

INFORMATION TO USERS

This was produced from a copy of a document sent to us for microfilming. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help you understand markings or notations which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure you of complete continuity.
2. When an image on the film is obliterated with a round black mark it is an indication that the film inspector noticed either blurred copy because of movement during exposure, or duplicate copy. Unless we meant to delete copyrighted materials that should not have been filmed, you will find a good image of the page in the adjacent frame. If copyrighted materials were deleted you will find a target note listing the pages in the adjacent frame.
3. When a map, drawing or chart, etc., is part of the material being photographed the photographer has followed a definite method in "sectioning" the material. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.
4. For any illustrations that cannot be reproduced satisfactorily by xerography, photographic prints can be purchased at additional cost and tipped into your xerographic copy. Requests can be made to our Dissertations Customer Services Department.
5. Some pages in any document may have indistinct print. In all cases we have filmed the best available copy.

University
Microfilms
International

300 N. ZEEB RD., ANN ARBOR, MI 48106

8217466

Robison, John Charles

**TAX COURT CLASSIFICATION OF ACTIVITIES NOT ENGAGED IN FOR
PROFIT: SOME EMPIRICAL EVIDENCE**

The University of Arizona

PH.D. 1982

**University
Microfilms
International** 300 N. Zeeb Road, Ann Arbor, MI 48106

TAX COURT CLASSIFICATION OF
ACTIVITIES NOT ENGAGED IN FOR PROFIT:
SOME EMPIRICAL EVIDENCE

by

John Charles Robison ,

A Dissertation Submitted to the Faculty of the
COMMITTEE ON BUSINESS ADMINISTRATION
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

1 9 8 2

THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Final Examination Committee, we certify that we have read
the dissertation prepared by John Charles Robison

entitled Tax Court Classification of Activities Not Engaged
in for Profit: Some Empirical Evidence

and recommend that it be accepted as fulfilling the dissertation requirement
for the Degree of Doctor of Philosophy.

Bernard P. Herber

February 23, 1982
Date

Julian R. Ayre

Feb. 23, 1982
Date

R. Bruce Bellings

Feb. 23, 1982
Date

Russell M. Bonfield

Feb 23, 1982
Date

Dan S. Dhaliwal

Feb 24, 1982
Date

Final approval and acceptance of this dissertation is contingent upon the
candidate's submission of the final copy of the dissertation to the Graduate
College.

I hereby certify that I have read this dissertation prepared under my
direction and recommend that it be accepted as fulfilling the dissertation
requirement. DAN S. DHALIWAL

D. S. Dhaliwal
Dissertation Director

March 10, 1982
Date

STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: John Charles Robinson

ACKNOWLEDGMENTS

I would like to express my appreciation to each member of my dissertation committee for their advice and encouragement. I am particularly grateful to my dissertation chairman, Dr. Dan S. Dhaliwal, for his thoughtful and thought-provoking comments throughout this project. I would also like to thank Dr. Russell Barefield, University of Accounting Department Chairman, for his counsel and support throughout my Ph.D. program. The financial assistance provided by the Ernst & Whinney Foundation has also been appreciated.

I owe special thanks to my wife, Tracy, for her encouragement and comfort, as well as her editorial and proofreading abilities. I also appreciate my son Alex's attempts to cheer me at the end of every day and his efforts in helping me to complete a project he was too young to comprehend.

Last, but not least, I would like to express my thanks to the faculty, staff and Ph.D. students in the Accounting Department of the University of Arizona for their friendship, which made the entire project much more enjoyable.

TABLE OF CONTENTS

	Page
LIST OF TABLES	vii
LIST OF ILLUSTRATIONS	viii
ABSTRACT	ix
1. INTRODUCTION	1
Contributions to the Field of Taxation	2
Statement of the Hypotheses	4
Methodology	6
The Sample	7
Description of Variables	8
Data Analysis	8
Implications	10
Scope and Limitations	11
General Outline	12
2. SPECIFICATION OF THE INDEPENDENT VARIABLES	14
History and Current Status of Activities Not Engaged in for Profit	14
Hobby Losses Prior to Section 183	14
Section 183: Its Intent and Provisions	15
Description of Variables	21
Treasury Regulation Factor 1	22
Treasury Regulation Factor 2	25
Treasury Regulation Factor 3	26
Treasury Regulation Factor 4	27
Treasury Regulation Factor 5	28
Treasury Regulation Factor 6	28
Treasury Regulation Factor 7	32
Treasury Regulation Factor 8	33
Treasury Regulation Factor 9	34
Other Variables	36
Summary	37
3. METHODOLOGY	38
Procedures for Analyzing Data	38
Reduction of Collinearity and the Number of Variables	38
Development of the Model	44

TABLE OF CONTENTS--Continued

	Page
Tests of the Hypotheses	52
NH-1 Ability of Variables to Discriminate between Outcomes	52
NH-2 Stability of the Model over Time	54
NH-3 Stability of the Model across Lines of "Business"	56
NH-4 Ability of the Model to Predict Appeals	56
Selection of Cases and Coding of Variables	57
Selection of Cases	57
Coding Variables	60
Missing Data	66
Summary	70
4. ANALYSIS OF DATA AND EVALUATION OF THE NULL HYPOTHESES	71
Principal Component Analysis (PCA)	71
Analysis Using Scalers	75
Selecting a Reduced Scaler Model	84
Evaluation of the Null Hypotheses	91
NH-1 Ability of the Variables to Discriminate between Outcomes	91
NH-2 Stability of the Model over Time	97
NH-3 Stability of the Model across Lines of "Business"	99
NH-4 Ability of the Model to Predict Appeals	102
Summary	105
5. CONCLUSIONS AND LIMITATIONS	107
The Significant Characteristics of Business Activities	107
Comparison with the Literature	109
Scope and Limitations	110
Implications of the Study	112
For Taxpayers	112
For the Government	113
For Judges	114
For Future Macrocass Analysts	114
Suggestions for Further Research	115
Summary	116
APPENDIX A: OBSERVATIONS INCLUDED IN THE STUDY	118
SELECTED BIBLIOGRAPHY	128

LIST OF TABLES

Table	Page
1. Summary of Those Cases Eliminated from the Study	61
2. Summary of Observations by Year of Court Decision	62
3. Summary of Observations and Outcomes by Time Period	63
4. Summary of Observations by Line of "Business"	64
5. Revised or Eliminated Variables	68
6. Summary of Missing Data	69
7. Naming of Rotated Principal Components	73
8. Means and Standard Deviations of Included Variables	76
9. Composition of the Scalers	78
10. Probit Coefficients for Nine-scaler Model	80
11. Classification Results Using Nine-scaler Probit Model	81
12. Correlation Coefficients among the Scalers	83
13. Explanatory Power of Probit Functions (Varying Scalers Included)	85
14. Probit Coefficients for Five-scaler Model	86
15. Classification Results Using Five-scaler Probit Model	87
16. Observations Misclassified by the Five-scaler Probit Model	88
17. Importance of the Regulation Factors	94
18. Best Discriminant Analysis Model	96
19. Likelihood Ratio Test for Stability over Time	98
20. Likelihood Ratio Test for Stability across Lines of "Business"	100

LIST OF TABLES--Continued

Table	Page
21. Outcomes of Appealed Cases	104
22. Test of Model's Ability to Predict Taxpayer Appeals . . .	104

LIST OF ILLUSTRATIONS

Figure	Page
1. Scree Test for the Number of Significant Principal Components	72

ABSTRACT

The primary objective of this dissertation was to identify and estimate the relative importance of factors used by the Tax Court in deciding hobby loss cases. This was accomplished in two steps. The first step was to review the Treasury Regulations, cases and literature pertaining to hobby losses to determine the relevant factors used by the Court in deciding this issue. The second step involved using probit analysis to identify which of these factors actually influenced the Court in deciding hobby loss cases and to determine the relative importance of the factors. A secondary purpose was to explore the probit model's ability to predict decisions likely to be appealed.

The probit model was based on the analysis of 219 post-1954 Tax Court cases involving determination of whether activities were or were not engaged in for profit. By application of log-likelihood techniques, it was determined that the model developed was stable over time and across lines of "business," the implication being that cases decided both before and after the passage of Section 183 and involving all types of activity should have precedential value in conflicts between taxpayers and the Internal Revenue Service.

Five factors were found to be significant predictors: manner of operation, level of expertise, time expended, history of income and loss, and presence of elements of personal pleasure. It is important to note that the two factors not susceptible to tax planning--success in other activities and financial status of the taxpayer--were insignificant

discriminators between business and hobby outcomes. The implication is that with careful tax planning, one can organize and operate a given activity so that it is likely to receive favorable tax treatment.

The probit model proved to be unable to predict decisions likely to be appealed. The probability that a particular case would be classified by the Court as a business did not appear to be a significant predictor of whether a taxpayer would appeal an adverse decision.

CHAPTER 1

INTRODUCTION

Since the beginning of our current system of income taxation in 1913, classification of activities as being engaged in for profit or not engaged in for profit has created difficulty for both taxpayers and jurists. Since taxpayers are allowed to deduct trade or business losses against other income, thereby reducing tax obligations, it is to an individual's advantage to claim losses resulting from hobbies or recreational pursuits as being business related. The Commissioner of Internal Revenue, on the other hand, wishes to increase revenue and promote equitable taxation by classifying activities with doubtful profit intent as hobbies. The courts are inundated with legal battles resulting from this controversy.

Prior to the 1969 passage of the provisions specifically applicable to activities not engaged in for profit (Section 183), there was no specific code section which sought to clearly define such activities. The Commissioner generally challenged activities with questionable profit motivation by applying Sections 162 and/or 165. This area of the law came to be known as the "hobby loss" area, although that terminology is not used in the Code.

The primary objective of the present study is to identify and estimate the relative importance of the factors used by the Tax Court in deciding hobby loss cases. This will be accomplished by first reviewing the Treasury Regulations, cases and literature pertaining to hobby losses

to determine the relevant factors. A model then will be developed whose predictions will be used to assess the significance of these factors in discriminating between losses the Court has classified as resulting from pursuit of profit and those determined to be hobby losses. A secondary purpose will be to explore the model's ability to predict decisions likely to be appealed.

Contributions to the
Field of Taxation

The hobby loss controversy has been a chronic problem for Congress as evidenced by legislators' attempts to clarify the original Section 183 provisions in 1971 and 1976 and the enactment of a new section in 1976 (Section 280A) to deal with the specific area of vacation homes. Authors have written hundreds of pages of commentary in an effort to define the factors relevant to the business/hobby decision and provide guidance to taxpayers. Nevertheless, numerous taxpayers run afoul of this area of the tax law each year, and the Tax Court remains inundated with hobby loss cases. The recent IRS announcement that it will audit 6,000 returns in order to develop better techniques for identifying potential hobby loss activities indicates that Section 183 is an area of the tax law certain to receive increased attention in the 1980's (Internal Revenue Service, 1977a, Suppl. 56).

One of the problems plaguing commentators is just which characteristics are most important in determining profit intent. The regulations under Section 183 (Treas. Reg. §1.183-2) set forth the following nine factors to be considered:

- 1) manner in which the taxpayer carries on the activity;
- 2) the expertise of the taxpayer or his advisers;
- 3) the time and effort expended by the taxpayer in carrying on the activity;
- 4) expectation that assets used in activity may appreciate in value;
- 5) the success of the taxpayer in carrying on other similar or dissimilar activities;
- 6) the taxpayer's history of income or loss with respect to the activity;
- 7) the amount of occasional profits, if any, which are earned;
- 8) the financial status of the taxpayer;
- 9) elements of personal pleasure or recreation.

The regulations go on to state that other factors may also be relevant. But "taken individually, the factors are of little benefit since their importance is not ranked or weighted" (Knobbe, 1979, p. A-13). Several authors have used traditional legal tax research in an attempt to identify which factors are most important in court decisions, with conflicting results. Lee (1974, p. 397) suggests that the manner of carrying on the activity, the expertise of the taxpayer or his advisers, time and effort spent, and success in other activities are the most influential regulation factors; Doan (1974, p. 19) considers the financial status of the taxpayer most significant; and Knobbe (1979, p. A-17) suggests that the history of income and loss carries the most weight. With regard to factors not specified in the regulations, Lee (1974, p. 444) concludes that advertising is the primary determinant, and Burns and Groomer (1980,

p. 205) feel that a valid profit plan is the most important of those variables omitted from the regulations. But according to Jensen and Crumbley, traditional tax research methods, because of their subjectivity and the possibility that a researcher may be biased toward finding precedent for his own point of view, are unlikely to reveal which factors are, in fact, most significant (undated, pp. 1-2).

Statement of the Hypothesis

The Treasury and the commentators have proposed numerous factors as being relevant to the determination of profit intent, but no rigorous analysis has been undertaken to determine whether these factors are indeed used by jurists to differentiate hobbies from business activities. A pertinent question for investigation, therefore, is whether the Tax Court uses these factors to differentiate between the two possibilities.¹ Accordingly, the primary null hypothesis to be tested in this study is

NH-1 The definitional factors found in the Treasury Regulations, cases and literature concerning activities not engaged in for profit fail to discriminate between Tax Court-determined hobby losses and business losses.

A predictive model will be developed to test this hypothesis. Rejection of NH-1 will imply that the factors have discriminatory power, in which event the relative importance of the factors will be assessed.

The next issue to be addressed deals with the stability of the model over time. Congress sought to define activities not engaged in for profit in Section 183 by referencing existing Code Sections 162 and 212.

1. Cases are either classified by the Court as engaged in for profit or not engaged in for profit. No compromise decision is possible other than hobby classification for one period and business classification for a subsequent/previous period.

This implies that the factors used in deciding hobby loss cases should not have changed due to the passage of Section 183, and such is the conclusion of most commentators. The Tax Court itself has observed that "the outcome of many cases will be the same whether they involve years beginning prior to or subsequent to December 31, 1969" (Jasionowski v Com. 66 TC 312 at 322 (1976)). Stated in null hypothesis form:

NH-2 The definitional factors used by the Tax Court for taxable years prior to the enactment of Section 183 are no different from those used after its enactment.

It has been suggested that the discriminatory power of the various factors differs across business lines. This possibility is investigated by developing separate models for farming and rental cases. Farming is of interest because Congress has felt it the prime area of abuse.² Some authors (Lee, 1974, p. 413; Knobbe, 1979, pp. A-17 and 19) have suggested that some factors might be weighted differently in cases involving farming activities. The classification of rentals warrants special attention because Congress, considering it an area where the provisions of Section 183 might not be sufficiently definitive, enacted Section 280A. Should the importance of the factors vary across business lines, then the use of separate models for farming and rentals (restricted models) should result in higher predictive ability than the use

2. This is evidenced by the initial classification of discussions pertaining to Section 183 under the heading of "Farm Loss Rules" and the appointment of advisory committees from the cattle and horse industries to assist the Treasury in drafting the regulations under Section 183 (U.S. Congress, Senate, 1969, p. 103).

of a single general model which includes all types of activities. The third hypothesis tested thus is:

NH-3 There is no difference between the predictive ability of a general model and that of restricted models based on specific lines of "business."

The final hypothesis deals with the model's ability to predict cases likely to be appealed.³ The model developed will estimate the probability that a particular case will be classified by the Court as a business.⁴ It is hypothesized that, to the extent the model is well specified and taxpayers and the IRS behave in a rational manner, the cases appealed will tend to be those not given a high probability of either business or hobby classification (marginally classified). In other words, it will only be reasonable to appeal an unfavorable decision to a higher court when the evidence presented at the original trial does not appear to clearly favor the other party. Formally stated, this hypothesis is:

NH-4 The percentage of decisions which are appealed is the same for cases the model assigns a .40 to .60 probability of business classification as for those cases which are assigned a probability outside of this range.

Methodology

This project is expected to improve upon past tax research and analysis of hobby loss cases in two major respects: (1) use of analytical

3. I am grateful to Dr. Jerold Zimmerman for bringing this possible extension to my attention.

4. Since there are only two possibilities, the probability of a hobby outcome is one minus the probability of a business outcome.

tools to determine the factors relevant to court decisions, and (2) specification of the relative importance of the factors involved.

The methodology relies on the same precedential information obtained through traditional research methods; but collection, organization and analysis of the data proceeds in a scientific manner. Objectively determinable factors are used to minimize the subjectivity normally inherent in traditional research and to allow the findings to be replicated. Although objective factors have been used successfully to determine the elements relevant to decisions in other areas of taxation, their use has been criticized by some as unrealistic.⁵ In the present situation, however, Congress has specified just such objective factors as being pertinent to profit intent decisions (U.S. Congress, Senate, 1969, p. 104). In addition to greater objectivity, the methodology herein provides for assignment of relative weights to pertinent factors, rather than merely listing those factors.

The Sample

The individual cases to be used in the analysis will be selected from all decisions issued by the Tax Court between 1955 and mid-1981. By referencing four of the major tax services, a list was compiled of 251 Tax Court cases dealing with the hobby loss issue decided during the specified time period. Nine additional Tax Court cases have been

5. The objective approach has been used to determine definitional elements in the areas of reasonable compensation (Boyd, 1977), debt-equity attributes (Bond, 1977; Whittington and Whittenburg, 1980), capital gain-ordinary income attributes (Oatsvall, 1978; Taylor, 1978) and accumulated earnings tax (Madeo, 1979); among others.

identified by use of the Lexis computer system. Three-quarters of these cases will be used in the model-building process, the remainder serving as a holdout sample to test the model's classificatory power. The Tax Court was selected due to the expertise of the judges in tax matters and the fact that it is the court of original jurisdiction for nearly 95% of all tax cases (Jacobs, 1980, p. 1).

Description of Variables

In order to test the proposed research hypotheses, information on dependent and independent variables will be gathered for each case in the sample, the dependent variable being the Tax Court's decision and the independent variables being the factors used by the Court in arriving at the decision. Forty-nine independent variables have been identified based on a preliminary reading of over thirty hobby loss cases and a review of the applicable regulations and relevant literature. Since the regulation factors are composites of variables, they have been broken down into subfactors. Each of the questions used as a factor surrogate is specified in a manner which allows it to be answered based on the objective data presented by the taxpayer at the time of trial. This results in thirty-four of the factors being surrogated by dichotomous dummy variables.

Data Analysis

The data obtained are analyzed by a two-step procedure. The goal of the first stage of the analysis is to reduce colinearity among the independent variables and, if possible, to reduce the number of variables so that the final model will be as parsimonious as possible. The

second stage of the analysis will attempt to develop a model which can be used in predicting the outcome of hobby loss cases and which will indicate the relative importance of the independent variables under consideration. Thus, at the end of stage two the validity of HN-1 will be determinable.

Three methodologies have been evaluated for possible use in the first stage of the analysis. These methodologies are 1) principal component analysis, 2) a stepwise regression/discriminant procedure, and 3) the use of scalars. Principal component analysis attempts to reduce the variables into a smaller set of components "that may be taken as source variables accounting for the observed interrelations in the data" (Nie et al., 1975, p. 469). The stepwise procedures are sequential processes in which variables are selected from the original group in order of their importance in discriminating between groups. The scalar method totals the standardized scores of related variables to form a summary index which will be referred to as a "scalar." The appropriateness of each of these methods will be discussed and evaluated.

The suitability of three model-building methodologies will also be analyzed. These methodologies are 1) regression analysis, 2) a quantal method (logit or probit), and 3) discriminant analysis. Regression analysis builds a model which summarizes the relationship between the dependent and independent variables. Quantal methods are specialized forms of regression analysis designed to deal with a limited dependent variable, zero/one for purposes of this study. They provide an estimate of the probability of a specific outcome. Discriminant analysis constructs a model based on the independent variables which forces the two case

outcomes to be as statistically distinct as possible. The applicability of each of these will be considered.

