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Anticipating state revenue for Iowa through regression on personal income

Thomas Michael Hoenig
Iowa State University

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Anticipating state revenue for Iowa through regression

on personal income

by

Thomas Michael Hoenig

A Thesis Submitted to the

Graduate Faculty in Partial Fulfillment of

The Requirements for the Degree of

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CHAPTER I. INTRODUCTION

Changes in the Role of State Governments and Implications for Revenue Estimating

Prior to 1930 states had primarily regulating functions. They were law-enacting and law-enforcing agencies and as such, their expenditures were modest in comparison to present state fiscal requirements. Since the 1930's state governments have assumed new responsibilities or broadened existing efforts in development and compensatory policies within the state. State governments have continually increased expenditures for "people-oriented functions" such as increased social services, local school aid, and the cost of "higher" education. Capital expenditures have grown by 9 percent per year since 1960 with the bulk of this increase being for new highway systems and expansion of educational facilities. Although the federal government has assisted the states in meeting these needs, federal aid frequently is in the form of cooperative help. That is, the federal government will match state expenditures only. To obtain additional federal aid a state must increase its own revenue and expenditures. It is not surprising therefore to find that even though total federal aid or revenue sharing to state and local governments have been increasing at a rate of 6 percent per year since 1960, state expenditures have themselves risen by 7 percent per year for the same period (32).

State governments no longer deal primarily with matters
of enactment and enforcement of civil laws. Today states
find themselves in an ever-widening debate concerning develop-
ment policy and income redistribution. Vast financial respon-
sibility requires that larger sums of money not yet collected
be committed to future projects.

The average per capita state revenue for the U.S. has
risen from 93.68 dollars in 1957 to 199.34 dollars in 1968.
Iowa State revenue paralleled the U.S. growth with a change
from 89.91 dollars in 1957 to 184.63 dollars in 1968 (see
Chart 1.1 (32)). Note also that while the average rate of
growth for state governments for the U.S. was 5 percent per
year from 1950 to 1957, after 1957 this rate increased to over
9 percent per year. Iowa revenue increased at a rate of 6
percent per year from 1950 to 1957 and then it too accelerated
to a level of over 7 percent increase per year after 1957.
Other states reveal similar acceleration patterns in the rate
of growth of revenue collected (see Table 1.1 (32)).

Until after World War II estimating revenues as a spe-
cialized function was not considered by many state governments
to be an essential aspect of the state budget-making process.
Before this period state revenue could be estimated with suf-
ficient accuracy using methods involving merely averaging
previous years receipts or trending percent changes in re-
ceipts. In more recent years with the large volumne of reve-
nue involved in state government policy, small percentage

IN DOLLARS
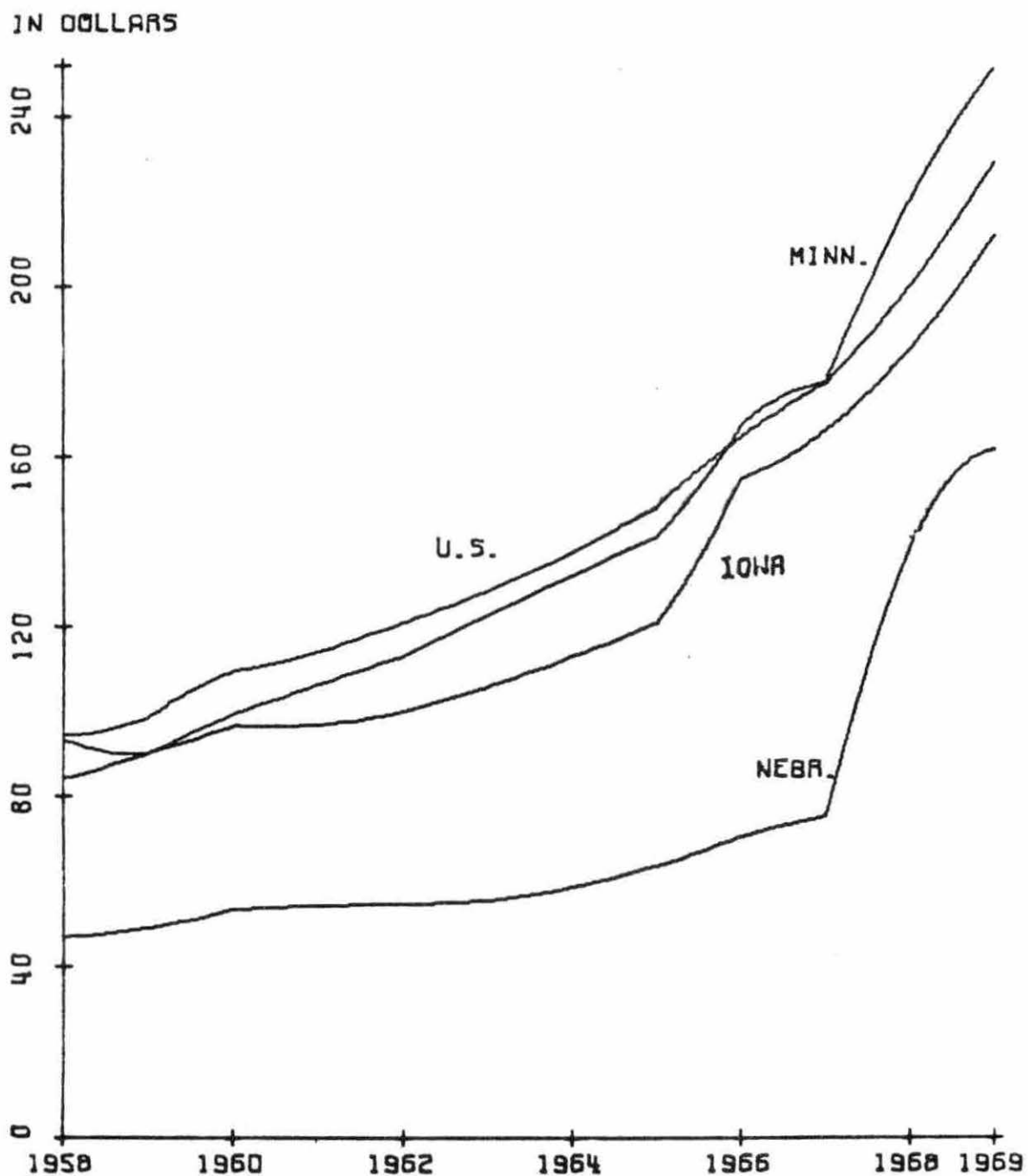
Chart 1.1 State general revenue collected per capita by Iowa.
Selected Midwestern states and total U.S. from 1958 to 1969
(32)

Table 1.1 Total general revenue collected for the U.S., Iowa and selected midwestern states from 1957 to 1968.[a] (millions of dollars)

Year	U.S.	Ill.	Ia.	Ks.	Minn.	Mo.	Nebr.
1950	8967.0	435.3	154.6	125.3	196.3	184.3	56.9
1951	-	-	-	-	-	-	-
1952	9837.5	455.2	158.2	132.9	232.6	184.9	56.2
1953	10542.1	514.4	159.3	137.3	227.6	207.2	58.8
1954	11071.4	545.8	187.9	140.1	246.5	224.4	63.5
1955	11583.5	551.8	197.8	144.5	245.4	225.8	68.5
1956	13335.0	641.1	230.4	159.7	283.9	257.4	74.4
1957	14530.7	690.7	247.9	158.0	292.6	266.2	73.7
1958	14905.0	731.9	237.1	168.3	319.8	279.6	84.8
1959	15831.4	742.5	250.0	199.0	313.7	289.4	81.0
1960	18017.1	836.4	265.8	206.6	351.9	312.9	91.3
1961	19001.0	874.3	268.2	214.3	383.0	340.9	94.3
1962	20562.0	980.4	276.5	228.3	403.4	395.3	94.8
1963	22099.4	1079.9	290.3	239.0	442.5	413.5	98.5
1964	24244.3	1122.3	311.3	248.6	479.9	463.7	111.2
1965	26104.0	1218.7	331.3	265.3	519.5	503.8	115.2
1966	29374.2	1365.2	418.0	347.0	615.0	579.8	127.3
1967	31909.0	1450.3	453.6	355.2	660.1	615.1	136.5
1968	36414.0	1730.6	502.5	357.0	814.1	657.0	194.0
1969	41981.0	1927.4	588.6	385.1	914.6	711.1	217.3
1970	49537.0	2183.0	698.4	484.2	1113.4	821.4	291.8
avg. % growth	7.7	7.7	7.2	6.5	8.4	7.2	7.7

[a] Source: (32)

errors in revenue estimation involve intolerable absolute
errors of many millions of dollars. For example, in 1935 a
2 percent error in estimating Iowa's revenue involved approx-
imately 300,000 dollars; however, the same 2 percent error to-
day would involve closer to 12 million dollars. In contrast
to this, there remains the need to plan total expenditures
and revenue to avoid deficits or surpluses of over a few mil-
lion dollars. State governments are, therefore, seeking
better and more reliable methods with which to forecast rev-
enues and plan state expenditures.

<div align="center">

The Nature of the State Revenue Systems and
Implications for Estimating Procedures

</div>

To obtain needed revenue, state governments have used
higher rates and broader coverage of consumption and income
taxes. For Iowa, 1959 sales tax collections and gross re-
ceipts from consumption taxes were 76 million dollars and in-
come tax collections were 36 million dollars. Ten years later
collections were 207.5 million dollars and 106.9 million dol-
lars respectively (32).

During the ten-year period in which these changes in rev-
enue figures occurred, Iowa experienced three different income
tax schedules. There was a one percent increase in the sales
and use tax rates accompanied by addition of items to which
the tax was applicable. Iowa residents also raised the rates
on other consumption taxes such as all cigarette sales and

beer consumption.[1]

All of the states listed in Table 1.1 have made comparable increases in tax rates and comparable additions to the tax base. In some instances, states have implemented new taxes to acquire the revenues necessary to match state expenditures (32).

Frequent rate changes and significant base changes imply a need to develop special estimating techniques which can assure accurate and responsible fiscal management during such rapid change. Revenue estimating procedures must be able to anticipate the impact on state revenue collections of changes in rate and base in the tax structure.

Alternative to accurately estimating revenue

State governments can compensate for revenue uncertainty or poor forecasting by permitting a non-balanced budget. A relatively permissive policy of non-balanced budgets would require less accurate forecasting than a policy of a carefully balanced budget. For example, one might obtain stability in state expenditures with variable revenue by creating a budget surplus in years with more revenues than expected to be used in years with lower-than-expected revenue receipts. Also, one might go into debt if receipts were less than ex-

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[1]A more detailed analysis of rate and base changes concerning the revenue sources is given in the following chapters to this study.

pected to maintain the promised level of services to the public. However, taxes to create surplus or pay debts are difficult for taxpayers to accept as necessary. A debt or surplus means that either expenditures or tax rates were too high in a previous year. Thus, a non-balanced budget, though it reduces the need for accuracy in forecasting, does not avoid the consequences of poor forecasting. Severe unbalancing is a political liability and not practical for implementation into the state fiscal system as an alternative to accurate forecasting.

A policy of averaging income would smooth short-run fluctuations in revenues by changing the income base from one year to a three or four-year moving average. Such a policy would tend to reduce large fluctuations in the tax system. The difficulties with this are that the procedure is applicable directly only to the income tax, which contributes only 30 percent of revenue to the state's general fund. Also, such averaging procedures affect the after tax income of residents of the state, which affect other consumption tax revenues. For example, if income for an individual was to fall below previous years incomes, his tax obligation would be higher than it would have been if such a system did not exist. With a smaller income and higher tax obligation his consumption would tend to be reduced by more under this system than under the non-averaging type system. Too, revenue from taxes

on consumption goods would be reduced. However, since consumption taxes are less volatile than the income tax to changes of income, the total net effect of such a system should be stabilizing for total state revenues.

Finally, the cost of implementation and administration of such a system would likely outweigh any benefits. For instance, if such a system had been implemented in 1969, over 834 thousand pay returns would have required adjustment and checking. Maintenance of the system would then require continued recalculation and records control of past data, all at accelerated cost to the state. Even though the procedure might stabilize revenue, its cost would be higher than its introduction would warrant.

Personal income: stability and influence on state revenues

Broader coverage and higher tax rates on income and expenditures have resulted in an increasing dependence of state revenues on the future level of personal income within the state. With increased dependence on this unstable tax source, difficulties increase in maintaining stability of state revenues over time. Personal income is dependent on the general level of economic conditions existing in a state which vary considerably over time. Personal income fluctuates with employment and wage rates and increasingly now so also will state revenue. For example, if state revenues are predominantly dependent on income and consumption taxes, and a

nominal rise is expected in state personal income of, say,
10 percent, there would be expected an increase in state con-
sumption expenditures of about 8 percent. For the state
treasury, there would result a final revenue growth in in-
come tax receipts and sales and consumption tax receipts from
6 to 8 percent, depending on the state taxing structure.
Conversely, however, if state personal income was to rise
less than the expected 10 percent or was actually to decline,
revenues to the state treasury would reflect this fact as
well. A 5 percent decline in personal income would imply a
fall in revenues of perhaps 2 or 3 percent, just at a time
when larger expenditures had already been authorized!

A future year's revenue may rise, remain constant or de-
cline depending on economic conditions regardless of what
state expenditures may have been planned.

Personal income for Iowa from 1950 through 1970 is list-
ed in Table 1.2 along with changes in the level and the per-
cent changes in the level of personal income. Changes in
personal income vary from as high as a positive 13.80 percent
in 1965 to as low as a minus 04.81 percent in 1955. Revenues
to the state vary from a plus 5 percent in 1955 to a plus 26
percent in 1966 (see Table 1.1 (32)). Such figures reflect
the influence of changes in the tax structure, not only fluc-
tuation in income. Still, they do give some idea of the vol-
atile nature of the revenue system.

Table 1.2 State personal income and change in personal
income for Iowa from 1953 to 1969.[a] (income in millions of
dollars)

Year	Personal Income	Change in Personal Income	% Change Personal Income
1950	3897	-	-
1951	4127	230	5.90
1952	4338	211	5.11
1953	4200	-138	-3.18
1954	4525	325	7.73
1955	4307	-218	-4.81
1956	4580	273	6.33
1957	5077	497	10.85
1958	5202	125	2.46
1959	5319	117	2.24
1960	5475	156	2.93
1961	5743	268	4.89
1962	6005	262	4.56
1963	6352	347	5.77
1964	6649	297	4.67
1965	7567	918	13.80
1966	8327	760	10.04
1967	8523	196	2.35
1968	9123	600	7.04
1969	9870	747	7.57
1970	10418	548	5.55

a
Source: (34), (35)

Unfortunately, the most sophisticated models of income
determination cannot perfectly anticipate future levels of in-
come. Thus, revenue-estimating procedures cannot estimate
with complete accuracy revenues to be received from taxation
where the base of that tax is income. However, reasonable
assumption may be developed for personal income in future
years. It is because of the awareness of the volatile nature

of income that new methods of revenue estimation are being developed.

Responsiveness of the state tax structure to income

State revenue yields can be more or less responsive to changes in personal income. How income and revenue are linked depends on the nature of the tax structure for the state. That is, revenue yields usually change by a smaller percent than changes in income, how much smaller depending on the structure of the tax system. If expenditures for the state are rising at 9 percent per year, revenues need to rise at the same 9 percent regardless of the percent income may change for that year. Since state expenditures usually rise faster than revenues if tax rates are held constant, state tax rates have been increasing. Tight budget and revenue shortages occur for two reasons. First, the rate of change in personal income is usually smaller than the rate of change in state expenditures; and second, the percent change in revenue is usually smaller than the percent change in personal income. This combination has necessitated the relatively frequent increases in tax rates and wider coverage of tax base which have occurred since 1950 and at an accelerated pace since 1960.

The responsiveness of a state tax structure is usually defined by an income elasticity coefficient. A tax is considered income inelastic if the response of change in the tax

yield T to changes in the level of total state income Y is less than one (3).

That is, if

$$E_t = \frac{\Delta T/To}{\Delta Y/Yo} < 1$$

where   To and Yo = initial levels of tax yield and income, respectively

                 ΔY and ΔT = changes of tax yield and income, respectively

E_t then is the income elasticity coefficient which measures the percentage change in the tax yield that results from a given change in income. The closer the income elasticity coefficient E_t is to 0, the less responsive the tax to income changes.

A study by J. Dockel (3) estimated the income elasticity for various tax sources for Iowa and also a weighted average of the elasticity of the combined state tax structure.[1] Dockel found that the elasticity of the Iowa income tax structure with respect to its base is 1.7, indicating a better than proportional change in revenues for a given change in income. The elasticity coefficient for sales tax receipts was estimated to be .9393 and .5153 for the cigarette tax. The weighted elasticity for the entire tax

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[1]For an explanation of the method of measurement for these coefficients, see reference 4, p. 103-104.

structure was estimated to be .8548. This last figure implies that the overall response of state revenue to changes in state personal income is less than proportional.

In general, most state tax structures have elasticity coefficients relatively close to 1 although they may vary around 1. For example, the elasticity coefficient for Missouri is 1.1. The coefficient determined for Nebraska is .7 and that for Minnesota is 1.3. The coefficient for Illinois is .9 and for Kansas is 1.0 (2).

The next question must then concern how personal income and state expenditures change in comparison to one another. For Iowa the average rate of change in personal income since 1950 has been 5.08 percent while the average rate of change in expenditures has been closer to 7.85 percent (32). In other words, expenditures have been growing 2.77 percent faster than personal income. Comparing this to the response coefficient, E_t = .8548 for revenues and neglecting the impact of rate changes, expenditures have been rising on the average of 3.11 percent more than revenues for Iowa.

The desired level of E_t for a tax structure predominantly depend on the rising expenditure needs and the degree of fluctuation in the economic conditions of the state in question. Most states find themselves in the paradoxical position of wanting a tax structure which is income elastic in order to meet rising expenditures while still wanting the structure

to be stable by being income inelastic so that revenues do
not change radically for fluctuations in income. This para-
dox occurs because state governments cannot control directly
the economic situation that might prevail in the state for
any given time period. The fact is that states are not de-
terminants of economic circumstances but are subject to them
and as such, they must attempt to estimate the expected rev-
enues and expenditure needs.

Finally, it is the unresponsive nature of the state's
tax structure combined with tendency of state governments to
increase expenditures that have occasioned the changes in
rate and base which have accrued over time in the state rev-
enue systems. It is within this context that budget and fis-
cal management must be conducted. It is within this context
that judgments will be made as to the extent the rate and
base will be required to change for a tax system. Past meth-
ods of revenue estimating techniques are inadequate. Simple
averaging of previous data cannot anticipate future revenues
which will result from a range of tax rates that might be im-
plemented. Methods are needed to anticipate the possible
conditions that may exist and may affect revenue yields for
the state while at the same time remaining within a simple
one or two equation estimating model.

The Experience of Others in Developing
Revenue Estimating Techniques

Income - population and estimating revenues

The first models describing revenue as a function of
income often focused on the question of whether existing
state tax sources could provide sufficient revenue to conduct
government affairs without reference to tax rates. For
example, Groves and Kahn (13) concentrated on calculating
income elasticities of various states using a model of the
form

$$\text{Log } R = \log a + b \log Y \qquad (1.1)$$

where   R = total tax revenue from specific source

Y = state personal income

a = regression coefficient

b = regression coefficient

The function was only fitted for those taxes where no rate
or administrative change occurred.

Expansion of the model to include taxes where rate
changes had occurred interferred with measuring income elas-
ticity coefficients because of fluctuations in revenue data
associated with rate changes. Consequently, it was often
assumed that the response of revenue to rate changes was

proportional. That is,

$$\frac{dR}{dr} \cdot \frac{r}{R} = 1$$

where   R = revenue

r = tax rate

Under such an assumption, no specific attention was required
for tax rate changes introduced into the system; thus, income
elasticity coefficients could be estimated for different tax
sources.

A modification to this method suggested by Wilford (38)
was to include administrative rate changes in the model having
it take the form

$$Log\ R = log\ a + b\ log\ Y + c\ log\ r \qquad (1.2)$$

where   R = tax revenue

Y = state income

r = tax rate

Using this function with the impact of tax rate changes ac-
counted for, Wilford suggested that states neglect stability
questions concerning revenues to income as this factor is, in
general, out of their control and concentrate on designing
the tax system so as to ensure an income elasticity greater
than 1. Other discussion concerning the model focuses on the
type of income variable to be used.

Legler and Shapiro (24) criticized these earlier models,
specifically Wilford's modifications, on two grounds. First,

it ignores the specific mechanism by which tax revenue varies with income. Second, it is based on the assumption that the yield of one tax is independent of other state taxes.

By estimating parameters of the model from regression of past data for each tax source separately and independently of how changes in other taxes affect the income-revenue relationship of the tax in question, the model does not represent the reality of the interdependency in the system. For example, this procedure assumes that an increase in the income tax rate will not affect the revenue to be received from the sales tax in any way. This criticism is, in general, quite valid. Specifically, it is valid if the model is designed to be used for a number of years where frequent changes in the tax structure may occur or if changes in the tax base or rate, though few in number, are of significant size. That is, if the time period is twenty years or there is a twenty percent change in the tax rate of a particular revenue source, most certainly this may change the value of the parameters of other estimating equations in the tax structure. If, however, the question of interdependence concerns a short period where fewer changes may occur, then perhaps for purposes of constructing simple operational estimating equations, the assumption can be made.

Legler and Shapiro set forth a number of assumptions which they believed would alleviate earlier difficulties of

independence.

They assume that:

1. There are only two distinct types of taxes, an income tax and a sales or consumption type tax.

2. The supply of taxed and untaxed goods are perfectly elastic; the non-taxed component of price is uneffected by the introduction of the tax.

3. State income and growth is independent of the tax yields. Based on these assumptions they develop a model as follows:

$$R = r_1Y + r_2C \qquad (1.3)$$

where R = tax revenue

           r_1 = income tax rate

           r_2 = sales tax rate

           C = expenditures on taxable goods

           Y = income

To equation (1.3) is then added

$$C = C(y,Y,N,P,r) \qquad (1.4)$$

where Y = per capita income

           N = population

           P = before sales price

Combining equation (1.3) and (1.4) is derived

$$R = R(y,N,P,r_1,r_2) \qquad (1.5)$$

This equation was estimated then for various states by multiple regression.

The model drops the independence assumption of taxes and considers the entire tax system (or a majority of it) rather than each particular type of tax separately. Though the objective of the model is to construct a general equilibrium type system, in implementation it suffers from the common problem of aggregation. That is, the difficulties of tying different items which are taxed differently under a single measure makes operation of the model somewhat limited. Finally, though the approach is specifically designed to account for the interdependence of the tax system, it does not determine the degree of interdependence which for future estimates might be crucial. The authors of the study themselves recognize that in order to apply the methodology of the study to more exact policy questions, it is necessary to concentrate on the tax legislations of each state individually (24).

Expenditures approach

It is argued that even with the shortcoming of the general income-population approach to revenue estimation, it is the most plausible approach since population and income are the marks of need and source respectively. However, it is argued by others that revenue-population and revenue-income ties are in fact not capable of indicating future revenue needs (29). It is argued that if one must predict the population and income values that are to serve as inputs, the

statistical significance of the model's forecast is restricted
or made indeterminant. That is, because the projected income
variable cannot be directly estimated, its values as to being
a reliable variable is subject to question.

What is offered in the place of these earlier hypotheses
and models is a theoretical approach proposed by H. Thomassen
(30) based on expenditure policies of a state rather than the
responsiveness of revenues to income. It is noted by Thomas-
sen that there exists an explicit demand for the goods that
a state can supply to its citizens and revenue will respond
to meet this need. For example, as a function of increased
automobile and truck use, there is an increase in the demand
for primary and secondary road and highway construction. It
is held that any model designed to estimate revenues for a
state should be based on state needs dependent on both im-
plicit and explicit private spending. The indicator of the
demand for public goods in this type analysis are variables
which lead the revenue series by at least one year. They
include, for example, population, employment and investment
data.

A particular model for this approach to revenue estimat-
ion designed by Thomassen does present some useful results
(29). However, the model indirectly, though no less impor-
tantly, depends on population and income for an estimate of
the demand for public goods and since it has no direct con-

straint on the revenue figure, the model may and does give incorrect results for any given time period. This is not surprising since indicators can be as misleading in regard to demand for public goods as they are in estimating incomes.

The conclusion to be drawn, therefore, is that in estimating revenues to be received by a state, there may be statistical errors associated with a projection no matter what the approach employed since any projection requires looking into the future. Whether this error is incurred directly or indirectly is of little difference to the final outcome.

Purpose

This study will not correct or improve general theory of revenue estimating or propose a new technique. It will construct revenue estimating for Iowa using the contributions already made by others when possible and recognizing the various shortcomings to meet the requirements of the Iowa tax structures. Specifically, the purpose is:

1. To identify correlates and explanatory variables of trends in base and yield of selected sources of revenues for the State of Iowa.

2. Estimate revenue yields for selected income and consumption taxes for a defined time period.

3. Evaluate the usefulness of these revenue-estimating techniques in the State of Iowa.

This study will deal with individual taxes, not with the entire system as suggested by Legler and Shapiro. This approach is taken because it is individual taxes within the system which separately and substantially may affect the final outcome; and to see how this may happen, the individual tax must be considered. Though this necessarily requires once again the independence of taxes be assumed, it does not, given Iowa's taxing structure, affect the results substantially. Finally, this approach has also been chosen because the difficulty of accounting for interdependence has not been adequately solved to date. Though Legler and Shapiro have provided an insight, they have not provided a solution.

CHAPTER II. PERSONAL INCOME TAX

State income taxation for Iowa in the nineteenth century and early twentieth centry was for the most part a failure. Success was limited because income taxes were imposed as emergency measures with public support disappearing with the emergency. Also in the early twentieth centry agriculture composed approximately 50 percent of the state's economy. Paucity of farm business records and payroll data rendered the collection of a general income tax extremely difficult. Perhaps, however, the most significant cause of failure of the income tax was local administration by unqualified and untrained officials.

The modern era of income taxation began in 1911 when Wisconsin enacted the first successful general income levy. The tax provided central administration through a state tax commission staffed with civil services employees.

Difficulties with the Iowa tax structures during the 1920's led to a reconsideration into the possibility of an income tax for the state. It became recognized during this period that the Iowa tax structure did not distribute the tax burden in accordance with ability to pay. Also, the tax base was so narrow that only a small percentage of the population was directly effected by expenditure policy, with about 80 percent of all state and local tax revenues coming from property taxes and only 19 percent of the people being property

owners. Finally, the depression had depleted the state's revenues and new sources were urgently needed. In 1932, therefore, the first extensive state personal income tax was proposed for Iowa (22).

