in the long term.

Bibliography

APPENDIX I

Impacts on University of Michigan Employees

Since the University of Michigan (UM) is the largest employer in Ann Arbor, we include this separate section to discuss the broad impacts of the city income tax proposal on UM employees. In this Appendix, we show the city tax revenue that would be generated from the income of UM employees if Ann Arbor were to adopt a 1 percent city income tax.\(^2\)

We subcategorize these employees into Ann Arbor residents, non-Ann Arbor Michigan residents (in-state commuters), and those that live outside of Michigan (out-of-state commuters).\(^3\) We do not show decile distributional impacts for the university because the data are not available.

We used the university’s aggregated federal taxable gross income (TGI) paid out to all university employees for the 1995 tax year. This TGI came from the 1995 university W-2 database. Each of the employees in the database had a federal and state tax liability on earnings they received from the university during the tax year.

One special feature of this appendix is a discussion of the likelihood that the Census data undercounts the non-Ann Arbor, non-Michigan population and associated wages that would be subject to the proposed city income. We include in our discussion the apparent size of the undercounting, possible explanations for it, and its possible impact on projected total income tax revenues.

General Findings

The university had 52,406 employees who would be subject to a city income tax. These university employees earned a TGI of $1.02 billion. The proportion of Ann Arbor residents was slightly less than 47 percent (24,486 of the 52,406 employees). They earned wages in the amount of $484 million, or slightly more than 47 percent.

To calculate the tax revenue they would generate, we subtract out a $600 per person exemption multiplied by the average household size (2.9 for Ann Arbor) as follows:

\[
\begin{align*}
\text{Revenue:} & \quad [483,741,660 - (24,486)(600)(2.9)](0.01) = 4,411,360 \\
\text{Per capita tax:} & \quad 4,411,360 / 24,486 \text{ employees} = \$180 / \text{employee}
\end{align*}
\]

\(^2\) We exclude the approximately 3000 employees who work on the Dearborn and Flint campuses because they would not be taxable under UCITA.

\(^3\) These are non-Michigan U.S. residents and non-U.S. residents who do not have a Michigan Tax Exclusion Certificate on file at the university Payroll Office. We assume they all worked on the Ann Arbor campus.
The proportion of non-Ann Arbor residents subject to the city income tax was 53 percent (27,920 employees out of 52,406). They earned wages in the amount of $537 million. We split these non-Ann Arbor residents into two components: non-Ann Arbor Michigan residents (in-state commuters), of which we found 24,799 who earned $505 million; and non-Michigan residents (out-of-state commuters), of which we found 3,124 who earned $32 million. We use an average household of 3.07 for both groups. City income tax revenues that would be generated by these non-Ann Arbor residents are as follows:

Non-Ann Arbor Michigan Residents (in-state commuters)

- Revenue: \( \left[ \frac{504,868,894 - (24,799)(600)(3.07)}{100} \right] \times 0.005 = 2,295,946 \)
- Per capita tax: \( \frac{2,295,946}{24,799 \text{ employees}} = 93 \text{ / employee} \)

Non-Michigan Residents (out-of-state commuters)

- Revenue: \( \left[ \frac{31,783,423 - (3,124)(600)(3.07)}{100} \right] \times 0.005 = 130,514 \)
- Per capita tax: \( \frac{130,514}{3,124 \text{ employees}} = 42 \text{ / employee} \)

It is this last group of UM employees (3,124 out-of-state “commuters”) that may be underrepresented in the Census data. Our earlier results in Chapter 5 included only 800 nationwide employees who live neither in Ann Arbor nor Michigan suburbs of Ann Arbor but who work in Ann Arbor. However, UM data identifies 3,124 employees in this category. This discrepancy is explained simply by the fact that the Census data are unable to capture this complete subgroup. To explain the Census’ inability to capture this data we looked at the “form” of the university data and the “secondary income” attribute of employees in this population. Because the university W-2 data reflect a snapshot in time of employees and their income (at the end of the calendar year), it is likely that some of the people in this population relocated during the academic school year. While they received their W-2 at a residence out of state (their new residence), they worked part of the year in Ann Arbor. On the Census they would have reported their current location as their place of work. Likewise, if they work at UM on a seasonal basis (e.g. the spring and summer terms), their income would be “secondary,” and once again the Census would not report an Ann Arbor work location.

---

4 The average household size for non-Ann Arbor residents comes from the Census data for Ann Arbor suburbs. We use the same average household size in calculating non-Michigan resident tax revenues for lack of better data.

5 Census data reported only 800 employees who work in Ann Arbor and live outside the state of Michigan while UM data showed 3,124 employees in this category. According to the UM database, these 3,124 employees incurred both state and federal tax liabilities. Our rationale for including them in the city tax revenue calculation is that the university data are more accurate than the Census data because they represent actual numbers. These 3,124 employees most likely worked on the Ann Arbor campus in the summer or moved during the academic year. In both cases, they would have a city income tax liability. According to UM payroll personnel the university withholds taxes for all of these employees.
Our earlier results estimated city income tax revenue of $43,500 from this subgroup. Here, we have computed $130,000. The implication is that there may be an extra $86,500 of revenue not included in the report that potentially could be realized.