Implications

The hobby loss area seems particularly well suited to empirical analysis due to Congress' specification that decisions in these cases are to be approached objectively, rather than subjectively. The courts have been instructed to use case facts and circumstances (without regard to the taxpayer's subjective intent) in reaching their decisions (U.S. Congress, Senate, 1969, p. 104). Since the analysis outlined will use just such factors, it is expected that the model developed will be robust.

Such a model will be valuable in providing information about the hobby loss area not obtainable through traditional legal research methods. Taxpayers will be able to use such information to plan entry into activities with questionable profit potential. Tax practitioners and the Internal Revenue Service can use the model's ability to estimate the probability of court decisions for or against hobby classification in assessing the advisability of taking cases to trial. Judges can use the results to make consistent determinations and to avoid entanglement in a multitude of considerations which, in the final analysis, will have no bearing on their decisions.

The proposed research will expand the scope of past macro-case analysis to include the analysis and prediction of cases which are likely to be appealed. Much has been written about how the Commissioner decides which cases to appeal, and many authors have attempted to determine under

what circumstances it is to a taxpayer's advantage to proceed to a higher court; but the ability of macro-case analysis to predict appeals has not been evaluated previously. Such an investigation should provide insights as to situations in which cases are generally appealed and should produce information about the power of the analytical models used in empirical tax research as well.

Scope and Limitations

This dissertation is not intended to contain an exhaustive review of the literature or a detailed analysis of the cases decided in this area. Condon (1971), Lee (1974) and Knobbe (1979) and others have already provided such analysis; their studies have been used in developing the independent variables. Furthermore, empirical research is not a substitute for or an alternative to traditional tax research methods; rather it is a method for facilitating research and a supplement to reading some of the cases (Misiewicz, 1979, p. 641).

The data included in this research were limited to cases decided by the Tax Court between 1955 and mid-1981. The District Courts and Court of Claims also try hobby loss cases, but great caution should be exercised in extending the results of the model to cases tried in those courts. It should also be noted that there are many opportunities within IRS administrative and pre-trial procedures for an issue to be settled prior to trial wherein different variables may be important. The model, therefore, is relevant only in predicting the outcome of cases which reach the Tax Court.

In addition, three factors that might affect the outcome of the study could not be controlled for:

- 1) Coding of variables for each case is based on the trial summary written by the Tax Court judge, rather than on the reading of the actual trial transcript. The completeness with which the judge summarizes the relevant data thus becomes a variable whose impact might be important but is not analyzed.
- 2) The skills of the attorneys involved must surely have an impact on which facts were presented and thus may affect the judge's determination. This factor is not taken into account in the analysis.
- 3) To the extent that Tax Court judges' decisions are subject to human error (e.g., hobby activity is classified as a business), error is introduced into the model. This effect should be small due to the expertise of the judges in tax matters.

General Outline

The dissertation is presented in five chapters. Following this introduction is a chapter which contains a brief history, an assessment of the current status of this area of taxation, and a specification of the independent variables. Chapter 3 discusses the methodology to be used in the research; this includes an evaluation of the available analytical techniques, a discussion of how each hypothesis will be tested, the delineation of the research sample, and the method of coding the variables. The results of the study and evaluation of the chosen model are presented in Chapter 4. The final chapter summarizes the study,

indicating limitations and suggesting implications and ideas for further research.

CHAPTER 2

SPECIFICATION OF THE INDEPENDENT VARIABLES

The primary purpose of this chapter is to review the history of the hobby loss controversy and to provide some insight into the legislative intent behind Section 183. Indications of this intent are found in Congressional reports and hearings as well as in the regulations. Secondly, this section discusses the concepts relevant to business/hobby classification and poses questions which surrogate these concepts.

History and Current Status of Activities Not Engaged in for Profit

Hobby Losses Prior to Section 183

It took the Commissioner (at that time called the "Collector") little time after passage of the Revenue Act of 1913 to realize that people were abusing the trade or business tax laws by deducting losses from activities that were not bona fide business ventures. Most of the early cases dealt with what the courts referred to as "gentlemen farmers." These individuals deducted the cost of "farms" surrounding their personal residences; the IRS contended that care and use of these grounds constituted recreation, that expenses involved resulted from pursuit of personal pleasure rather than profit.

As cases developed within the hobby loss area, the focal point of judicial analysis became the intent of the taxpayer to realize a

profit. The courts developed two basic methods of determining a taxpayer's intent from the mass of testimony and documentation that usually was presented: 1) the subjective method, which was heavily influenced by the taxpayer's testimony as to intent; and 2) the objective method, which gave greatest consideration to case facts and circumstances pertinent to the taxpayer's intent. Over the years, the courts seem to have favored the objective approach, and in 1969 this method was incorporated into Section 183.

The Revenue Act of 1943 included a new provision (Section 130 of the 1939 Code, which became Section 270 of the 1954 Code) that is often referred to as the predecessor of Section 183. Commerce Clearing House (1981, ¶ 2268) describes its provisions as follows: "Former Code Section 270 limited to \$50,000 per year the amount of losses from a trade or business carried on by an individual that could have been used to offset other income. The limitation only applied, however, where the losses from the business exceeded \$50,000 per year for a period of at least five consecutive years."

Although Section 270 was deleted from the Code when Section 183 was passed, they really have little relationship to one another. Under Section 270 the classification of an activity as a trade or business is not at issue, whereas Section 183 deals specifically with that question.

Section 183: Its Intent and Provisions

Thomas Condon (1971, p. 720) summarizes the intent of Section 183 as follows:

. . . Congress changed weapons and moved steadily ahead in the attempt to curtail or minimize the use of hobby losses. The Congress evidently had not been asleep the last 26 years (a reference to the period 1943-1969 when Section 270 was in effect and generally ineffective). They were merely watching the courts and the Treasury Department deal with the hobby loss problem in a different or more effective manner. Apparently Congress heeded their experience, since their new weapon, Section 183, was primarily a codification of old case law and regulations under the general loss (Section 165), the trade or business (Section 162) and expenses for the production of income (Section 212) sections of the Code.

Treatment of Hobby Losses under Section 183. The Code and the various Committee reports fail to specify or identify any kind of deduction which was allowable prior to the enactment of Section 183 but which is not allowable now (Condon, 1971, p. 720). However, this is not to imply that Section 183 contributes nothing new; this section and the related regulations make clarifications in the following areas:

- 1) provision of a presumption in favor of the taxpayer,
- 2) clarification of what deductions are allowable if an activity is not engaged in for profit,
- 3) specification that profit intent is to be determined based on objective tests,
- 4) definition of nine factors which might commonly be used to determine intent.

Before briefly discussing each of these items, it is important to note that, although the new hobby loss provisions may have clarified various ambiguities which arose in prior case law, they do not seem to have reduced the number of cases litigated in this area. Also, despite the Congress' fixation on farm and horse-breeding operations in

discussing the enactment of Section 183 and its implications, less than 30% of the Section 183 cases tried to date have involved these activities.

Section 183(d) Presumption. Section 183(d) provides that an activity is presumed to be conducted for profit if it operates at a profit in two or more of the years in a consecutive five-year period (seven years for horse-breeding, training, showing or racing activities). Under Treas. Reg. §1.183-1(c), none of the years prior to the two profit years may receive the benefit of this presumption. Because the regulations are not in accordance with Congress' original intent (U.S. Congress, Senate, 1971, p. 74), the Revenue Act of 1971, through the addition of Section 183(e), provides an election to suspend the application of the presumption until there are five years in existence (seven for horse activity).

Despite the time spent by Congress debating, drafting and amending the presumptive test to be more workable, it is not likely to apply often. John Lee's "survey of the vast body of hobby loss cases decided both in favor of the government and the taxpayer reveals that in only a handful would the presumption have applied" (1974, p. 484). Also, by filing the election a person is, in effect, notifying the IRS of his own doubt about whether his "business" is engaged in for profit.

According to the regulations, if a taxpayer does not meet the requirements of the presumptive test, "no inference that the activity is not engaged in for profit shall arise by reason of the provisions of Section 183" (Treas. Reg. §1.183-1(c)(ii)). But this reassurance is

mitigated by Tax Court Rule 142, which provides that the burden of proof normally shall be upon the taxpayer, and Section 7422, which establishes a similar rule for refund suits in other courts.

Deductions Allowed Re: Activity Not Engaged in for Profit. The regulations under Section 183 outline a three-tier system of allowing deductions for hobby activities (Treas. Reg. §1.183-1(b)). Tier 1 deductions, which are taken first, are those deductions allowable under Chapter 1 of the Code only if an activity is engaged in for profit (e.g., interest or taxes). Tier 2 deductions are items allowable under Chapter 1 of the Code only if an activity is engaged in for profit, but they must not result in an adjustment to the basis of property (e.g., maintenance and supplies). Tier 3 deductions are those which do result in basis adjustments (e.g., depreciation). Tier 2 and 3 deductions are allowed only to the extent that gross income remains after the immediately preceding tier's deductions.

How is Profit Intent To Be Determined? At the time Congress passed Section 183, the Senate Finance Committee (1969, p. 104) stated that:

In making the determination of whether an activity is engaged in for profit, the Committed intends that an objective rather than a subjective approach is to be employed. Thus, although a reasonable expectation of profit is not to be required, the facts and circumstances (without regard to the taxpayer's subjective intent) would have to indicate that the taxpayer entered the activity, or continued the activity, with the objective of making a profit.

These provisions, included in the final version of Section 183, contrast with the provisions originally proposed by the House in that the latter required a reasonable, rather than a bona fide, profit intent.

The Nine Relevant Factors. The objective approach does not solve the problem of classifying activities as businesses or hobbies; it merely poses another question: What factors are relevant in determining intent? Section 183(c) states ". . . the term 'activity not engaged in for profit' means any activity other than one with respect to which deductions are allowable for the tax year under Section 162 or under paragraph (1) or (2) of Section 212." Therefore, the logical source of the factors is prior case law under these sections. Most commentators acknowledge that this is, in fact, the source of the nine factors contained in the regulations (Lee, 1974, p. 486; Knobbe, 1979, p. A-13; Doan, 1974, p. 23--to cite only a few). The Tax Court itself has observed that "the outcome of many cases will be the same whether they involve years beginning prior to or subsequent to December 31, 1969" (Benz v Com. 63 TC 375 at 385 (1979) and Jasionowski v Com. 66 TC 312 at 322 (1976)).

The factors listed in the regulations (Treas. Reg. §1.183-2(b)) are as follows:

- 1) manner in which the taxpayer carries on the activity;
- 2) the expertise of the taxpayer or his advisers;
- 3) the time and effort expended by the taxpayer in carrying on the activity;

- 4) expectation that assets used in activity may appreciate in value;
- 5) the success of the taxpayer in carrying on other similar or dissimilar activities;
- 6) the taxpayer's history of income or loss with respect to the activity;
- 7) the amount of occasional profits, if any, which are earned;
- 8) the financial status of the taxpayer;
- 9) elements of personal pleasure or recreation.

The same regulation warns against a simple tally of the factors for and against the determination that an activity is a hobby because the nine items are not equally weighted, nor are they all inclusive. Elaboration on these factors and others noted by the courts and commentators is contained in the discussion of selection of variables which appears later in this chapter.

The Effect of the Section 280A Provisions on Section 183. Section 280A was included as part of the Tax Reform Act of 1976 in order to provide definitive rules as to when the rental of a vacation home was not engaged in for profit (excessive number of days of personal use). Although Section 183 had been intended to cover such activity, Congress noted that the rules and regulations under Section 183 were not sufficiently applicable in the vacation-home area (U.S. Congress, House, 1974, p. 29).

Section 280A does not remove all vacation homes from the scrutiny of Section 183, however, because the Finance Committee Report (U.S.

Congress, Senate, 1976, p. 153) provides that, even if the Section 280A provisions do not apply, the rental may still be treated as an activity not engaged in for profit under the standards of Section 183. Thus, although Section 280A provides definitive rules when deductions for rentals must be limited, the failure to meet those rules does not eliminate the possibility of applying Section 183.

A brief review of rental cases tried in Tax Court under Section 183 reveals several which would not fall within the provisions of Section 280A due to lack of personal use of the dwelling, so the final impact of Section 280A on the number of Section 183 cases litigated may be relatively small. Since vacation homes can still come within the purview of Section 183, pre-Section 280A cases involving vacation rentals will be included in this study. Tests will be conducted to see that their inclusion does not bias results, however.

Description of Variables

A review of hobby loss literature reveals no previous attempts to analyze statistically the factors used in deciding cases. The only analytical study found which was in any way related to the hobby loss issue involved Section 162, one of the sections used to define activities not engaged in for profit (Streer, 1978). It dealt solely with the issue of whether expenses were "ordinary and necessary" (a requirement under Section 162) and therefore is not germane.

The independent variables used in the current study were identified based on a preliminary reading of over thirty hobby loss cases and a review of applicable regulations and relevant tax literature. It

should be remembered, however, that these variables were originally extracted from a reading of the case law in this area. The selection of the variables from case law is much more appropriate than a theoretical derivation of the "ideal" factors because the objective of the research is to determine those factors which are important to the Court's decision, not those which should be important.

Because the regulations under Section 183 are the principal source of the variables, the discussion which follows is organized around the nine regulation factors. Each factor and its explanation is quoted from the regulations, followed by comments concerning judicial application and expansion of the factors and specification of the questions to be used as surrogates for the pertinent concepts. Following this discussion, variables unrelated to the regulation factors are examined.

Treasury Regulation Factor 1

1) Manner in which the taxpayer carries on the activity. The fact that the taxpayer carries on the activity in a business-like manner and maintains complete and accurate books and records may indicate that the activity is engaged in for profit. Similarly, where an activity is carried on in a manner substantially similar to other activities of the same nature which are profitable, a profit motive may be indicated. A change of operating methods, adoption of new techniques or abandonment of unprofitable methods in a manner consistent with an intent to improve profitability may also indicate a profit motive (Treas. Reg. §1.183-2(b)(1)).

This factor generally is broken down into four criteria:

- a) Business-like manner of operations. The establishment of a business name, obtaining a business license, having a business phone listing and conducting the business within the proper zoning have been noted as indicators of this subfactor.

Variable:

1. Is the taxpayer holding himself out to the community as being engaged in a business?

b) Similarity to profitable activities of the same nature.

Variable:

2. Was evidence presented that the activity was operated in a manner similar to that employed in other comparable operations?

c) Complete and accurate books and records. The rationale for this factor appears to be that "such records are necessary to control expenditures with an eye to reducing losses and eventually achieving a profit" (Lee, 1974, p. 399). Nonfinancial records which reveal animal breeding dates, show entries, boat trips, etc., also have impressed the courts (Friedman, 1976, p. 17,435; Burns and Groomer, 1980, p. 198).

The following factors thus result:

Variables:

3. Are formal books and records maintained?

4. Is a separate business bank account maintained?

5. Does the record-keeping system provide for the determination of segment profits and the analysis of relevant costs?

6. Does the taxpayer maintain detailed nonfinancial records?

d) Changes in operating methods.

Variable:

7. Have operating methods been changed, new techniques adopted or unprofitable methods abandoned in an attempt to improve profitability?

In addition to the four criteria discussed above, the courts have expanded their investigation as to the manner in which the activity was carried on into two other areas: advertising and development plans, thus increasing Factor 1 into six subfactors.

- 3) Advertising. The undertaking of advertising in relation to the activity seems to be of great interest to the courts and has been noted as a relevant factor by several commentators (Lee, 1974, pp. 444-45; Friedman, 1976, p. 17, 436; Burns and Groomer, 1980, p. 206). The concept of advertising includes the showing of animals and other pursuits which may be appropriate for the taxpayer's particular type of activity.

Variable:

8. What level of advertising or promotion was undertaken for the activity in question? (0 = none, 1 = low, 2 = moderate, 3 = high)
- f) Development plan. The presence of a development plan has been held to be evidence that the activity was pursued in a business-like manner. Where plans were presented which projected the various cycles the activity would go through, the court was able to justify a string of losses as having an ultimate profit motive (Lee, 1974, pp. 445-46; Knobbe, 1979, p. A-20; Burns and Groomer,

1980, p. 205). In addition, a plan which is followed or revised normally will carry more weight.

Variables:

9. Did the taxpayer have a development plan?
10. Was the development plan followed or reviewed?

Treasury Regulation Factor 2

2) The expertise of the taxpayer or his advisors. Preparation for the activity by extensive study of its accepted business, economic, and scientific practices, or consultation with those who are expert therein, may indicate that the taxpayer has a profit motive where the taxpayer carries on the activity in accordance with such practices. Where a taxpayer has such preparation or procures such expert advice, but does not carry on the activity in accordance with such practices, a lack of intent to derive profit may be indicated unless it appears that the taxpayer is attempting to develop new or superior techniques which may result in profits from the activity (Treas. Reg. §1.183-2(b)(2)).

This factor has not been expanded upon by the courts, but the following questions may be proposed based on the text of the regulation.

Variables:

11. Was an attempt made to determine the activity's profit potential prior to entry?
12. Was expert advice sought prior to entering the activity (or did the taxpayer have prior preparation) as to the methods and practices which would lead to profitable operation?
13. Was evidence presented which indicated such pre-entry expert advice/experience was a basis for operation?

14. Was expert advice sought after entering the activity as to methods and practices which would lead to improved profitability?¹
15. Was evidence presented which indicated such post-entry advice was followed?
16. Did the taxpayer attempt to develop new or superior techniques that may be profitable?

Treasure Regulation Factor 3

3) The time and effort expended by the taxpayer in carrying on the activity. The fact that the taxpayer devotes much of his personal time and effort to carrying on an activity, particularly if the activity does not have substantial personal or recreational aspects, may indicate an intention to derive a profit. A taxpayer's withdrawal from another occupation to devote most of his energies to the activity may also be evidence that the activity is engaged in for profit. The fact that the taxpayer devotes a limited amount of time to an activity does not necessarily indicate a lack of profit motive where the taxpayer employs competent and qualified persons to carry on such activity (Treas. Reg. §1.183-2(b)(3)).

In evaluating the amount of time spent, the courts discount the work involved in personal or recreational activities as being a "labor of love."

Variables:

17. Does the taxpayer employ a competent and well-informed manager to carry on the activity in his/her behalf?
18. What is the average time spent per week by the taxpayer on the business' behalf? (0 = none or only occasional time

1. The decision to seek expert advice after entry did not appear to be influenced by the fact that the taxpayer had prior preparation in the area. Of those cases in the study with prior preparation, 33.8% sought expert advice after entry; of those without prior preparation, 33.3% sought advice after entry.

spent, 1 = a few hours, 2 = half-time, 3 = three-quarter time, and 4 = full-time. Time spent on related recreational or social activities will be excluded.)

19. Did the taxpayer withdraw from another business to devote most of his/her energies to the activity?

The courts seem to be impressed not only with the hours spent but also with the type of work performed during that time. They seem particularly impressed with physical labor (Lee, 1974, p. 414).

Variable:

20. Did the taxpayer engage in physical labor?

Treasury Regulation Factor 4

4) Expectation that assets used in activity may appreciate in value. The term "profit" encompasses appreciation in the value of assets, such as land, used in the activity. Thus the taxpayer may intend to derive a profit from the operation of the activity, and may also intend that, even if no profit from current operations is derived, an overall profit will result when appreciation in the value of land used in the activity is realized since income from the activity together with the appreciation of land will exceed expenses of operation. See, however, paragraph (d) of §1.183-1 for definition of an activity in this connection (Treas. Reg. §1.183-2(b)(4)).

This regulation appears to be an attempt to clarify the term "profit," rather than a factor which can be used as a separate indicator of profit intent. It therefore would seem better placed in the general discussion under Treas. Reg. §1.183-2(a) than in a listing of factors relevant to profit intent. Nevertheless, because it is listed as one of the relevant factors, it may have a bearing on the judges' determinations of profit intent separate from the effect on profits of asset appreciation.