Though collections began in 1935, the relative importance of the personal income tax has only increased in significance since World War II. In 1935, for instance, the personal income tax contributed less than 7.0 percent to state receipts; whereas, for fiscal 1970 it has been estimated to have produced 113.3 million dollars in net revenue or 30.0 percent of total revenues collected by the state, second only to the sales tax in overall collections. The rise in revenues from income taxation has been most noticeable since 1964 (see Chart 2.1 (20)). This sharp rise has occurred, first, because the ever-increasing need for revenue combined with greater emphasis on equity in the tax system has caused legislators to shift to the income tax for needed revenues. Second, revenues have risen because the tax base (i.e., personal income) grew at a significantly higher rate during this period than during previous periods. Thus, given a response coefficient for the income tax of $E_t = 1.7$, large increases of personal income caused revenues to increase by significant magnitudes (see Table 1.2 (34) for level of personal income).

MILLIONS OF DOLLARS
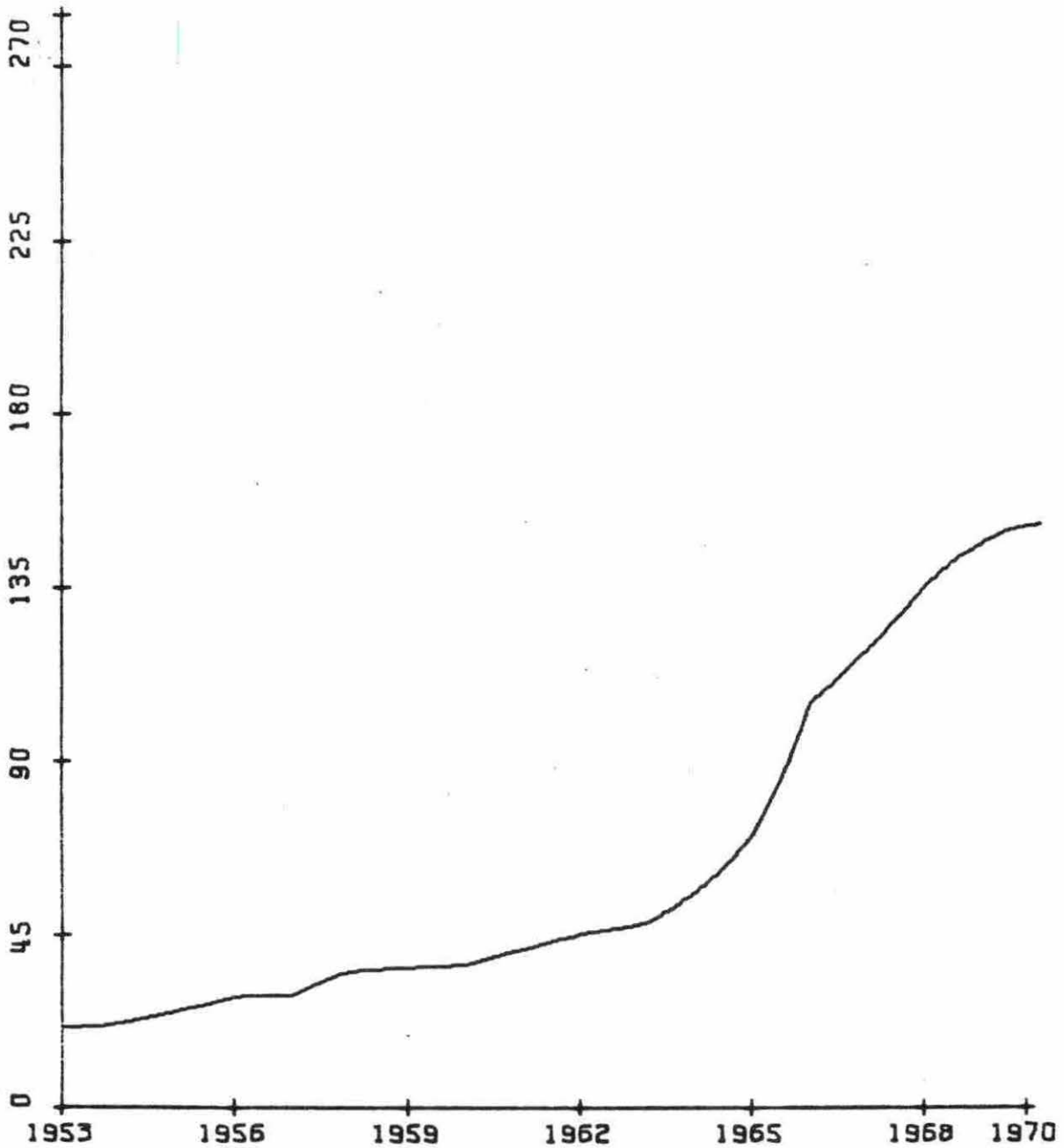
Chart 2.1 Gross revenue collected per year by the state
from the income tax in Iowa from 1953 to 1970   (20) (17)

Structure of the Income Tax System in Iowa

The income tax base for Iowa is defined as:

$$TI = AGI - FD - D$$

$$TP = r(TI) - C$$

where

TI = taxable income

AGI = adjusted gross income

FD = federal tax paid

D = state deductions (itemized and standard)

TP = tax payable to state

C = personal and dependence credits of 15 and 10 dollars respectively

r = applicable tax rate

During the period considered in this study the only major legal change which occurred in the base has been the increased allowance from $7.50 to $10.00 for each dependency credit. The only influences effecting the base have been those initiated by changes in the federal tax structure which is deductible on the Iowa Tax Report. This would include, for example, the effects of the tax reform of 1964.

Though no major changes occurred in the tax base itself, a number of changes have occurred in the applicable tax rates. From 1958-59 to 1964-65 the rates were:

0.75¢ on the 1st	$1000 of taxable income
1.50% on the 2nd	$1000 of taxable income

2.25% on the 3rd $1000 of taxable income

3.00% on the 4th $1000 of taxable income

3.75% on the 5th to nth $1000 of taxable income

For the period 1965-66 to 1966-67, one aspect of the rate structure was changed to where the rates for the 10th to nth $1000 of taxable income was 4.50 percent. The rates were changed again for the period 1967-68 to December 31, 1970. The rates for the 1st thru 4th $1000 taxable income remained as before. Changes which then occurred were as follows:

3.75% on the 5th to 7th $1000 of taxable income

4.50% on the 8th to 9th $1000 of taxable income

5.25% on the 10th to nth $1000 of taxable income

Effective January 1, 1971, tax rates for the 1st to 2nd $1000 of taxable income remain as before. Other changes are as follows:

3.00% on the 3rd $1000 of taxable income

4.00% on the 4th $1000 of taxable income

5.00% on the 5th to 7th $1000 of taxable income

6.00% on the 7th to 9th $1000 of taxable income

7.00% on the 9th to nth $1000 of taxable income

The nature of a state's tax rate structure, that is, whether it is progressive or regressive, is best understood by computing the ratio of the percent of tax paid to the percent of income earned (AGI in this instance) and observing its movement as higher income levels are examined. Whether a tax

system is progressive or regressive is determined by observing whether this ratio is rising or falling as income increase. The degree of progression or regression of the tax structure is determined by the range the values of the ratio assumes as incomes rise. If the ratio increases as incomes rise, it is an indication that the structure is progressive and similarly, if it remains constant or declines, this implies it is proportional or regressive. For Iowa, in 1969, the ratio of percent of tax paid to percent of AGI ranges from .8004 to 1.07 for the income group of 6 to 10 thousand dollars. This ratio is 1.073 for the income group of 10 to 15 thousand dollars. The ratio ranges from 1.6 to 1.7 for the remaining 15th to nth income group. Also, the 6th to 10th income group paid approximately 36 percent of the income tax revenue the state received. The 10th to 15th income group contributed 26.5 percent of income revenues for the state while the remaining 15th to nth group contributed 30 percent of the revenues to the state (see Table 2.1 (17)). This suggests that the Iowa income tax structure is slightly progressive with the main tax burden falling on the middle and upper middle income groups.[1]

Finally, a minor change in the tax administration occurred with the introduction of a withholding system into the struc-

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[1]One should be cautious when interpreting these results. Adjusted gross income is, as the name implies, an adjusted figure. Data concerning personal income and its distribution with respect to tax paid would perhaps be a more valid measure of the tax burden in Iowa. However, such figures are not readily available.

ture in 1966.

Table 2.1 Distribution among income brackets of adjusted
gross income and state tax payment with estimates of relative
tax burden derived from 1969 state tax returns.[a]

AGI Bracket	Share of AGI (percent)	Share of Tax Paid (percent)	Tax Burden[b]
under 3000	8.25	.82	.0994
3000-3999	5.53	1.65	.2983
4000-4999	6.37	3.03	.4754
5000-5999	7.09	4.60	.6497
6000-6999	8.12	6.50	.8004
7000-7999	8.94	8.15	.9116
8000-8999	8.72	8.68	.9954
9000-9999	7.77	8.34	1.0030
10000-14999	20.78	26.53	1.7760
15000-19999	6.52	10.56	1.6190
20000-24999	3.16	5.70	1.8030
25000-29999	1.91	3.58	1.8740
30000 to nth	6.85	11.86	1.7310
Total	100.00	100.00	1.0000

[a]
  Source: (17)

[b]
  Column 3 divided by column 2

An Income Tax Model

The income tax revenue estimating model developed in this
study is comparable to completing a single simple state income
tax return. First, the expected income for the state is deter-
mined. Second, the expected allowable deductions are esti-
mated. Net taxable income is derived by subtracting state and
federal deductions from income and the expected tax rate is

applied to this net figure to estimate the income tax levied by the state. Finally, to get expected taxes to be paid, the estimated personal and dependency credits are subtracted from the tax levied figure.

That is,

$$NTI = AGI - FD - D$$
$$TL = (NTI)(ATR)$$
$$TP = TL - M(DC) - N(PC)$$

where

NTI = net taxable income

AGI = adjusted gross income

TL = tax levied

TP = tax payable to the state

DC = dependency credits

PC = personal credits

ATR = aggregate tax rate

FD & D = federal tax paid and state deductions

M = dollar value of one dependency credit

N = dollar value of one personal credit

and where each of the variables on the right side of the e-quation must be individually estimated over time.

The method of estimation described here will yield useful results if the following assumptions hold. First, the distribution of income within the state does not shift significant-ly over time. Second, the population of the state does not

drastically change over time. Finally, the income tax struc-
ture does not change in essence over time. These assumptions
are reasonable with respect to Iowa and are not likely to be
effected significantly in the foreseeable future.

Adjusted gross income

For Iowa, AGI is personal income excluding transfer pay-
ments. It includes personal contributions for social
insurance by residence but does not include social security
or unemployment payments to residents. Employer contri-
butions to retirement systems, life insurance and medical
insurance are included in personal income but not AGI. On
balance, AGI is smaller than personal income but is effected
by economic circumstances in relatively the same manner. It
has remained about 70 percent of personal income over time.

Precisely because AGI and personal income are effected
similarly by the general economic circumstances existing in
the state and because they have shown a definite proportional
relationship to one another over past years, a regression
analysis was conducted and model constructed for estimating
the dependency relationship between the two variables. The
equation estimated was for AGI a function of personal income.
The results were as follows:[1]

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[1]Throughout this chapter the superscript (*) indicates
the coefficient to be significant at the 5 percent level while
(**) indicates the coefficient to be significant at the 10
percent level. Absence of the asterisk superscript indicates
the coefficient to be nonsignificant.

$$\text{Log AGI} = -.870^* + 1.1848^* \text{ Log Y}$$
$$(.1869) \quad (.0487)$$

where   AGI = adjusted gross income

         Y = personal income

and where, because a constant proportional relationship between Y and AGI is observed, a log functional form is estimated.[1]

The R^2 term for the equation is .984. Since the coefficients in the model are significant and with the high R^2 coefficient, indications are that the relationship as hypothesized does indeed hold and reliable values may be obtained for AGI from this equation which will be used in the final estimation of income tax paid to the state.

Federal deductions

As incomes rise, tax obligation to the federal government rises. Thus, in Iowa, deductions against AGI for federal tax payments must also increase assuming no changes take place in the state policy concerning federal deductions.

However, exogenous changes in the federal tax structure may occur and if so, will shift the level of federal deduction. For example, the 1964 federal tax reform lightened federal tax obligations and decreased total federal deductions

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[1]In the remaining analysis of the income tax, the models identified all assume constant rate of growth between the variables. As log functions are used, therefore, a separate comment will not be made in each instance.

on Iowa returns by 5 percent as opposed to a normal increase
of 5 percent brought on by changes in incomes.[1] Thus, Iowans
paid more state income tax because they paid less federal
tax.

Federal tax changes cannot be anticipated directly
for future years. They may for past years be taken into ac-
count by the introduction of dummy variables which will shift
the linear function to allow for the effect of a change in
the federal system. The dummy variable is determined by con-
structing a column of 1's and 0's for each major change in
the federal tax rules which occur over time. A 1 is entered
in the column for years in which the specific tax structure
was in effect and 0's are entered elsewhere. These separa-
rate columns are then combined with the columns of observed
data on which a regression analysis is to be conducted. In
this manner separate intercept coefficients are estimated for
each of the different federal structures which were in effect
during the period from which the data was drawn.

Therefore, contending that federal deductions can be
determined as a function of income if account is taken for
outside changes in the federal tax structure, a regression
analysis and equation is developed to test the feasibility

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[1]Changes in federal deductions can be observed in Table
7.1 of the Appendix.

of the relationship. The results are as follows:

$$\text{Log FD} = -2.52* - 2.61*D_1 - 2.52*D_2 + 1.38* \text{ Log Y}$$
$$\qquad\quad (.7310) \quad (.7575) \quad (.7748) \quad (.1947)$$

where   FD = deductions to state tax obligation resulting from federal tax payments

Y = personal income

D_1 = dummy variable used to derive a shift parameter for 1964 tax reform

D_2 = dummy variable used to derive a shift parameter for introduction of surtax in 1968

Note that the introduction of the surtax in 1968 brings the intercept coefficient to its 1964 level and since the surtax was only a temporary phenomenon, ending in 1971, the particular coefficient may be omitted from the model.

The R^2 term for this equation is .862. This lower R^2 coefficient is not a surprising result, given the explanation that the federal tax system is a relatively volatile structure and difficult to judge as to total effect on deduction to the state. However, the R^2 term and significance levels of the coefficients still indicate a functional relationship between personal income and federal tax deduction and the equation can be used to determine estimates of federal deductions for Iowa.

State tax deductions

As with federal deductions the prime determinant for the

level of state deductions will reasonably be the level of income for the state. As incomes rise so also do demands on the individual incomes within the state. So, more opportunity for deductions to the state increase as well. Also, as incomes rise there is cause to be more aware of allowable deductions since larger incomes imply larger tax obligations and it is to the individual's advantage to minimize his tax obligation through deductions.

Also, since standard deductions have a maximum limit of 250 dollars, it is assumed here that this figure will remain a relatively constant proportion of total deductions over time and, therefore, not require strict separation as an estimated variable for the general model.

The model then derived based on this discussion is as follows:

$$\text{Log } D = -2.470^* + 1.3428^* \text{ Log } Y$$
$$(.2947) \quad (.07681)$$

The R^2 term was estimated to be .967. This result, together with the observed significance levels for the coefficients in the equation, support the argument that state deductions are directly a function of income.

Aggregate tax rate

In order to construct an equation for estimating an aggregate rate of taxation for the state, it is important not that rate changes occur over time but rather that these changes do not effect the basic structure of taxation. What

this means is that though the rate may be altered over time,
the important fact is that it does not change, for instance,
a regressive tax system to a progressive system. For Iowa,
in past years and indications are that for future years, no
extreme structural changes in the system with respect to the
tax rate have or will occur. Therefore, it may be assumed
that the Iowa structure will remain slightly progressive with
the burden remaining on the middle income bracket. The effec-
tive aggregate tax rate (the percent of tax levied to taxable
income) is then a function of the average existing tax rate
and the taxable income for the state.

Finally, in estimating an equation for this variable from
past data, it is necessary that allowance be made for the im-
pact of the 1966 introduction of a state tax withholding
system. Again account may be taken for this influence on tax
receipts with the introduction of a dummy variable into the
model.

The equation then derived is as follows:

$$\text{Log ATR} = -2.047* - 2.035*D_1 + \text{Log } .2094* \text{ (NTI)(AR)}$$
$$(.0303) \quad (.0349) \quad\quad (.0166)$$

where   AR = average tax rate for all levels of AGI

ATR = aggregate tax rate

NTI = net taxable income

D_1 = dummy variable designed to account for influ-
ence of introduction of withholding into Iowa
tax system in 1964

The coefficient for the D_1 variable was determined to be

significantly different from the constant term, indicating an improvement in collections brought on by the administrative change.

The R^2 term for the model is .989. This is not a surprising result when one considers that the only explainable variation for the model might be that there is a tendency toward a more progressive system with changes in the tax rate. However, this would be slight given the explanation that the tax structure is designed so that the majority of the burden falls on the middle level of income.

Dependency credits

What remains then for completion of the income tax model is the determination of personal and dependency credits which must be subtracted from the tax-levied figure to derive a tax payable figure. These estimates could best be determined if figures were available for the distribution of age groups within Iowa and their relative changes over time. However, data for these figures are only available for five years and use of this approach is, therefore, precluded at this time.

Attempts were made for regressing combinations of total population data and time in an effort to determine trends in the credit figures. However, the fits were quite poor and the coefficients were in one instance negative for population and in each instance statistically insignificant at the 5 percent level.

It was, therefore, decided that the best estimates could be made by merely using an average change in the respective figures for recent years and applying this average to the year in which an estimate is desired.[1]

Restatement of the income tax model

Having dealt with the major elements in the tax structure, it is desirable to review the general model for estimating revenue from the income tax source. The model is again stated as follows:

$$NTI = AGI - FD - D$$
$$TL = (NTI)(ATR)$$
$$TP = TL - m(DC) - n(PC)$$

where the variables have been defined on page 36 above.

Implementing the model for years 1958-59 through 1969-70, the estimates derived are quite good (see Chart 2.2 (20)). The comparison of the figures for actual data obtained for these years to estimated data obtained from the general model shows that the estimated values follow closely the actual figures for income tax paid to the state. Deviations of actual and estimated data are less than 1 million dollars or 3 percent .

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[1]This method hopefully will not be necessary for future years since figures are now being made available for population by age on a yearly basis for states. From these figures it may be possible to determine accurately how these respective credits will behave.

The results derived from implementation of the model for estimating future state revenues from this source remain consistent with past observed data (see Table 2.2) and Chart 2.2 (20)). The income variable used for the model was derived

Table 2.2   Estimated state income tax revenue for Iowa for 1970-1973 based on estimated personal income assumed by extrapolation of past growth trends from 1948 to 1969. (millions of dollars)

Year	Personal Income	State Revenue
1970	9986	109.5
1971	10450	133.1
1972	10950	143.3
1973	11500	155.0

by extrapolating income trends.[1] These estimates show a slight drop in revenue for 1970 of about 2 percent due to the fact that the level of income increases by less than 100 million dollars. This relatively small increase in income implies an increase in the tax levied figure of less than

[1]A more detailed discussion of the origin of the income variable is considered in Chapter V of this study.

MILLIONS OF DOLLARS

X ACTUAL
— ESTIMATED

1958 1961 1964 1967 1970 1973
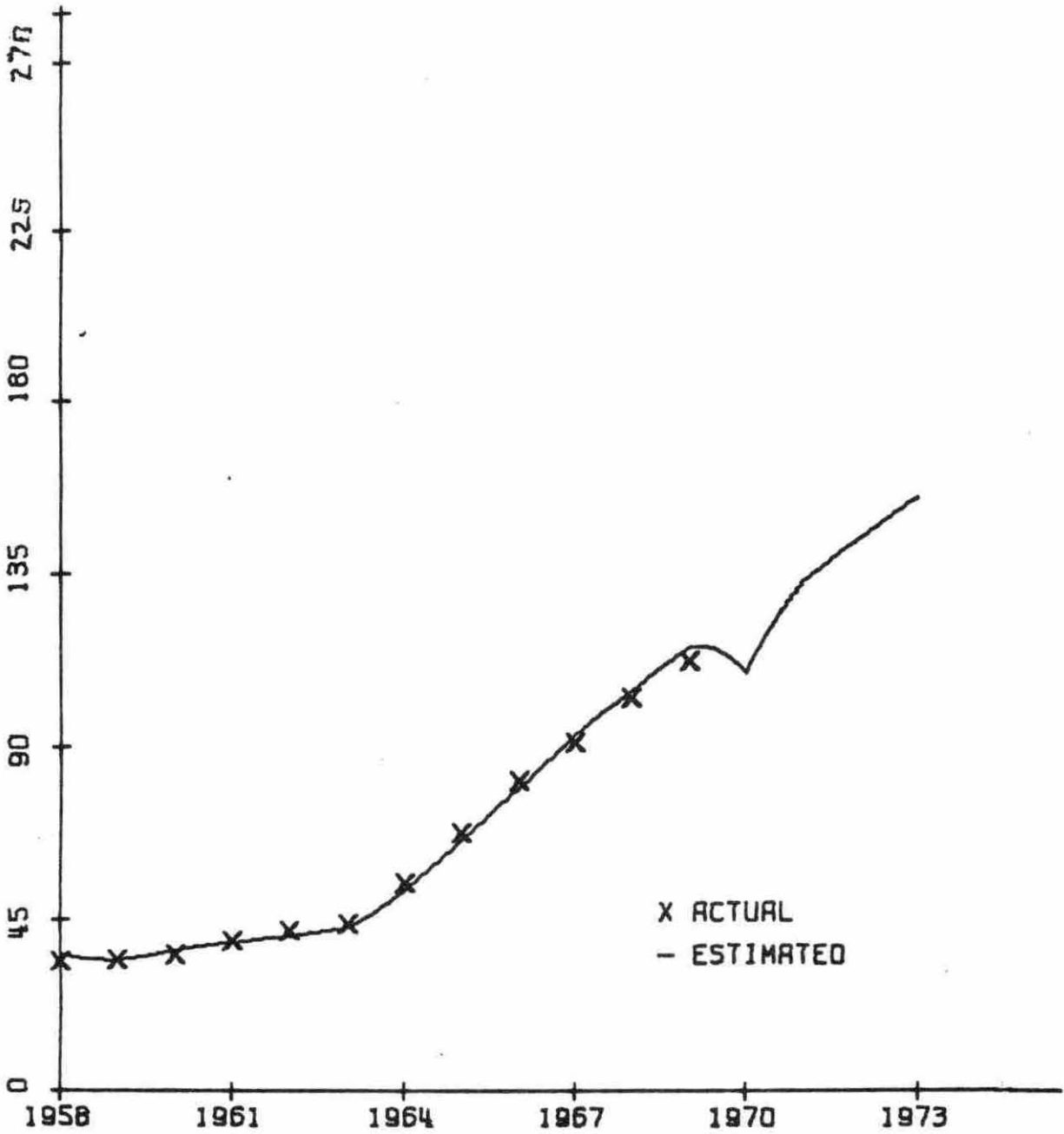
Chart 2.2 Revenue estimates per year for the Iowa income tax from 1958 to 1973 with actual collections for comparison (20)

one million dollars. Also, the credits from the state tax liability figure increased by four million dollars. This, therefore, caused net taxes paid to decline by nearly four million dollars or 3.5 percent. The following year shows a rise in revenue of about 22 percent caused by an increase in income of about 5 percent and a general increase in the tax rate schedule (for rate schedule, see "Income tax structure" in this chapter). For years 1972 and 1973 the revenue path continues to rise at a rate of about 7 percent.

These results are entirely reasonable and if the income projections themselves are correct, the revenue model can be of considerable use for estimating revenues to the state from the personal income tax.

CHAPTER III.   RETAIL SALES AND USE TAX

Sales Tax

The sales tax is a tax on the retail sales of tangible
property or services by individual economic units. It is an
ad volorem tax which is a tax on the value of the items sold,
not the quantity involved in the sale. It is, therefore, a
tax on the dollar volume of expenditures by the residents of
a state.

The sales tax was delayed from implementation into the
tax structure of most states because of a fear that taxation
of sales might cause migration into tax-free states. This
fear was based on the fact that the Supreme Court had been
zealous in barring taxation of transactions of an interstate
character. Sales made to customers outside a taxing state
and sales made by merchants who were outside a taxing state
to customers in a taxing state could not be taxed. This
ruling had the effect of stifling any attempt to impose a
tax on sales.

The depression of the 1930's broke through some of
these obstacles. The states saw that the general taxation
of sales was a source of revenue which fluctuated less over
time than did the income tax. States receiving increased
pressure to reduce the property tax burden and experiencing
critical financial difficulties saw the sales tax as a means
to help remedy their situation. In 1933 thirteen states

enacted a general tax on retail sales and by 1938 the number
had increased to 24 states. World War II halted this move-
ment, but afterwards, as states began once again to provide
increased services, the growth of the sales tax soon follow-
ed. This growth was evident not only in the number of states
using the tax but also in the amount of revenue the tax pro-
vided to the states. In 1950 twenty-eight states levied a
general sales or gross receipts tax involving 1.68 billion
dollars. In 1969 the number of states using the tax had in-
creased to 44, and the revenue had grown to 12.44 billion
dollars (32).

There were several specific factors which led to the
implementation and increased dependence on the sales tax as
a source of revenue in Iowa. First, there was the need to
ease financial stresses resulting from the depression of the
1930's. Directly related to the depression was the increased
pressure on the state to provide additional government ser-
vices. A second cause was the strong pressure to broaden
the tax base away from reliance on property taxation for
state revenue. Finally, income taxes were regarded as un-
reliable and unstable producers of revenue, fluctuating
directly with movements of income. This contrasted with con-
sumption expenditures which were observed to be more stable
and thus more dependable as a source of state revenue.

From 1952 and until the mid-sixties, revenue from sales

tax grew at a rate averaging a little below 4 percent per year. This involved an increase from 51.6 million dollars in 1952 to 77.4 million dollars in 1964. After 1964 receipts from the sales tax increased substantially, rising from 77.4 million dollars to 181.4 million dollars in 1969 (see Chart 3.1 (16)). This accelerated growth after 1964 was the result of three interrelated factors. The first was simply the normal rise in sales tax revenues associated with rising income. Given that the income elasticity of the sales tax is approximately equal to .9, then the rapid growth of income after 1964 (see Table 1.2 (34)) should have indeed been accompanied by a significant increase in sales tax receipts. A second cause for the accelerated growth was an increase in the applicable tax rate from 2 to 3 percent in 1967. This tax increase implied an additional 36 million dollars over the revenue that a rate of 2 percent would have yielded for the same tax base. The third factor causing the rapid increase in revenue was the expansion of the applicable tax base to include selective services. This widening of the base implied additional taxable sales in 1967 amounting to roughly 400 million dollars or 12 million dollars in tax revenue.