Variable:

21. Did the taxpayer state that he/she entered or continued in the business due to the assumption that the assets involved therein would appreciate?

Treasury Regulation Factor 5

5) The success of the taxpayer in carrying on other similar or dissimilar activities. The fact that the taxpayer has engaged in similar activities in the past and converted them from unprofitable to profitable enterprises may indicate that he is engaged in the present activity for profit, even though the activity is presently unprofitable (Treas. Reg. §1.183-2(b)(5)).

The following question may be proposed based on the text of the regulation.

Variable:

22. Has the taxpayer previously converted other enterprises from losing to profitable operations?

This factor seems to have been expanded by the courts to include a consideration of the recordkeeping system maintained for the activity at issue versus that maintained by the same taxpayer for a profitable activity (Lee, 1974, pp. 419-20).

Variable:

23. Is the recordkeeping system comparable to those maintained by the taxpayer for clearly profit-motivated and successful activities?

Treasury Regulation Factor 6

6) The taxpayer's history of income or losses with respect to the activity. A series of losses during the initial or start-up stage

of an activity may not necessarily be an indication that the activity is not engaged in for profit. However, where the losses continue to be sustained beyond the period which customarily is necessary to bring the operation to profitable status such continued losses, if not explainable, as due to customary business risks or reverses, may be indicative that the activity is not being engaged in for profit. If losses are sustained because of unforeseen or fortuitous circumstances which are beyond the control of the taxpayer, such as drought, disease, fire, theft, weather damages, other involuntary conversions, or depressed market conditions, such losses would not be an indication that the activity is not engaged in for profit. A series of years in which net income was realized would of course be strong evidence that the activity is engaged in for profit (Treas. Reg. §1.183-2(b)(6)).

The historical pattern can be observed in the ratio of receipts to disbursements. Mertens notes that such a ratio is an important item of evidence in this area. "If receipts are insignificant and disbursements very high, the tendency is to prove a lack of profit motivation, and vice versa" (1980, p. 375). The ratio was also noted in the proposed regulations (Prop. Reg. §1.183-2(b)(1)) but was eliminated when the Regulations became final. The annual ratios of receipts to disbursements therefore will be computed and their average will be used in answering the following question:

Variable:

24. What is the average ratio of receipts to disbursements for the activity?

In addition, Lee notes the lack of substantial receipts as being important (1974, p. 421).

Variable:

25. In what percentage of the years for which information was presented were receipts less than or equal to five percent of disbursements?

Since the taxpayer's intent must be to generate an overall profit (Besseney v Com. 45 TC 261 at 274 (1961)), the following factors are relevant:

Variables:

26. What is the average magnitude of losses?²
27. Did the inflation-adjusted dollar amount of the losses have an upward (-1), level (0), or downward (+1) trend?

The length of time an activity has been conducted has also been noted as an important factor. Lee has observed that "from the earliest hobby-loss opinions to the present, the courts have been quite receptive to taxpayer contentions that losses incurred in the initial stages of a farm operation were not inconsistent with a profit motive" (1974, pp. 422-23).

Variable:

28. How many years has the taxpayer operated the activity in question?

Other elements mentioned in Factor 6 are surrogated as follows:

2. Due to inflation during the period under consideration, dollar amounts will be converted to average 1980 dollars using the yearly average Consumer Price Index for all urban consumers.

Variables:

29. Are losses due in part to circumstances beyond the taxpayer's control?
30. In what percentage of years for which evidence was presented was profit generated?

The presumptive test of Section 183(d) also deals with an activity's history of income or loss. Although few cases have been tried where the requirements of the presumption were present, either before or after Section 183 was enacted, the effect of meeting its conditions seems relevant. Question 31, therefore, is worded such that it assumes that the election under Section 183(e) has been made (i.e., the determination of the issue is delayed until 5(7) years have existed), and Question 32 is worded assuming no such election (i.e., the presumption only exists if there have been two years of profitability prior to the year(s) at issue). Both questions are based on the wording in Treas. Reg. §1.183-1(c)(1).

Variables:

31. Has the activity generated income in two or more of the taxable years in a period of five consecutive years including the year in question? (A seven-year period will be used for horse-related activities.)
32. Has the activity generated income in two or more years within a period of five (seven for horse activities) consecutive years prior to or including the year under examination?

Treasury Regulation Factor 7

7) The amount of occasional profits, if any, which are earned. The amount of profits in relation to the amount of losses incurred, and in relation to the amount of the taxpayer's investment and the value of the assets used in the activity, may provide useful criteria in determining the taxpayer's intent. An occasional small profit from an activity generating large losses, or from an activity in which the taxpayer has made a large investment, would not generally be determinative that the activity is engaged in for profit. However, substantial profit, though only occasional, would generally be indicative that an activity is engaged in for profit, where the investment or losses are comparatively small. Moreover, an opportunity to earn a substantial ultimate profit in a highly speculative venture is ordinarily sufficient to indicate that the activity is engaged in for profit even though losses or only small profits are actually generated (Treas. Reg. §1.183-2 (b)(7)).

The following questions will be used as surrogates for this factor:

Variables:

33. What is the ratio of average profit for years which generated profit to the average loss for tax years with losses?³
34. What is the average return on investment (at cost)?⁴
35. What is the largest profit earned for any year for which data were presented?⁵
36. Was evidence presented that indicated a chance for substantial future profit where the nature of the business was speculative?

3. See no. 2 above.

4. Although, according to the regulations, market value would be a relevant measure in this specific area, the value of the taxpayer's investment is seldom noted by the Court and usually is an item of contention when it is noted.

5. See no. 2 above.

Treasury Regulation Factor 8

8) The financial status of the taxpayer. The fact that the taxpayer does not have substantial income or capital from sources other than the activity may indicate that an activity is engaged in for profit. Substantial income from sources other than the activity (particularly if the losses from the activity generate substantial tax benefits) may indicate that the activity is not engaged in for profit especially if there are personal or recreational elements involved (Treas. Reg. §1.183-2(b)9)).

The following question may be proposed based on the regulation's text.

Variable:

37. What is the taxpayer's average adjusted gross income before including income or loss from the activity in question?⁶

Knobbe notes that the ratio of the loss in question to the taxpayer's income from other sources is more important than total income alone. He feels that as the proportion of nonactivity income spent on the operation rises, so does the chance for business classification (1979, p. A-20).

Variable:

38. What is the average ratio of activity losses to the taxpayer's adjusted gross income from other sources?

Although the regulations note that wealth is an important factor, no specific information about wealth is normally provided in the cases. Evidence on the taxpayer's standard of living (e.g., expensive autos, mansion) is often presented, and the importance of such evidence is supported by other research studies. Gleason and Harris conclude that

6. See no. 2 above.

"it appears clear that in both jury simulation research and statistical studies of the criminal justice system, SES (socio-economic status) plays an important part in judgments about defendants" (1976, p. 190).

Variable:

39. Was evidence presented that the taxpayer has a modest standard of living? (+1 = modest, 0 = normal, -1 = extravagant)

The Court has also noted that type rather than amount of other income may be important. In Appley v Com. (TC Memo 1979-433), where the majority of the taxpayer's income was from salary and fees rather than passive sources, the Court suggested that personal service income was less likely to be squandered on a hobby.

Variable:

40. Is the majority of the taxpayer's nonactivity income from passive sources?

Treasury Regulation Factor 9

9) Elements of personal pleasure or recreation. The presence of personal motives in carrying on of an activity may indicate that the activity is not engaged in for profit, especially where there are recreational or personal elements involved. On the other hand, a profit motivation may be indicated where an activity lacks any appeal other than profit. It is not, however, necessary that an activity be engaged in with the exclusive intention of deriving a profit or with the intention of maximizing profits. For example, the availability of other investments which would yield a higher return, or which would be more likely to be profitable, is not evidence that an activity is not engaged in for profit. An activity will not be treated as not engaged in for profit merely because the taxpayer has motivations other than solely to make a profit. Also, the fact that the taxpayer derives personal pleasure from engaging in the activity is not sufficient to cause the activity to be classified as not engaged in for profit if the activity is in fact

engaged in for profit as evidenced by other factors whether or not listed in this paragraph (Treas. Reg. §1.183-2(b)(9)).

The conclusion as to personal pleasure or recreation may be based on the elements summarized in the following questions:

Variables:

41. Does the taxpayer state that he/she or other family members obtain personal pleasure or enjoyment from the activity?
42. Are the facilities constructed in a utilitarian manner rather than as a personal showplace or recreational center?
43. Does the normal conduct of the activity involve functions (apart from the activity itself) which would be classified as social or recreational in nature (parties, social meetings, etc.)?
44. Did the taxpayer or family members have a long-time interest in the activity or originally undertake the activity as a hobby?
45. Were operating methods constrained or the ability to earn profit limited by personal motives?

Maintenance of a portion of a particular activity solely for recreation may be useful evidence that the remainder of the activity is engaged in for profit (Knobbe, 1979, p. A-22).

Variable:

46. Are elements of personal use or showplace facilities separately accounted for and not included as costs of the activity?

Other Variables

There are two other types of variables to be considered: variables not related to the regulation factors and a variable to test the significance of missing data. The regulations state that factors other than those described in the regulations may be useful in determining if a profit intent exists. Review of the relevant literature and case law yielded the following item which appears to be unrelated to the regulation factors:

Later Discontinuance of the Activity. When the taxpayer has concluded that no profit can be made and has either sold the operation or is in the process of doing so, the courts seem favorably impressed (Burns and Groomer, 1980, p. 199).

Variable:

47. Has the activity been sold or discontinued because the owner has concluded that it cannot be conducted at a profit?

It has also been suggested that the discontinuance of the activity for any reason may have some weight (Lee, 1974, p. 406).

Variable:

48. Has the activity been sold or discontinued?

Missing Data. Where there are many independent variables, Cohen and Cohen suggest the importance of testing for the randomness of missing data by "including a single separate variable, 'tendency to have missing data'" (1975, p. 286).

Variable:

49. What is the number of data points for which information is missing?

Summary

A review of the intent of Section 183 reveals that, in reaching their decisions, the judges have been instructed to use the objective facts presented by the taxpayer. The specific elements of fact which have been discussed in the regulations, cases and literature are the basis for the forty-nine questions which are used as predictor variables. Responses to the predictor variables gathered from the Tax Court cases in the research sample form the data to be analyzed.

CHAPTER 3

METHODOLOGY

This chapter first discusses and evaluates various methodological tools that could be used to link Court decisions (business/hobby) with the independent variables listed Chapter 2. The method for selecting the best of these tools and testing each of the null hypotheses developed in Chapter 1 is presented. The final part of this chapter explains how the cases included in the analysis were selected and how the variables selected for analysis were coded.

Procedures for Analyzing Data

The data obtained will be analyzed by a two-step procedure. The purpose of the first stage will be to reduce colinearity among the independent variables and, if possible, to reduce the number of variables so that the final model will be as parsimonious as possible. The second stage of the analysis will attempt to develop a model which can be used in predicting the outcome of hobby loss cases and which will indicate the relative importance of the independent variables. Thus, at the end of stage two validity of NH-1 can be determined.

Reduction of Colinearity and the Number of Variables

Reduction of colinearity among the independent variables is advantageous because "high degrees of collinearity (high correlations) among the variables (classificatory variables, in this study) lead to

discriminant (or probit) coefficients that are unstable, making it difficult to interpret the contribution of each independent variable" (Sanathanan, 1975, p. 245). Reduction of the number of variables is only a secondary goal, because with reduction of variables comes information loss which interferes with the accuracy of the classification model. Therefore, factors will be eliminated only where little effect on the classification model results.

Two methods normally are suggested to deal with colinearity: stepwise discriminant (regression) analysis and principal component analysis (PCA).¹ Stepwise discriminant analysis is a sequential process in which variables are selected from the original group in order of their importance in discriminating between outcomes. This method results in parsimony while avoiding multicollinearity but at the cost of losing some of the classificatory information.

PCA also avoids multicollinearity by reformulating the independent variables into a new set of independent variables (principal components or "PC") in such a way that each PC is uncorrelated with the others.

The factor analysis (PCA) approach has the following advantage over the stepwise discriminant analysis approach. If there are two or more variables that are highly multicollinear, then stepwise discriminant analysis tends to drop a few of these, whereas in the former these variables are retained in forming appropriate summary measures used in prediction. It is clear

1. When PCA is included as a subset of factor analysis, as it is in many social science applications, the summary variables are referred to as "factors." Because of the confusion which might result from the use of the term "factor" to reference both Treas. Reg. §1.183-2 (b) factors and the factors (principal components) determined by use of PCA, the variables will be referred to as principal components (PC). It should be noted that factor analysis is mathematically distinct from PCA because it separates shared and unique variance, whereas PCA is only concerned with total variance.

that for classification it is safer, or more efficient to use a summary variable involving, say, two original variables rather than only one of them (Sanathanan, 1975, p. 246).

Since achieving classificatory power is more important than parsimony in this study, PCA is the more appropriate method. An advantage of PCA is that it does not limit the model-building methods available in the second stage of the analysis. Although stepwise techniques have been developed for regression and discriminant analysis, no equivalent procedure is available for the calibration of quantal models due to the iterative nature of the quantal calibration process (Stopher and Meyburg, 1979, p. 314).

Principal Component Analysis (PCA). PCA is not a unitary concept but subsumes a large variety of procedures which can be organized around the three customary steps of analysis. The first step will be performed by constructing a matrix of the correlations between the independent variables. The use of such correlations presents a problem in that the majority of these variables are dichotomous and thus do not meet the assumption of product-moment type correlations which underlies PCA. But Maxwell (1961, p. 271) and Harris (1975, p. 7) suggest that PCA produces results which are robust enough to allow for the violation of this assumption.

The second step is to select the summary variables (PC) which are expressed as follows:

$$Z_j = a_1^j X_1 + a_2^j X_2 + \dots + a_n^j X_n$$

where Z_j is the j^{th} PC, the X_n are the independent variables and the a_n^j are selected to maximize the variance accounted for by a PC under the condition that each PC is orthogonal to all those previously selected. Principal components continue to be selected until all of the variance is accounted for. Unless at least one variable is perfectly determined by the rest of the variables in the data, the PCA solution requires as many components as there are variables.

Since each extracted PC contributes less and less to the explanation of the residual variance, a determination must be made as to whether it is necessary to retain all of them. Several tests dealing with the variance accounted for by each PC (eigenvalue) have been developed, one of which is the scree test developed by Cattell (1966) as the test for retaining PCs. This test involves plotting the trend of the eigenvalues for all PCs. The curve thus plotted normally falls steeply at first and then straightens into a line (or nearly so) with a small slope. This straight-end portion is called the "scree," a term which refers to the "straight line of rubble and boulders which forms at the pitch of sliding stability at the foot of a mountain." The implication is that the scree represents the rubbish of small error factors and invariably begins at the "Kth latent root when K was the true number of factors" (Cattell, 1966, p. 249). Thus the PCs down to and including the one at the highest point on the scree are retained.

Finally, the PCs which result from step two will be rotated around the origin to increase the larger independent variable loadings and decrease the small ones, the goal being to simplify PC interpretation. There are two basic methods of rotation: orthogonal and oblique.

An orthogonal rotation results in PCs which remain uncorrelated with one another and which, therefore, can be represented graphically as perpendicular axes. An oblique rotation does not impose this constraint. Thus, if the dimensions in the real world are correlated, then the oblique PCs will be correlated. Due to the fact that correlation among the PCs would lead to a final model whose coefficients are unstable, an orthogonal rotation method will be used in this study.

There are three basic methods of orthogonal rotation: Quartimax, Varimax, and Equimax. They differ in the objective being sought through the rotation. The Quartimax objective is to simplify the rows of the PC matrix such that the final weights for each variable are high on one PC and low on the others. Varimax, on the other hand, attempts to simplify the columns of the PC matrix "by reducing the number of variables with nonzero coefficients in each factor (PC), or by increasing the values of the large coefficients as much as possible" (Stopher and Meyburg, 1979, p. 249). The Equimax method is a compromise between these two methods. Since the Varimax solution tends to produce the simplest structure (Harman, 1976, p. 290), and because differentiation between all PCs would be useful, it appears to be the most advantageous method for purposes of this study.

After rotation, the resulting solution should be conceptually interpretable. For example, one PC might load highly on questions designed to test the taxpayer's history of losses and his occasional profits. The PC then would be labeled in such a way as to convey the information concerning the variables on which it loads highly, e.g., for the example above, "Business Income."

The above process, often called the complete estimation method, will result in a number of conceptually distinct PCs which contain terms for each of the study's independent variables. Before proceeding to the model-building stage, some researchers select the most highly loaded variable or the group of highly loaded variables on a given PC as candidate predictors for the final model. This technique, referred to as the substantial loadings method, has the advantage of making the modeling results more easily interpretable, but it is not without its costs. The omitted variables will tend to make the final results unstable if they happen to be intercorrelated with the variables used in the model (Nie et al., 1975, pp. 488-89; Green and Tull, 1978, pp. 437-38). In this study, the decision whether to use complete estimation or the substantial-loadings method will be made, after PCA has been completed, based on the optimality of the loadings of each PC (i.e., the closeness to one or zero of the a^j 's).

An Alternative Method. The fact that 34 of the 49 variables are dichotomous dummy variables violates the normality assumptions of PCA and the modeling methods. In order to avoid this violation, an alternative method of reducing the colinearity and number of variables will be explored. This method will convert the underlying variables into "scalers." The scalers will be derived by adding together the standardized scores of the variables related to each of the regulation factors. Scaler scores will be determined for each court case and used as the input for the model-building stage of the analysis. Thus, each case would have ten scalers: one for each of the nine regulation factors and the

tenth from the two questions (Variables 47 and 48, which dealt with the sale or discontinuance of the activity) which were not related to any of the regulation factors. This alternative method will be used in addition to the PCA outlined above.

Development of the Model

A predictive model will be developed from the PCs/scalers obtained in stage one of the analysis. One of three methods normally is used to construct this type of model: 1) regression analysis, 2) a quantal method (logit or probit), or 3) discriminant analysis. (The following discussion is based on Watson, 1974, Chapter 14; and Pindyck and Rubinfeld, 1976, Chapter 8.)

Due to the dichotomous nature of the dependent variable, the use of regression analysis presents several problems, the most severe of which stems from the fact that the regression equation may be interpreted as describing the probability of occurrence of an event, given the zero/one nature of the dependent variable. The dependent variable is limited to values between zero and one, but this is not necessarily the case with the normal linear regression model. Thus, the model is inadequate when used for predictive purposes due to the possibility that regression will yield predictions outside the relevant range. Other problems result from the restrictions based on the disturbance term due to the zero/one form of the dependent variable. These restrictions prevent the estimated betas from being best-linear unbiased estimates and normally distributed, consequently rendering classical significance tests

inapplicable. These disadvantages appear to be serious enough to eliminate regression analysis from further consideration.

The obvious solution to the problems which result when regression analysis is used is to transform the model in such a manner that predictions will lie within the zero/one interval. This is precisely what the quantal methods do. There are infinitely many transformations which would yield the desired result, but two are more popular than the others: the probit and the logit transformations. In the probit model, the transformation function employed is the cumulative normal distribution, whereas in the logit model the logistic function is employed. Maximum likelihood methods are used in both probit and logit to obtain estimates of the population parameters which, under general conditions, are "consistent and asymptotically efficient, and their asymptotic sampling distribution is known. Also, hypotheses can be tested . . . by use of the likelihood ratio" (McKelvey and Zavoina, 1975, p. 109). Both methods produce models which express the estimate of the dependent variable in the form of probability of occurrence. In terms of their statistical properties, it is difficult to distinguish between the two methods since they both require normality assumptions, produce results subject to the same significance tests, have similar properties, and give virtually identical performances. Chambers and Cox determined that approximately 1,000 observations are necessary to yield even modest statistical differences between probit and logit (1967, p. 573). The choice of probit over logit in the research herein was based on the availability

of a probit computer program with the capability of performing the necessary modeling tasks.²

Discriminant analysis assumes that the population from which the sample is drawn is, in fact, composed of two subpopulations--business and hobby activities, in this instance. Watson (1974, p. 112) explains the goal of discriminant analysis as follows:

(It) aims to find the values of λ_p (weights for the independent variables, or PCs/scalers) that best discriminate between the two populations. The function that "best" achieves this end is one that provides the greatest separation between the two populations (e.g., the greatest distance between their means) relative to the variance within the subpopulation.

In its normal form, discriminant analysis would predict an outcome without indicating probability of occurrence. But if the underlying assumption of a multivariate normal distribution for the independent variables (Pcs/scalers) can be extended to the discriminant scores, then these scores can be converted into probabilities of group membership. Thus, the results produced are similar to those of probit analysis.

Watson (1974, p. 118) proposes that the probabilistic extension of discriminant analysis is merely a special, more restrictive case of the probit function in which the linear discriminant function is chosen as the most suitable linear combination. He argues that, as such, it is less satisfying and less efficient than estimating the probabilities directly. He also states that there is a conceptual reason for preferring probit analysis to discriminant analysis. Theoretically, the probit model begins with the assumption that judges do make choices between

2. The program employed was developed by Richard McKelvey, California Institute of Technology.

alternatives; discriminant analysis, on the other hand, assumes that the research is seeking to identify and classify activities in terms of the characteristics of particular groups--hobby or business, in this instance (Westin and Watson, 1975, p. 283). This theoretical distinction makes probit analysis the more appropriate tool where the researcher is interested in determining the effect of a variable's presence or absence on the outcome under study (McFadden, 1976, pp. 522-23). Since the effect of a shift in variables is of interest in the present study, the use of probit analysis as the primary model-building tool is conceptually appropriate. Its use is also advantageous in providing a statistical test for the significance of each PC (t-test). No similar test is available when discriminant analysis is used.

Probit Analysis. Probit analysis, a variation of regression analysis, was originally developed by D. J. Finney to deal "with the situation in which one wishes to attempt to place a mathematical explanation on the response of a subject to some level of stimulus" (Stopher and Meyburg, 1979, p. 300). Use of this technique results in estimation of the probability that the dependent variable is present based on observations of the occurrence of a number of events. The key concept in applying probit analysis to hobby loss decisions is the assumption that there is some threshold level of the independent variable (PCs/scalers) above which the activity will be determined to be a business and below which the activity will be determined to be a hobby.

... (T)he threshold values are assumed to be normally distributed³ over the population as a result of which the parameters of the distribution are estimated using maximum likelihood methods from data that show the number in the sample observed to be in one or the other category (business/hobby) at various levels of the explanatory variables (PCs/scalers) (Watson, 1974, p. 103).

The maximum likelihood estimates are found by an iterative process which results in the following linear model:

$$\hat{Y} = b_0 + \sum b_j Z_j$$

where \hat{Y} is the value of the probit (probabilities are obtained from a table giving the probabilities for a unit-normal curve corresponding to the probit value); b_0 indicates the number of standard deviations from equal probability of business or hobby when all the PCs/scalers are zero, the b_j are the probit coefficients, and the Z_j are the PCs/scalers developed in stage one of the analysis.

The probit model is based on the following process (see Watson, 1974, pp. 103-107).

The dependent variable W is postulated to take the values 0 or 1, depending upon the values of the independent variables, $Z_1 \dots Z_j$. An index, I , is then constructed which is a linear combination of the independent variables.

$$I = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \dots + \beta_j Z_j$$

3. Unfortunately, it is impossible to test for normal distribution of the threshold values since they are unobservable (Watson, 1974, p. 117). Theil suggests that where many independent factors determine the threshold value, as is the present situation, the central limit theorem may be used to justify the choice of the normal distribution (1971, p. 630).

The concept of a linear relationship is analogous to the linear relationship in regression analysis.

If I_1 is the value of I evaluated from the above equation using the values of Z corresponding to the i^{th} case, and \bar{I}_1 is the critical, or threshold, value of \bar{I} for the i^{th} case, then

$$W_i = 1 \text{ for } I_1 \geq \bar{I}_1 \quad \text{and}$$

$$W_i = 0 \text{ for } I_1 < \bar{I}_1$$

In other words, if the value of I_1 is equal to or greater than the critical value, \bar{I}_1 , then $W_i = 1$; if I_1 is less than \bar{I}_1 , then $W_i = 0$.

The \bar{I}_i 's, or critical values, are assumed to be normally distributed over the population, $N(0,1)$. The fact that the \bar{I}_i 's are normally distributed represents differences among cases which are either random or the result of variables not included in the model.

The probability that, given I , W_i will equal 1 is:

$$P(W = 1 | I) = P(\bar{I}_i \leq I_i) = P(I) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^I \exp(-\frac{1}{2}u^2) du$$

Therefore, the probability that, given I , W_i will equal 0 is:

$$P(W = 0 | I) = P(\bar{I}_i \geq I_i) = 1 - P(I) = Q(I) = \frac{1}{\sqrt{2\pi}} \int_I^{\infty} \exp(-\frac{1}{2}u^2) du$$

Thus, I is the probit of $P(W)$ and is defined as the abscissa which corresponds to the probability $P(W)$ in a normal distribution with mean, 0, and variance, 1.

The parameters of the model can be estimated by maximum likelihood methods. The program to be used employs the Newton-Raphson hill-climbing technique to maximize the likelihood.

Consider a sample of observations on m variables at s points ($Z_{jk}; j = 1 \dots m; k = 1 \dots s$). Let n_j be the total number of observations at the k^{th} point; let r_j be the number of observations at the k^{th} point for which $W = 1$; then $n_k - r_k =$ the number of observations at the k^{th} point for which $W = 0$. The likelihood of the sample is a function of the values $(b_0, b_1 \dots b_m)$ assumed to represent the population parameters $(\beta_0, \beta_1 \dots \beta_m)$:

$$L(b_0, b_1 \dots b_m) = \prod_{k=1}^s [P(b_0 + b_1 X_{1j} + \dots + b_m X_{mk})]_k$$

$$[Q(b_0 + b_1 X_{1j} + \dots + b_m X_{mk})]^{n_k - r_k}$$

Now let

$$Y_k = b_0 + b_1 Z_{1k} + \dots + b_m Z_{mk}; P_k = P(Y_k);$$

$$Q_k = Q(Y_k)$$

To find the maximum likelihood estimates of the population parameters, it is convenient to find the value of the b 's that maximize $\log L$ (rather than L).

$$\begin{aligned} L^*(b_0, b_1 \dots b_m) &= \text{Log } L(b_0, b_1 \dots b_m) \\ &= \sum_{k=1}^s (r_k) \log P_k + (n_k - r_k) \log Q_j \end{aligned}$$

Thus, the conditions for a maximum are the $m+1$ equations that result from finding the partial derivatives of L^* and setting them equal to zero. These equations can be shown to be:

$$L_1(b_0, b_1 \dots b_m) = \sum_{k=1}^s r_k \frac{X_{jk} Z_i}{P_k} - (n_k - r_k) \frac{X_{jk} Z_i}{Q_k} = 0$$

$$(i = 0, 1, 2 \dots m)$$

The equations can be solved by an iterative process. As the algebra is complex and tedious, it is not intended to present the solution here.

Two tests for the goodness of fit of the resulting model are commonly used: the estimated R^2 and a log-likelihood ratio test. The estimated R^2 produced by probit analysis is similar to that produced by regression analysis, but in probit analysis "we cannot observe the residuals about the regression plane or, indeed, even the deviations of the dependent variable, Y , about its mean. Thus both the sum of the squared residuals . . . and the total sum of squares . . . are estimates rather than actual values of these quantities" (McKelvey and Zavoina, 1975, p. 112). Consequently, probit analysis produces only an estimate of R^2 . The problems associated with using an estimate of R^2 are minimized as the sample size becomes large.

The log-likelihood test statistic is computed from the general likelihood ratio test statistic, the ratio of the maximum of the likelihood function for the model with only a constant term (no explanatory variables) to the maximum of the likelihood function for the model with the full variable complement. The logarithm of this ratio, the log-likelihood ratio test statistic, is a measure of the difference between the two models, or, more precisely, the relative contribution of the explanatory variables. When the log-likelihood ratio is multiplied by -2 , the ratio has an asymptotic chi-square distribution . . . (Russell and Rives, 1979, p. 104).

The test may be carried out using either of two null hypotheses. One hypothesis assumes an equal probability of hobby or business classification. The second, more stringent, test is obtained by choosing a null hypothesis in which the constant is set equal to the log of the proportion of cases being classified as businesses. This second hypothesis is often referred to as a "market share" test. Since the sample is not anticipated to consist of an equal number of hobby and business activities, the market share test appears to be the more appropriate for use in this study.

Tests of the Hypotheses

Although the testing of each null hypothesis is discussed separately, NH-1, NH-2 and NH-3 are interrelated. For example, if the classificatory variables used by the Court are unstable over time (NH-2 rejected), then further tests would have to be made to see if the variables had stabilized in the post-1968 period. Should this be the situation, then the final model used to test NH-1 would have to be developed from only those cases tried during the period in which the variables had stabilized. Thus, a determination as to the outcome of NH-2 and NH-3 must be made before the full significance of the model's classificatory ability can be ascertained.

NH-1 Ability of Variables to Discriminate between Outcomes

The data from a random sample of three-quarters (170) of the observations in the data-base will be used to calculate the variable means and standard deviations, and hence the scalers. The scalers will then

be used as inputs for the probit analysis. The predictive power of the resulting model will be tested in the following manner:

- 1) Classification matrices will be constructed for the 170 observations on which the model was developed and for the observations from the holdout sample. (A classification matrix is a 2 x 2 matrix comparing the actual court classification with the classification predicted by the model.)
- 2) A chi-square test will be performed to determine the likelihood that the classification did not arise by chance.
- 3) An estimated R^2 will be calculated to measure the proportion of the original variance of the dependent variable explained.
- 4) A log-likelihood test will be performed to determine if none of the probit coefficients is significantly different from zero.

This procedure will be repeated using PCA to construct the inputs for the probit analysis. The tests of predictive power will be compared in order to ascertain which method, scalar-probit or PCA-probit, yields the most powerful results; whichever proves superior will be used in the remainder of the analysis. Should both methods yield insignificant results, NH-1 will be accepted and further hypothesis testing will not be undertaken.

The significance of the b_j 's (probit coefficients) of the most powerful model will be tested by the use of t-statistics. Standardized maximum likelihood estimates (MLE) will then be calculated. The resulting coefficients, which may be interpreted in much the same way as standardized beta coefficients in regression analysis, will be used to

determine the relative strength (importance) of each scaler/PC. This information, combined with the data relating to those original independent variables used to construct the scaler (or those loading highly on each PC), can be used to infer the significance of the underlying independent variables.

NH-2 Stability of the Model over Time

NH-2 is meant to test not only the effect of the passage of Section 183 and the promulgation of the regulations pertaining thereto, but also the stability of the model over time.

The test used is a generalization of Chow's analysis of covariance test between regressions. Commonly referred to as the log-likelihood test, it is performed as follows:

$$\lambda^* = -2 \ln \lambda = -2(\ln L_0 - \ln L_1)$$

λ^* has a chi-square distribution with r degrees of freedom where:

L_0 = log-likelihood of the general model,

L_1 = the sum of the log-likelihood of the restricted models,

r = the sum of the number of parameters (including constants) in the restricted models less the number of parameters in the general model.

NH-2 is rejected if λ^* exceeds the critical value for chi-square (Stopher and Meyburg, 1979, p. 332; Westin and Watson, 1975, p. 285).

Two restricted models will be necessary to perform this analysis. One model will be constructed using the data from observations based on the cases tried prior to the introduction and passage of Section 183

(1955-1968), and the second model will use data from observations based on cases involving taxable years after 1969 (effective date of Section 183). Cases involving post-1969 years did not begin to reach the Tax Court until 1974 due to the lengthy audit process and a backlog of Tax Court cases. Post-1969 cases in which Section 183 was not applied will not be included in the analysis of NH-2 because the mere passage of Section 183 may have had an effect on their outcome. The general model will use all of the observations employed in constructing the two restricted models.

Should λ^* be less than the critical value, NH-2 is accepted and the other null hypotheses can be tested with cases from the entire time period under study. If the critical value is exceeded, NH-2 will be rejected and additional models will be developed with cases from the post-1968 period to determine whether discriminating factors stabilized during that time period. That is, the two restricted models will be developed from the cases tried during the 1968-1974 and the 1975-1981 periods; the log-likelihood test will again be used to test for stability.

The log-likelihood ratio technique determines whether the two restricted models yield significantly better predictive results than the general model, not whether the individual scalars/PCs used in deriving the models have the same importance in the two restricted models. No specific test exists to determine whether the difference in the weights given an individual PC/scalar in the two models is significant. There is reason to believe, however, that where the restricted models cannot produce significantly better results than the general model, any change in PC/scalar weights is not significant.

NH-3 Stability of the Model across Lines of "Business"

This hypothesis will also be tested using the log-likelihood ratio test. Two restricted models will be developed, one constructed with data from the observations related to farming activities and the second model based on all of the nonfarming observations. The general model will be based on all observations in the data set. Should λ^* be less than the critical value, NH-3 will be accepted and the other null hypotheses can be tested with a combined-lines-of-business model. If the critical value is exceeded, NH-3 will be rejected and two models (farm and nonfarm) will be used to test the other hypotheses. This same testing procedure will be repeated with rental and nonrental models.

NH-4 Ability of the Model to Predict Appeals

The final model (or models, should NH-3 be rejected) resulting from the analysis of NH-1 through NH-3 will be used to generate the probability that each case will be classified as a business, and the Prentice-Hall Citator will be used to determine which cases have been appealed. These data will then be used to construct a 2 x 2 contingency table with the rows classified by probability of business outcome (.40-.60 versus all others) and the columns classified with respect to appeal or no appeal. A chi-square test will be used to determine the independence of classification. If the principles of classification are independent, NH-4 will be accepted and conversely, if the principles of classification are not independent, NH-4 will be rejected.

Selection of Cases and
Coding of Variables

Selection of Cases

Although the study of cases at the audit, assessment, and trial stages would be interesting, public information is only available on (and the sample will thus be limited to) cases decided in court. Since on the average less than 1% of audits with proposed adjustments are appealed, and approximately 85% of these are settled before trial, the vast majority of conflicts are eliminated from consideration.⁴ The remaining population is probably far from a random subset of the original population because

. . . there is a rule of thumb that if, in the Appellate Conference's judgement, the Government's case has a success probability of less than 20 percent, the taxpayer is given full settlement. Furthermore when the Government's chances of success are judged less than 80 percent, compromise is sought (Horvitz and Finley, 1979, p. 639).

Thus a certain degree of bias cannot be prevented due to the limited sources of public information. But since taxpayers and tax practitioners rely on these published cases in assessing the manner in which the law is being applied, the remaining population is felt to be significant in its own right.

There are three courts of original jurisdiction for tax cases: Tax Court, U.S. District Court, and U.S. Court of Claims. The numerous differences between these courts have led most researchers to the

4. Percentages are based on statistics for fiscal years 1976 through 1979 (Internal Revenue Service, 1977a, 1978, 1979, 1980; Internal Revenue Service, Chief Counsel, 1977, 1978, 1979, 1980).

conclusion that they should not be mixed for purposes of analysis (Bond, 1977; Englebrecht and Jamison, 1979; Madeo, 1979; to cite only a few).

Some of the principal differences are as follows:

- 1) A jury may only be obtained in the District Court.
- 2) The Tax Court is the only court where the tax assessment need not be paid prior to trial.
- 3) The Court of Claims only meets in Washington, D.C., while the other two courts meet throughout the country.
- 4) The appellate process also differs, depending on which of the three courts of original jurisdiction is selected. Tax Court and District Court decisions are appealed to the appropriate Circuit Court, whereas Court of Claims decisions may only be appealed to the Supreme Court.

Presumably, taxpayers do not choose between the courts in a random manner. In this study, the sample selection has been limited to cases tried in the Tax Court for three reasons:

- 1) The Tax Court handles the vast majority of tax cases. In 1979, 17,126 cases were filed in Tax Court, as compared with 1,000 tax cases in the District Courts and Court of Claims combined (Jacobs, 1980, p. 1). Of the 59 cases tried under Section 183 between 1974 and mid-1981, only three have not been tried in the Tax Court.
- 2) The published Tax Court opinions provide more complete information. In District Court jury trials, only the jury charge is published.

- 3) The fact that the Tax Court hears only tax cases and that many of its "justices have been appointed from IRS or Treasury Department positions, has led some to conclude that the Tax Court has more expertise in tax matters" (Hoffman, 1980, p. 31).

The Tax Court issues two types of opinions, regular and memorandum. Memorandum decisions are entered by the Court when the case involves no questions of law to be decided or when the question of law has been "decided previously by the Tax Court and followed in many decisions, and upheld in the Circuit Courts" (Commerce Clearing House, 1972, p. 199). Moreover, these cases are published not by the federal government, but privately by Commerce Clearing House and Prentice-Hall. Regular decisions, on the other hand, involve unusual issues, matters not previously resolved by the Tax Court. "However, this distinction does become blurred in actual practice, and many memorandum decisions have settled novel issues and obtained great value as precedents" (Englebrecht and Jamison, 1979, p. 557). It is not surprising to find that in the hobby loss area, where the principal question is decided on the facts presented, the Tax Court issues far more memorandum opinions than regular decisions. Both types of opinions were used in the present study; both are written to comply with the same laws, and the taxpayers and the Commissioner have the same rights of appeal.

The individual cases analyzed were selected from all decisions issued by the Tax Court between January, 1955, and July, 1981, by reference to four major tax services--Commerce Clearing House, Inc., Standard Federal Tax Reporter; Mertens, Law of Federal Income Taxation;

Prentice-Hall, Inc., Federal Taxes; and Research Institute of America, Inc., Federal Tax Coordinator, 2d. This search process yielded 251 cases which appeared to relate to the research question. In order to assure the completeness of this sample, the Lexis computer system was used to search for additional cases. Those cases which contained the words "intent" or "expect" within five words of "profit," or directly referred to Section 183, or contained the term "hobby loss" were listed through the Lexis search. These cases were reviewed to determine whether their inclusion in the sample was appropriate. This process resulted in the addition of nine cases to the preliminary sample of 251.

Of the resulting 260 cases, 219 were selected as usable and 41 cases were eliminated. Appendix A lists the cases included and Table 1 summarizes reasons for eliminating cases. Of the usable cases, two involved different decisions for the tax years involved, and five cases involved multiple activities that the Court dealt with separately, thus increasing the final data set from 219 to 227 observations. These observations are summarized by year of Court decision, time period and line of business in Tables 2 through 4.

Coding Variables

From each published Tax Court opinion, information will be gathered on the dependent variable (the Court's decision as to whether the activity constituted a business or a hobby) and the independent variables (factors used by the Court to arrive at its conclusion).

Table 1. Summary of Those Cases Eliminated from the Study.