Though receipts from the sales tax have become the dominant source of revenue to the state, the more recent emphasis on equity in taxation has caused a movement away

MILLIONS OF DOLLARS
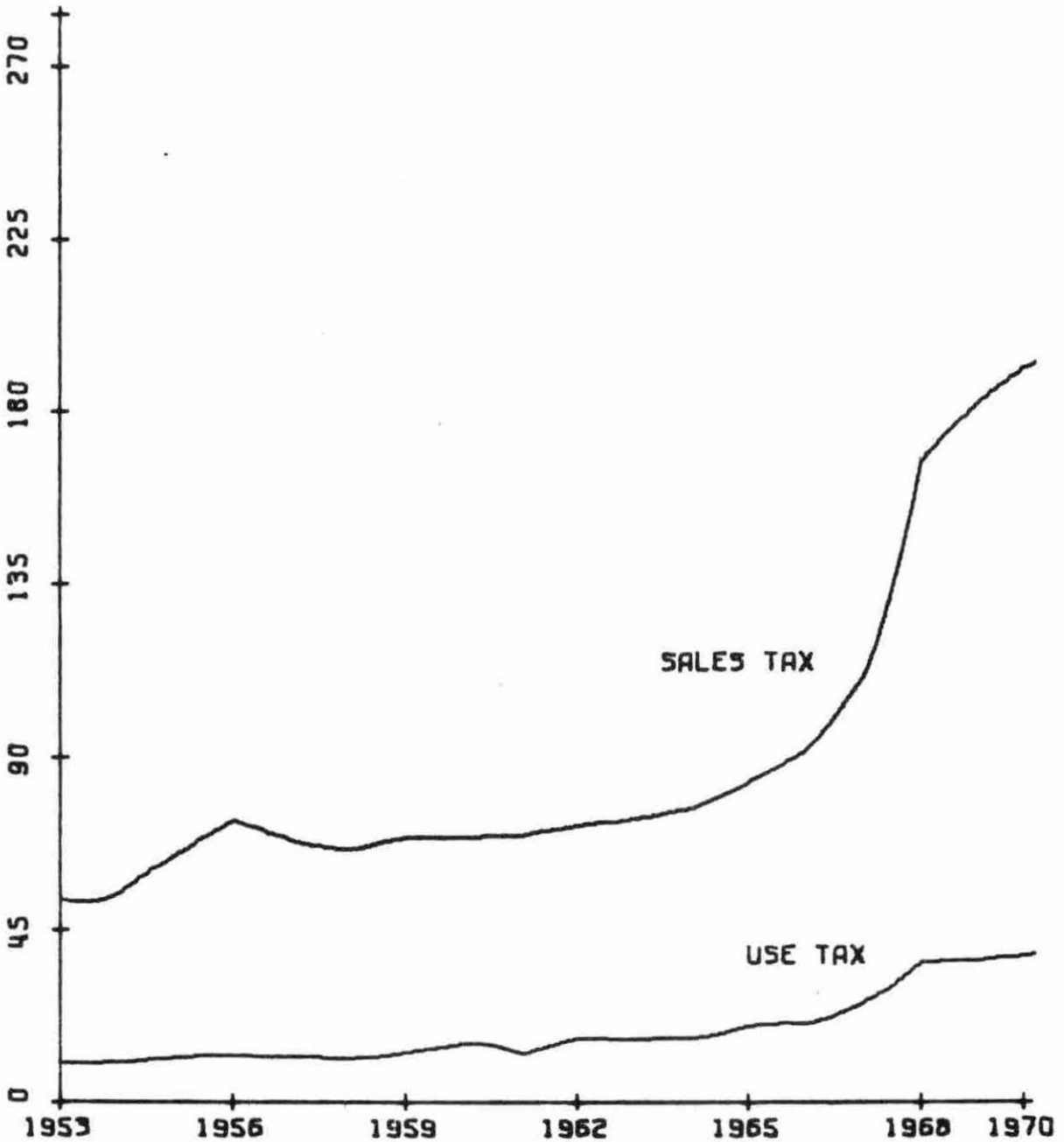
Chart 3.1 Revenue collected per year by the general sales and
use tax in Iowa from 1953 to 1970   (16)

from relatively strict reliance on the sales tax for state
revenue. In 1952 the 51 million dollars of revenue the sales
tax furnished the state was approximately 54 percent of to-
tal state revenue collected. The 1969 figure of 181.81
million dollars was closer to 45 percent of state revenues.
Most of the 9 percent drop in relative yield in the sales
tax was assumed by the income tax which increased from 21
percent of state collections in 1952 to nearly 30 percent in
1969.

Use Tax

The use tax is a state levy on commodities purchased
outside a state but brought into the state for use. As
state retail taxes grew in number, the strong protection
then given by the Supreme Court to interstate commerce was
troublesome to state tax administrators and retailers alike.
States handled the problem by introduction of the use tax
which, in 1938, the Supreme Court held to be constitutional.
Designed merely as a supplement to the sales tax, its rates
and application are usually identical to the retail sales
tax.

The use tax was assumed into the Iowa tax structure
shortly after the introduction of the sales tax. It is
specifically designed for the task of preventing the poten-
tial sales tax avoidance by out-of-state purchases and to

give some degree of protection to merchants in broader areas
of the state. The use tax has assumed a growth path nearly
parallel to that of the sales tax (see Chart 3.1 (16)). In
volume the revenue has increased from 7.6 million dollars in
1952 to 39.1 million dollars in 1970. As with the sales
tax, the most rapid period of growth in revenue from the use
tax was from 1964 through 1969. The reasons for this growth
is the fact that the tax is indeed a supplement to the sales
tax. It assumes the same basic nature and income and tax
rate changes apply nearly identically to each. Thus the
rate, base, and income changes which occurred during this
period and caused significant gains in sales tax revenues
also caused significant gains in the use tax collections.

Prospects for the Sales and Use Taxes

The most severe criticism of the sales and use tax has
been its inequity among taxpayers. The tax is on consumption
and it is argued that since consumption must absorb a higher
percentage of income for the poor than for the rich, it is
regressive. That is, its rate as a percentage of income is
higher for the poor man than for the rich. The extent of re-
gression depends on the extent of the coverage.

With the existing pressure for a more equitable tax
structure, the State of Iowa has for the most part already
increased the bounds of the sales and use tax to their

feasible limits. In 1969 expenditures on items subject to the tax was 7.2 billion dollars or 71.9 percent of personal income received by residents of the state. The type of item which would require inclusion into the Iowa tax base, if it were to be broadened, generally tends to either increase the regressive nature of the tax or is difficult to administer. For example, if the sale of new housing was assumed into the sales tax base, a definite increase in state revenues would result since new housing sales ranged between 161 and 183 million dollars per year from 1965 through 1969. However, such a broadening of the base would, it is often believed, also tend to extend the regressive aspect of the tax. This regressive aspect, whether imaginary or real, accompanying the inclusion of housing into the tax base would severely increase resistance to the sales tax in general.

Some difficulties of administration which reduce the possibilities of broadening the base can perhaps best be pointed out by referring to a past example. In 1967 when the extension of the base was made to include selective services, two of these services were to be advertising and construction. However, the taxes were strongly opposed by the special interests involved which reduced possibilities of voluntary compliance. With the help of a strong lobby, both types of services were removed from the tax base within a year and a half of their institution.

For similar reasons other services such as medical care
will most likely not be included in the tax base within the
near future.

If the goal of the state is to provide a more equitable
tax structure, it is probable that the relative importance
of the sales tax will decline. Pressure to hold the rate
and base of the sales and use taxes at their present levels
in Iowa will indeed slow the growth of revenue from this
source. As additional revenues are required it is reasonable
to assume that the income tax, not the sales tax, will be the
more severely and frequently changed revenue source in the
state taxing structure.

Iowa Sales and Use Tax Structure

Sales tax

A tax of 3 percent is levied on the retail sales of
goods and services to consumers of the State of Iowa. In
Iowa, a retail sale is defined as a sale to consumers or users
for any purpose other than for processing or resale. This
does not include rents, doctor fees, advertising or elec-
tricity and steam used in the processing of tangible personal
property, for ultimate retail sales. However, it does in-
clude the sale of tangible personal property, electricity,
water and communication services. Admission and operation
of amusement enterprises are also included in the definition.

Exempted from the tax are purchases by manufacturers where
these materials are used in the performance of construction
contracts or for purposes of resale or for further process-
ing. Also, exemptions include gross receipts from transpor-
tation services, tickets of admission to state, county or
local fairs or such receipts from charitable, educational,
or religious institutions, and the trade-in value of an item
which is not in excess of the original purchase price, pro-
vided proper records are kept. Exemptions are granted to
farmers on material used in the production of agricultural
products for the market. The exemptions consist of materials
used in disease and weed control, insect control, the health
promotion of livestock and plants as well as fuel consumed
in implementation of husbandry engaged in agricultural pro-
duction.

Major changes in the tax have consisted of either rais-
ing the tax rate or broadening the tax base. In 1949 the
base was extended to the sale of building material to owners
or builders for the creation of buildings, repair and im-
provement of the real property. In 1955 gross receipts from
bowling alleys were defined as a retail sale. Also, in 1955
the retail sales of beer and cigaretts were no longer tax
exempt. In 1965 hotel services were defined as taxable under
the retail sales tax. In 1967 the base was extended to se-
lective services. These included most types of repair

services, services in construction of personal private prop-
erty and advertising services. New construction and adver-
tising were only in effect a year and a half and then re-
pealed in 1969.

The sales tax rate was changed in 1955 from 2 percent
to 2.5 percent and then reduced once again to 2 percent in
1957. In 1967 the sales tax rate was raised from 2 percent
to 3 percent.

Use tax

The use tax is a tax on the use of tangible property
in Iowa. It is divided into three primary categories.

1) Use tax paid directly by users

2) Use tax paid by out-of-state sellers for the sales
to Iowa residents where transactions are subject to taxation

3) Use tax collected on new motor vehicles and trailers
For items to fall under the use tax the only evidence re-
quired to establish sales for use in Iowa is evidence of
sales for delivery in Iowa. Taxes paid in a state other than
Iowa are deductible from the liabilities imposed by the Iowa
use tax.

A major change in the tax structure came with the repeal
of the "not readily available clause" in 1967. This clause
had previously exempted from taxation tangible personal prop-
erty not readily available in Iowa and which is used directly
in the fabrication, compounding, manufacturing, or securing

of tangible personal property intended to be sold at retail.

Sales and Use Tax: Revenue Model

Revenue derived from the sales and use tax in Iowa is
a set percent of taxable consumption (sales) in the state.
For the United States consumption is known to be primarily
dependent on the level of income (23). More specifically,
for Iowa taxable sales and personal income over past
years have, in fact, grown at a relatively constant
proportion to one another. In years where this has not oc-
curred, it is usually attributable to administrative changes
in the tax base. Therefore, a model using income as the de-
termining variable and which makes adjustment for changes in
the tax base would seem a suitable means with which to esti-
mate actual sales in the state for future years. The appro-
priate tax rate can then be applied to the determined sales
figure to estimate expected revenue.

In setting up an estimating model for Iowa, it is useful
to recognize that the use tax as a supplement to the general
sales tax is not separate from or independent of it. Con-
sequently, the two taxes may be considered as one and this
figure calculated as a function of taxable sales or aggregate
consumption. Because the coverage of the Iowa sales and use
tax is extensive, it is probable that relative price and tax
rate changes will not influence the relationship between

income and expenditures on taxed and non-taxed items. Final-
ly, since the tax rate is the same on all taxed items, tax
collections need not for short-run analysis be examined by
type of sale.

Given this assumption the estimating model takes the
form:

$$TS = a + D_1 + D_2 + Y^b \qquad (3.1)$$

$$R = r(TS) \qquad (3.2)$$

where   T = taxable sales

Y = personal income

R = revenue

r = tax rate

b = exponent identifying the proportional changes
of revenue to income

D_1 and D_2 = dummy intercept coefficient measuring
the impact of applicable base changes
in the tax structure

A shortcoming of equation 3.1 is that it cannot direct-
ly anticipate changes in revenue resulting from relevant base
changes. However, in dealing with any type of forecast model
it is nearly an impossible task to determine in advance the
extent of effect some future change in base will have on rev-
enues to be collected. What may be done in developing a
model of this type is to estimate the various shifts in the
relationship between income and taxable sales for past years
in which significant changes have occurred and to assume the
last major change will be in effect for future projection

needs.

This has been done by introducing dummy intercept variables, D_1 and D_2, into equation 3.1. The variables are estimated by placing a column of 1's and 0's into the observed data set on which a regression analysis is to be conducted. For each tax base 1's are entered into a separate column for the years the base was in effect and 0's elsewhere. In this way the analysis estimates a different intercept coefficient for each base.

The model estimates revenue only after taxable sales have been determined. This is done, of course, by applying the tax rate to the taxable sales figure. It would be incorrect to follow such a procedure if, in fact, changes in rates were to have a direct impact on the nature of the consumption function. That is, if a 5 percent tax rate reduced consumption significantly below what would have occurred had the rate been 4 percent, this procedure would be invalid. It was determined from separate studies, one by J. Dockel (3), for Iowa, and another by R. Hansen (14) for the U. S. that the rate effect on total expenditures is nil. Therefore, a two-stage model, the first stage estimating the volume of taxable sales, the second stage estimating revenue from the determined sales figure, is valid. It is possible, therefore, to anticipate directly any effects on revenue that changes in the tax rate might cause.

In discussing the form of the tax model and the vari-
ables to be included in the model, it is necessary to review
briefly the specific hypothesis on which the assumption of
an aggregate consumption function has been based. It has
long been noted that revenues from the sales tax are more
stable than income tax revenues. This indeed seems to have
been one factor for its development as the single most im-
portant revenue source for state government. The most widely
held explanation for this observed phenomena is the "perma-
nent income hypothesis" (11). This hypothesis states that
consumption is more correctly a function of income in terms
of wealth rather than income in terms of current receipts.
The hypothesis implies that when a consumer unit experiences
a transitory increment of income, that is, when an individ-
ual's measured income exceeds the expected or permanent in-
come, the "transitory" component is added to his assets or
used to reduce liabilities rather than spent on consumption.
Similarly when the individual experiences a transitory de-
crement of income, the consumer adjusts consumption to perma-
nent income financing any excess over measured income by
drawing down assets or increasing liabilities.

Empirically, the hypothesis is implemented by approxi-
mating the wealth variable by means of a weighted average of
present and past levels of income. The weights are so cal-
culated that the current year's level of income is most

heavily weighted and subsequent years are weighted in a geo-
metrically declining manner such that the sum of the weights
is equal to one (11).

The extensive coverage of the sales tax in Iowa allows
one to assume that such an hypothesis is feasible in esti-
mating consumption of taxable items for Iowa. Also, in
implementing the empirical analysis and constructing the
appropriate equation for Iowa, the specific technique de-
scribed above is employed.

The equation developed for the model is stated as fol-
lows:[1]

$$(3) \quad \text{Log TS} = .1123 + .1131D_1 + .1610^{**}D_2 + .9399^* \text{ Log } Y_w$$
$$(.1225) \quad (.1268) \quad (.1336) \quad (.0340)$$

where   TS = taxable sales

      Y_w = income variable (weighted)

      D_1 = dummy variable for tax base effect for 1956-
         1967

      D_2 = dummy variable for tax base in effect after
         1967

and where the weights for the income variable are .400, .240,
.184, .070, and .044 for income Y_t through Y_t-4.

---

[1]The superscript (*) indicates the coefficient in the
equation to be significant at the 5 percent level while (**)
indicates the coefficient to be significant at the 10 percent
level. Absence of the asterisk superscript indicates the co-
efficient to be non-significant.

The R^2 term for the equation was .9794. This figure is considerably higher than what might have been expected, given that a number of changes in the tax base introduced over the period considered were not directly taken into account. However, for this equation in the two instances in which it was decided to measure the effect of broadening the base, only one of the coefficients, that for D_2, was significant and it was marginally significant at the 10 percent level. For the base change of 1956 the coefficient D_1 was not significant. This implies the base changes had very small effect in changing revenue for the state. The implication is that for other base changes which were not statistically measured, there was no significant impact on revenues which would cause a fundamental shift in the taxable sales function. This observation offers some explanation for why the R^2 term was indeed high even when for each instance of occurrence, changes in revenue caused by changes in the base were not explicitly accounted for in the model.

Before any acceptance of the model is made, it should first be compared to an analysis which does not rely on a "permanent income hypothesis" but rather on one which assumes consumption to be a simple function of current income. Such an analysis, omitting a lagged income variable and using instead a simple yearly income figure, resulted in a reduction

of the R^2 term to .962 and a slight reduction in the signif-
icance of the income coefficient for the general model. The
reduction was not large but this is of no surprise for this
particular model since the weighted income variables are not
extremely different from actual yearly figures. The fact
remains, however, that the weighted figures do give best re-
sults and it is consistent with the theoretical concepts con-
cerning consumption and its relation to income.

Comparing actual and estimated taxable sales figures,
the maximum deviations occurring in the data amount to 180
million dollars or about 4 percent of the actual taxable
sales figures (see Chart 3.2 (16)). Also, the largest dif-
ferences between actual and estimated revenue figures is 2.5
million dollars or 4 percent of actual revenue data (see
Chart 3.3 (16). These results, when placed in the context
that the levels of sales for years (1959, 1960) in which
these errors occurred was 4 billion dollars and revenue was
80 million dollars, imply that the model does approximate
well actual data.

To project levels of taxable sales and revenue for
future years, it is necessary to assume as already determined
the value of the income variable (see Table 3.1).[1]

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[1]A more complete discussion of the income variable is
considered in Chapter V.

MILLIONS OF DOLLARS
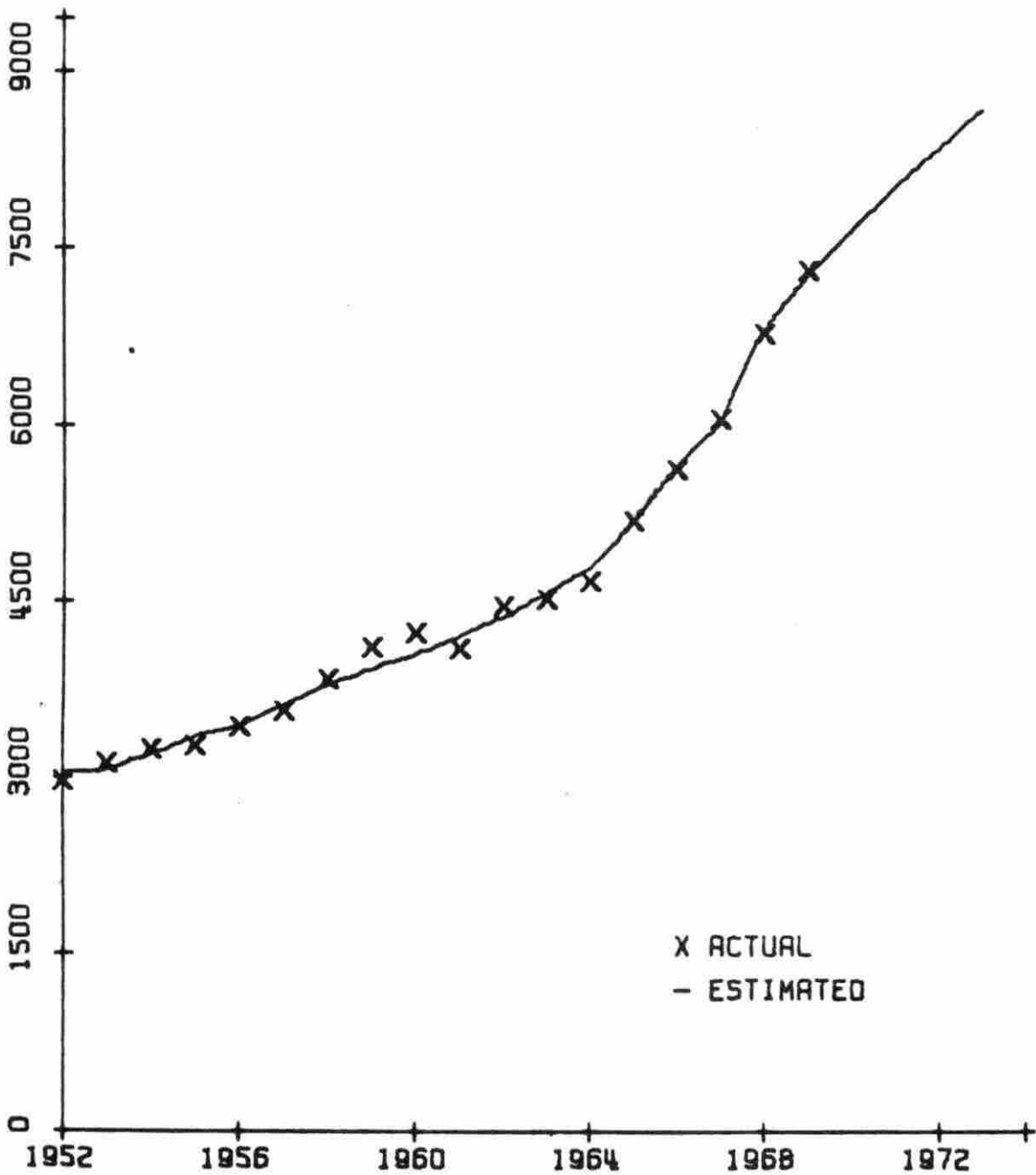
X ACTUAL

— ESTIMATED

Chart 3.2 Estimated volume of retail sales per year subject to sales tax in Iowa from 1952 to 1973 with actual sales for comparison (16)

MILLIONS OF DOLLARS
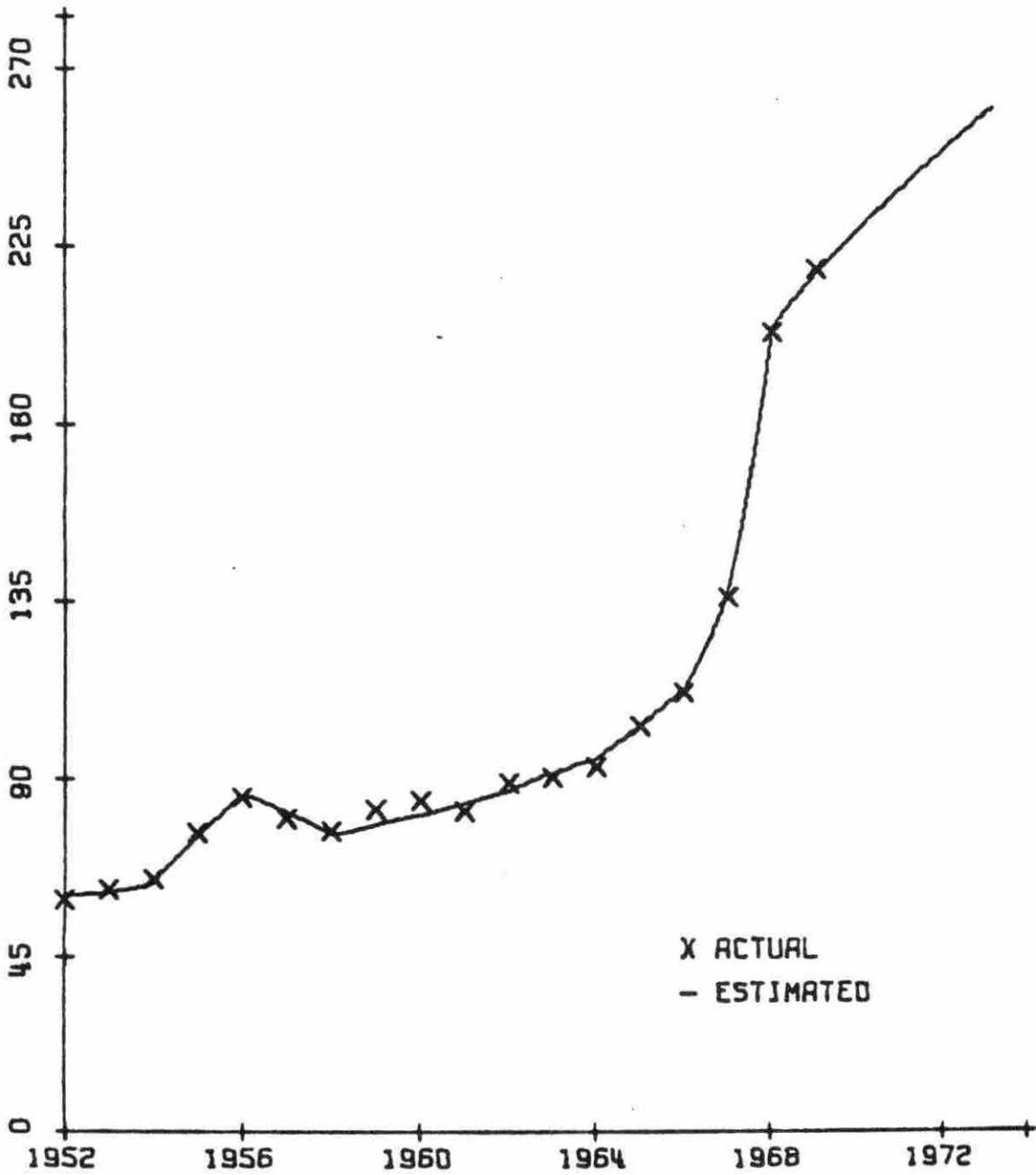
Chart 3.3 Estimated revenue collected per year from sales
tax plus use tax in Iowa from 1952 to 1973 with actual
collections for comparison (16)

Table 3.1 Estimated taxable sales, total sales tax revenue
plus use tax revenue for Iowa for 1970-1973 based on estimated
personal income assumed by extrapolation of past growth trends
from 1948 to 1969. (millions of dollars)

Year	Personal Income	Taxable Sales	Revenue
1970	9986	7550	226.5
1971	10450	7864	235.9
1972	10950	8136	245.6
1973	11500	8551	256.5

Estimates of taxable sales and sales tax revenue are consis-

tant with past trends (see Chart 3.2 (16) and 3.3 (16)). The

model predicts a general rise in taxable sales and revenue

with some slowing down in the rate of growth from nearly 6

percent for 1965-1969 (disregarding tax rate changes in rev-

enue) to a rate of 4 percent for 1970-1973. This is, of

course, caused by the lower 5 percent growth rate of the

weighted income variable used in the model, down from over

5.5 percent for the period 1965-1969.

Results yielding such relatively small deviations between

actual and estimated data when a model of the type described

here is used would suggest that it is in fact a valid pro-

cedure to estimate sales tax revenue for Iowa. Further,

future projections which are consistent with past movement

in revenue would indicate that such results may be used for

purposes of basing future state revenue and expenditure policy decisions.

CHAPTER IV. OTHER SELECTIVE SALES TAXES

Besides the general sales tax, special taxes are levied
on selected consumption items such as motor fuel, cigarettes,
liquor and beer. The tax on motor fuel is not discussed here
even though it provides a large amount of revenue to the
state. Motor fuel tax is a charge for use of public roads
and does not contribue to revenue for general state use.

The taxes on consumption of cigarettes, liquor, and beer
constitute as much as 25 percent of the purchase price of
the item and might be thought of as fulfilling a sumptuary
purpose of diminishing their consumption. In fact, however,
the taxes seem to serve the purpose of securing for the state
large revenues but do not actually prevent consumption. If
the consumer wishes to pay a penalty tax of which the pro-
ceeds are used for collective purposes, he may do so (26).

In general, the taxation of these items was introduced
during the 1930's when financial difficulties for the states,
brought on by the depression were rapidly increasing. By
1930 eight states taxed cigarettes and by 1936 forty-eight
states had imposed a tax on liquor or beer. Today all states
tax liquor and beer by one means or another and only North
Carolina does not tax cigarettes or tobacco products. The
growth in revenue from these sources has been substantial in
absolute terms moving from .6 billion dollars in 1946 to .9
billion dollars in 1951 and to 3.3 billion dollars in 1969.

As a percent of total revenues received by all states, the growth of this type of revenue has been declining. This is due to the significant increase in state income tax receipts and retail sales taxes. As a percent of total revenues they have moved from 9.8 percent in 1946 to 9.9 percent in 1951 and to 7.8 percent in 1969.

Selective sales taxation was introduced into the Iowa tax structure in 1921 with the appearance of a tax on cigarettes sold within the state. Then, with the repeal of prohibition, control of the sale of liquor was assumed by state government and consumption of beer was immediately taxed. In 1935 these revenues contributed about 26 percent of the states general revenue obtained from non-property tax sources. In 1946 the figure was 20 percent. Because of the significant increase in reliance on the income and retail sales tax for state revenues, the relative yield of this type of selective tax has steadily declined to where in 1969 they contributed only 13 percent of state revenues. This has occurred despite the notable increases in the absolute size of revenues from these sources. They have increased, for example, from about 11 million dollars in 1946 to 59 million dollars in 1969. A description and development of revenue models for cigarettes, liquor, and beer follow.

Cigarette Tax

In 1921 Iowa law began requiring all cigarette whole-
salers to pay a tax on each package of cigarettes for sale.
Since then, the tax rate has increased from 2 cents per pack
to 13 cents per pack and the consumption of cigarettes has
risen from 74 million packs in 1935 to 300 million packs in
1969. It has, therefore, become an important source of rev-
enue to the state. Tax receipts from cigarettes composed
approximately 6.0 percent of the total state receipts for
1969. Revenue from cigarette taxes has grown rapidly but
unevenly since the end of World War II caused by the fact
that though consumption has risen at a steady pace from 1946
to 1963 and has been constant or declined slightly since
then, a number of rate increases have led to uneven increases
in receipts (see Chart 4.1 (8)).

These increases in the tax rate on cigarettes are fre-
quent because the payer of a cigarette tax is politically
vulnerable. The cigarette tax makes expensive a consumption
item which is generally considered hazardous. It is a tax
paid only on those who smoke, and thus, in theory, it could
be avoided by anyone objecting. As a result an increase in
the cigarette tax meets with the smallest amount of public
resistance as compared to proposed increases in the income
or sales tax. The cigarette tax is therefore often the first
tax to be increased when additional revenues are needed. To

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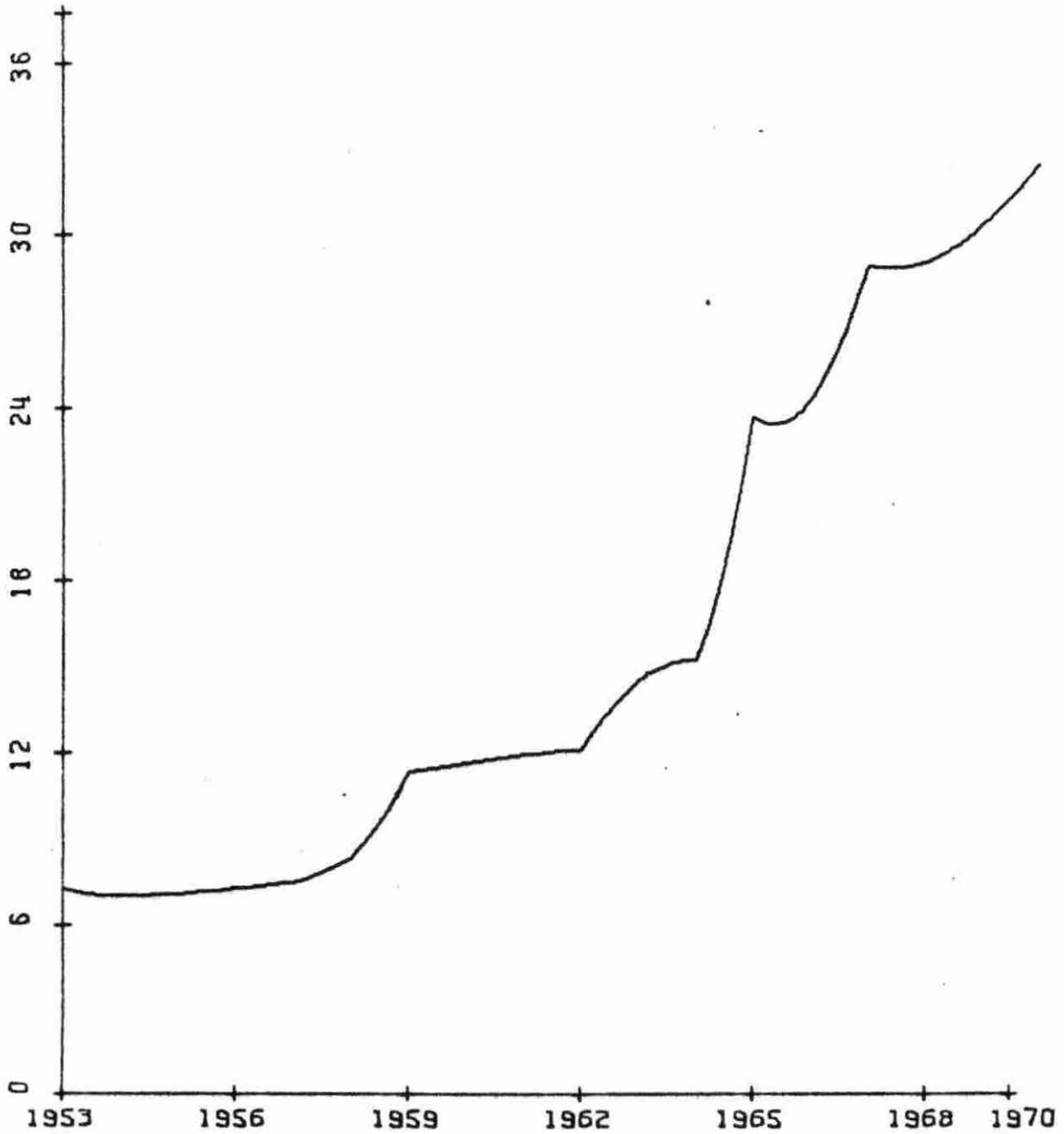
Chart 4.1 Revenue collected per year by the State of Iowa
from the taxation of cigarettes for years 1953 to 1970 (8)

demonstrate, note that the cigarette tax has been increased 7 times since 1950.[1]

Tax structure on cigarettes

The tax on cigarettes is a tax per unit of physical volume, not per dollar of cost. The only changes which have occurred have been in the applicable rates. The rate was 2 cents per pack from 1921 to 1953. It was raised to 3 cents per pack in 1953, to 4 cents in 1959, to 5 cents in 1963, to 8 cents in 1965, and to 10 cents in 1967. Finally, the tax rate was increased to 13 cents in March, 1971.

As a percent of the total cost of cigarettes the 2-cent tax by the state in 1946 was approximately 14 percent of the cost of a pack of cigarettes. In 1969 the percent of state taxes contribute approximately 26 percent of the cost.

Cigarette tax model

The volume of cigarettes consumed in any time period has been observed to exhibit two fundamental characteristics: First, the demand for cigarettes is price inelastic. That is, if a 10 percent increase in the price of cigarettes occurs, for example, through a tax rise, the quantity of cigarettes demanded decreases by a smaller proportion of

---

[1]In fiscal 1968 collection of taxes on other tobacco began. However, in 1969 the tax contributed only .14 percent of receipts for Iowa and therefore will not be dealt with in this study.

of about 2 percent. Second, the quantity of cigarettes con-
sumed per capita rises with real income.

In 1950 Richard Tennant examined the demand for ciga-
rettes and found that for the United States the consumption
data for cigarettes from 1900 through 1949 seemed consist-
ent with these observations of price inelasticity and income
elasticity. The income elasticity was estimated to average
.8 (28). In the study, Tennant compared prices of cigarettes
with actual per capita consumption and in terms of the R^2
coefficient, he found that not only were the deviations from
trend remarkably small, but they did not fall in such a
pattern as to indicate even minor influences of price upon
consumption. Also, for the relation of cigarette consump-
tion to real per capita income, Tennant found that his
analysis accounted for 96.7 percent of the variability. The
explanation given by Tennant for these results is that to-
bacco is an urgently desired commodity of small cost and its
consumption is a matter of habit. However, it is also re-
garded as a luxury item and when incomes are low or when they
decline, it is natural that people should attempt to cut down
on its consumption.

For Iowa, expanding the data to 1962, the results con-
tinue to agree with those of Tennant. However, when the data
is extended to include 1970, it is found that after 1962
the linear relation of consumption to income no longer holds

(see Chart 4.2 (8)). In Iowa a per capita cigarette con-
sumption has remained constant or has actually declined
after 1962, while per capita personal income has increased
by a substantial amount (see Chart 4.3 (8)). The same
pattern is displayed when real income is substituted for
personal income in the comparison, as was done by Tennant.
To examine further the hypothesis that consumption of ciga-
rettes is a function of income, per capita consumption of
cigarettes is regressed on per capita income. The results
of this analysis rendered an R^2 term of .757 as compared to
Tennant's R^2 coefficient of .967. The more recent data does
not, therefore, agree with Tennant's observations concerning
the relationship of income to consumption of cigarettes.

The impact of price changes on the demand for cigarettes
in Iowa continues to agree with Tennant's conclusion and in
general, the demand remains price inelastic. However, this
conclusion must be qualified somewhat since it can be ob-
served in past data that a tax increase on cigarettes was
often accompanied by a short run effect of a decline in con-
sumption (1959-1960, 1963-1964, 1965-1966, 1967-1968) aver-
aging 2.37 percent for each one cent increase in the tax
(see Chart 4.3 (8)). The effect is referred to as being
a short run phenomena since generally the rate of consumption
is restored to its dominant trend within one year after the
initial tax increase. This fact is understandable when one

NUMBER OF CIGARETTE PACKS

PER CAPITA INCOME IN DOLLARS
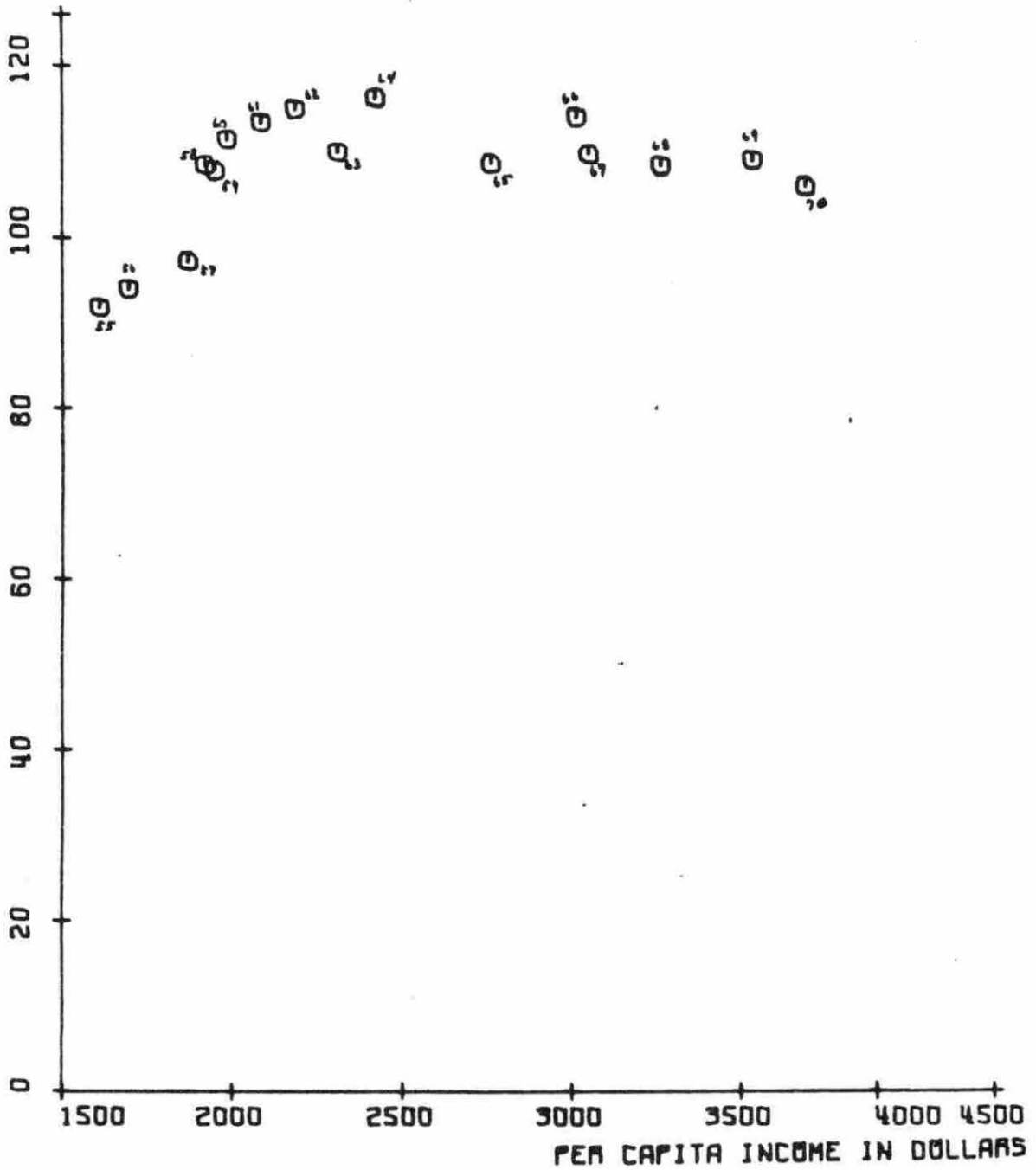
Chart 4.2 Scatter diagram plotting per capita cigarettes consumed in Iowa by level of per capita income from 1955 to 1970 (8)
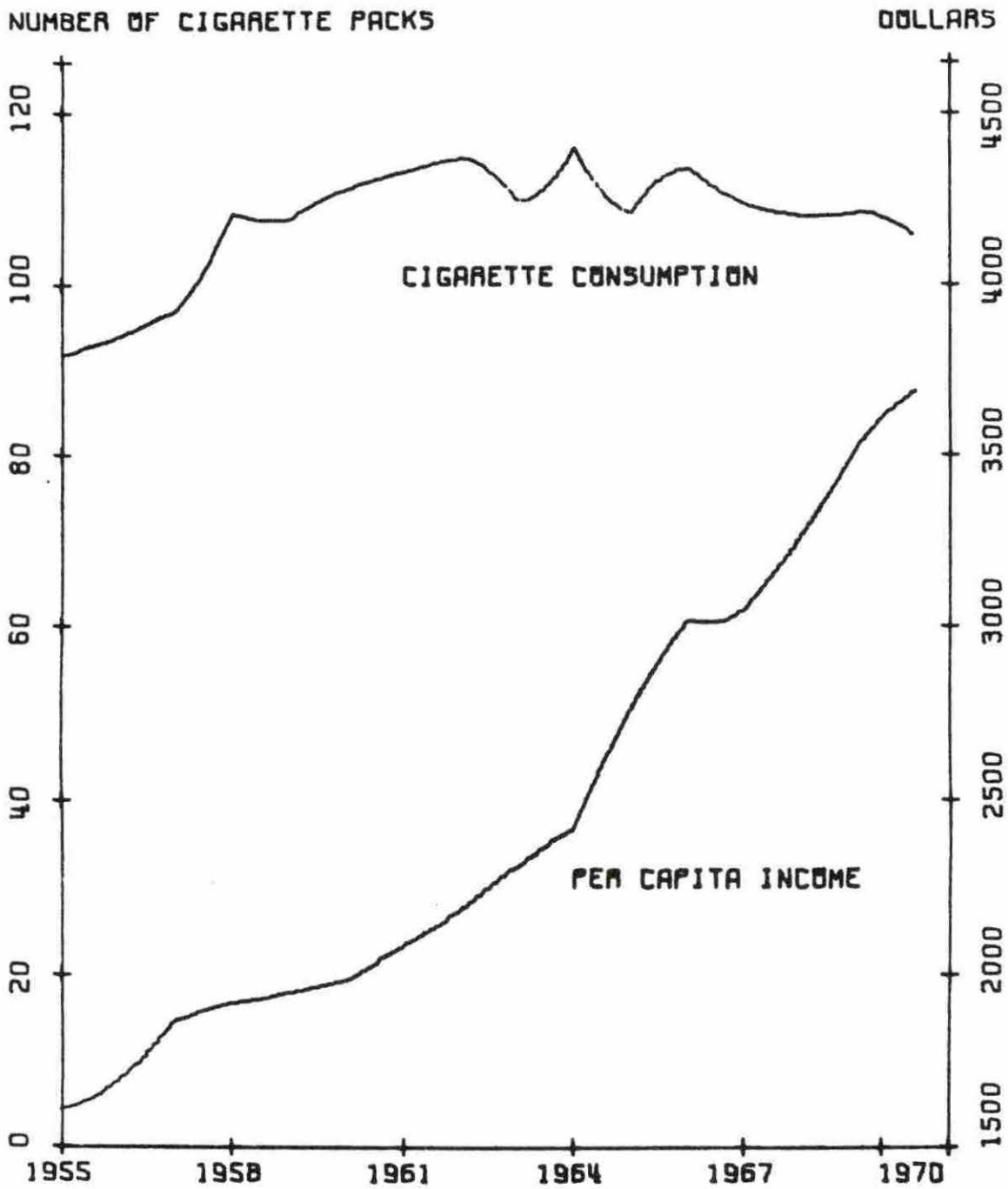
Chart 4.3 Per capita cigarette consumption and per capita
personal income per year for Iowa from 1955 to 1970 (8)

considers the immediate reaction to any price increase given
a normal demand function. However, the important fact here
is that the acquired habit of smoking seems to overpower a
tendency to reduce smoking caused by a price increase. Con-
sumption, therefore, is restored within a short period of
time to its observed trend.[1]

A more reasonable explanation into the determination of
the demand for cigarettes and for the decline in per capita
consumption of cigarettes is not that it is linked to per-
sonal income but, rather, that it is linked to more funda-
mental psychological factors. For example, the effects of
an intensive campaign against cigarette smoking conducted
by the American Cancer Society seems to have had a definite
impact on reducing per capita smoking in the United States.

To give some idea of how intensive this campaign has
been, some examples may be sighted. In January, 1960, the
Board of Directors of the Society made known that clincial,
epedimeological, experimental, chemical and pathological
evidence presented by the many studies reported indicate
beyond reasonable doubt that cigarette smoking is the major

---

[1]As noted by Tennant and emphasized by the cigarette in-
dustry, the price inelasticity for cigarettes cannot go on
indefinitely if price rise to unreasonable levels. At some
point the demand can become price elastic and cause permanent
reductions in consumption of cigarettes.

cause of the unprecedented increase in lung cancer (1). In 1965 the Society set a five-year objective of reducing ciga- rette smoking among teenagers by 50 percent, in the general public by 25 percent and among physicians by 50 percents. Finally, strongest support of the effort against cigarette smoking was received in 1964, in the definite Report of the Surgeon Generals Advisory Committee on Smoking and Health, which on reviewing the evidence made the judgment that ciga- rette smoking is a health hazard of sufficient importance to warrant appropriate action (1).

Though no specific data is available on the overall effectiveness of this campaign it is known that the per capita consumption of cigarettes for the nation dropped from a high of 4,266 cigarettes in 1961 to a low of 4,195 in 1968, and data for 1969 and 1970 indicate further re- ductions should occur (36). Thus, it would seem in general that the campaign has had some influence at least in turning the trend away from increases in smoking and toward an actual decline.[1]

---

[1]There is some dispute to this since the largest gain- ing population age-group during the 1970's probably will be the 25 to 34 year olds. This age group has the highest per capita smoking rate of all age groups over 18 and thus over- all per capita smoking may begin to increase once again.

Though the influence of the anti-smoking campaign has been important, it certainly has not been completely successful and thus there must exist other influences to be accounted for. The causes of the less-than-perfect success of the campaign is most likely to be the habit for smoking acquired by people over time and the disregard to warnings published by the various agencies rather than, as suggested originally, levels of personal income.

The best method of determining the demand for cigarettes would be to obtain complete studies on the formation of smoking habits; the effect of anti-smoking campaigns on smokers; and finally, the changing age distribution of smokers over time. With this information one would then be able to anticipate just what the level of consumption in the future might be. Unfortunately no data adequate for fulfilling this need is at present available. Therefore, the best estimates that have been obtained thus far are from the construction of a curvilinear time trend which simply fits per capita consumption to time in terms of years. Such a method using per capita data picks up as well as possible the shifting attitudes toward cigarette smoking and at least some aspects of changes in population distribution of those who are smoking.

A model based on this analysis would then be as

follows:

$$R = r(TCC) \qquad\qquad (4.4)$$

$$TCC = C \times \text{population} \qquad\qquad (4.5)$$

$$C = a + bt + ct^2 \qquad\qquad (4.6)$$

where   R = revenue from taxation of cigarettes consumed in Iowa

                 TCC = total cigarette consumption

                 C = per capita cigarette consumption

                 r = tax rate

                 t = time

                 a, b, c = parameters

Before determining the parameters for equation 4.6, it is necessary to allow first for the short run effect of the tax rate changes. That is, observing that a rate increase temporarily reduced consumption of cigarettes, the data for these years was adjusted upward to its anticipated trend by the average of 2.37 percent for each one cent increase in the tax rate.[1] Using the adjusted data the equation for per capita consumption is:[2]

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[1]Because of simple statistical techniques used in this study, a model employing a dummy variable to estimate the impact of rate changes on consumption could not be determined for the polynomial equation.

[2]Throughout this chapter the superscript (*) indicates the coefficient in the equation to be significant at the 5 percent level, while (**) indicates the coefficient to be significant at the 10 percent level. Absence of the asterisk superscript indicates the coefficient to be non-significant.

$$C = -1026.2^* + 35.14^* t - .2705^* t^2 \qquad (4.7)$$
$$\quad\;\; (.1374) \qquad (.4413) \qquad (.0353)$$

where   C = per capita consumption

t = time

The R^2 term for the equation is .916. This result implies
that better than 91 percent of the variation in consumption
of cigarettes is accounted for in the model. The actual
degree of smoking and the direction it may turn in the fu-
ture is uncertain and dependent on a good deal more psycho-
logical factors than can be picked by a simple time trend.
A model accounting for better than 91 percent of the vari-
ation of per capita consumption over time is indeed accept-
able as a tool for estimating future levels of revenue.

Comparing actual and estimated per capita consumption
(see Chart 4.4 (8)), the model tends to dampen the fluctu-
ations in observed consumption. This is a consequence of
the regression analysis used to determine the estimating
equation. Even with this damped effect on the estimates,
the deviations do not exceed two packs per capita or 9 per-
cent of the actual consumption figure for any year. For
years in which tax increases have occurred, adjustment of
the data (a fall in the trend line in Chart 4.4) reflect the
decline of consumption resulting from these changes.

Projecting per capita consumption for years 1970 through
1973 indicates rather sporadic movement (see Table 4.1).

NUMBER OF PACKS
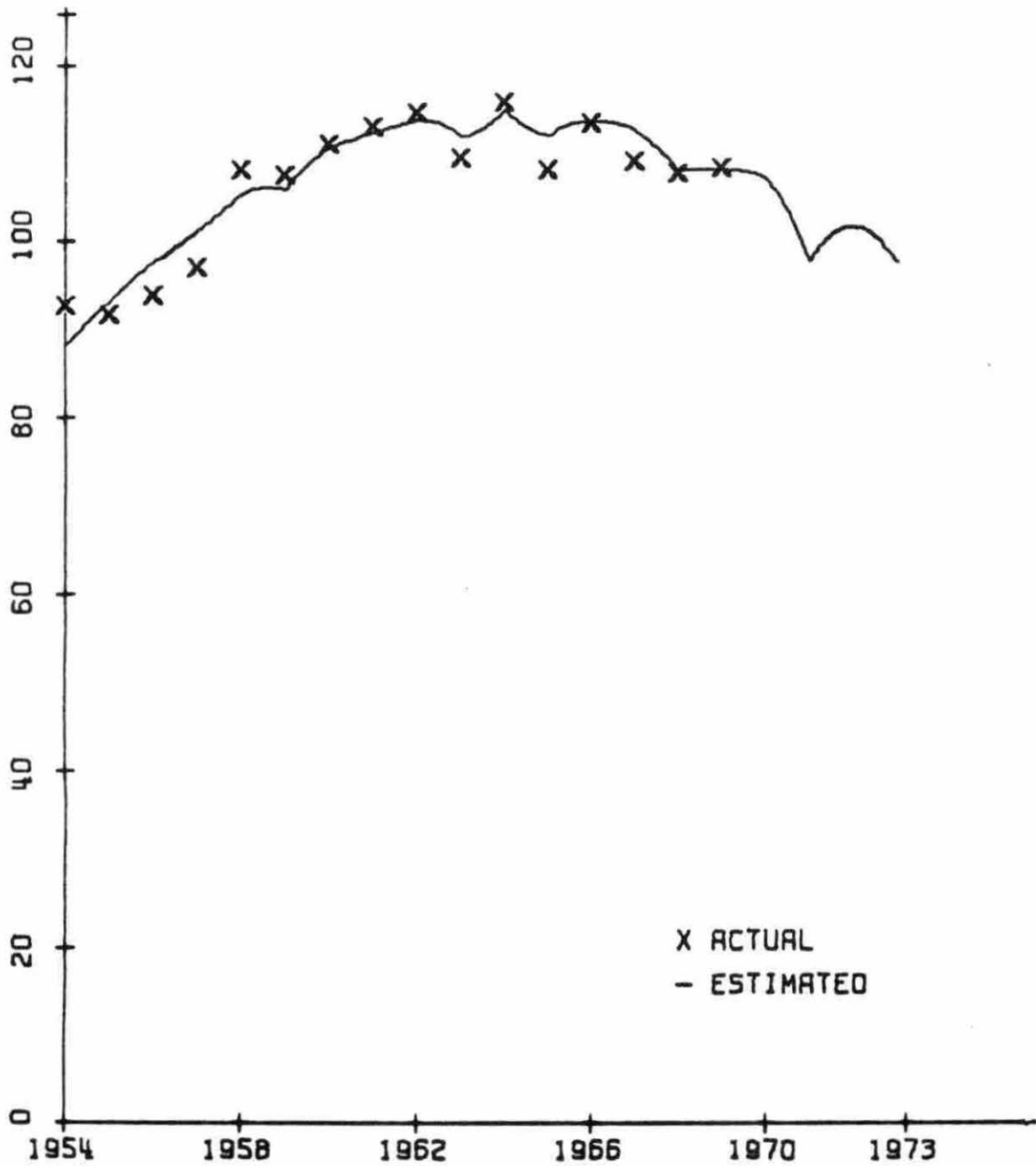
Chart 4.4   Estimated per capita consumption of cigarettes
in Iowa from 1954 to 1973 with actual consumption for com-
parison (8)

Table 4.1 Estimated cigarette tax revneue for Iowa based on estimated personal income assumed by extrapolation of past growth trends from 1948 to 1969.