<u>Reasons for Exclusion</u>	<u>No. of Cases</u>
Central issue was whether expenses were pre-entry (capital expenditures) or incurred in the active conduct of a trade or business (deductible)	8
Losses not substantiated so intent question never pursued	8
Case involved single sales transaction rather than an activity	8
Case involved an organization to which Section 183 does not apply (non-Subchapter S corporations)	7
Taxpayer stated he/she did not expect or desire to earn a profit	6
Central issue concerned whether expenses were ordinary and necessary	3
Unclear delineation of activities with which Court dealt separately	<u>1</u>
Total Cases Eliminated	<u>41</u>

Table 2. Summary of Observations by Year of Court Decision.

Year	NUMBER OF OBSERVATIONS		
	Non-§183	§183	Total
1955	5	-	5
1956	3	-	3
1957	8	-	8
1958	7	-	7
1959	3	-	3
1960	7	-	7
1961	2	-	2
1962	8	-	8
1963	7	-	7
1964	12	-	12
1965	10	-	10
1966	10	-	10
1967	10	-	10
1968	11	-	11
1969	13	-	13
1970	7	-	7
1971	9	-	9
1972	7	-	7
1973	12	-	12
1974	2	1	3
1975	5	-	5
1976	7	1	8
1977	3	3	6
1978	1	13	14
1979	2	14	16
1980	-	13	13
1981 ^a	-	11	11
Totals	<u>171</u>	<u>56</u>	<u>227</u>

^aCases reported by Lexis through July 20, 1981.

Table 3. Summary of Observations and Outcomes by Time Period.

Time Period	NUMBER OF OBSERVATIONS		Total
	Business	Hobby	
Cases tried before 1969	41 (39.8%)	62 (60.2%)	103
Cases tried after 1968 not involving Section 183	27 (39.7%)	41 (60.3%)	68
Cases involving Section 183	19 (33.9%)	37 (66.1%)	56
Totals	<u>87</u> (38.3%)	<u>140</u> (61.7%)	<u>227</u>

Table 4. Summary of Observations by Line of "Business."

Line of "Business"	TIME PERIOD OF OBSERVATION			Total
	Pre-1969	Post-1968 No. §183	Section 183	
Farming	53	25	15	93
Rental	5	12	17	34
Writing and Publishing	6	7	5	18
Aircraft and Boat Chartering	4	7	4	15
Pet Breeding or Kennels	5	2	5	12
Inventing	7	3	1	11
Art	5	2	1	8
Other	<u>18</u>	<u>10</u>	<u>8</u>	<u>36</u>
Totals	<u>103</u>	<u>68</u>	<u>56</u>	<u>227</u>

Coding the Dependent Variable. In most cases, the Court's decision is easily identifiable. However, some question as to coding arises when a decision is later overturned by a higher court. In such a situation, one might argue that the final decision is the relevant one for coding the dependent variable. However, NH-4, which involves predicting appeals, necessitates the use of the Tax Court's original decision. Furthermore, any possible error introduced by using the original decision should be minimal; only three cases included in the sample were reversed upon appeal.

Coding the Independent Variables. It must be remembered that the independent variables are coded based on the Court's printed opinion. The researcher is not the observer of the variables as actually presented at the trial; he is, rather, the "observer" of the judge's enumeration of the facts. The assumption therefore is made that despite the fact that an opinion is, in effect, a judge's justification of an outcome, it enumerates all facts pertinent to the decision. This assumption is bolstered by the fact that judges attempt to include in their opinions a discussion of the facts relevant to their decision-making process so that complete information will be available in the event of appeal to a higher court.

The objectivity of the variable coding was enhanced through a second reading of a random selection of thirty cases (13%) by an independent researcher. (Variables that involved the mere extraction of financial data were excluded from the second reading.) The two readers gave identical codings for the variables over 98% of the time. A Spearman

rank-order correlation analysis was performed to determine the inter-reader reliability of the coding on each variable. The average correlation coefficient was .97, with the lowest coefficient being .86 for Variable 39. Variable 39 was then altered to make its coding more objective:

Revised Variable

39. Was evidence presented that the taxpayer has an extravagant standard of living?

Missing Data

One of two methods was used to deal with missing data, depending on the type of question involved. For several of the variables, the lack of discussion of the particular subject matter involved seemed to imply the absence of the variable. Thus Variables 5, 6, 7, 14, 19, 29, 39, 41, 44 and 45 were coded zero when not discussed in the Court's opinion. The same logic was used in coding Variable 42; facilities were assumed to be utilitarian (and thus coded one) if they were not discussed. In addition, if the opinion discussed the pre-entry period and did not mention the determination of profit potential (Variable 11) or the seeking of pre-entry advice (Variable 12), then the pertinent variable was coded zero. All other variables with data missing were coded by the mean of the value where the variable was present. This allowed for retention of all cases while "making the missing data information orthogonal to, and hence uninvolved in, the contrasts among the group members" (Cohen and Cohen, 1975, p. 283).

In the process of reading and coding the cases, it became evident that five of the variables were seldom mentioned (see Table 5 for frequency of discussion); the judges appeared to consider these factors of little or no significance even when they were discussed. Thus Variables 21, 22, 23, 34 and 36 were excluded from the ensuing analysis.

In three situations, two related variables were consolidated into a single summary variable. Variables 12 (pre-entry advice sought) and 13 (advice followed) were combined into a new variable (12A) which was coded as follows:

- +1 - advice sought and followed,
- 0 - pre-entry period discussed and no seeking of advice mentioned,
- 1 - advice sought and not followed.

The variables were combined because, although pre-entry advice was usually considered, when such advice was given but ignored, the Court viewed it as detrimental to the taxpayer's contention of profit intent. When pre-entry advice was ignored, no mention was made that failure to follow it was due to the taxpayer's conclusion that the advice was unsound. Variables 9 (development plan) and 10 (plan followed) and Variables 14 (post-entry advice) and 15 (advice followed) were combined in a similar manner. Table 5 contains a summary of revised or eliminated variables.

The number of missing data points is summarized in Table 6. Any correlation between missing data and case outcome will be tested by Variable 49; that is, if Variable 49 is significant, there is a significant relationship between missing data and outcome. The average number of missing data points per observation did not appear to vary

Table 5. Revised or Eliminated Variables.

Original Var. No.	New Var. No.	Description	Coding
9, 10	9A	Did the taxpayer originate and follow a development plan?	1,0,-1
12, 13	12A	Was pre-entry expert advice sought (or did the taxpayer have prior preparation) and followed as to the methods and practices which would lead to profitable operations?	1,0,-1
14, 15	14A	Was post-entry expert advice sought and followed as to methods and practices which would lead to improved profitability?	1,0,-1
21	elimin.	Assumption assets would appreciate (missing in 87% of observations)	
22	elimin.	Converted other business to profit (missing in 95% of observations)	
23	elimin.	Records similar to other business (missing in 96% of observations)	
34	elimin.	Return on investment (missing in 83% of observations)	
36	elimin.	Evidence presented that business was speculative (missing in 94% of observations)	
39	39	Was evidence presented that the taxpayer has an extravagant standard of living?	1,0

Table 6. Summary of Missing Data.

Number of Missing Data Points in Each Observation	NUMBER OF OBSERVATIONS BY TIME PERIOD			
	Pre-1969	Post-1969 No 183	Section 183	Total
0	-	1	-	1
1	6	2	3	11
2	8	5	11	24
3	13	3	5	21
4	12	3	5	20
5	16	10	7	33
6	8	13	7	28
7	12	8	2	22
8	7	12	3	22
9	5	3	3	11
10	7	3	4	14
11	2	-	3	5
12	2	3	-	5
13	-	1	1	2
14	3	1	2	6
15	1	-	-	1
21	1	-	-	1
Average number missing per observation	5.98	6.37	5.43	6.01

significantly by time period, and it was decided, therefore, to include all observations in the analysis.

Summary

The classification problem presented in this study is the identification of a particular activity as a business or hobby. Due to the large number of independent variables proposed, the consolidation of variables is appropriate prior to attempting to develop a classification model. Two methods of reducing the colinearity and number of variables were ultimately proposed: PCA and the development of scalars. The choice between these two methods was deferred until their comparative results could be ascertained.

Probit analysis was found to be the most appropriate tool for developing a classification model from the PCs/scalars. Tests to determine the stability of the model over time and across lines of "business" were discussed. A method for testing the model's ability to predict appeals was also outlined.

Post-1954 hobby loss cases litigated in the Tax Court were selected as the basis for the study. Methods of data collection and coding were described.

CHAPTER 4

ANALYSIS OF DATA AND EVALUATION OF THE NULL HYPOTHESES

The purpose of this chapter is to describe the input into and output from the probit model. Two methods of reducing the colinearity and the number of variables are discussed; the preferred method is selected and used to develop the probit model. Finally, the probit model is used to test the four null hypotheses.

Principal Component Analysis (PCA)

PCA was performed, using data from the 170 model-building observations, to reduce the 41 variables to their underlying research factors. The scree test was performed on the 41 PCs which resulted from the PCA (Figure 1). The curve plotted from the eigenvalue of each PC fell sharply until the ninth PC was added, at which point the curve leveled out into a smaller-sloped scree, as predicted by Cattell (1966, p. 249). It was decided, therefore, to retain only the first 8 PCs for the remainder of the PCA.

A varimax rotation was performed on the eight PCs retained, and an attempt was made to conceptually interpret the resulting PCs (see Table 7). The meaning of PC 3, which loaded heavily on four of the underlying variables, was not conceptually clear. In addition, the meaning of PC 5 was complicated by the fact that it loaded heavily on Variable 2, which made a comparison between operations, and also on Variables 5 and 6, which dealt solely with recordkeeping for the activity in question.

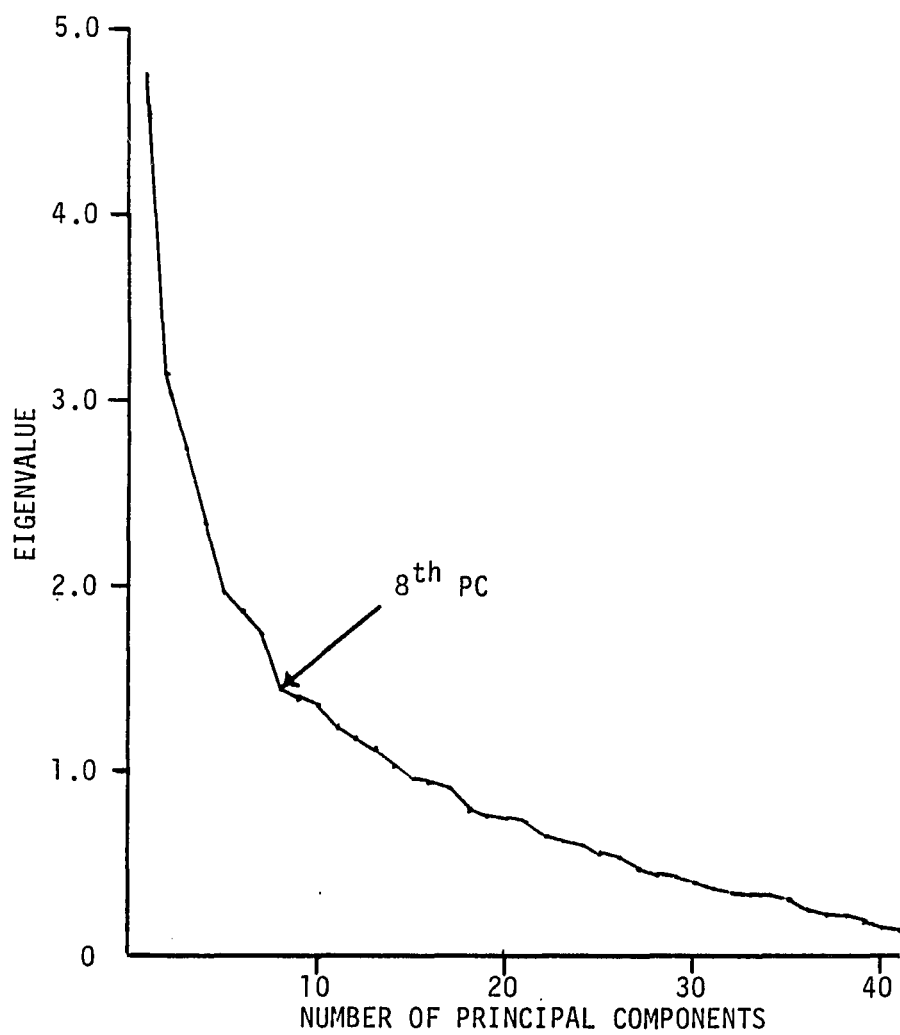


Figure 1. Scree Test for the Number of Significant Principal Components.

Table 7. Naming of Rotated Principal Components.

Loading ^a	Variable Number	Variable Description
		<u>PC 1: Manner of Operation</u>
.61	1	Was activity held out to community as a business?
.44	2	Operated similarly to comparable operations?
.54	7	Methods changed to improve profit?
.64	8	Level of advertising
.52	14A	Post-entry advice sought and followed?
.57	18	Average time spent by taxpayer
.41	19	Withdraw from other business?
-.49	45	Operating methods constrained by personal motives?
		<u>PC 2: Financial Success of "Business"</u>
.55	24	Average ratio of receipts to disbursements
.84	30	Percentage of years with profit
.72	31	Profit in any two of five years including year in question?
.68	32	Profit in two of five years prior to year in question?
		<u>PC 3: Unclear Meaning</u>
.42	11	Profit potential determined prior to entry?
.47	17	Competent and well-informed manager employed?
.67	47	Activity sold or discontinued because no chance for profit?
.45	48	Activity sold or discontinued for any reason?

Table 7--Continued

Loading ^a	Variable Number	Variable Description
		<u>PC 4: Resources Available and Used in Activity</u>
.67	26	Average magnitude of losses
.62	37	Taxpayer's average income before activity loss
.49	40	Majority of other income passive?
		<u>PC 5: Control over Operations</u>
.67	2	Operated similarly to comparable operations?
.40	5	Segment profits and relevant costs determined?
.44	6	Nonfinancial records maintained?
		<u>PC 6: Amount of Occasional Profit</u>
.66	33	Ratio of profit to loss
.79	35	What is largest profit earned?
		<u>PC 7: Extravagant Lifestyle or Operations</u>
-.71	39	Maintain extravagant standard of living?
.72	42	Are facilities utilitarian?
		<u>PC 8: Magnitude of Receipts</u>
.63	24	Ratio of receipts to disbursements
-.66	25	Percentage of years receipts \leq 5% of disbursements

^aOnly variables with a varimax rotated factor loading of above .39 or below -.39 are shown. Each PC contains some weight for each of the 41 variables considered, however.

In addition to these problems, three additional difficulties arose:

- 1) The majority of the underlying variables were dichotomous and thus did not meet the assumption of product-moment type correlations which underlies PCA.
- 2) Variables 2 and 24 loaded heavily on more than one PC. Their "meaning" was therefore "no longer simple: It measures more than one theoretical dimension" (Nie et al., 1975, p. 475).
- 3) The loading of the individual variables on each PC did not approach the optimal loading (closeness to 0 or 1) which the varimax rotation strives for and which makes interpretation of the importance of the underlying variables feasible. In only one instance did a variable have a loading in excess of .80; in over 20% of the situations, the variables had loadings which did not approximate optimality (greater than .20 and less than .80).

Because of these problems, PCA was not used in stage one of the analysis.

Analysis Using Scalers

Scaler scores were derived for each of the observations by calculating the mean and standard deviation (Table 8) for each of the variables based on data from the 170 model-building observations. The scale for each variable in each observation was then standardized by subtracting the mean of each variable from the value of that variable and dividing the remainder by the standard deviation. Scores for related variables were then combined to form scalars. A variable's score was added in forming the scaler if the relevant literature predicted that its presence or higher positive value would contribute to the Court's decision that an

Table 8. Means and Standard Deviations of Included Variables.

Variable	Mean	Standard Deviation
1	.71	.46
2	.45	.24
3	.48	.37
4	.36	.26
5	.04	.20
6	.40	.49
7	.31	.47
8	1.23	.91
9A	.08	.35
11	.17	.31
12A	.53	.47
14A	.25	.51
16	.09	.28
17	.27	.44
18	1.44	1.34
19	.08	.27
20	.70	.31
24	.20	.23
25	44%	37%
26	\$25,714	\$41,457
27	.15	.84
28	8.63 yrs	8.10 yrs
29	.28	.45
30	4%	12%
31	.17	.21
32	.02	.15
33	.05	.28
35	\$-9,487	\$33,873
37	\$173,000	\$169,000
38	.02	.08
39	.09	.29
40	.25	.40
41	.05	.21
42	.91	.28
43	.48	.50
44	.43	.50
45	.31	.46
46	.82	.36
47	.05	.21
48	.18	.39
49	6.01	3.34

activity was a business; the score was subtracted when the contrary was true. A summary of the composition of the scalers is included in Table 9. There are only seven scalers based on the nine regulation factors; all questions relating to Regulation Factors 4 (expectation of appreciation) and 5 (success in similar activities) were eliminated due to excessive missing data.

The eight resulting scalers and Variable 49,¹ which dealt with the number of missing data points, were then used as inputs for the probit analysis. The nine-scaler model which was derived and rank-order significance of the included scalers are shown in Table 10. Classification results for the nine-scaler model are shown in Table 11. A chi-square test revealed that the scaler model results were significantly different than one would expect by chance.

All of the scalers contributed to the Court's decision in the manner expected (had a positive sign), with the exception of Scaler 7 (amount of occasional profits). However, a t-test revealed that the coefficient for Scaler 7 was not significantly different from zero. A negative sign for Scaler 7 implies that larger profits (smaller losses) are not indicative of a business outcome. This might be due to the fact that small losses are more closely correlated with a small capital investment (a negative factor) than with a trend toward profitability; but evidence was so seldom present as to the size of the taxpayer's investment that testing this possible explanation was not possible.

1. For convenience, Variable 49 will be referred to as a scaler throughout the remainder of the discussion.

Table 9. Composition of the Scalers.

Sign	Var. No.	Variable Description	Coding
<u>Scaler 1--Reg. Factor 1: Manner in Which Activity is Operated</u>			
+	1	Was activity held out to community as a business?	1,0
+	2	Operated similarly to comparable operations?	1,0
+	3	Formal books and records maintained?	1,0
+	4	Separate bank account maintained?	1,0
+	5	Segment profits and relevant costs determined?	1,0
+	6	Nonfinancial records maintained?	1,0
+	7	Methods changed to improve profitability?	1,0
+	8	Level of advertising	3 to 0
+	9A	Development plan formulated and followed?	1,0,-1
<u>Scaler 2--Reg. Factor 2: Expertise of the Taxpayer or His Advisers</u>			
+	11	Profit potential determined prior to entry?	1,0
+	12A	Pre-entry advice (or prior preparation) sought and followed?	1,0,-1
+	14A	Post-entry advice sought and followed?	1,0,-1
+	16	New or superior techniques developed?	1,0
<u>Scaler 3--Reg. Factor 6: History of Income and Loss</u>			
+	24	Average ratio receipts to disbursements	.xx
-	25	Percentage years receipts \leq 5% of disbursements	%
-	26	Average magnitude of losses	\$ amount (losses positive)
+	27	Trend of losses	1,0,-1
-	28	Number of years activity operated	no. years
+	29	Losses due circumstances beyond control?	1,0
+	30	Percentage of years with profit	%
+	31	Profit in any two of five years including year in question?	1,0
+	32	Profit in two of five years prior to year in question?	1,0
<u>Scaler 7--Reg. Factor 7: Amount of Occasional Profit</u>			
+	33	Ratio of profit to loss	.xx
+	35	Largest profit earned	\$ amount

Table 9--Continued

Sign	Var. No.	Variable Description	Coding
		<u>Scaler 8--Reg. Factor 8: Financial Status of Taxpayer</u>	
-	37	Taxpayer's average income before activity loss	\$ amount (in thousands)
+	38	Ratio of activity losses to other income	.xx
-	39	Maintain extravagant standard of living?	1,0
-	40	Majority of other income passive?	1,0
		<u>Scaler 9--Reg. Factor 9: Elements of Personal Pleasure or Recreation</u>	
-	41	Statement about obtaining personal pleasure?	1,0
+	42	Are facilities utilitarian?	1,0
-	43	Does activity involve social or recreational functions?	1,0
-	44	Long-time interest in activity or originally hobby?	1,0
-	45	Operating methods constrained by personal motives?	1,0
+	46	Personal use or showplace separately accounted for?	1,0
		<u>Scaler 10--Sale or Discontinuance of Activity</u>	
+	47	Activity sold or discontinued because no chance for profit?	1,0
+	48	Activity sold or discontinued for any reason?	1,0
		<u>Missing Data--Number of Missing Data Points</u>	
n/a	49	Number of points for which data missing	no. missing

Table 10. Probit Coefficients for Nine-scaler Model.