Year	Revenue ($000)	Population[a] (000)	Per Capita Consumption (units)	Total Consumption (000,000)
1970	30248	2825	107.1	302.5
1971	36192	2847	97.8	278.4
1972	37882	2869	101.6	291.4
1973	36582	2891	97.5	281.4

[a]
 Source: (33)

In 1971 consumption fell by 9.3 packs or nearly 9 percent because of a rate increase which occurred in that year. In 1972 recovery in demand from the short run effect of a tax increase resulted in an increase in consumption of 4.8 packs or 5 percent. Finally, in 1973 consumption once again fell by 4.1 packs or 4 percent reflecting the observed declining per capita trend in demand for cigarettes. Consumption should continue to decline if, as expected, private and public agencies continue their policy of educating the public on the dangers of smoking and the public respond to these warnings.

Using population figures and tax rates already

determined[1] and substituting these figures into equations
4.4 and 4.5, revenue estimates may be determined and com-
pared to observed data for the time period on which the re-
gression was conducted (see Chart 4.5 (8)). Since population
is stable for Iowa, these estimates reflect closely the move-
ments of per capita consumption estimates. Consequently,
deviations between actual and estimated data do not exceed
.5 million dollars or 2 percent of actual data.

Regarding future estimates, it is not surprising to
observe a marked increase in revenue of 20 percent for 1971
since the tax rate increased from 10 to 13 cents (see Chart
4.5 (8) and Table 4.1). The following year, 1972, demon-
strates a further increase in revenue of about 5 percent
after the short run effects of the decline in consumption
caused by the tax increase work their way out of the demand
for cigarettes. The last year, 1973, demonstrates a decline
in revenue of nearly 4.8 percent which reflects the hypoth-
esized trend toward reduced smoking by individuals even
though total number of people smoking may be rising with in-
creased population.

These observations referenced with the statistical re-
sults determined by the regression analysis itself would

---

[1]The population figures used for 1954-1969 are from
statistical abstract (33) and tax rates used are those des-
cribed under "Tax structure on cigarettes" in this chapter.
Future projections assume a rate of 13 cents per pack.

MILLIONS OF DOLLARS
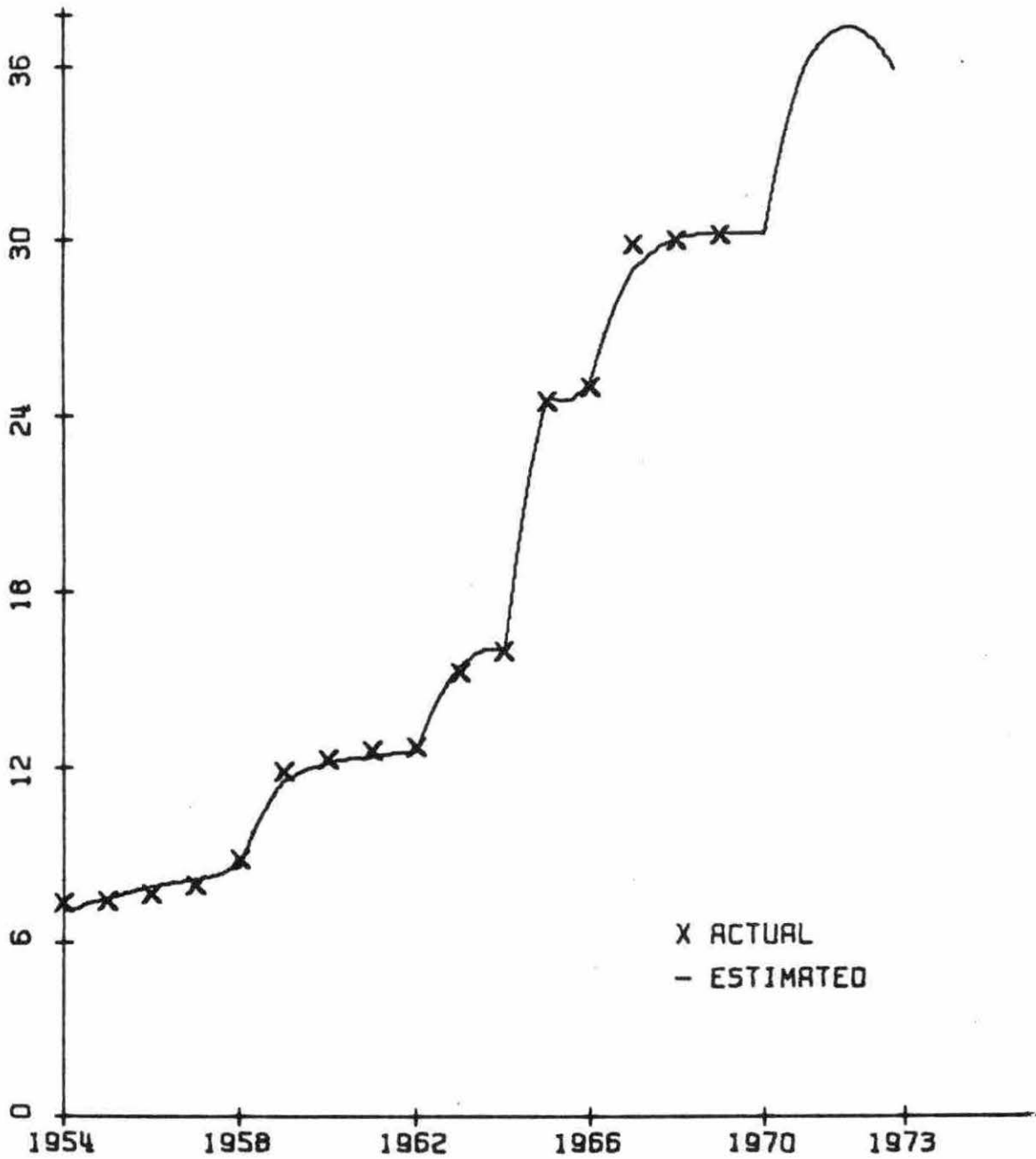
X ACTUAL

— ESTIMATED

Chart 4.5   Estimated revenue collected per year from the taxation of cigarettes in Iowa from 1954 to 1973 with actual collections for comparison   (8)

therefore imply the model to be acceptable as a tool for es-
timating revenue to be received by the state from this source.

Liquor Revenue and Tax

With the repeal of the Eighteenth Amendment to the Con-
stitution, Iowa was given access to a lucrative source of
revenue from the sale of alcoholic beverages within the
state. In setting up control over its sale, Iowa chose a
monopolistic approach which delegated all selling rights
and control solely to the state government under the direc-
tion of a liquor control commission.

Net income from operations of the commission, though
declining in relative importance, contribute a significant
percent to total revenue for the state. In 1970 this amount
averaged 6.2 percent of state revenue as compared to 8 per-
cent, approximately in 1954. In absolute terms, increases
in revenue have been important going from 7.8 million dollars
in 1954 to 23.8 million dollars in fiscal 1969-70 (see Chart
4.6 (18)). Most notably, it has increased at an accelerated
rate since the mid 1960's. This increase has paralleled
quite remarkably the movement of personal income.

Policy structure of state liquor commission

Revenue received by the state from its control over the
sale of liquor is obtained by two separate methods. First,
from the commission's operations as a retailer of liquor
stores, it earns gross receipts on the sale of liquor to the

MILLIONS OF DOLLARS
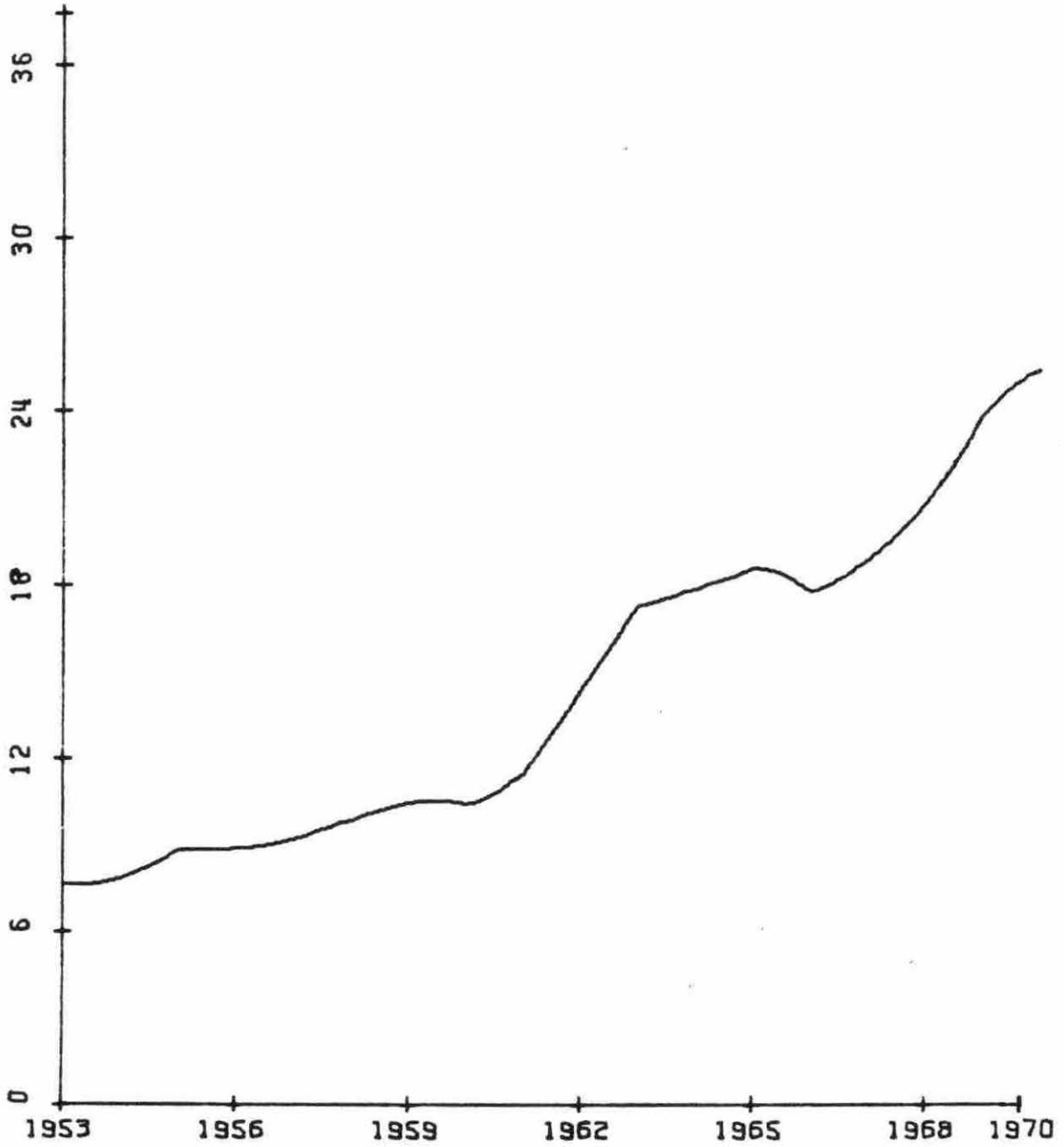
Chart 4.6 Revenue collected per year for the state from
the sale and taxation of liquor in Iowa from 1952-53 to
1969-70 (18)

general public and to licensed establishments entitled to
sell liquor by the drink. From each of these sources the
commission receives a set price for the goods it sells.
These prices, which are charged for each of the different
types of liquor sold per package and not gallons consumed,
range between a markup of 50 and 70 percent of cost, depend-
ing on the particular item sold. Second, from the licensee
who purchases a particular type of liquor, the commission
receives an additional 15 percent tax on the retail price of
the item sold.[1]

From gross receipts, not including the 15 percent tax,
is then deducted the necessary operating expenses of the
commission which have been a relatively proportional figure
of 6 percent of sales over time. With this is of course de-
ducted purchasing cost of the goods sold. The remainder,
net income, is subject to transfer to the state treasury.[2]
No major changes in the general pricing or policy procedures
by the commission have occurred in the time period studied
here.[3] Passage of legislation to allow sale of "liquor by

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[1] It should be noted that a retail sales tax is also im-
posed on the sale of liquor in Iowa. However, since Chapter
III concerns the retail sales tax, it will not be discussed
separately at this time.

[2] This disregards any mention of funds earmarked for
specific state agencies or levels of government.

[3] Change did occur in the administrative structure of
the commission as of January 1, 1972.

the drink" in 1963 gave control of this aspect of the sale of liquor to the commission also.

Development of a revenue model for liquor sales and taxes

Liquor is a luxury item and it is assumed that the consumption of it is dependent on the level of income in the state. For example, as incomes rise, people become more socially oriented and have occasion to spend more of their income on this type of item.

It is assumed that for small changes in price, the elasticity of demand for liquor is close to zero.[1] Further, it is assumed that for small price changes which occur over time the proportion of total sales to income will not be significantly effected by these changes. The net income figure from the operation of the liquor commission in Iowa is dependent on the cost of operation as well as the level of sales. If it is assumed that the cost of operations will continue to be a constant percent of sales, it is then possible to set up a model stating net income from operations of the commission to be a function of total sales. This

---

[1] I have been unable to find specific detailed studies on the impact of income and prices on the demand for liquor. The best that is available to me generally points out that the liquor industry itself believes that income and the social mood tend to dominate the demand for its products. Price competition is usually closely controlled and price responses are in general considered to be quite inelastic. I refer this reader to reference (27).

assumption is a reasonable one since it has already been noted that costs have run at a fairly constant rate of 6 percent of sales.

Since the state receives revenue from the taxation of sales of liquor to licensed establishments, this must be accounted for in the final revenue estimate. This can be done by first estimating the proportion of sales to licensed establishments and then applying to this figure the appropriate tax rate to determine tax revenue.

The estimating model for this procedure is of the form:

$$TR = NI + dSL \qquad (4.8)$$

$$SL = eS \qquad (4.9)$$

$$NI = a + S^c \qquad (4.10)$$

$$S = a + Y^c \qquad (4.11)$$

where   S = sales of liquor in the state

NI = net income

SL = sales to licensed establishments

TR = total revenue to state

Y = personal income

a = intercept coefficient respectively

c = measures percentage change of respective variables

d = tax rate of sales to licensed establishments

e = proportion of sales of licensed establishments to total sales

Whether this model is feasible depends first of all on

the pricing policies of the commission, and secondly on con-
sumers response to this policy. For example, a change in
the commission's policy for pricing its goods could notice-
ably effect profits either by changing dollar volume of goods
sold holding quantity constant or by changing the demand for
the goods themselves, or some combination of these two pos-
sibilities. Upon speaking with the office of the comptroller
of the commission, it was determined that pricing of the
items is set by the commission and varies only insofar as
changes in the purchase price to the commission itself occur.
Therefore, no erratic or violent price changes should occur
over time which would cause significant underestimation of
total sales. Also, the assumption of price inelasticity of
demand for liquor implies that for those price increases
which do occur, the demand for liquor will not be reduced by
any drastic amount which would make the model inoperable.

Thus, the model best suited for the purpose of esti-
mating revenue from this source is one where sales are a
function of income, where operating expenses are considered
a relatively constant proportion of sales, where prices are
stable, and where the demand for liquor is assumed to be
price inelastic.

The equations then estimated for sales and net income
are as follows:

$$\text{Log } S = -1.2969^* + .7851^* \text{ Log } Y \qquad (4.12)$$
$$(.1151) \quad (.0304)$$

$$\text{Log NI} = -1.099^* + 1.295^* \text{ Log S} \qquad (4.13)$$
$$(.0897) \quad (.0533)$$

where the variables have been defined in equations 4.6 and 4.7 above.

The R^2 term for equation 4.12 was .987 and that for equation 4.13 was .976. The coefficients for both equations were statistically significant at the 5 percent level. The coefficients indicated that for each 1 percent increase in income, sales increased by nearly .8 of one percent and for each 1 percent increase in sales, net income rose by 1.2 percent. These results are in agreement with earlier observations concerning the growth of revenue from this source as compared to the growth of personal income in the state. This suggests that the basic hypothesis and assumptions set forth in the above discussion relating to the nature of the demand for liquor and cost incurred in the operation of the commission are acceptable.

To complete the model one must add to the results of equation 4.13 a 15 percent tax collected on sales to licensed establishments. It is, therefore, necessary that the proportion of sales to this group be determined. Because "liquor by the drink" has been in effect in Iowa only since 1963, exact estimates on the percent of sales to licensees is rather difficult to derive. When first introduced the proportion of sales to this group was only 23.68 percent.

Since then, of course, it has steadily increased until, in fiscal 1970, the figure had risen to 30.15 percent of total sales. However, in the past three years this percentage has increased at a substantially reduced rate. In fact, the rate has risen by less than 1.5 percent over this three-year period. The percentage figure which will be used for purposes of projecting the proportion of future sales to licensees is 31 percent, reflecting the tendency for it to remain around this level in recent years. The final stage of the model outlined in equation 4.9 and 4.10 will take the following form:

$$TR = NI + (.15)(SL) \qquad (4.14)$$
$$SL = .31(S) \qquad (4.15)$$

where the variables are as defined for equation 4.8 through 4.11 above.

Applying the 31 percent figure to the total estimated sales gives the amount of sales made to licensees. To this is applied the 15 percent tax rate to determine the additional revenues to be received by the state.

Implementing the model for years 1954-1955 through 1969-1970 (adding actual tax figures to estimated net profit for years 1963-1970) the estimated data fall close to observed levels of revenue (see Chart 4.7 (18)). This pattern displayed is entirely consistent with the movements in income over time and show no deviations over .6 million dollars

MILLIONS OF DOLLARS
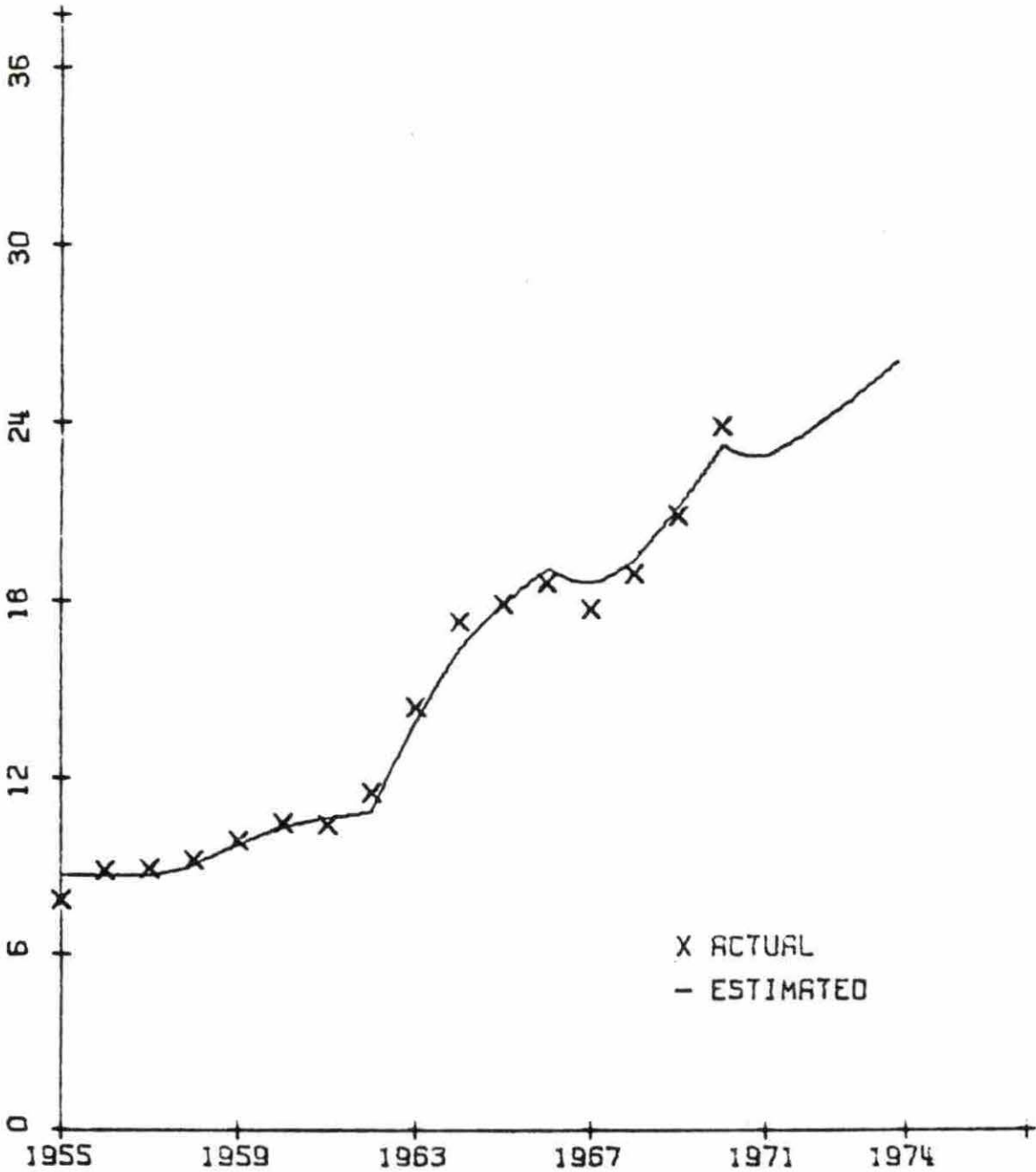
Chart 4.7 Estimated revenue collected per year from the sale and taxation of liquor in Iowa from 1953-54 to 1973-74 with actual revenue for comparison (18)

or 3 percent of actual revenue. Because continued updating
of the model is required, any effects to the estimate brought
on by price changes which occur over time should always be
minimal.

To derive estimates of expected future revenue from the
sale of liquor in Iowa, it is necessary to assume the value
of the income variable as given.[1] Expected future revenue
as determined by equations 4.12 through 4.15 are consistent
with past trends (see Chart 4.7 (18) and Table 4.2).

Table 4.2 Estimated revenue from the sales and taxation of
liquor in Iowa for fiscal years 1970-71 to 1973-74 based on
estimated personal income assumed by extrapolation of past
growth trends from 1948 to 1969. (millions of dollars)

Fiscal Year	Personal Income	Net Profit	Tax Receipts	Liquor Sales	Total Revenue
1970-71	9986	19.4	3.23	69.6	22.6
1971-72	10450	20.3	3.35	72.1	23.6
1972-73	10950	21.3	3.48	74.3	24.8
1973-74	11500	22.4	3.62	77.3	26.0

Estimates for 1970-1971 fell slightly from the 1969-1970
level. This occurred first because income for this year

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[1]A discussion of the assumed income variable and its
derivation is considered in Chapter V.

remains about the same as it had for the previous year and second, because only at this point are estimates rather than the actual tax receipts added to estimates of net income to compute estimated total revenue. Because the tax figure for 1970-1971 was below the actual figure for 1969-1970, total estimated revenue shows a decline.

Finally, estimates of total revenue for year 1971-1972 through 1973-1974 increased at a steady rate of nearly 4.5 percent per year. This reflects similar increases of personal income of 5 percent and of net profits and tax receipts for the commission of 4.5 and 4 percent, respectively.

These results would imply that the model as described here is valid for purposes of estimating future revenues to the state from this source. Such estimates may then be added to total estimated revenue figures for the state upon which state revenue and expenditure policy decisions can be made.

Taxation of Beer

Unlike liquor, the sale of beer is not directly administered by the state. Nevertheless, with the repeal of prohibition the sale of beer was immediately taxed. For 1969 the revenues from the tax on beer contributed 1.2 percent of the total revenue to the state, which is a drop from the 1946 level of 3 percent. Though the taxation on beer

contributes a relatively small amount to total revenues for the state, it is considered in this study because of its relationship to income; and also because the tax rate may be readily altered to yield predictable additional revenues to the state as may be needed. For example, the increase in the tax rate on beer from 8 cents to 12 cents in 1967 increased revenues from this source by nearly 55 percent between 1966 and 1968 (see Chart 4.8 (31)). In years where no tax rate increase occurs, revenues increase at a rate of about 2 percent, reflecting a similar rate of growth in consumption. From 1954 to 1969 consumption of beer in Iowa increased by 8.4 million gallons, from 38.2 million gallons in 1954 to 46.6 million in 1969. Though not as easy politically to increase the tax rate on beer as it is that on cigarettes, it is nevertheless a sumptuary tax which can be changed with considerably less difficulty than can be those of sales or income taxes. As a result, consideration and construction of a model to estimate revenues from the taxation of beer is indeed useful when considering types of revenue sources available to the state.