Variable	Variable Description	Expected Sign	MLE Coef.	Rank Order of Importance	Std. MLE	t-score
Constant		-	-1.358			2.53
Scaler 1	Manner in Which Activity is Operated	+	.321	1	3.32	4.36 ^a
Scaler 2	Expertise of the Taxpayer or His Advisers	+	.436	4	2.04	3.50 ^a
Scaler 3	Time and Effort Expended	+	.349	5	1.66	2.76 ^a
Scaler 6	History of Income and Loss	+	.196	6	1.64	3.39 ^a
Scaler 7	Amount of Occasional Profits	+	-.124	8	-.44	-.75
Scaler 8	Financial Status of Taxpayer	+	.421	3	2.09	2.60 ^a
Scaler 9	Elements of Personal Pleasure or Recreation	+	.404	2	2.49	3.46 ^a
Scaler 10	Sale or Discontinuance of Activity	+	.307	7	1.09	1.59
Var. 49	Number of Missing Data Points	n/a	.057	9	.40	.93

Decision Rule: If MLE for case ≥ 0 , classify as business.
If MLE for case < 0 , classify as hobby.

^aSignificant at the 99% level. Critical value is 2.58.

Table 11. Classification Results Using Nine-scaler Probit Model.

<u>Actual Group</u>	<u>Number of Observations</u>	<u>Classified Business</u>	<u>Classified Hobby</u>
<u>Classification Results for 170 Observations Used to Construct the Function:</u>			
Business	65	60 (92.3%)	5 (7.7%)
Hobby	105	5 (4.8%)	100 (95.2%)
Percent of Observations Correctly Classified: 94.1%			
Test of Significance: Chi-square = 130.3 with 1 d.f. Probability that classification arose by chance: less than .001			
<u>Classification Results for 57 Observations in the Holdout Sample:</u>			
Business	22	21 (95.5%)	1 (4.5%)
Hobby	35	4 (11.4%)	31 (88.6%)
Percent of Observations Correctly Classified: 91.2%			
Test of Significance: Chi-square = 38.7 with 1 d.f. Probability that classification arose by chance: less than .001			

The significance of the other eight scalers was also determined using t-tests. The coefficients for Scaler 10 and Variable 49 were also found not to be significantly different from zero.

A correlation analysis (Table 12) was performed on the nine scalers to insure that they were not highly intercorrelated. The highest correlation was .386 between Scalers 1 and 3. This level was not felt to be sufficient to make the probit coefficients unstable and, therefore, interpretation of the contribution of each scaler appeared feasible.

Before making further tests on the nine-scaler model, models with fewer scalers were developed to determine if they could perform as well as the nine-scaler model. A reduced model would be helpful in that it would be easier to interpret and apply. Since it was not feasible to build models using all possible combinations of the nine scalers and because no stepwise technique is possible in probit analysis, stepwise regression analysis was used to determine which reduced models should be tested. The scalers to be included in the reduced models were determined by performing stepwise discriminant analysis using the Wilk's lambda technique. No differences in the composition of the reduced models resulted. Summary statistics for the nine-scaler and reduced models are shown on Table 13. The signs of all scaler coefficients were positive, as expected, with the exception of Scaler 7, which had a negative sign in every model in which it was included.

Table 12. Correlation Coefficients among the Scales.

	SCALER									
	1	2	3	6	7	8	9	10		
Scaler 1	1.000									
Scaler 2	.345	1.000								
Scaler 3	.386	.290	1.000							
Scaler 6	.118	.076	.006	1.000						
Scaler 7	.126	.035	.107	.241	1.000					
Scaler 8	-.169	.081	-.025	.226	-.035	1.000				
Scaler 9	.127	.231	.227	-.027	.013	.249	1.000			
Scaler 10	.217	.193	.042	-.014	.146	.056	.037	1.000		
Var. 49	-.269	-.081	-.104	-.013	-.083	.174	.114	-.116		

Selecting a Reduced Scaler Model

A reduced scaler model required a trade-off between parsimony and classificatory power. Table 13 reveals that as the number of included scalers decreased, the classificatory power of the models decreased--with one exception--the five-scaler model, which gave equal or better predictive results for the model-building sample than all but the nine-scaler model. Based on Table 13, it appears that the decreased complexity of the five-scaler model may offset the slight reduction in predictive power. And, in fact, a log-likelihood ratio test revealed that one can be 99% confident that the explanatory power of the nine-scaler model is not significantly better than that of the five-scaler model. When both the model-building sample and the holdout sample were considered, each model misclassified fifteen cases (although only ten of them were the same). In order to test whether it was necessary to further reduce the number of scalers included in the model, a log-likelihood test was performed comparing the five- and four-scaler models. This test revealed that reducing the model from five to four scalers significantly reduced its explanatory power. It was therefore concluded that the five-scaler model was the appropriate model for testing the null hypotheses.

The coefficients for each of the scalers in the five-scaler model and their order of importance are shown in Table 14. Details concerning the classificatory power of the model and the observations it misclassified are shown in Tables 15 and 16.

Table 13. Explanatory Power of Probit Functions (Varying Scalars Included).

No. Incl.	Scalars Included	$-2\ln\lambda^a$	Estimated R^2	% Outcomes ^b Correctly Predicted
9	1 to 3, 6 to 10, missing data	177	.929	94.1
8	1 to 3, 6 to 10	176	.926	93.5
7	1 to 3, 6, 8 to 10	176	.925	92.9
6	1 to 3, 6, 9, 10	168	.884	92.9
5	1 to 3, 6, 9	165	.883	93.5
4	1, 2, 6, 9	155	.868	91.8
3	1, 2, 9	137	.803	90.6
2	1, 2	114	.722	81.8
1	1	72	.525	77.1

^a $-2\ln\lambda$ is the market share log-likelihood test and has a chi-square distribution, with d.f. equal to the number of scalars included. All models perform significantly better than a model built with just a constant (at 99% confidence level).

^bPredictions shown are for the 170 cases used to build the probit model.

Table 14. Probit Coefficients for Five-scaler Model.

Variable	Variable Description	Expected Sign	MLE Coef.	Rank Order of Importance	Std. MLE	t-score ^a
Constant		-	-.849			3.62
Scaler 1	Manner in Which Activity is Operated	+	.244	1	2.52	4.69
Scaler 2	Expertise of the Taxpayer or His Advisers	+	.379	3	1.78	4.04
Scaler 3	Time and Effort Expended	+	.276	5	1.31	2.92
Scaler 6	History of Income and Loss	+	.188	4	1.57	3.95
Scaler 9	Elements of Personal Pleasure or Recreation	+	.382	2	2.35	3.83

Decision Rule: If MLE for case ≥ 0 , classify as business.

If MLE for case < 0 , classify as hobby.

^aThe t-scores for all variables are significant at the 99% confidence level. Critical value is 2.58.

Table 15. Classification Results Using Five-scaler Probit Model.

Actual Group	Number of Observations	Classified Business	Classified Hobby
<u>Classification Results for 170 Observations Used to Construct the Function:</u>			
Business	65	59 (90.8%)	6 (9.2%)
Hobby	105	5 (4.5%)	100 (95.2%)

Percent of Observations Correctly Classified: 93.5%

Test of Significance: Chi-square = 126.5 with 1 d.f. Probability that classification arose by chance: less than .001

Classification Results for 57 Observations in the Holdout Sample:

Business	22	21 (95.5%)	1 (4.5%)
Hobby	35	3 (8.6%)	32 (91.4%)

Percent of Observations Correctly Classified: 93.0%

Test of Significance: Chi-square = 41.8 with 1 d.f. Probability that classification arose by chance: less than .001

Table 16. Observations Misclassified by the Five-scaler Probit Model.

Obser. No.	SCALER SCORES					OUTCOME		Prob. of Actual Outcome	Activity other
	1	2	3	6	9	Actual	Predicted		
22	-4.80	3.21	4.70	-3.98	1.55	H ^a	B ^b	37% ^c	
39	1.61	-.81	.29	.21	1.05	B	H	41%	rental
41	2.26	1.15	.29	-1.76	1.55	H	B	31% ^c	farming
43	-.43	-.81	1.00	-2.11	3.55	B	H	49%	publishing
46	-7.48	1.15	-.27	.94	1.38	B	H	5%	farming
60	-1.53	-.81	-.62	8.81	.59	H	B	43%	farming
82	-2.76	-.81	-1.98	16.70	-3.40	B	H	46%	rental
85	-2.63	5.72	-1.24	-4.46	3.55	H	B	19%	writing
89	.13	-.53	-.30	-2.27	3.55	B	H	43%	farming
104	-.43	3.21	-1.24	.80	1.38	H	B	27%	other
110	-1.53	3.21	-.91	-4.66	3.55	H	B	41%	other
112	10.48	-.36	-.49	-3.25	1.55	H	B	8% ^c	writing
143	2.71	-2.48	.29	-.52	1.05	B	H	23%	rental
166	.32	1.15	.25	-.16	-1.22	B	H	22%	other
188	-2.76	5.17	5.67	-2.23	1.55	H	B	1% ^c	inventing

Table 16--Continued

Obser. No.	SCALER SCORES					OUTCOME		Prob. of Actual Outcome	Activity
	1	2	3	6	9	Actual	Predicted		
<u>Data Set:</u>									
Mean	.36	.15	.08	-.24	.06				
Std. Dev. Dev.	5.02	2.37	2.45	4.02	3.04				

^aHobby

^bBusiness

^cCase was appealed. Observation 22 was the only misclassified case which was reversed on appeal.

Scaler scores for misclassified observations (Table 16) were examined to determine if those cases had any common characteristics. Scaler 9 showed an unusually high incidence of two scores, 1.55 and 3.55. A review of the correctly classified observations revealed that one or the other of these scores was present in nearly 40% of the cases. This high incidence of equal scores seemed partially attributable to the fact that two of the variables underlying Scaler 9 had identical standard deviations and very similar means. Cases with Variable 43 (mean .48) present and Variable 44 (mean .43) absent yielded a standardized score for these two variables equal to that for observations where Variable 44 was present and Variable 43 absent. This abnormality, rather than some trait which existed solely in the misclassified cases, seemed to cause the high incidence of equal scores for Scaler 9.

A review of the correlation coefficients shown on Table 12 revealed that the scalers excluded from the five-scaler model were not highly intercorrelated with those included in the model. The highest intercorrelation was $-.269$ between Scaler 1 and Variable 49. It therefore appears that none of the scalers was excluded merely because it was surrogated by one of the included scalers. This indicates that the excluded scalers are of less importance to the Court than those included in the five-scaler model.

Interpreting the Probit Model. Table 14 shows that all of the scalers have significant coefficients. Since the maximum likelihood coefficient for each of the scalers is positive, an increase in the value of a scaler should lead to a greater propensity toward a business

outcome. Watson (1974, p. 106) suggests that interpreting the probit model is less difficult if the following points are remembered:

. . . the dependent variable in the probit relationship is not I , the linear combination of the independent variables (scalers), but $P(X)$, its unit cumulative transform. Thus, the probit coefficients can be explained in the following way: a one-unit change in X_1 (Scaler 1) will produce a change of β_1 standard deviation units on the probability $P(X)$ (probability of business outcome).

The standardized MLE shown on Table 14 may be interpreted in much the same way as a standardized beta coefficient in regression analysis. "It is equivalent to normalizing all variables (scalers) and then performing the probit analysis on these normalized data The standardized coefficient thus allows us to compare the strength of different variables (scalers) in the same equation" (McKelvey and Zavoina, 1975, pp. 115-16). An examination of the standardized MLE reveals that the importance of the factors included in the model varies significantly, the most important scaler (manner in which the activity is operated) being nearly twice as important as the least important of the scalars included (time and effort expended).

Evaluation of the Null Hypotheses

NH-1 Ability of the Variables
to Discriminate between Outcomes

The first null hypothesis to be tested in this study is:

NH-1 The definitional factors found in the Treasury Regulations, cases and literature concerning activities not engaged in for profit fail to discriminate between Tax Court-determined hobby losses and business losses.

The null hypothesis should be rejected if the probit model is able to correctly classify a significantly better-than-chance proportion of the

57 cases in the holdout sample. The holdout sample is the relevant subset of observations for this test because the ability to accurately predict the outcome of the model-building observations might be due to sampling errors or the intensive search for variables, rather than resulting from a true ability to discriminate between outcomes. A classification matrix and results of a chi-square test for the holdout sample are shown on Table 15. The probability that the classification arose by chance is less than .001. The null hypothesis is therefore rejected.

Implications. The factors used by the Court in discriminating between hobby losses and business losses have been identified. The model thus permits rejection of the contention expressed by Knobbe and others that "if the court (by 'gut reaction') feels a certain decision is proper, most of the relevant factors can be used as either a 'sword or shield' to rationalize that decision" (1979, p. A-13). Due to the high predictive ability of the model, it would appear that cases are being decided consistently.

The model provides information as to the relative importance of the factors considered by the Court. Not only is it possible to divide the factors considered in the model-building process into strong and weak categories based on whether they were included in or excluded from the final model, but the relative importance of the scalers included can be determined by examining their standardized MLE (Table 14).

The two scalers based on nonregulation factors (Scaler 10, discontinuance of the activity; and Variable 49, missing data) were found not to be important. Thus, we can use the model to determine the

importance of the nine factors listed in the regulations. Table 17 summarizes the relative importance of the regulation factors. The scalers are composed of questions based directly on the regulations and of questions based on the courts' expansion of the regulation factors; it is the importance of this expanded concept of the factors that is actually being determined. It is important to note that the two factors which are not susceptible to tax planning (Factor 5, success in other activities; and Factor 8, financial status of the taxpayer) were not important discriminators between business and hobby outcomes. The implication is that, with careful tax planning, one can organize and operate a given activity so that it is likely to receive favorable tax treatment. It is also noteworthy that Regulation Factors 4 (expectation of appreciation) and 5 (success in other activities) are so seldom mentioned by the judges that they appear to be clearly unimportant to decisions in this area.

Extreme care must be exercised when employing the five-scaler model in a tax-planning context because the model was developed based on the intercorrelation that exists among the variables at the time of trial. To the extent that taxpayers rely on the five scalers in the model, the intercorrelations and the importance the judges attribute to the variables might change, causing different variables to contribute significantly to a business classification. From a tax-planning standpoint, therefore, it is necessary to consider all nine scalers.

The fact that the model is constructed with scalers which give equal weight to the independent variables upon which they are based implies that the variables underlying each scaler are of approximately

Table 17. Importance of the Regulation Factors.

STRONG FACTORS - in order of importance

Reg. Factor 1	Manner in Which the Activity is Operated
Reg. Factor 9	Elements of Personal Pleasure or Recreation
Reg. Factor 2	Expertise of the Taxpayer or His Advisers
Reg. Factor 6	History of Income or Loss
Reg. Factor 3	Time and Effort Expended

WEAK FACTORS

Reg. Factor 4	Expectation of Appreciation
Reg. Factor 5	Success in Other Activities
Reg. Factor 7	Amount of Occasional Profits
Reg. Factor 8	Financial Status of Taxpayer

equal importance. To further test the importance of the underlying variables, probit models were developed with double weight placed on certain of the variables which the researcher intuitively felt to be important. Models were developed with the weights being altered for Variables 1, 8, 9A, 12A and 14A. There was little or no increase in the predictive ability of the resulting models or their estimated R^2 . Thus, it would appear that the number of variables present in a specific area, rather than any specific individual variable, is instrumental in determining the Court's decision.

In order to determine whether better results could be obtained by basing the model on the individual underlying variables, models were developed using stepwise discriminant analysis. Stepwise techniques are unavailable with probit analysis; they are useful in situations such as this research where the number of variables prohibits testing of all possible combinations. The difference between the scaler-probit and the individual-variable discriminant analysis techniques may be due in part to the fact that the preponderance of dichotomous independent variables violates the assumptions underlying discriminant analysis.

The best model employing discriminant analysis appeared to be one based on 15 of the underlying 41 variables. Its classificatory power, summarized in Table 18, is slightly lower than that of the best probit model. Despite the fact that the probit model contains 32 of the underlying independent variables versus the discriminant model's 15, it is the preferred model because 1) it determines the relative importance of the regulation factors; 2) it contains 5 rather than 15 weighting elements; 3) it is able to classify correctly slightly more of the

Table 18. Best Discriminant Analysis Model.

Var. No. ^a	Variable Description	Standardized Coefficient
18	Average time spent by taxpayer.	.496
17	Competent and well-informed manager employed?	.422
32	Profit two of five years prior to year in question?	.410
8	Level of advertising.	.394
12A	Pre-entry advice (or prior preparation) sought and followed?	.382
14A	Post-entry advice sought and followed?	.295
40 ^b	Majority of other income passive?	-.293
11	Profit potential determined prior to entry?	.291
7	Methods changed to improve profitability?	.249
44	Long-time interest in activity or originally a hobby?	-.247
45	Operating methods constrained by personal motives?	-.211
43	Involve social or recreational functions?	-.208
9A	Development plan formulated and followed?	.194
2	Operated similar to comparable operations?	.190
41	Statement about obtaining personal pleasure?	-.159
<u>Cases Correctly Predicted:</u>		
	170 observations used to build the model	94.1%
	57 observations in the holdout sample	91.2%

^aShown in order of their importance.

^bThis is the only variable included which is not contained in the five-scaler probit model.

holdout sample; and 4) it is based on scalars, which do not violate any of the assumptions underlying its construction. As previously noted, the probit model is also the theoretically preferred model and allows the use of significance tests, which are not available when discriminant analysis is employed.

NH-2 Stability of the Model over Time

The second null hypothesis to be tested in this study is:

NH-2 The definitional factors used by the Tax Court for taxable years prior to the enactment of Section 183 are no different from those used after its enactment.

This hypothesis was tested using a log-likelihood test. Two restricted probit models were constructed, one using the 103 observations from cases tried prior to 1969 and the second from the 56 Section 183 observations. A pooled model using the observations from both of these underlying time periods was then constructed. The log-likelihood test (Table 19) revealed that there was no significant difference between the pooled model and the models developed for the two underlying time periods. It was concluded, therefore, that the development of separate models for the underlying time periods would not produce significantly better predictive results.

This technique was also used when two other models were developed, one from all 159 pre-Section 183 cases and the other from the 56 Section 183 observations. Again, there was no significant difference between the pooled model and the models developed for the two underlying time periods. NH-2 is therefore accepted.

Table 19. Likelihood Ratio Test for Stability over Time.

Time Period	$-2\ln\lambda$	d.f.	Critical χ^2 at .95 level ^a	Significance
Pre-1969 vs. Section 183	7.675	6	12.592	none
Pre-Section 183 vs. Section 183	9.247	6	12.592	none

^aIf $-2\ln\lambda$ does not exceed the χ^2 (chi-square) critical value, one may state with 95% confidence that there is no significant difference between the pooled model and the models developed for the two underlying time periods.