Structure of the Iowa beer tax

Taxation of beer is a unit-per-physical-volume tax. The only changes in the beer tax structure have been changes in the rate per gallon of beer sold. The tax was increased from 4 cents a gallon to 8 cents in 1947. It was increased

MILLIONS OF DOLLARS
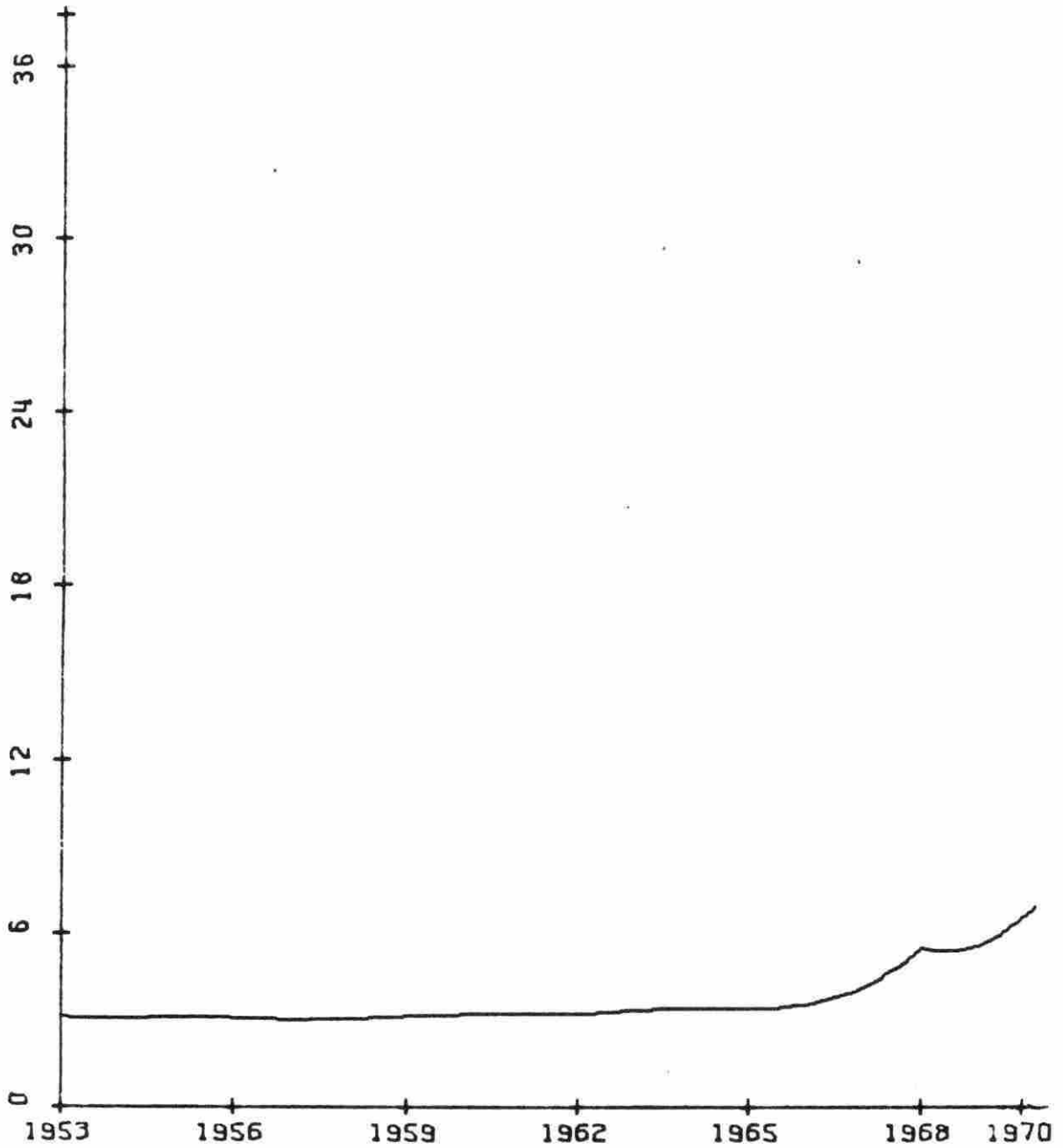
Chart 4.8   Revenue collected per year for the state from the
taxation of beer consumed in Iowa for years 1953 to 1970   (31)

to 12 cents a gallon in 1967. Finally, in March, 1971, the tax was increased to 15 cents per gallon consumed.

Development of a revenue model

Revenue received by the state from the consumption of beer is derived by a single per unit tax on consumption. It is apparent that to estimate the amount of revenue going to the state, it is necessary first to determine the amount of beer consumed and second, to apply the appropriate tax rate to this consumption figure.

As with the demand for liquor, the demand for beer is assumed to be price inelastic. Past data of beer consumption patterns in Iowa indicate that beer is a non-necessity and that the level of consumption is determined by income in the state. Note, however, that though the secular trend of per capita consumption of beer and personal income move in a similar increasing manner, cyclical movements around each of the respective trend lines often move in an opposite direction to one another (see Chart 4.9 (31)). That is, for sharp increases in income, beer consumption may fall or conversely for decreases of income, consumption of beer may rise. Therefore, the demand for beer displays a behavior pattern which is similar to what is expected of an
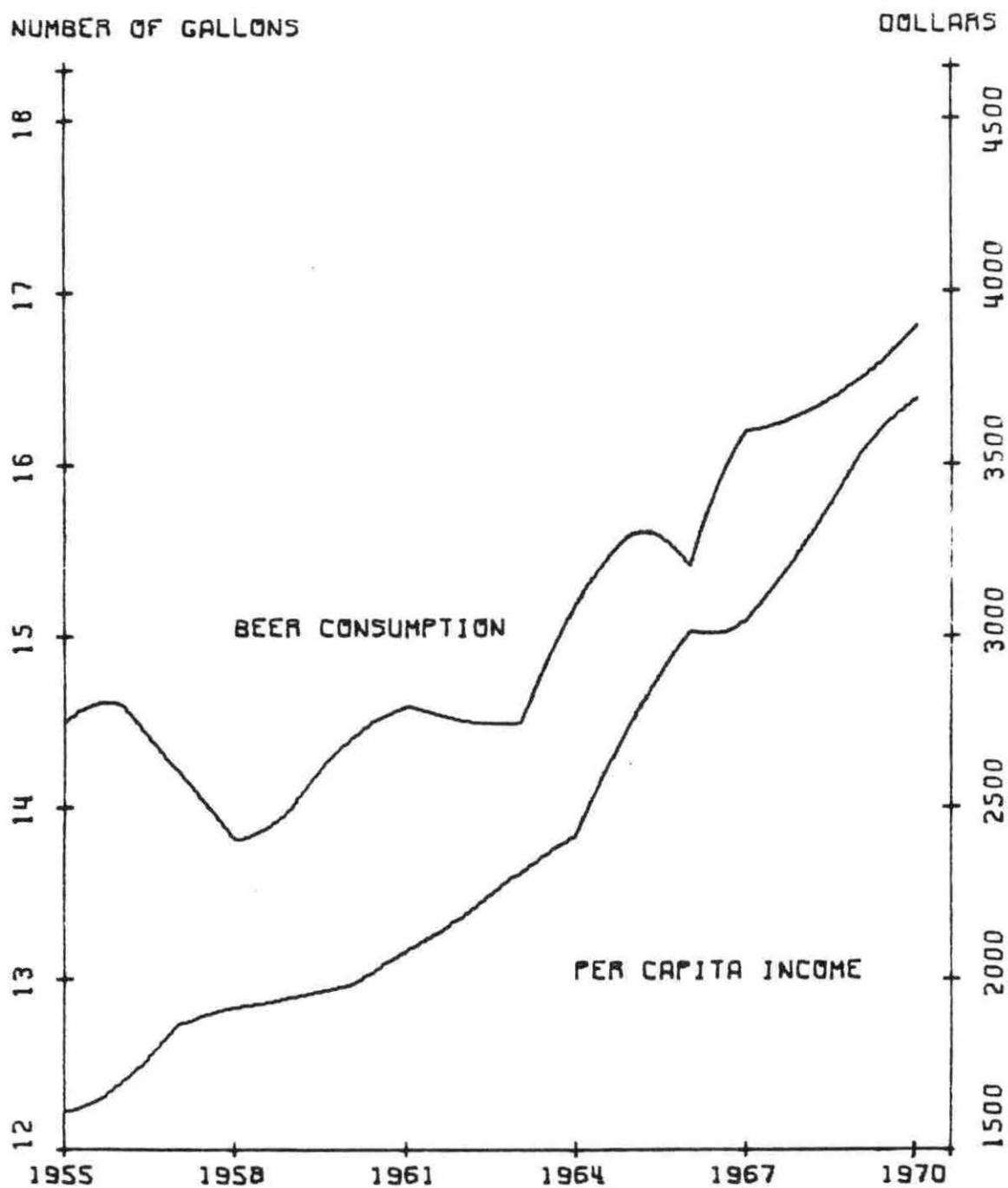
Chart 4.9 Actual per capita beer consumption and per capita income per year for Iowa from 1955 to 1970 (31) (34)

inferior good.[1]

A model which is expected to estimate beer consumption for the state must, therefore, account for this pecularity in the demand for beer. This can be accomplished by incorporating into the estimating model a change of income variable as well as a level of income variable. The specific purpose of the change of income variable would be to anticipate the direction consumption of beer would move for any noticeable increases or decreases of income.

In an effort to eliminate the difficulty of separating population influences effecting total consumption as opposed to the influence income has in determining the level of consumption, per capita consumption data is used. Once per capita consumption is estimated, population figures may be employed to determine total consumption. To total consumption may be applied the appropriate tax rate to determine estimated revenue to the state.

The model for determining beer tax revenue would then

[1]In an article by Stephen Greyser (12) it was noted that researchers have found that an increase of income does, in fact, lead to a decline in consumption of beer in a locality, while decreases of income may lead to an increase.

be:

$$R = r(TBC) \qquad (4.16)$$

$$TBC = BC \times (population) \qquad (4.17)$$

$$BC = a + bY + c(\Delta Y) \qquad (4.18)$$

where   BC = per capita beer consumed

TBC = total beer consumed

Y = level of per capita personal income

ΔY = change in or first difference of per capita personal income

R = revenue

r = tax rate

a, b, c = determined parameters

To be more certain that the form of equation 4.18 is of use, results of the regression analysis used to determine the equation were compared to those obtained from conducting a regression analysis for a similar equation leaving out the change in income variable. For the analysis using only an income variable, the R^2 term was .88 and the coefficients for the model were significant at the 5 percent level. For equation 4.18 using both the income and change of income variables, the R^2 coefficient was .911. The coefficient for the income variable was significant at the 5 percent level and that for the change of income variable was significant at the 10 percent level. Note below in equation 4.19 that the coefficient takes on a negative sign which agrees with the contention that beer is, in fact, an inferior good.

Thus, all indications are that a model of the type described in 4.18 above is a valid representation of consumption of beer in Iowa.

The equation for this model is given as:

$$BC = 11.3738^* + .0016712^*Y - .0017109^{**} \Delta Y \qquad (4.19)$$
$$(.3462) \qquad (.00017328) \qquad (.000966)$$

The R^2 term is .919.

The model indicated that for each one dollar of per capita income .0016 gallons of beer would be consumed. And that for each one dollar change in personal income, there would be a .0017 gallon change in consumption of beer in the opposite direction. The income variable is the dominant variable and accounts for over 88 percent of the variability. However, its first difference is significant at the 10 percent level and it is believed that it should be included in the model.

Comparing estimates of per capita consumption derived from equation 4.19 to actual data for the same period suggests that the equation does approximate reasonably well the observed data (see Chart 4.10 (31)). Deviations of estimated and actual data do not exceed .6 of one gallon or alternatively, they do not exceed 9 percent of the actual consumption data. Both actual and estimated figures rise at a rapid pace from 1964 to 1970, reflecting the sharp increase in the rate of growth of income for this period. The cyclical pattern of beer consumption has been dampened in the

NUMBER OF GALLONS
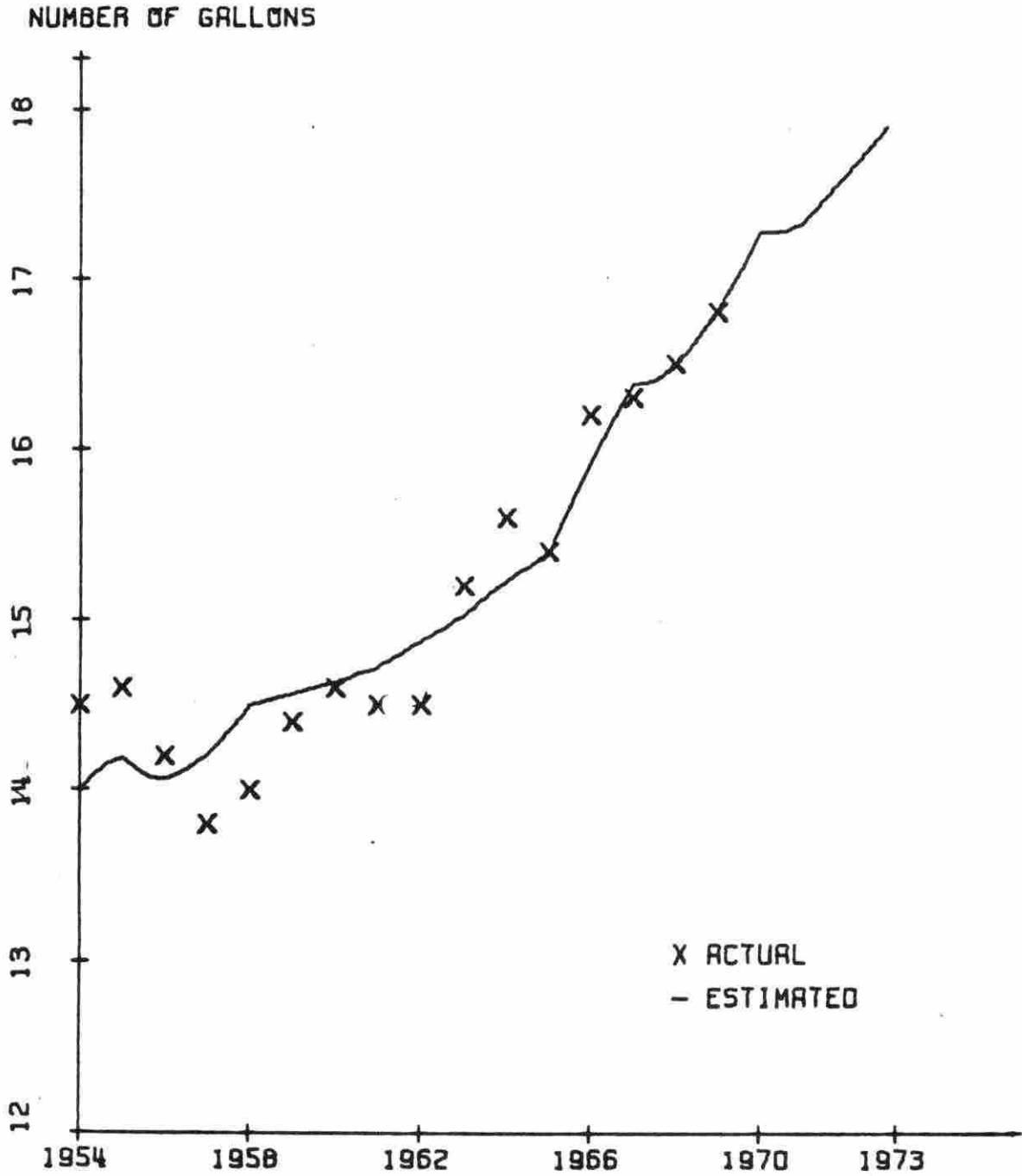
Chart 4.10 Estimated per capita consumption of beer in Iowa from 1954 to 1973 with actual consumption for comparison (31)

analysis. This fact explains why the deviations were as
large as 9 percent. However, the model still reflects in
part the cyclical variations in trend displayed by the data.
For example, the decline of income of 4 percent in 1955 is
displayed in the estimate by a rise in consumption of about
.2 gallons. The sharp rise of income of 13 percent in 1965
is reflected in the estimate, though not significantly, by a
slow down in the rate of growth of consumption from about 1
percent to about .8 percent. For future estimates, this fac-
tor may be of important use for estimating consumption if
fluctuation of income is anticipated to be significant.

Using population figures and the tax rates already de-
termined[1] and substituting this figure into equations 4.16
and 4.17 revenue for the state is determined (see Chart 4.11
(31)). The deviations between observed and estimated data
are no more than 200,000 dollars or 3 percent of actual fig-
ures.

By assuming that the value of the income variable is al-
ready determined,[2] expected future levels of consumption and
revenue can be estimated (see Table 4.3) and Chart 4.11 (31)).
Both consumption and revenue increased slowly for 1970 where

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[1]The population figures used for 1954-1969 are from
statistical abstract (33) and tax rates are those described
under "Tax structure of the Iowa beer tax" in this chapter.
Future projections assume a rate of 15 cents per gallon.

[2]Chapter V discusses the income variable.

MILLIONS OF DOLLARS
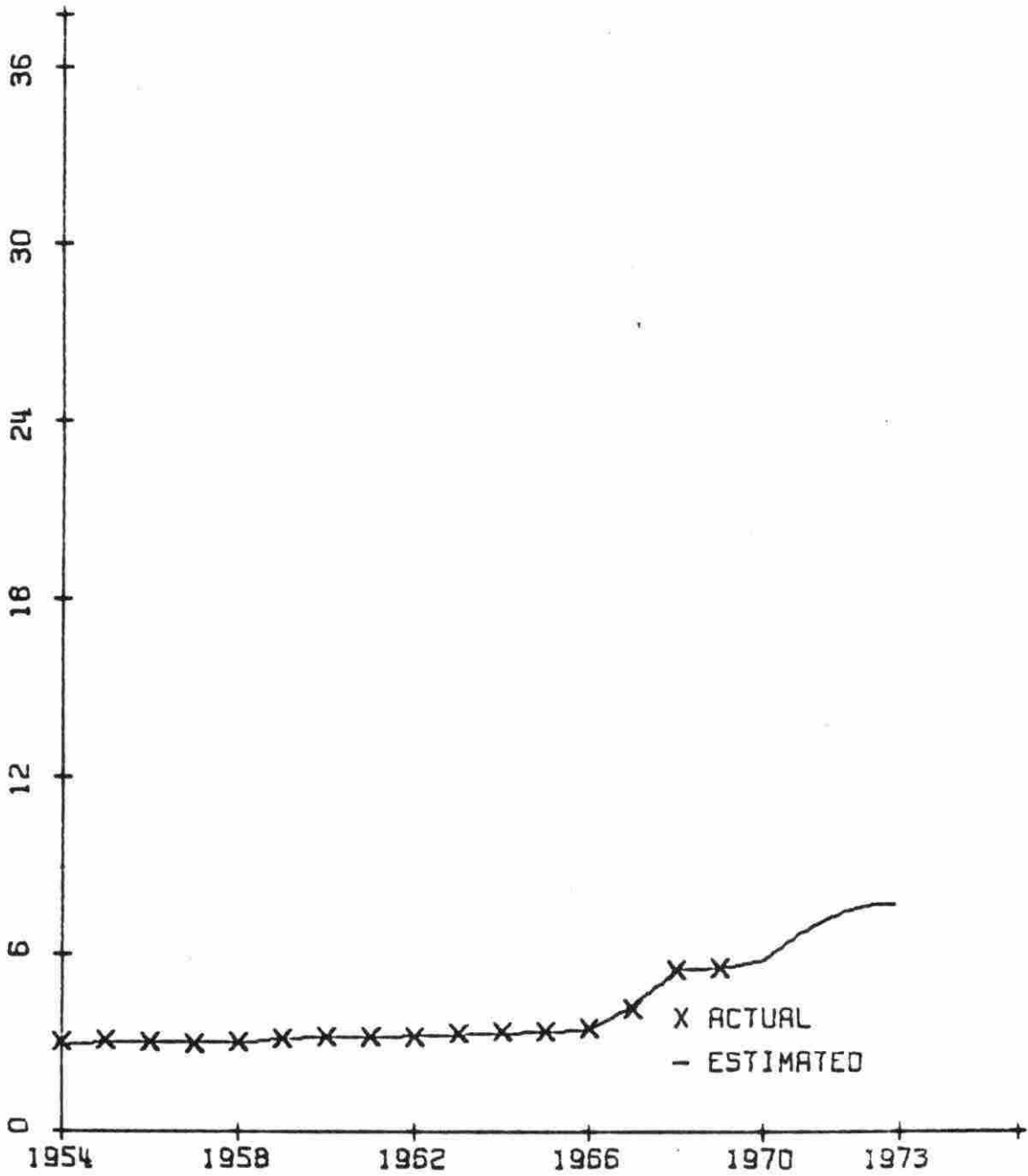
Chart 4.11 Estimated revenue collected per year by the
State of Iowa from the taxation of beer consumed in Iowa
with actual collections for comparison (31)

Table 4.3 Estimated beer tax revenue for Iowa for 1970-1973 based on estimated personal income assumed by extrapolation of past growth trends from 1948 to 1969.

Year	Personal Income (000,000)	Revenue (000)	Population[a] (000)	Per Capita Consumed (units)	Total Consumed (000,000)
1970	9986	5.85	2825	17.26	48768
1971	10450	6.90	2847	17.32	49329
1972	10950	7.57	2869	17.59	50475
1973	11500	7.75	2891	17.88	51693

[a]
Source: (33)

income was assumed to have remained at nearly the 1969 level of income. Revenue then increased by nearly 20 percent in 1971 reflecting the increase in the tax rate rather than any significant change in consumption or the level of population. Finally, after 1971 the rate of growth in revenue from this source leveled off increasing at a rate somewhat over 2 percent. This rate is consistent with a rate of growth in per capita consumption of just over 1 percent and an average increase in population of nearly 1 percent.

These results of comparing estimates and observed data of consumption and revenue for beer lend further support to the hypothesis that personal income and changes in personal income determine the level of consumption of beer in Iowa and

thus the amount of tax revenue derived from beer in the state. Therefore, the model described in this section may be used to anticipate future levels of revenue going to the state from the taxation of beer.

CHAPTER V. PERSONAL INCOME

In the preceding sections of this study, income was found to be a highly significant explanatory variable of past trends and varations in state revenue. As a consequence, the accuracy of future revenue estimates are, in fact, contingent on the reliability of the income variable itself. One might attempt to avoid this dependency and source of uncertainty by utilizing instead a procedure which simply calls for extrapolation of past revenue trends on into the future. However, this does not work since changes may occur in the applicable tax base, tax rate or income which may directly and substantially affect revenues. It is more useful for estimating purposes to recognize that state revenue is dependent on the relationship of state income to its tax structure.

Though it has been hypothesized that an estimating procedure recognizing income as the primary determinant of revenue in Iowa is the best procedure available, such an approach for revenue estimation brings forth further difficulties in terms of obtaining reliable estimates of state income. The fact is that at present no error-free procedure for estimating income at any level exists. Uncertainty concerning the value of the determinants of income is one primary cause of this difficulty. No one knows what investment or consumption levels will be in the future. Even when the government

conducts policies to stimulate or constrain economic growth,
there is no way to be certain the economy will respond as the
planners wish. Therefore, in determining an estimate of in-
come, the best that can be done is to attempt to define major
determinants of personal income and establish an estimating
model from this information; or more simply, to extrapolate
levels of personal income from past data as the best indica-
tion of what future levels of income will be.

Iowa Personal Income in Perspective

Personal income is current income of persons or house-
holds from all sources. It includes both receipts for pro-
ductive services provided by persons living in Iowa and re-
ceipts such as transfer payments made to Iowans for which no
productive services were provided by the recipient.

Personal income in Iowa has increased bv more than 6
billion dollars since 1950. From 1950 through 1959 state
personal income increased at an average annural rate of 2.6
percent. More notable, however, is the fact that from 1960
through 1969 this average rate climbed to over 5 percent, in-
creasing to as much as 13 percent in 1964 (see Table 1.2 (35)).

Also, variation around the linear 20 year trend of state
personal income has been as high as 18.9 percent and as low
as -7.4 percent, displaying an ordered cyclical movement over
time (see Chart 5.1 (35)).
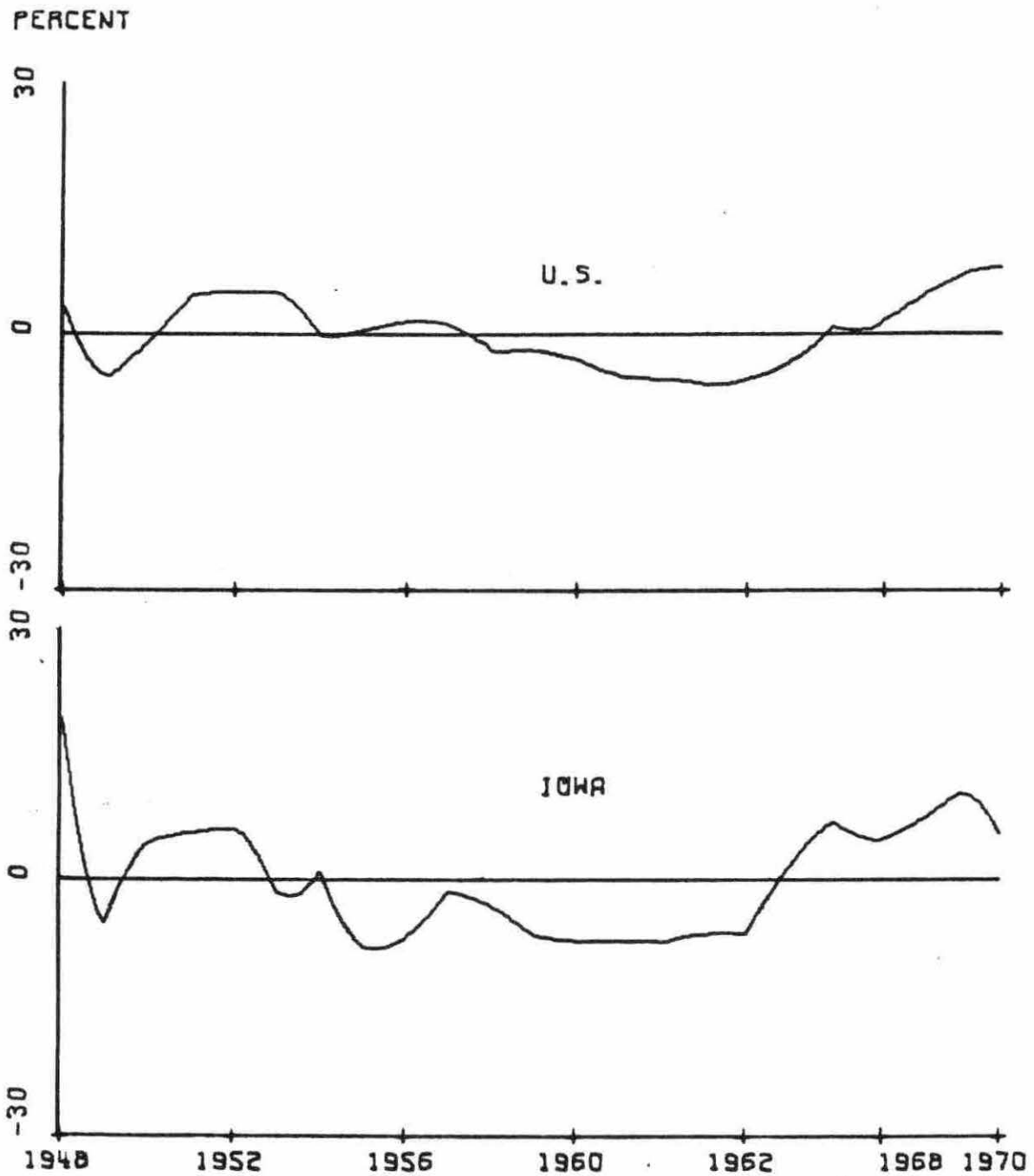
PERCENT

Chart 5.1   Percent deviation of personal income from twenty-
year trend for the United States and Iowa for years 1948 to
1970   (35)

Growth and variation of total personal income for Iowa
has in the past been the result or summation of economic
circumstances and prospects in the several sources of income
within the state.