Implications. The factors used in deciding hobby loss cases appear to be stable over time. This finding is consistent with the conclusion of most commentators. The acceptance of NH-2 allows the final model to be constructed using observations from Court decisions during the entire 26-year period covered by the data set.

NH-3 Stability of the Model across Lines of "Business"

The third null hypothesis to be tested in this study is:

NH-3 There is no difference between the predictive ability of a general model and that of restricted models based on specific lines of "business."

This hypothesis was also tested using log-likelihood tests. Some of the literature suggested that the relative importance of the factors pertinent to Court decisions might vary for two specific lines of "business": farming and rentals. A separate test therefore was conducted in each of these areas to determine whether the importance of the relevant factors did indeed vary in farming and rental decisions as compared with other "businesses."

The test in the farming area involved the construction of two restricted models and one pooled model. One of the restricted models was built using data from the 93 observations involving farming activities, and the second restricted model used all nonfarm observations. Then a pooled model using all 227 observations was constructed. The log-likelihood test (Table 20) revealed that there was no significant difference between the pooled model and the restricted models. It can be concluded that development of a separate probit model for farming

Table 20. Likelihood Ratio Test for Stability across Lines of "Business."

Lines of "Business"	$-2\ln\lambda$	d.f.	Critical χ^2 at .95 level ^a	Significance
Farm vs. nonfarm observations	11.501	6	12.592	none
Rental vs. nonrental observations	11.023	6	12.592	none

^aIf $-2\ln\lambda$ does not exceed the χ^2 (chi-square) critical value, one may state with 95% confidence that there is no significant difference between the pooled model and the models developed for the two underlying time periods.

activities will not yield statistically significant improvement in results.

The same techniques were used to build and test restricted models for rental and nonrental activities. The log-likelihood test (Table 20) again revealed that there was no significant difference between the pooled model and the restricted models.

In reaching a conclusion as to the stability of the general probit model across lines of "business," it would be useful to perform log-likelihood ratio tests for each of the lines of "business" outlined in Table 4. Unfortunately, the small number of observations with respect to each of the other lines of "business" severely limits the possibility of finding significant differences using log-likelihood techniques. An examination of the misclassified cases (Table 16), however, reveals that no individual line of business tends to have more misclassified observations than one would expect by chance. This, combined with the fact that separate models for farming and rentals yield no more significant results than a general model capable of predicting over 90% of the outcomes correctly, indicates that acceptance of NH-3 is appropriate.

Implications. The factors used in deciding hobby loss cases appear to be stable across lines of "business." This finding, combined with the results of NH-2, allows a comprehensive final model to be constructed using observations from all lines of "business" over the entire 26-year period included in the data set. This general model is summarized in Table 14.

Although the factors that influence rental case decisions appear to be no different than those involved in other hobby loss determinations, the need for special legislation in the rental area (Section 280A) can be justified--not by an underlying difference between rental activities and the other activities dealt with by Section 183--but because of the need for objective tests which might prove helpful to taxpayers in planning their financial affairs. Since the factors important in hobby loss case decisions do not vary across lines of "business," general articles dealing with hobby loss activities would appear to be more appropriate and useful than the numerous articles now being published which deal with specific types of activity.

NH-4 Ability of the Model to Predict Appeals

The final hypothesis to be tested in this study is:

- NH-4 The percentage of decisions which are appealed is the same for cases the model assigns a .40 to .60 probability of business classification as for those cases which are assigned a probability outside of this range.

Since NH-2 and NH-3 were both accepted, the general probit model shown in Table 14 was used to test NH-4. An initial review of the observations revealed that the government had never initiated an appeal for any of the cases included in the study. NH-4, therefore, was revised as follows:

- NH-4A The percentage of hobby determinations which are appealed is the same for observations the model assigns a .40 to .99 probability of business classification as for those observations which are assigned a probability outside of this range.

Only the observations which the Court determined to be hobby losses were included in the analysis. Since the model classified all activities with a .50 or higher probability of business classification as "predicted business outcomes," the revision of the hypothesis to include observations with a probability of .40 or above had the effect of including cases which the Court determined involved hobbies but which the model predicted as having business outcomes (probability of .50 or above--misclassified cases), as well as those not given a high probability of hobby classification (probability of .40-.49).

A summary of the appealed cases is included in Table 21, and the classification matrix used to test NH-4A shown in Table 22 indicates, and a chi-square confirms, that there is no significant relationship between marginal/misclassified observations and observations which are appealed. Because the probability range of .40 and above was somewhat arbitrary, the hypothesis was retested with a classification of matrix contrasting observations to which the model assigned a .30 or higher probability of business classification with observations outside of that range. The result was only a slight improvement in the strength of the hypothesized relationship, with a chi-square test still yielding insignificant results. NH-4 is therefore accepted.

Implications. Taxpayers apparently are not deciding whether to appeal Tax Court decisions on grounds related to the factors that actually influence a hobby classification. It remains to be determined whether this is due merely to the model's failure to consider other variables pertinent to the appeal decision (e.g., the amount of tax involved)

Table 21. Outcomes of Appealed Cases.

	Number of Observations	Appealed Observations (%)	% of the 140 Hobby Outcomes
Appeal dismissed by higher court	6	12.7	4.3
Hobby outcome affirmed	35	74.5	25.0
Hobby outcome reversed	3	6.4	2.1
Appeal still pending	<u>3</u>	<u>6.4</u>	<u>2.1</u>
Total	<u>47</u>	<u>100.0</u>	<u>33.5</u>

Table 22. Test of Model's Ability to Predict Taxpayer Appeals.

Probability of Business Classification	Number of Observations	RECORD OF APPEAL	
		Appeal	No Appeal
Greater than or equal to .40	13	5 (38.5%)	8 (61.5%)
Less than .40	127	42 (33.1%)	85 (66.9%)
Test of Significance: Chi-square = .154 with 1 d.f. No significant relationship.			

or to some other deficiency in the modeling process. Because this is the first time such a test has been applied in macrocase analysis, it is unclear whether the result is a phenomenon peculiar to the hobby loss area, individual income tax matters, and/or taxpayers in general.

The finding that the government has never appealed a Tax Court decision is not entirely unexpected since "the Service is normally content to accept the Tax Court's resolution of factual questions" (Uretz, 1970, p. 142). The IRS is discouraged because the appellate review of determinations of fact (i.e., the determination of whether there was a profit intent) "must be quite restricted . . . (and), the judge's findings must stand unless 'clearly erroneous'" (Commissioner v Duberstein, 363 U.S. 278 at 290-291 (1960)).

Summary

The empirical findings show that it is possible to discriminate between activities engaged in for profit and activities not engaged in for profit based on the regulation factors. This chapter presented the five-scaler probit model as the preferred model in discriminating between outcomes. This model was derived from a nine-scaler model with only slightly superior classificatory ability. The five-scaler model misclassified only four out of the 57 observations included in the hold-out sample.

The five-scaler model determined the most important factors to be 1) manner in which the activity is operated, 2) elements of personal pleasure or recreation, 3) expertise of the taxpayer or his advisers, 4) history of income or loss, and 5) time and effort expended. The model

was tested and found to be stable over time and across lines of "business." The model's ability to predict cases likely to be appealed was also tested; it was found to be incapable of this task.

CHAPTER 5

CONCLUSIONS AND LIMITATIONS

This chapter presents conclusions which may be drawn from interpretations of the five-scaler probit model developed in Chapter 4. Discussion will center around distinction between business activities and hobbies, identification and discussion of the strongest variables, and comparison between the results of this study and conclusions derived by use of traditional legal research methods. Limitations of this study and suggestions for future research also are explored.

The Significant Characteristics of Business Activities

The classificatory power of the five-scaler probit model indicates that business activities can be distinguished from hobby activities--that it is possible to identify and determine the relative importance of the characteristics which influence Tax Court jurists in discriminating between business and hobby activities. The null hypothesis, that the definitional factors proposed would be unable to discriminate between outcomes, was rejected.

Five of the scalers used in this study appear to be significant contributors to Court classification of an activity as a business. In order of importance in terms of influencing hobby loss decisions, the significant characteristics of business activities are as follows.

- 1) The activity is conducted in a businesslike manner (Regulation Factor 1).

- 2) Elements of personal pleasure or recreation do not constitute a significant part of the activity (Regulation Factor 9).
- 3) The taxpayer has prior experience in the activity and/or consults with others both prior to and after entry (Regulation Factor 2).
- 4) The activity has previously generated profit or its chances for future profits are improving (Regulation Factor 6).
- 5) The taxpayer spends a significant amount of time and effort on the activity or employs others to do so (Regulation Factor 3).

Because business activities and hobby activities are opposites in a two-group dichotomy, the significant contributors to business classification also provide an implicit profile for hobby classification. For example, if spending a great deal of time on an activity is characteristic of a business activity, then spending little time is characteristic of a hobby.

The standardized MLEs of the scalers in the final model indicate that Scaler 1 (Regulation Factor 1), manner in which the activity is operated; and Scaler 9 (Regulation Factor 9), elements of personal pleasure or recreation, are of relatively greater importance than the remaining three. Scaler 1 has nine underlying independent variables broken down into four categories: businesslike manner of operations (Variables 1, 8,9A); similarity to profitable activities (Variable 2); maintenance of complete and accurate books and records (Variables 3 to 6); and changes in operations (Variable 7). Scaler 9 is based on six variables, which fall into four subcategories: operation of

activity-involved recreational activities or facilities (Variables 41 to 43), personal motives affected the manner in which the activity was conducted (Variable 45), personal benefits from the activity were excluded from or included in the activity's expenses (Variable 46), and personal interest was exhibited or the activity was conducted prior to the time when tax deductions were claimed (Variable 47).

Comparison with the Literature

Chapter 1 included a brief summary of expert opinion as to the importance of the various regulation factors. It is of interest to compare the findings of the present study with the conclusions of commentators who have used traditional legal research methods.

In a 1974 article, Lee (p. 397) suggested that four regulation factors significantly influenced hobby loss decisions. Three of these, Regulation Factors 1 (manner in which the activity is operated), 2 (expertise of the taxpayer or his advisers), and 3 (time and effort expended), were found to be important in the current study. The fourth, Regulation Factor 5 (success in other activities), was found to be so infrequently considered by the Court that it was eliminated for purposes of this project.

The results of applying the five-scaler model also conflict with the findings of other commentators. Doan (1974, p. 19) found Factor 8 (financial status of the taxpayer) to be the most influential factor, but it was determined by this study to be one of the weakest factors. Knobbe (1979, p. A-17) suggests that Factor 6 (history of income and loss) is the most significant of the regulation factors. Although the

probit analysis determined Factor 6 to be influential, it was found to be the fourth most important factor rather than the most important factor. Finally, Research Institute of America has observed that "since the order of these factors (regulation factors) differs from the order in the proposed regs, the present order (that of the final regulations) may indicate the relative importance of these factors to IRS" (1981, p. 36,125). This observation is not supported by the empirical evidence presented in this study except that the first regulation factor was found to be the most important.

Thus, none of the commentators has predicted the results found in the current study. Since data were collected, organized and analyzed in a scientific manner, the results of this project would appear to provide a more reliable indication of the true importance of the regulation factors that previous studies have yielded.

This work also provides evidence in two other areas that have been widely discussed in the literature. The commentators' general conclusion that the passage of Section 183 did not alter the factors pertinent to the judges' decisions has been verified. Secondly, the tendency of authors to discuss a given factor only as it relates to a specific line of "business" implies that the factors considered by the Court vary with the type of activity involved, an implication which is not supported by the present study.

Scope and Limitations

This research was based on data from 219 hobby loss cases decided by the Tax Court between 1955 and mid-1981. The results and

predictive ability of the model, therefore, are limited to the decisions of that court. Taxation law is a dynamic process, so care must be taken in using the model to predict the outcome of future cases. An amendment to the existing law or precedent set by a new court case might change which factors are relevant in hobby loss decisions so that the model would have to be respecified or, in some situations, totally abandoned.

It must be remembered that the model is based on Tax Court decisions. Variables crucially important in determining whether a case is pursued by the IRS to the point of trial may be given little weight in the model because they have little effect on trial outcomes. For this reason, and because there are so many chances for compromise prior to trial, the model is relevant only in predicting the outcome of cases which reach the Tax Court.

Since the coding of independent variables was based on Tax Court judges' summaries rather than on verbatim trial transcripts, the completeness with which the judges summarized the relevant data is a variable the importance of which is not considered in this study. In addition, the skill of the attorneys involved surely must have an impact on the facts presented and the method in which they are presented, and thus may affect a judge's determination. Since pertinent objective data were not available, however, this factor was not taken into account in the analysis.

The variables were specified as objectively as possible, but another researcher might have formulated different questions as surrogates or chosen different concepts to be tested. To whatever extent other questions and methods of coding are possible, other models and/or

conclusions could have resulted. Thus, although the final five-scaler model appears to be preferable to the other models examined, it is not necessarily the optimal of all possible models.

Implications of the Study

The findings of this study have implications for taxpayers, the government and jurists, as well as for future macrocase analysts.

For Taxpayers

Information concerning the relative importance of the regulation factors should prove helpful to taxpayers in planning entry into activities with questionable profit potential. Two factors over which a taxpayer has little control--financial status and prior success in other activities--were found to be of little importance. Therefore, an individual with substantial income or who has previously conducted a profitable enterprise need not fear that the Court will automatically consider an unprofitable pursuit to be a hobby. Factors he can control--the manner in which he plans and conducts the venture--will prove much more significant determinants in the Court's classification of the activity.

A taxpayer might also use the model to decide if it is worthwhile to contest an IRS audit finding that an activity is a hobby. The model's ability to predict the probability of a ruling in the taxpayer's favor will be particularly helpful if a proposed bill (Public Bill, 1981) is passed which allows the awarding of attorney fees and other expenses to a taxpayer who prevails in Tax Court. This bill would put the burden on the taxpayer to prove that the government's position was "unreasonable" before awarding compensation. The model's prediction of a high

probability of taxpayer success (business classification) could be used to support the taxpayer's position. The findings also are important in that they establish the propriety of citing pre-Section 183 court decisions and decisions based on other lines of "business" as relevant legal precedents in support of a taxpayer's case.

For the Government

The model's ability to indicate the probable outcome of a particular case should aid the IRS in deciding whether to take a case to court. The passage in 1980 of P.L. 96-481, which allows the awarding of legal expenses to a prevailing taxpayer if the government cannot substantially justify proceeding to trial in the District Court or the Court of Claims, lends financial importance to this predictive ability.

The IRS announced recently that it will audit 6,000 returns in order to develop better techniques for identifying potential hobby activities (Internal Revenue Service, 1977a, Suppl. 56). The results of the research herein should be useful in identifying such techniques because of the model's ability to identify the factors most important to Tax Court decisions.

If the writers of the tax regulations are satisfied with current Tax Court decisions, then the analysis suggests that the regulations under Section 183 need to be redrafted. Factors that are seldom considered in the Court's decisions should be eliminated, and the discussion of the remaining factors should be expanded to include items currently discussed in the literature and by the courts but not specifically mentioned in the regulations (e.g., Variables 8 and 9A).

Another implication for government is the possible need for re-drafting the Section 183(d) presumption. The analysis found the presumption to be of little use at the trial stage because the necessary profit years were present so infrequently. In only three Court cases did the taxpayer operate the activity in question at a profit for two or more of the years in a consecutive five-year period. Two of those cases resulted in a business outcome, and the third was resolved by a split decision, business for one year and hobby for one year. The ineffectiveness of the presumption at the trial stage may merely be due to the fact that cases in which the presumption is present are usually resolved in the taxpayer's favor prior to trial; unfortunately, the data to verify this possibility are not available through public records. Should the presumption also prove to be ineffective at the pretrial stage, it should be abandoned or redrafted.

For Judges

The study reveals that cases in the hobby loss area are decided in a consistent manner. The model's ability to reduce the many variables currently considered by the Court to those that actually affect Court decisions should allow judges to avoid entanglement in a multitude of unimportant considerations which, in the final analysis, will have no bearing on their decisions.

For Future Macrocase Analysts

This research expands the scope of past macrocase analysis, in that no previous research has used a quantal method for its primary

model-building tool.¹ Probit analysis, which is designed to deal specifically with the all-or-nothing type of outcome that frequently exists in tax cases, appears to be a more appropriate analytical tool than the discriminant models used in past tax-case research.

The study also goes beyond past analysis, in that it attempts to predict hobby loss cases which are likely to be appealed. Although the model developed in this project proved incapable of such predictions, pursuit of similar analyses in future research appears warranted.

Suggestions for Further Research

The sample used in this study was limited to Tax Court cases and excluded all non-Subchapter S corporations. Future research might be conducted to determine if altering either of these constraints would modify results.

The present research did not address the question of how to determine under what circumstances the Court treats related ventures as multiple activities as opposed to a single activities. An analysis of the considerations involved in such determinations might prove helpful to taxpayers.

All macrocase analysis is based on the premise that a judge's opinion enumerates all the factors that were salient to the decision. Future research could compare the results of analysis based on verbatim court transcripts with this dissertation, which is based on the written opinions, to determine the validity of that premise.

1. Both logit (Seat, 1980) and probit (Oatsvall, 1978) have been used as secondary tests, however.

Further investigation is necessary in other areas of tax law concerning the ability of macrocase analysis techniques to predict cases which are likely to be appealed. Such research would help to determine whether the results obtained in the present study were a mere anomaly or whether, in fact, taxpayers on the whole are irrational in choosing the cases they appeal to higher courts.

Summary

In Chapter 1, four hypotheses were stated. The major null hypothesis, NH-1, stated that it was not possible to discriminate between court-determined hobby losses and business losses based on the definitional factors identified. Two related hypotheses dealt with the stability of the definitional factors over time (NH-2) and across lines of "business" (NH-3). The final hypothesis concerned the ability of the resulting model to predict cases likely to be appealed.

The analysis rejected the primary null hypothesis; a five-scaler model was developed which correctly predicted over 90% of the case outcomes. The analysis did support the two related null hypotheses--the model developed was stable over time and across lines of "business." The final hypothesis concerning the predicting of appealed cases was also accepted--the model was not able to predict which cases were likely to be appealed. It was suggested that additional research is warranted in this area.

This study is limited to the extent that any variable's importance changes in the future, that variables used in arriving at decisions are omitted from judges' opinions, and/or that input variables are

mis-specified. The effect of these limitations cannot be known with certainty but one would expect it to be minimal.

The results obtained have significant implications for taxpayers, the government, judges and future macrocase analysts. The results of this study proved to be valuable in providing information about the hobby loss area not obtainable through traditional legal research methods.