Manufacturing

A major source of growth in personal income in Iowa has
been the development of manufacturing and other heavy indus-
try within its borders. Increases in employment and wages
indicate that Iowa is only beginning to fulfill its potential
as a location for industry. Diversification of manufacturing
away from agriculture and agricultural related industries is
increasing. Reports have indicated (25) that industries in
the machinery, food products, printing and publishing, chemi-
cals, fabrication metals, and transportation equipment are
beginning to locate in the state. In 1965 extension of
branch plants representing food products and fabricated met-
als plants located in Waterloo; electrical machinery and fab-
ricated metals in Burlington; non-electrical machinery, food,
printing and publishing and transportation in Des Moines; non-
electrical machinery in Dubuque; chemicals in Fort Madison;
and printing and publishing in Mason City (25).

A notable part of this expansion has occurred in the
smaller communities rather than the metropolitan areas of
the state. Of the 14 new major industries to locate in Iowa
in 1965, 13 were dispersed throughout Iowa in the smaller

communities. Of the 52 expansions which occurred, only half were located in metropolitan areas like Des Moines. Of the 51 new branch plants only five located in major metropolitan cities in the state (25).

The causes of this phenomenon are not certain, but its implications are significant for the growth of industry and income in Iowa. One explanation for this trend which is becoming increasingly prevalent is that in general throughout the United States, there is occurring a decentralization of industry away from crowded urban centers into the more manageable rural areas of states. With increasing frequency, it seems metropolitan areas offer more difficulties than benefit of central location. Problems of crime, pollution, incessant strikes, transportation traumas and high operating costs seem increasingly evident to the metropolitan center. Studies show that turnover rates for personnel are four times as great in cities as they are in smaller communities. It was estimated that men working in a small town have a 17 percent better chance of surviving from age 65 to 85. Cost of living for a middle income individual is as much as 50 percent higher in New York City as in the South or Southwest areas of the United States (10).

These observations have a very definite implication for Iowa. Iowa is rural by tradition yet it contains or is relatively near markets for skilled labor inputs which can meet

the technical and labor needs of various industrial concerns.
It provides central location to lucrative markets in Chicago,
St. Louis, Kansas City, Omaha, and Minneapolis. Iowa offers
excellent transportation facilities. It is bounded on two
borders by water routes for low cost transportation. It has
an adequate railroad system and two primary interstate highway
systems leading to major market areas.

Some indication of what effect the increased growth in
Iowa's share of total manufacturing might have on the state's
economy may be previewed by examining past trends. For exam-
ple, the rate of growth of wages and salaries in Iowa have
fluctuated from 5.5 percent in the early 60's to a rate as
high as 9.2 percent in the middle and later 60's (see Chart
5.2A (35). Wages and salaries from the manufacturing compo-
nent of personal income have increased from 14.03 percent to
17.76 percent of total personal income for the state between
1954 and 1969 (see Table 5.1 (35)). Depending first on the
general economic circumstances for the nation it is reason-
able to expect that movements in wages and salaries from
manufacturing over the next decade will continue to become a
more significant figure for the state's level of personal
income.

On considering the possibility of a rising level of wages
and salaries in the state, note that the total level of wages
and salaries is determined not only by wage and salary rates
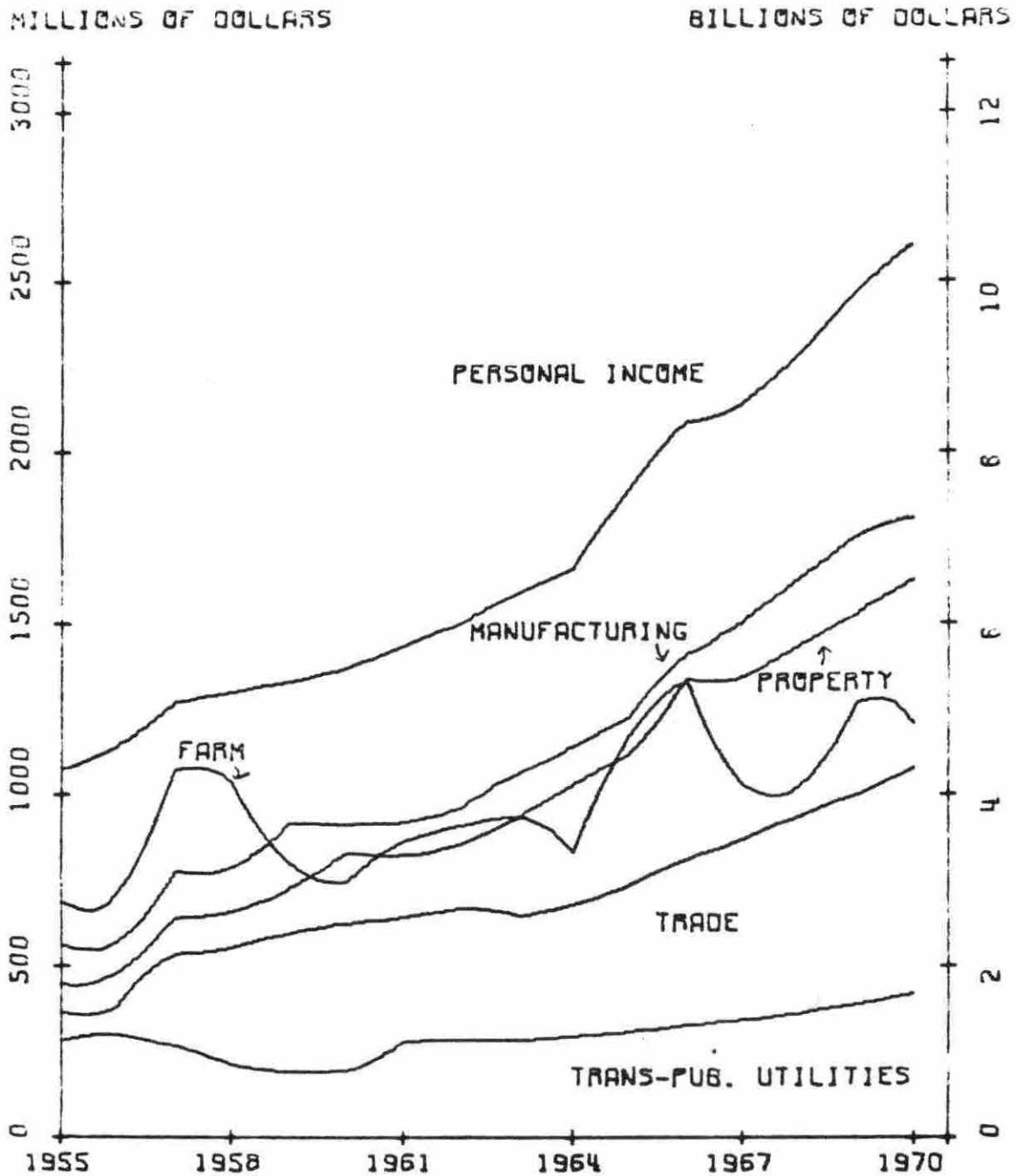
Chart 5.2A Iowa personal income and personal income by sources per year from 1955 to 1970 (35)

MILLIONS OF DOLLARS   BILLIONS OF DOLLARS

PERSONAL INCOME

GOVERNMENT

NONFARM PROPRIETORSHIP

SERVICES

CONTRACT CONSTR.

TRANSFER PAYMENTS
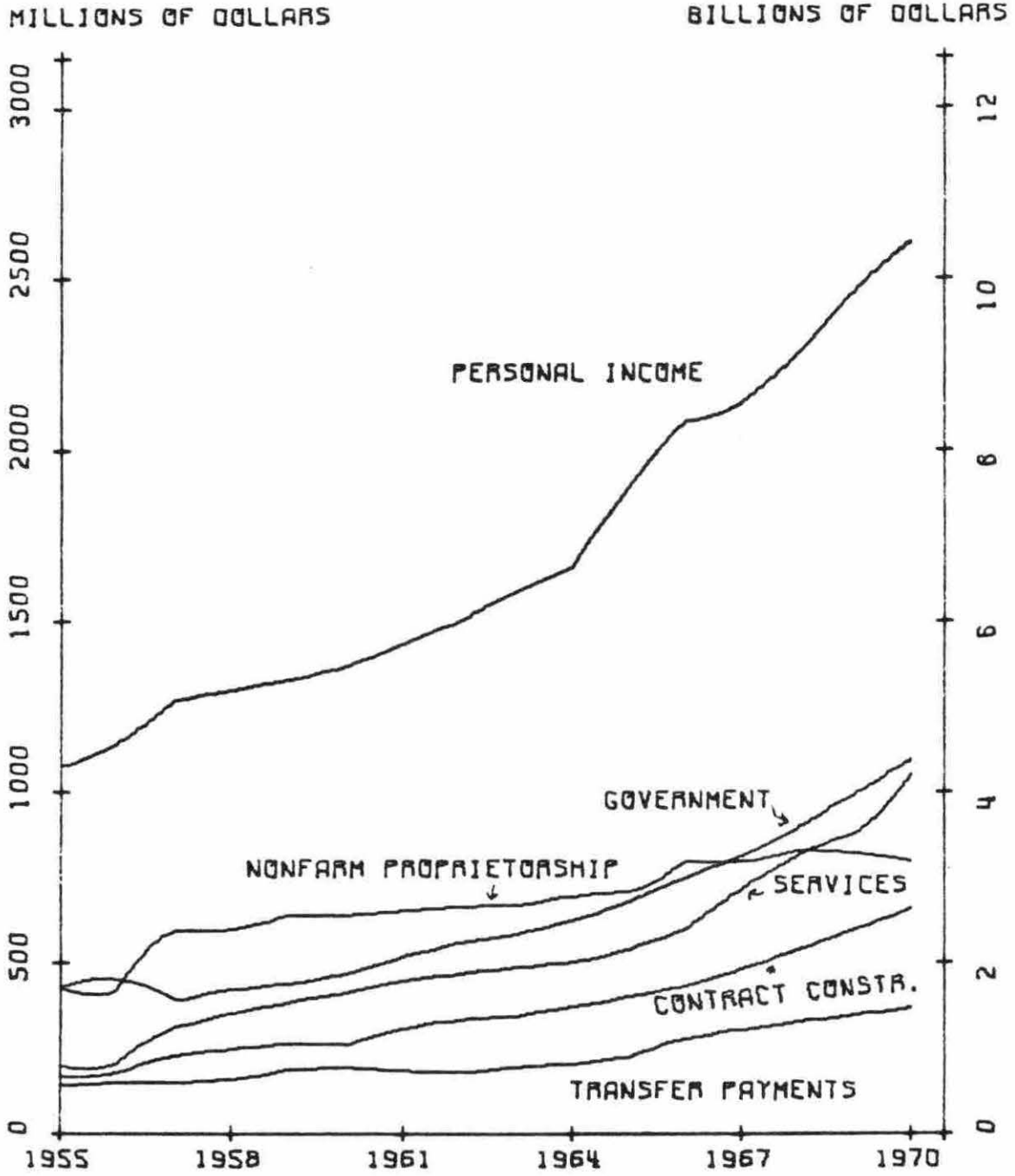
Chart 5.2B   Iowa personal income and personal income by
sources per year from 1955 to 1970 (35)

Table 5.1 Farm income and manufacturing income in Iowa and the percentage share of total income for each from 1954 to 1970. [a] (millions of dollars)

Year	Farm Income	Share Of Total	Manufacturing Income	Share of Total
1954	1174	25.9	635	14.03
1955	686	15.7	700	16.28
1956	714	15.5	750	15.37
1957	1076	21.1	776	15.28
1958	1039	19.9	789	15.16
1959	795	14.9	912	17.20
1960	743	13.5	915	16.65
1961	866	15.0	919	16.00
1962	909	15.1	962	16.02
1963	937	14.7	1029	16.19
1964	825	12.4	1143	17.19
1965	1173	15.5	1233	16.29
1966	1330	15.9	1409	16.92
1967	1020	11.9	1507	17.68
1968	1024	11.2	1630	17.86
1969	1270	12.8	1753	17.76
1970	1200	11.5	1807	17.33

[a] Source: (34), (35)

but also by the number of persons receiving a wage or salary. Thus, if wage rates are rising at 5 percent per year, total wages may be rising by 6 percent reflecting a net increase of 1 percent in the number of persons employed or redeployed into higher paying jobs. For Iowa, related to its increasing growth in manufacturing will be the increase of personal income determined by higher wages and salaries and an increase in the number of people employed in the manufacturing industry. The exact rate will depend on how well Iowa does in fact develop its potential for manufacturing in the next decade.

Agriculture

There remains for Iowa a real concern for the influence of farm income on the total personal income figure for the state. On balance even during the 60's when the Iowa economy was considered to be expanding, with incomes rising by relatively significant amounts, farm income grew slowly or was constant (see Chart 5.2A (35)). Farm income as a percentage of total personal income in Iowa has also been declining in importance falling from a high of 25.5 percent of personal income in 1954 to a low of 11.5 percent in 1970 (see Table 5.1 (35)).

Movements in farm income do have an influence on personal income, but it is no longer itself sufficient to cause direct corresponding movement in personal income of a proportional magnitude. For example, the fall in farm income of 42 percent from 1154 million dollars in 1954 to 635 million dollars in 1955, corresponded to a drop in state personal income of 6 percent from 4575 million dollars to 4307 million dollars for the same period. However, the fall in farm income of 25 percent from 1313 million dollars in 1966 to 1083 million dollars in 1967 corresponded to an increase in state personal income of 2 percent, from 8327 million dollars to 8523 million dollars (see Chart 5.2A (35)). The point to be made is that in the latter instance even with a significant decline in farm income for the state, personal income

increased. This does not mean to imply that agriculture is of minor importance in the determination of income in the state. Even though income increased in 1967 while farm income declined, it did so by a much smaller amount than might have been expected. The increase in personal income for the previous year 1966 and the following year 1968 both revealed substantial increases of 8 and 6 percent respectively, corresponding to the fact that farm income also increased during these years by 9 and 3 percent, respectively.

As with manufacturing, total farm income is determined by the number of farms being operated as well as the income produced by each farm. During the period 1960-1969 the number of farming units declined 24 percent. This represents 4,200 less farms each year. Also during this period the size of farms, in acres, increased 29 percent. These structural changes are reflected in the fact that both income and expenses have more than doubled for the farmer. Net farm income in Iowa averaged 8331 dollars per farm in 1969, an increase of 115 percent above 1960 (15). Projections are that the number of farms in Iowa will continue to decline rapidly over the next decade, while individual farm income will increase. However, this decline in number should easily outpace any rise in income, making farm income increasingly less important as a direct determinant of personal income for the state.

Tertiary activities

The growth of income from other sources resembles close-
ly that of the manufacturing components (see Chart 5.2A.(35),
5.2B (35)). This is not surprising if one considers that re-
tail trade, wholesale trade, and selective services, for ex-
ample, generally develop as a result of industrial expansion
in any economically defined area. This is supported in Iowa
by the fact that, like manufacturing, much of the new retail
and wholesale trade establishments, for instance, were situ-
ated in non-metropolitan areas. In 1963, of the new retail
trade establishments set up throughout Iowa, less than 42 per-
cent were in metropolitan areas (25). If this is any indi-
cation of future trends, it may be assumed that income from
trade and selective services will indeed expand at rates de-
pendent on and comparable to wages and salaries from manu-
facturing.

One exception to this is income from non-farm proprietor-
ships. Past data demonstrates that this source of income has
grown at rates often below that of total personal income. The
fact is that much of the income from this source is dependent
on the sale of farm-related items. For example, sales of
farm implements and fertilizer are very definitely tied to
previous levels of income to farms. As income from the farm
section may fluctuate, so also may non-farm proprietors' in
comes. However, like farm income, the effect of these

fluctuations is not of a sufficient magnitude to cause a corresponding downturn in the economy of the state.

Iowa Projections and National Income

In discussing projections of income for Iowa, it is useful and important to realize that state movements in income are tied to national economic circusmtances.

In the United States, with its basic free market structure and mobility of factors of production, there should be a tendency for personal income to equalize between states and regions and to assume similar patterns of growth over time. If, for example, high prices exist for goods in one region as opposed to another, goods from the region in which prices are lower should tend to flow to the area in which prices are higher, placing downward pressure on prices in the latter area and upward pressure on prices for the former area. This will consequently have an equalizing effect on price levels in general. Theoretically, the only differential between the return to the selling parties would be the cost of shipping the goods from one market to another.

Similarly, there should be a tendency toward equalization of wages and interest rates due to the mobility of these factor inputs. For example, if demand for factors in Iowa increased to where it was greater than supply, the wages and income, which might have been below the rest of the nation,

must increase in order to retain what labor it has and fur-
ther it must rise to draw labor input from other markets to
meet its increasing demand.

There are, of course, numerous obstacles that prevent
complete equalization of prices and wages and income through-
out the United States. Cost of transfer, degree of special-
ization, capital mobility in real terms, education, and a
host of other considerations may make impossible a sufficient
transfer of factors and goods to insure price and income
equalization. However, in general, conditions are such in
the United States that they allow for the necessary mobility
to establish a considerable degree of price and income equal-
ization among states and regions. Iowa has, it seems, fol-
lowed a pattern over the last twenty years which is in line
with this theoretical base. Through the 50's and early 60's
per capita income for Iowa rose at the rather slow but con-
sistent average rate of 2.7 percent, while at the same time
the level of per capita income was consistently below the
national average (see Chart 5.3 (35)). However, after 1963
as a change in the economic structure of Iowa become increas-
ingly apparent, per capita income rose sharply to an average
rate of growth of 6.2 percent, approaching the national level
of per capita income and even exceeding it in 1964.

Also, comparing variations of personal income in Iowa
with those of the United States, it can be observed that Iowa
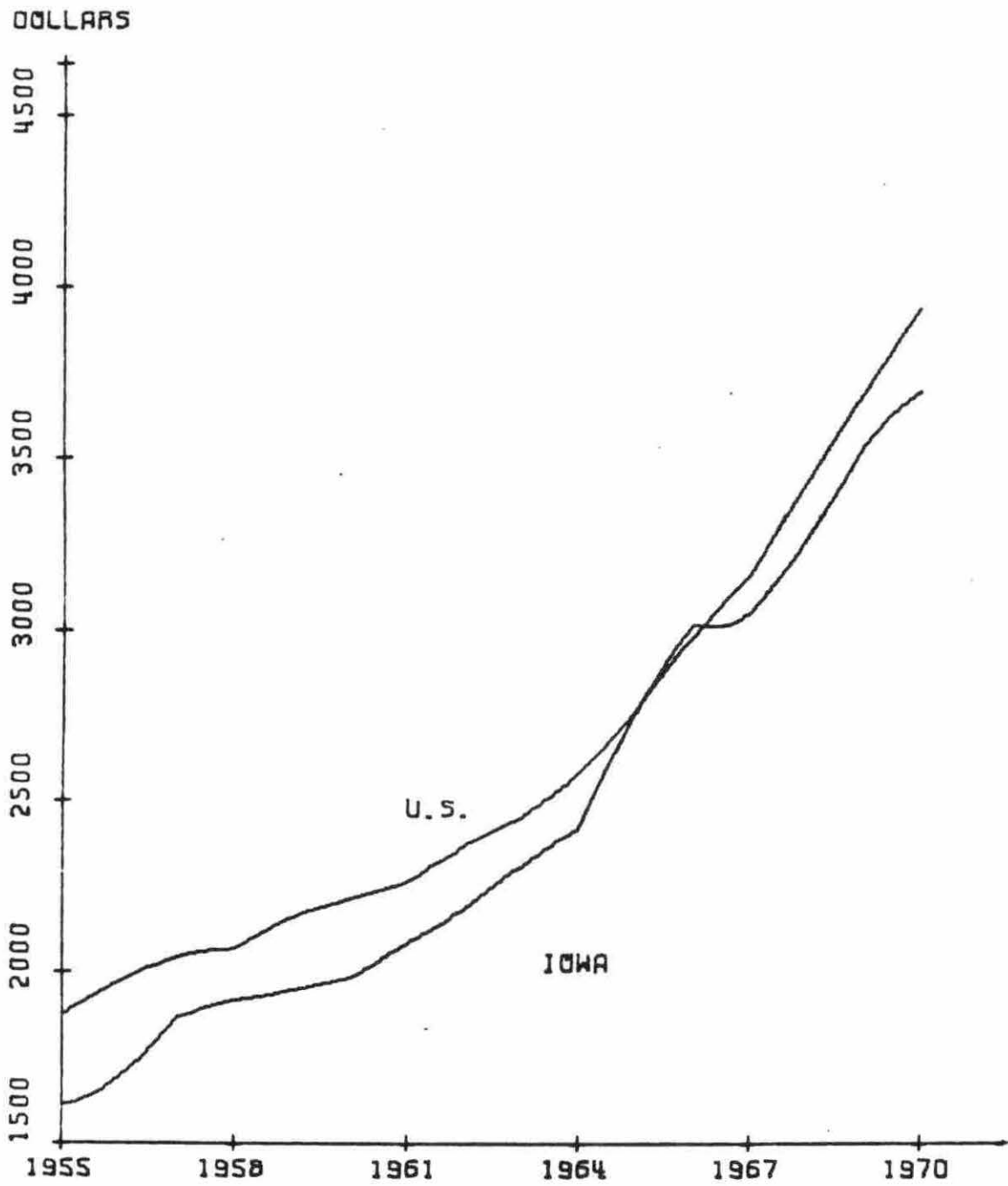
Chart 5.3 Per capita income per year for the United States
and Iowa from 1955 to 1970 (35)

displays a pattern of movement in income over time which is quite similar to that of the United States (see Chart 5.1 (35)). Movements of income for the nation ranged between +7.8 percent and -5.95 percent as compared to Iowa where it ranged between +18.9 percent and -7.4 percent. Though the cyclical movements are similar, there are differences in degree of variation. These differences can be explained in part by the relative importance of agriculture in Iowa as compared to the rest of the nation. The agriculture sector does on occasion accent declines or increases in income for the state and also on occasion stifles increases in income.

The major implication is that the Iowa economy does assume a similarity in movement to the national economy over time. Since income does fluctuate in a cyclical pattern similar to national movements, state projections for income may be based on more detailed projections concerning national income provided by federal agencies.

A further note is that today social pressures demand that government pursue policies which will maintain a full employment rate of growth in the economy. By administration of the correct policy, the government may both minimize unwanted fluctuations in the economy and insure a desired secular trend of growth. For Iowa an immediate effect of such a policy should be to also guide it into a consistently stable and desired growth rate. If the federal governement

continues to assume the role of economic supervisor, even in
a limited sense, this will imply that the United States econ-
omy and the economy of Iowa as well might itself assume an
ever more predictable path of income levels. The actual rate
the path will take is uncertain since numerous factors will
interplay to determine what the actual level will be. Even
so, government efforts for stablizing the economy should play
a significant part in seeing that a stated growth rate is at
least approached.

Alternative Methods to Estimating Income for Iowa

It remains to determine what value the income variable
might assume for any given future year. Whatever method for
determining income that might be chosen, the present state of
knowledge makes inevitable the fact that such forecasts will
be subject to some error. Data used in determining the in-
come variable are often inaccurate. For example, stocks of
capital and the degree of confidence in the economy cannot
at present be precisely measured. Before any model is chosen,
therefore, whether linked directly to national income or not,
the alternatives available for selecting the appropriate esti-
mates of income should be discussed.

Averaging or extrapolating income

Two methods often used for forecasting are to average
income changes over time or to extrapolate a trend of past

data into the future. In the former instance it requires a simple procedure of adding some average of previous year's levels of income to the most recent year's level and thus derive an estimate.

To extrapolate an income trend one might use a time series regression to determine an optimum path through the known income values and then simply extend this path to determine estimates for years in which forecast data is required.

Methods such as these, in their simplest form, cannot directly account for or adjust for unexpected or unwanted cyclical variations around the trend or average. For reasonably accurate estimates, adjustments for such variations may be required and without some means to allow for future circumstances, the adjustments would in fact be arbitrary.

Sales or use tax receipts as indicators

For Iowa, with its comprehensive sales tax structure, one method for forecasting income might be to employ either the sales or use tax, or some component of one of them to be used as a leading indicator of how income should behave in the future.

However, when such a model was implemented, for instance, using a lagged motor use tax variable, the results were not accurate enough to use as a means to project levels of income for a period of over one year. For instance, though the R^2

coefficient accounted for better than 86 percent of the variation and the coefficients to the appropriate equation were determined to be significant at the 5 percent level, there was in fact a number of years when the estimate was as much as 15 percent in error. Also, the model on three separate occasions anticipated a significant decline of income when in fact, income rose. On another occasion, it predicted an increase of income when there was actually a fall of income in the state.

It is not difficult to understand why such a method is unsuited for the task of predicting income. Consumption is not dependent alone on current income, and it is also obvious that movements in income are not strictly determined by trends in consumption. Certainly income is far more dependent on the interrelationships of expectation concerning future levels of economic activity and investment levels than on current levels of consumption for its projected value for any given year. Certainly consumption habits cannot adequately anticipate movements in all related variables.

Even if a method such as this were adequate for a one-year estimate, it falls far short of the needed three- to four-year estimate required for forecasting revenues to be received by the state for a period as long as a biennium.

To digress from the topic of three- to four-year estimates, it might be suggested that a model similar to the one

discussed here, using instead quarterly sales or use tax data, might indeed give a quick reliable estimate for the level of income to the state for the current year. That is, an estimate for income in Iowa during 1971 could be obtained as early as December of 1971. If, in fact, the relationship of current spending to state income is a relatively constant proportion over time, then income should be able to be estimated from tax reports for the current year. For example, on December 31, 1971, sales and use tax receipts are released by the state for the third quarter of 1971. If then the fourth quarter receipts are estimated with the appropriate seasonal adjustments made, and knowing taxable sales to be approximately 70 percent of personal income for the state, a reliable income estimate can be determined as much as eight months prior to most estimates provided by national agencies.

Personal income determined by sector

A method that might be used to forecast income, though no empirical work is done, would be to estimate the level of income or aggregate output in Iowa by sector.

This would be formulated into an econometric model or system of equations from which total output is determined and from which state personal income can be derived. The model might be designed such that all variables are endogeneous to the system. That is, a model where, for instance, present

levels of investment are dependent on past levels plus levels of consumption; or, farm income is determined by past income plus trends in state exports of farm commodities. From such a model an aggregate state output or income figure might be determined by solving simultaneously the set of equations or model. From this estimate a state personal income figure may be determined without having to assume directly that some exogeneous variable is given or without having to simply extrapolate past trends in income with no account taken of how changes in particular sectors of the state's economic structure might effect the income variable.

However, this particular procedure is appropriate more for national income estimates where specified variables and interrelationships between variables can be more easily approximated than could be for state estimates. Though general movements in economic activity over time are similar for Iowa and the nation, the interrelationships between state economic variables and the rest of the nation are difficult to define. For example, it is no simple matter to determine how much the level of investment in Iowa is determined by past investment in Iowa itself and how much is determined by present and past levels for the nation as a whole.

Though such a model if it could be designed would be of significant value in determining accurately future levels of income for the state, constructing such a model is a complete

study in itself and is not feasible to design in a study of
this nature.

Income Model For This Study

There are on occasion independent detailed econometric
studies conducted at the state level which attempt to derive
reliable income forecasts. If one obtains such an estimate,
and it is employed as the independent variable in each of the
tax models, it is reasonable to conclude that these results
are the best available at that time.

However, for Iowa there have been no recent forecast
models developed to determine levels of income in the state.
As a result, it is necessary to use an extrapolative pro-
cedure described in the preceding section for estimating in-
come. Extrapolating past trends of income into the future
while anticipating changes in the trend by relying on national
forecasts of income, it is possible to determine future esti-
mates of Iowa personal income. This implies a model of the
following type:

$$Y = a + t^c \qquad\qquad (5.1)$$

where   Y = personal income

t = time

a = intercept coefficient

c = exponent measuring percentage change of income

In developing the appropriate equation for the model, specific alternative structures were analyzed in an effort to account for cyclical variation from trend in the income variable. Trigonometric and cubic functions were estimated but they did not adequately anticipate when changes would occur. Often times these forms of the equation estimated changes of income in the wrong direction to what actually occurred.

Finally, a log linear model was estimated in which a dummy variable was introduced to allow for shifts in the function caused by changing patterns of cyclical variations (see Chart 5.4 (35)). The results of this analysis using Iowa data rendered an R^2 term of .9439. Each coefficient was determined to be significantly different from zero at the 5 percent level and each dummy variable representing a change of direction for the trend was also significant at the 5 percent level.

The observations noted concerning the similarity of movements in state and national income is important to this particular model. Without it, the results from the model would would have less significance for future estimates since it is unable on its own to predict directly where turns in trends might occur. With the observed similarity of movement in income for the nation and the state of Iowa, then predictions of turns in the economy made for the nation may be anticipated in the state estimate as well, either as a

BILLIONS OF DOLLARS
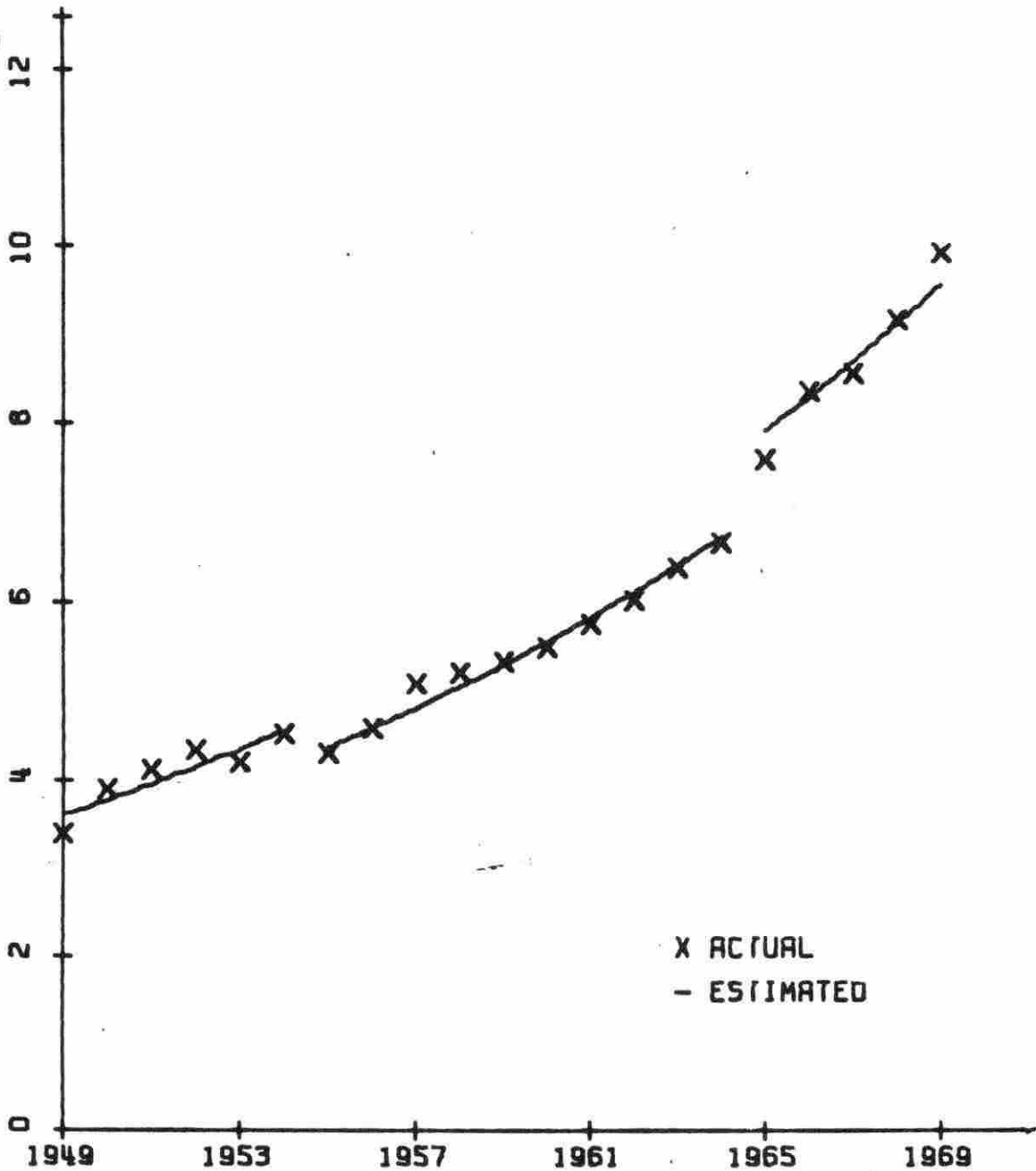
Chart 5.4 Estimated personal income for Iowa determined from
log linear regression analysis with actual income for compari-
son for years 1949 to 1969 (35)

percentage decline or increase from predicted trend.

Based on these considerations the value of the income variable used throughout this study was determined by the following equation:

$$Y = 3.537^* + 3.498D_1^* + 3.548D_2^* + .0205^* \qquad (5.2)$$
$$(.0070) \quad (.0150) \quad (.0151) \quad (.0012)$$

where Y = personal income

t = time

D_1 = dummy variable estimating average deviation from trend for 1955-1964

D_2 = dummy variable estimating average deviation from trend for 1965-1969

and where estimates for future years assumed the coefficient D_2 as the appropriate intercept coefficient.

There is, of course, no way to be certain of how valid this equation will in fact be in the future, but certainly knowing more of the expected movements for national income in general gives an improved basis for accepting the result obtained from the model.

Estimates for personal income for years 1970-1973 are consistent with past trends of income (see Table 5.2 and Chart 5.5 (35)). Indications are that the growth of income in Iowa should continue to increase at a rate much less than the 8 or 9 percent experienced in 1967-1969. The growth rate of nearly 5 percent is more closely aligned with the observation that government will implement and regulated stated

BILLIONS OF DOLLARS

X ACTUAL
— ESTIMATED
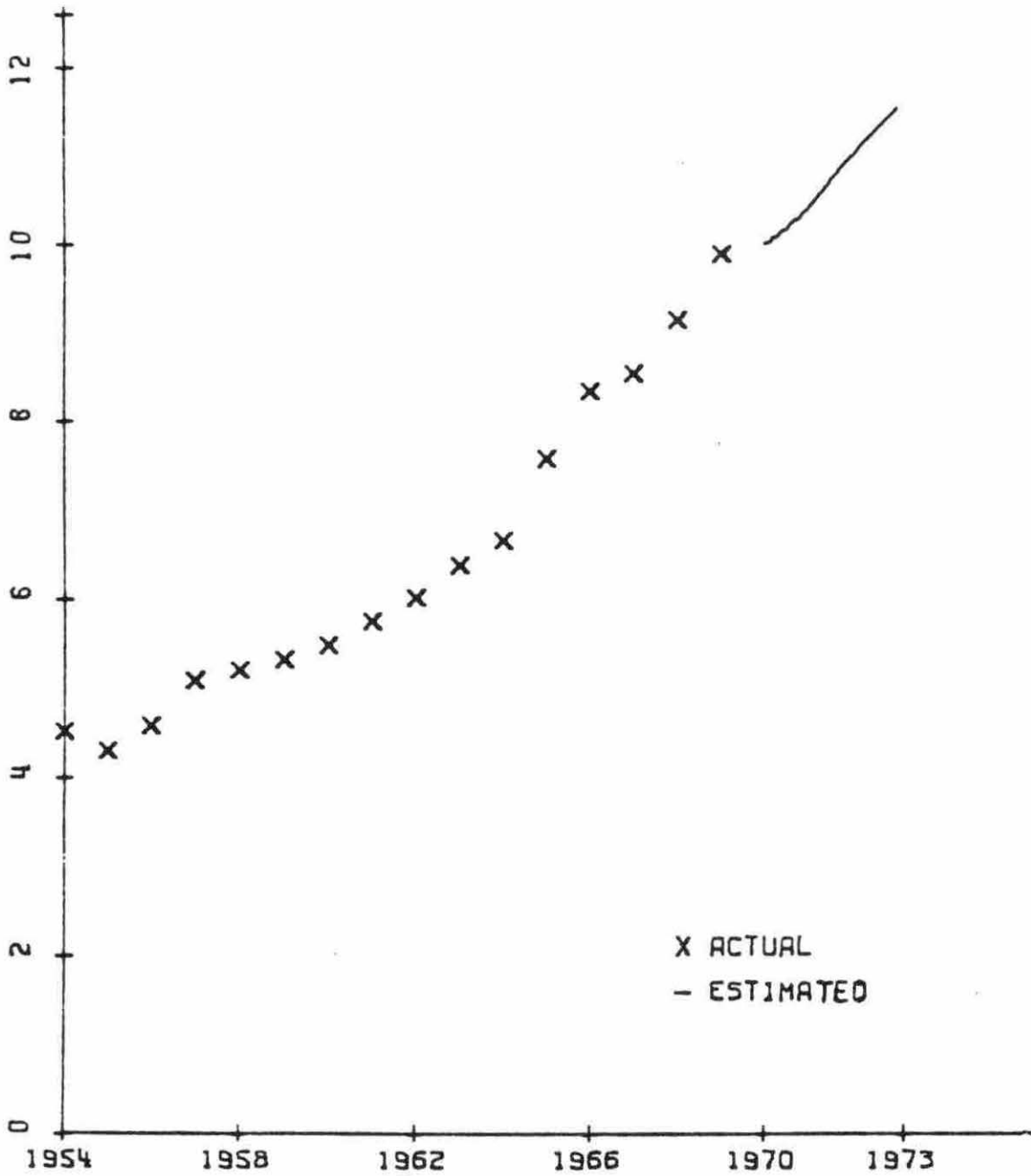
Chart 5.5 Personal income for Iowa from 1954 to 1969 with estimates given through 1973 (35)

Table 5.2 Estimated personal income and percent change of income assumed by extrapolation of past growth trends from 1948 to 1969. (millions of dollars)

Year	Personal Income	% Change
1970	9986	-
1971	10450	4.6
1972	10950	4.7
1973	11500	4.8

policy to achieve this rate of growth.

As the discussion has indicated, difficulties in obtaining reliable income variables are indeed extensive. No one particular method or model can in any complete sense look into the future and forecast what income will be. There are far too many uncertain and unaccountable factors with which to deal. The best that can be done is to look at the available data and make the best judgment possible.

CHAPTER VI. SUMMARY AND CONCLUSIONS

Final Observations and Implications

The purpose of this study has been to examine and explain the trends in selected sources of revenue received by the state and to develop models and procedures for estimating future revenues from these sources. It has been the primary hypothesis throughout this study that personal income and the tax rate are the dominant variables in determining revenue from most state tax sources. This hypothesis was examined for three types of revenue and except for revenues from the taxation of cigarettes, income was found to play a highly significant role in the determination of revenue. Thus, if personal income is known and the appropriate tax rates are assumed, revenue for future years can be anticipated within 3 percent with up to 95 percent confidence in the estimate.

With respect to estimating income, however, there exists many influences or determinants of its level. It is, therefore, unreasonable to formulate single valued expectations. As attempted in Chapter V, it is possible to determine "most likely" estimates of income, but there is just no way to be certain of what the level of personal income should be for each year an estimate is required.

If past trends in Iowa continue and if government intervention to stabilize and direct the economy is reasonably

successful, the most likely rate of growth of Iowa personal income is about 5 percent. But there is no guarantee that income will grow at exactly this explicit rate. It is nearly as likely that income will grow at 4 or 6 percent. If, for example, the government was unable to contain inflationary pressures completely, the level of personal income in absolute terms could rise at an average rate of about 5 percent, perhaps 6 percent. If government price and credit constraints become too severe, economic activity could slow, unemployment rise and the level of growth of income could actually be less than 5 percent, perhaps 4 percent. Though any rate of growth in income is possible, a 5 percent rate is more likely. Also, as the range of deviation from the estimate of 5 percent widens, the probability of having rates of about 3 or 7 percent falls. The federal government's policy commitment to price stability and full employment should limit the observed rates to values of nearly 5 percent which is the established trend. For instance, it is fairly certain that the government would not passively allow a situation of hyper-inflation or deflation to develop in the economy.

If Iowa continues to develop in the future as it has in the past, then its rate of growth of personal income should also move at rates comparable to those for the nation as a whole. Thus, the comments made above pertaining to the potential growth of personal income are valid for Iowa as well

as for the entire nation.

Because of the uncertainty of the income variable, the
models developed in this study were used to estimate alter-
native revenues to be received by the state assuming differ-
ent values for the income variable for years 1970-1973
(see Tables 6.1, 6.2, 6.3, and 6.4). The first series of

Table 6.1 Estimated state revenue for Iowa for 1970-1973
based on estimated personal income assumed by extrapolation of
past growth trends from 1948 to 1969. (millions of dollars)

	1970	1971	1972	1973
Personal Income	9986	10450	10950	11500
Income Tax	109.50	133.13	144.37	155.01
Sales and Use Tax	226.50	239.94	245.50	256.55
Liquor Profit and Tax	22.64	23.58	24.79	26.02
Beer Tax	5.85	6.91	7.57	7.75
Cigarette Tax	30.25	36.19	37.88	36.58
Total	394.74	435.35	460.01	481.21

Table 6.2 Estimated state revenue for Iowa for 1970-1973
based on estimated personal income assuming a 4 percent
growth per year after 1969. (millions of dollars)

	1970	1971	1972	1973
Personal Income	10263	10674	11101	11545
Income Tax	115.23	138.32	146.92	156.09
Sales and Use Tax	229.13	239.63	249.48	259.25
Liquor Profit and Tax	23.26	24.18	25.13	26.12
Beer Tax	5.85	7.10	7.63	7.79
Cigarette Tax	30.25	36.19	37.88	36.58
Total	403.72	445.42	467.04	485.83

Table 6.3 Estimated state revenue for Iowa for 1970-1973 based on estimated personal income assuming a 5 percent growth per year after 1969. (millions of dollars)

	1970	1971	1972	1973
Personal Income	10362	10880	11424	11995
Income Tax	117.27	143.12	154.56	166.92
Sales and Use Tax	230.06	242.13	254.11	266.33
Liquor Profit and Tax	23.48	24.64	25.85	27.12
Beer Tax	5.85	7.12	7.68	7.87
Cigarette Tax	30.24	36.19	37.88	36.58
Total	406.90	453.20	480.08	503.82

Table 6.4 Estimated state revenue for Iowa for 1970-1973 based on estimated personal income assuming a 6 percent growth per year after 1969. (millions of dollars)

	1970	1971	1972	1973
Personal Income	10461	11088	11754	12459
Income Tax	119.30	148.00	162.40	178.20
Sales and Use Tax	230.90	244.60	258.80	273.57
Liquor Profit and Tax	23.70	25.10	26.59	28.16
Beer Tax	5.85	7.14	7.72	7.95
Cigarette Tax	30.24	36.09	37.88	36.58
Total	409.99	460.93	493.39	524.46

of estimates used income determined from equation 5.1 of Chapter V. The remaining series of estimates used values of income assuming growth rates of 4,5 and 6 percent after 1969. As an example of the possible divergence of estimates when they are dependent on alternative levels of income, note that for 1970 differences in total revenue from all sources range

between 394.56 million dollars for the lowest income figure
(Table 6.1) to 409.82 million dollars for the highest income
figure (Table 6.4), a difference of about 3.8 percent.

The primary cause of the differences in revenue is the
influence the different levels of personal income have on
the personal income tax and sales tax revenues. These two
sources of revenue provide the state government with greater
than 70 percent of its non-property tax revenues. In fact,
of the 3.9 percentage difference in revenues in the example
above, 3.6 percent were directly attributable to the dif-
ferences in revenues received from sales and income taxes.
The remaining .3 percent was attributable to alcoholic bev-
erages including beer. Of course, none is dependent on rev-
enues from cigarettes since personal income was not considered
a dominant variable in determining demand for cigarettes.

Finally, it should be realized that the importance of
the income and sales taxes is not only because of their e-
lasticity with respect to income, which is close to one, but
also because of the volume of dollars and breadth of coverage
involved with collection of the taxes. The income and sales
taxes are universal taxes, not taxes confined to only those
individuals who choose to consume a specific product. The
sales tax effects over 70 percent of income earned in Iowa.
For the income tax, this coverage applies to adjusted gross
income which is over 70 percent of personal income in Iowa.

As stated then, perhaps to the point of monotony, it is not possible to forecast income three or four years into the future with certainty. In Chapters II through IV, estimates of revenues were given for levels of income determined by an extrapolative procedure. In this concluding section, the uncertainty of revenue forecasting has been more explicitly recognized and alternative income and revenue estimates have been anticipated and presented in Tables 6.1, 6.2, 6.3 and 6.4.

The estimates in each case represent what might be expected if income grew at any one of the various rates. The alternatives as presented, therefore, give the policy maker representable figures on which to base his decision and, further, various alternatives from which contingency plans may be designed. At the moment, this is the best that can be done and should be used as a step forward toward becoming more completely able to specifically estimate revenues for the state government.

Sources of Revenue Not Considered in Study

The income tax, sales and use tax, and other selective sales taxes and revenue sources discussed in this study contributed over 70 percent of revenue in the Iowa General Fund. Nevertheless, other taxes of significant magnitude were omitted and should be noted. They include, for example, the

corporation income tax, insurance premium tax, inheritance tax, and the motor fuel tax. Revenue from these sources, excluding the motor fuel tax, contributed 11.5 percent of total revenue collected by the state in 1970. By itself, motor fuel taxes amount to about 25 percent of state total revenues.

The majority of these sources have not been discussed primarily because they do not fit easily the basic relationship to income that has been hypothesized throughout the text of this work. For example, if one were to attempt to design a revenue-estimating technique for the corporation income tax, one would discover that an essential requirement for doing so would be to develop some method of projecting the distribution of the sales of corporations to be taxed between sales made within the state and those made outside its boundaries. Further, it would be necessary to examine the structure of the various corporations in Iowa and their respective growth in terms of future returns. Neither of these two aspects for establishing some means of estimating revenue from this source is of a simple nature and to date no approach has been adequately designed to cope with these problems.

The other taxes mentioned, though not as difficult as the corporation tax to deal with, are not required as further evidence of the usefulness of the approach to revenue

estimation set forth here. Omitted, they restrict the study from detailing a total revenue estimate to the state, but this does not inhibit the study from its purpose of demonstrating that with further research such a procedure might be detailed and estimates derived for all sources of revenue to the state.

Value of the Analysis

Judgments concerning whether revenues will meet future expenditure requirements for the state must be made on estimates from models exemplified by those listed in Tables 6.1, 6.2, 6.3 and 6.4. Because of the uncertainty of the income variable and the limits to the confidence bands for the models themselves, errors may indeed result. The fact is that in dealing with models of this type, it has often been observed that difficulties with actually determining accurate forecasts are sufficient to make one wonder that any such method is useful at all. Only a few econometric models have been used for forecasting purposes over any extended period (6). Problems in anticipating base changes in the tax structure or changes in the structure of demand for various goods make difficult the task of constructing meaningful econometric models. Also, judgment concerning the degree of aggregation or disaggregation regarding any such model is difficult to determine. If in determining the income variable, a model is developed using each sector of the Iowa economy, one could

disaggregate these sectors down to the manufacturing industry level. However, this very fine disaggregation poses problems where, for instance, a systematic influence which effects the behavior of all firms may be of considerable importance in the aggregate, yet the individual firm may be so swamped by other factors that it cannot be detected.

In spite of these difficulties, the fact is that in general, such methods are better than simple naieve forecast or departmental averaging alone. Naieve forecasting methods are by definition nearly incapable of being improved, whereas, econometric models can and are being improved for better and more detailed analysis. It is, therefore, with this final note that it may be said that the estimates and techniques presented in this study are of considerable value in determining useful data on which policy and budget decisions for the state government may be based.

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APPENDIX

Table 7.1 Iowa income tax and related figures for 1958 to 1970.[a]

Year	Personal Income	Adjusted Gross Income	Fed. Ded.	State Ded.	Effective Tax Rate	Net Taxable Income	Personal Credits	Dependency Credits	Tax Paid
1958	5201	3542	389	318	.02102	2835	1266	897	34.0
1959	5318	3561	445	342	.02124	2773	1185	856	34.5
1960	5474	3682	446	379	.02129	2856	1227	889	35.7
1961	5742	3842	474	339	.02188	2979	1233	907	39.5
1962	6004	3969	492	419	.02207	3058	1230	991	42.4
1963	6324	4152	517	453	.02208	3182	1361	982	44.1
1964	6648	4518	484	467	.02310	3557	1374	921	54.9
1965	7566	4994	532	515	.02430	3946	1415	878	98.1
1966	8346	5692	619	607	.02527	4440	1556	993	81.5
1967	8557	6284	731	683	.02638	4881	1762	1089	91.5
1968	9122	6937	883	729	.02668	5325	1877	1122	102.8
1969	9869	7517	1016	752	.02676	5371	1893	1116	112.3
1970	10418	7719	_b	_b	.02678	5795	1853	1103	116.2

[a] Source: (17), (20)

[b] Not available

Table 7.2   Taxable sales in Iowa and sales tax and use tax
collected for 1952 to 1969.[a] (millions of dollars)

Year	Taxable Sales	Sales Tax Collected	Use Tax Collected
1952	2960.23	51.60	7.61
1953	3113.54	52.57	9.69
1954	3236.87	54.45	10.28
1955	3380.83	64.75	11.74
1956	3428.12	73.62	12.08
1957	3580.55	68.02	11.61
1958	3846.07	65.59	11.35
1959	4112.36	69.35	12.90
1960	4231.13	69.36	15.36
1961	4095.48	69.94	12.10
1962	4451.18	72.42	16.64
1963	4521.67	74.08	16.34
1964	4667.45	77.14	16.75
1965	5181.11	83.69	19.96
1966	5603.73	91.93	20.31
1967	6040.34	111.31	25.94
1968	6768.47	166.45	36.67
1969	7294.91	181.81	37.09
1970	7709.23	192.49	38.78

[a] Source: (16), (19)

Table 7.3 Cigarette consumption and cigarette tax revenue
for Iowa from 1954 to 1969.[a]

Year	Cigarette Sales (millions of packs)	Per Capita Sales (units of packs)	Revenue (thousands of dollars)
1954	246.0	92.8	7381
1955	249.0	91.9	7471
1956	255.8	94.1	7675
1957	266.4	97.2	7991
1958	295.9	108.2	8876
1959	295.9	107.5	11911
1960	307.4	111.3	12296
1961	314.4	113.3	12594
1962	319.0	114.9	12759
1963	305.0	109.7	15249
1964	319.8	116.0	15989
1965	298.6	108.2	24500
1966	312.3	113.7	24980
1967	300.5	109.2	29832
1968	299.3	107.9	29929
1969	301.6	108.5	30156
1970	297.4	105.3	29754

[a]
 Source: (8)

Table 7.4 Liquor sales, net income and tax receipts from
operations of the Iowa liquor commission for fiscal years
1955 to 1971.[a] (millions of dollars)

Fiscal Year	Liquor Sales	Net Income	Tax Receipts	Total Revenue
1955	37.453	7.875	-	7.8
1956	37.452	8.869	-	8.8
1957	37.581	8.923	-	8.9
1958	38.869	9.236	-	9.2
1959	41.193	9.929	-	9.9
1960	43.320	10.539	-	10.5
1961	44.357	10.444	-	10.4
1962	44.813	11.541	-	11.5
1963	44.598	11.269	3.080	14.4
1964	49.778	13.369	3.940	17.3
1965	52.099	13.319	4.610	17.9
1966	54.384	13.643	5.099	18.6
1967	57.693	14.374	3.370	17.7
1968	62.645	16.442	2.490	18.9
1969	66.149	17.802	3.290	20.8
1970	71.252	20.811	3.270	23.8
1971	74.546	21.361	3.460	25.4

[a]
  Source: (18)

Table 7.5 Beer consumption and beer tax revenue for Iowa for 1954 to 1969.[a]

Year	Beer Sales (thousands of gallons)	Per Capita Sales (units of gallons)	Revenue (millions of dollars)
1954	38250	14.19	3.060
1955	39200	14.06	3.136
1956	38600	14.21	3.088
1957	37690	14.50	3.015
1958	38390	14.57	3.071
1959	39580	14.64	3.166
1960	40153	14.73	3.212
1961	40189	14.88	3.215
1962	40278	15.03	3.222
1963	41960	15.23	3.357
1964	43066	15.39	3.445
1965	42512	15.92	3.401
1966	44389	15.92	3.551
1967	44797	16.38	4.181
1968	45824	16.49	5.498
1969	46683	16.32	5.602
1970	-	-	-

[a]
  Source: (31)