APPENDIX A

OBSERVATIONS INCLUDED IN THE STUDY

Obser. No.	Case	Cite	Activity
1.	Adams, Benjamin	TC Memo 1966-242	artist
2.	Allen, Truett	72 TC 28 (1979)	rental
3.	Anderson, C. J.	TC Memo 1955-43	farm
4.	Appley, Lawrence A.	TC Memo 1979-433	farm
5.	Ashe, James E.	TC Memo 1967-169	inventor
6.	Asta, Theresa	TC Memo 1976-109	writer
7.	Austin, Frank M.	TC Memo 1969-8	farm
8.	Babbit, Dean	23 TC 850 (1955)	farm
9.	Ballich, Eve M.	TC Memo 1978-497	pet breed
10.	Baltis, John R.	TC Memo 1972-50	writer
11.	Barbour, Thomas E.	TC Memo 1976-85	farm
12.	Barcus, C. F.	TC Memo 1973-138	other
13.	Barton, Roderic	TC Memo 1980-179	other
14.	Bauer, Marshall	TC Memo 1973-191	other
15.	Beckwith, Sterling	TC Memo 1964-254	farm
16.	Benz, Francis	63 TC 375 (1974)	pet breed
17.	Besseney, Margit	45 TC 261 (1965)	farm
18.	Best Universal Lock	45 TC 1 (1965)	inventor
19.	Bishop, James S.	TC Memo 1972-167	farm
20.	Bolt, Lincoln A.	50 TC 1007 (1968)	other

Obser. No.	Case	Cite	Activity
21.	Boyer, Lawrence D.	69 TC 521 (1977)	pet breed
22.	Brooks, Matilda	30 TC 1087 (1958)	other
23.	Brown, James	TC Memo 1977-15	farm
24.	Brueck, William, Sr.	TC Memo 1964-204	farm
25.	Bullucks Dept. Store	TC Memo 1973-249	plane
26.	Calbom, John E.	TC Memo 1981-95	farm
27.	Carkhuff, John R.	TC Memo 1969-66	rental
28.	Carter, Charles H.	TC Memo 1978-202	boat
29.	Carter, Hilton V.	TC Memo 1960-205	farm
30.	"	"	"
31.	Casida, Donald J.	TC Memo 1979-267	other
32.	Cherry, Myron E.	TC Memo 1967-123	inventor
33.	Churchman, C. West	68 TC 696 (1977)	artist
34.	Clancy, Terence D.	TC Memo 1978-85	rental
35.	Clark, Harold M.	TC Memo 1969-241	farm
36.	Coe, James	TC Memo 1974-129	farm
37.	Conner, Walter	TC Memo 1956-290	pet breed
38.	Conyngham, Bertha	TC Memo 1964-194	farm
39.	Coors, William K.	60 TC 368 (1973)	rental
40.	Copeland, Herbert	TC Memo 1980-476	rental
41.	Cox, Alfred M.	TC Memo 1965-5	farm
42.	Crepeau, Claude L.	TC Memo 1969-236	other
43.	Crymes, M.B.S.	TC Memo 1972-3	publisher
44.	Curran, Joseph V.	TC Memo 1970-160	plane

Obser. No.	Case	Cite	Activity
45.	Currie, Robert E.	TC Memo 1969-4	farm
46.	"	"	"
47.	"	"	"
48.	Daniel, Clarence	TC Memo 1978-277	rental
49.	Davis, Eugene J.	TC Memo 1966-116	farm
50.	Davis, T. Wayne	TC Memo 1978-348	rental
51.	Deerman, Willard	TC Memo 1974-84	farm
52.	deGrazia, Sebastian	TC Memo 1962-296	artist
53.	Demler, Norman C.	TC Memo 1966-117	other
54.	Dicker, Edward T.	TC Memo 1963-82	farm
55.	Dodich, N. A.	TC Memo 1971-58	inventor
56.	Dreicer, Maurice C.	TC Memo 1979-395	writer
57.	Drew, Edward J.	TC Memo 1972-161	farm
58.	Duley, Carol Dean	TC Memo 1981-246	other
59.	DunLeavay, Charles	TC Memo 1965-163	other
60.	Dunn, Herbert A.	70 TC 715 (1978)	farm
61.	Edge, Walter E.	TC Memo 1973-274	farm
62.	Eggert, Charles D.	TC Memo 1957-221	other
63.	Eisenstein, Marvin	TC Memo 1978-95	rental
64.	Ellsworth, John S.	TC Memo 1962-32	farm
65.	Engdahl, Theodore	72 TC 659 (1979)	farm
66.	Eppler, Arthur H.	58 TC 691 (1972)	inventor
67.	Evans, Anne M.	TC Memo 1955-126	other
68.	Ewing, Lucia C.	TC Memo 1956-205	other

Obser. No.	Case	Cite	Activity
69.	Farris, Joan F.	TC Memo 1972-165	farm
70.	Farrow, Harvey, Sr.	TC Memo 1957-188	farm
71.	Feistman, Eugene	TC Memo 1981-105	other
72.	Fischer, C. Fink	50 TC 164 (1968)	plane
73.	Fisher, Everell	TC Memo 1968-212	farm
74.	"	"	"
75.	Fisher, Floyd E.	TC Memo 1980-183	farm
76.	Ford, Ebb, Jr.	29 TC 499 (1957)	rental
77.	Foster, Rex B.	TC Memo 1973-13	farm
78.	Foster, Rex B., Jr.	TC Memo 1973-14	farm
79.	Gettler, Benjamin	TC Memo 1975-87	rental
80.	Ginsburg, Arnold	TC Memo 1976-199	farm
81.	Giordan, Marguerite	TC Memo 1976-112	rental
82.	"	"	"
83.	Godfrey, Edward R.	TC Memo 1963-1	farm
84.	Golanty, Stanley A.	72 TC 411 (1979)	farm
85.	Groder, M. L.	TC Memo 1960-208	writer
86.	Guzowski, Ray	TC Memo 1967-145	other
87.	Hager, Edward, Jr.	76 TC #66 (1981)	farm
88.	Hailman, Johanna	TC Memo 1958-165	artist
89.	Harmon, Murray	TC Memo 1955-204	farm
90.	Hawkins, Lonnie, Jr.	TC Memo 1979-101	writer
91.	Hess, Rubin	TC Memo 1971-242	other
92.	Hill, Beverly J.	TC Memo 1967-249	farm

Obser. No.	Case	Cite	Activity
93.	Hill, Hamilton D.	TC Memo 1971-127	farm
94.	Hill, T. Gardner	TC Memo 1963-211	inventor
95.	Hires, Clara S.	TC Memo 1980-172	writer
96.	Holderness, Ralph	TC Memo 1977-5	farm
97.	Hollander, Bette	TC Memo 1975-157	artist
98.	Hollesen, Willie	TC Memo 1979-269	rental
99.	Howard, Jack R.	TC Memo 1981-250	writer
100.	Howell, Valentine	41 TC 13 (1963)	other
101.	Hurd, Peter	TC Memo 1978-113	farm
102.	Imbesi, Anthony	TC Memo 1964-276	farm
103.	"	"	"
104.	Indust. Research	40 TC 578 (1978)	other
105.	Jackson, Thomas W.	59 TC 312 (1972)	boat
106.	Jasionowski, Edward	66 TC 312 (1976)	rental
107.	Johnson, Joseph	59 TC 791 (1973)	rental
108.	Jones, Claranel	TC Memo 1978-290	boat
109.	Kannas, Michael	TC Memo 1980-127	rental
110.	Kilroy, Oliver	TC Memo 1973-7	other
111.	"	TC Memo 1980-489	inventor
112.	Lamont, Corliss	TC Memo 1964-2	writer
113.	Lanier, Estelle	TC Memo 1980-295	pet breed
114.	Lauer, Norma	TC Memo 1961-208	farm
115.	Lawver, Robert	TC Memo 1981-192	rental
116.	Lemler, John F.	TC Memo 1979-308	plane

Obser. No.	Case	Cite	Activity
117.	Lemmon, Sidney	TC Memo 1968-102	other
118.	Leyland, George	TC Memo 1975-346	rental
119.	Lindow, Lester	TC Memo 1978-301	rental
120.	Louw, Johan	TC Memo 1971-326	inventor
121.	Lowenthal, Jean	TC Memo 1968-79	farm
122.	Luce, W. Jane	TC Memo 1970-203	farm
123.	Lyon, Michael	TC Memo 1977-239	boat
124.	Marlin, John A.	TC Memo 1970-309	writer
125.	Martin, Ernest	50 TC 341 (1968)	boat
126.	Matthews, Earl	TC Memo 1970-336	farm
127.	Mauler, Ralph	TC Memo 1966-146	farm
128.	Mavis, Jack R.	TC Memo 1955-99	farm
129.	McCormick, Donald	TC Memo 1969-261	boat
130.	McGhee, D. H.	TC Memo 1957-248	farm
131.	McGowan, Martin	TC Memo 1964-241	other
132.	McKinney, Edith	TC Memo 1981-181	rental
133.	McLean, George	TC Memo 1960-128	farm
134.	McNamara, Justin	TC Memo 1973-3	boat
135.	Medical Collect Corp.	TC Memo 1977-266	rental
136.	Mercer, L. D.	TC Memo 1966-82	farm
137.	Meredith, Ida	65 TC 34 (1975)	rental
138.	Metcalf, Rowe P.	TC Memo 1963-277	farm
139.	Miner, Edwin H.	TC Memo 1962-222	farm
140.	Monette, V. H. & Co.	45 TC 15 (1965)	farm

Obser. No.	Case	Cite	Activity
141.	Morton, Glenn H.	TC Memo 1971-156	farm
142.	Morton, W. Brown	TC Memo 1957-101	farm
143.	Nelson, Richard H.	TC Memo 1978-287	rental
144.	Nemish, Charles A.	TC Memo 1970-276	writer
145.	Nicath Realty	TC Memo 1966-246	rental
146.	Nickerson, Melvin	TC Memo 1981-321	farm
147.	Nicolette, Clarence	TC Memo 1979-204	rental
148.	Nittler, Alan H.	TC Memo 1979-440	farm
149.	Norton, Helen L.	TC Memo 1962-20	other
150.	Ong, Kim L.	TC Memo 1979-406	rental
151.	Palmer, Ron G.	TC Memo 1981-354	farm
152.	Panek, Julian	TC Memo 1965-128	artist
153.	Parker, Normal	TC Memo 1971-217	rental
154.	Pennington, Charles	TC Memo 1967-111	farm
155.	Pickering, Normal	TC Memo 1979-243	farm
156.	Pickren, Charles	TC Memo 1981-52	farm
157.	Pino, Ralph H.	TC Memo 1962-49	farm
158.	Porter, Louis H.	TC Memo 1969-288	artist
159.	Prickett, Ralph S.	TC Memo 1967-2	farm
160.	Purdy, Frederick	TC Memo 1967-82	inventor
161.	Rand, Marcell	34 TC 1146 (1960)	boat
162.	Regan, Thomas J.	TC Memo 1979-340	rental
163.	Richardson, Robert	TC Memo 1978-322	rental
164.	Riss & Co.	TC Memo 1964-190	farm

Obser. No.	Case	Cite	Activity
165.	Robinson, Charles	TC Memo 1973-242	rental
166.	Rodgers, Dan	TC Memo 1979-128	other
167.	Sabelis, Theodore	37 TC 1058 (1962)	farm
168.	St. Germain, D. J.	TC Memo 1959-73	farm
169.	Sanderson, Herbert	TC Memo 1964-284	farm
170.	Sasso, L. P.	TC Memo 1961-216	pet breed
171.	Schaevitz, Herman	TC Memo 1971-197	boat
172.	Schafer, C. H.	TC Memo 1964-156	inventor
173.	Schley, Ellen R.	TC Memo 1965-111	farm
174.	Sealy, H. G.	TC Memo 1980-7	farm
175.	Sheban, Joseph	TC Memo 1970-163	writer
176.	Sheridan, N. H.	TC Memo 1958-215	rental
177.	Shiosaki, James T.	TC Memo 1971-24	other
178.	Sloan, Bruce	TC Memo 1956-36	pet breed
179.	Smith, Celeste	TC Memo 1971-122	pet breed
180.	Smith, Curtis	TC Memo 1967-241	farm
181.	Smith, Richard E.	TC Memo 1978-64	other
182.	Snyder, Harold I.	TC Memo 1966-259	farm
183.	Soloman, Lillian	TC Memo 1967-186	farm
184.	Sottong, George	TC Memo 1966-268	boat
185.	Sparre, Robert H.	TC Memo 1980-45	farm
186.	Stahnke, Herbert L.	TC Memo 1980-369	writer
187.	Stanley, Mary L.	TC Memo 1980-217	other
188.	Stanton, Jack P.	TC Memo 1967-137	inventor

Obser. No.	Case	Cite	Activity
189.	Starr, Alden B.	TC Memo 1969-35	farm
190.	Stay, Theron D.	TC Memo 1958-173	farm
191.	Steele, James R.	TC Memo 1981-118	pet breed
192.	Stoltzfus, Morris	TC Memo 1970-337	farm
193.	Sutherland, Henry	TC Memo 1966-155	other
194.	"	TC Memo 1968-20	other
195.	Szmak, Geza	TC Memo 1965-301	writer
196.	Taylor, Everett	TC Memo 1969-186	writer
197.	Teitelbaum, Abraham	TC Memo 1960-11	farm
198.	"	TC Memo 1964-141	farm
199.	Thacker, George	TC Memo 1969-276	farm
200.	Thomas, Robert	TC Memo 1962-73	farm
201.	Thompson, Alden G.	TC Memo 1969-19	other
202.	Thomson, Ione	TC Memo 1965-237	other
203.	Turner, Mary Ellis	TC Memo 1964-195	farm
204.	VanBeuren, Archbold	TC Memo 1963-280	publisher
205.	VanCleve, Mildred	TC Memo 1968-241	pet breed
206.	Vanderbilt, C., Jr.	TC Memo 1957-235	writer
207.	Verta, Robert	TC Memo 1959-143	farm
208.	Walet, Eugene	31 TC 461 (1958)	rental
209.	Wann, Billy V.	TC Memo 1968-246	farm
210.	Warren, James A.	TC Memo 1968-193	other
211.	Whitcomb, Martin	TC Memo 1976-181	other
212.	Whitner, Grady	TC Memo 1979-415	other

Obser. No.	Case	Cite	Activity
213.	Whitman, Thelma C.	TC Memo 1960-88	artist
214.	Windsberg, Arnold	TC Memo 1978-101	rental
215.	Winfield, Percy S.	TC Memo 1966-53	other
216.	Wise, Clarke	TC Memo 1957-83	farm
217.	"	"	"
218.	Wittstruck, James	TC Memo 1980-62	rental
219.	Wood, Harris L.	TC Memo 1975-189	farm
220.	Worcester, Alice	TC Memo 1962-212	farm
221.	Worley, Carl M.	TC Memo 1980-51	plane
222.	Wright, Kerns	31 TC 1264 (1959)	writer
223.	Wroblewski, Woodrow	TC Memo 1973-37	farm
224.	Yanow, Samuel	44 TC 444 (1965)	rental
225.	Zeagler, George	TC Memo 1958-93	farm
226.	"	"	"
227.	Zimmermann, Gloria	TC Memo 1976-123	other

SELECTED BIBLIOGRAPHY

- Bond, James G. "An Empirical Investigation of Court-determined Debt-equity Attributes for Federal Income Tax Purposes." Ph.D. dissertation, University of South Carolina, 1977.
- Boyd, Joseph L. "An Empirical Investigation of Reasonable Compensation Determination in Closely Held Corporations." Ph.D. dissertation, University of South Carolina, 1977.
- Burns, Jane O. and S. Michael Groomer. "Effects of Section 183 on the Business/Hobby Controversy." Taxes, 58 (March, 1980), pp. 195-205.
- Cattell, Raymond B. "The Scree Test for the Number of Factors." Multi-variate Behavioral Research, 1 (April, 1966), pp. 245-276.
- Chambers, Elizabeth and D. R. Cox. "Discrimination between Alternative Binary Response Models." Biometrika, 54 (December, 1967), pp. 573-578.
- Cohen, Jacob and Patricia Cohen. Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences. Hillsdale: Lawrence Erlbaum Assoc., 1975.
- Commerce Clearing House. When You Go to the Tax Court. Chicago: Commerce Clearing House, Inc., 1972.
- _____. Standard Federal Tax Reporter. Chicago: Commerce Clearing House, Inc., 1981.
- Condon, Thomas A. "Section 183: Work Horse or Hobby Loss." Catholic University Law Review, 20 (Summer, 1971), pp. 716-735.
- Doan, Burgess L. "Working with the New Hobby Loss Rules." The Practical Accountant, 7 (March/ April, 1974), pp. 15-23.
- Englebrecht, Ted D. and Robert W. Jamison, Jr. "An Empirical Inquiry into the Role of the Tax Court in the Valuation of Property for Charitable Purposes." Accounting Review, 54 (July, 1979), pp. 554-562.
- Friedman, Ronald M. "How To Prove a Profit Motive in Horse Breeding." Tax Ideas. Englewood Cliffs: Prentice-Hall, Inc., 1976, pp. 17431-17439.

- Gleason, James M. and Victor A. Harris. "Group Discussion and Defendants' Socio-economic Status as Determinants of Judgements by Simulated Jurors." Journal of Applied Social Psychology, 6 (April/June, 1976), pp. 186-191.
- Green, Paul E. and Donald S. Tull. Research for Marketing Decisions, 9th ed. Englewood Cliffs: Prentice-Hall, Inc., 1978.
- Harman, Harry H. Modern Factor Analysis. Chicago: University of Chicago Press, 1976.
- Harris, Richard J. A Primer of Multivariate Statistics. New York: Academic Press, 1975.
- Hoffman, William H., ed. West's Federal Taxation: Corporations, Partnerships, Estates and Trusts. St. Paul: West Publishing Co., 1980.
- Horvitz, Jerome S. and D. R. Finley. "A Macro-case Analysis Approach to Tax Research - A Comment." Accounting Review, 54 (July, 1979), pp. 637-640.
- Internal Revenue Service. Internal Revenue Manual - Audit, Vol. 4. Chicago: Commerce Clearing House, 1977a.
- _____. Annual Report - 1976. Washington: U.S. Government Printing Office, 1977b.
- _____. Annual Report - 1977. Washington: U.S. Government Printing Office, 1978.
- _____. Annual Report - 1978. Washington: U.S. Government Printing Office, 1979.
- Internal Revenue Service. Chief Counsel. Annual Report - 1976. Washington: U.S. Government Printing Office, 1977.
- _____. Chief Counsel. Annual Report - 1977. Washington: U.S. Government Printing Office, 1978.
- _____. Chief Counsel. Annual Report - 1978. Washington: U.S. Government Printing Office, 1979.
- _____. Chief Counsel. Annual Report - 1979. Washington: U.S. Government Printing Office, 1980.
- Jacobs, Sanford L. "Tax Court is Swamped with a Pile-up of Cases: Some Seem Frivolous." Wall Street Journal, 102 (April 14, 1980), p. 1 and 37.

- Jensen, Herbert L. and D. Larry Crumbley. "Quantitative Approaches to Validation, Description, and Prediction of US Tax Court Decisions." An unpublished working paper, undated, Texas A & M University.
- Knobbe, Kyler G. "Farm and Ranch Losses." Tax Management Portfolios, 241-3rd. Washington: Bureau of National Affairs, 1979.
- Lee, John W. "A Blend of Old Wines in New Wine Skin: Section 183 and Beyond." Tax Law Review, 29 (Winter, 1974), pp. 347-486.
- Madeo, Silvia A. "An Empirical Analysis of Tax Court Decisions in Accumulated Earnings Cases." Accounting Review, 54 (July, 1979), pp. 538-553.
- Maxwell, A. E. "Canonical Variate Analysis When the Variables are Dichotomous." Education and Psychological Measurement, 21 (Summer, 1961), pp. 259-271.
- McFadden, Daniel. "A Comment on Discriminant 'versus' Logit Analysis." Annals of Economic and Social Measurement, 5 (Fall, 1976), pp. 511-523.
- McKelvey, Richard D. and William Zavoina. "A Statistical Model for the Analysis of Ordinal Level Dependent Variables." Journal of Mathematical Sociology, 4 (December, 1975), pp. 103-120.
- Mertens, Jacob, Jr. and others. Law of Federal Income Taxation, Vol. 5, 1980 rev. Chicago: Callaghan and Co., 1980.
- Misiewicz, Kevin M. "Macro-case Analysis Approach to Tax Research - A Reply." Accounting Review, 54 (July, 1979), pp. 641-642.
- Nie, Norman H., C. Hadlai Hull, Jean G. Jenkins, Karen Skinbrenner, and Dale H. Bent. Statistical Package for the Social Sciences. New York: McGraw-Hill Book Co., 1975.
- Oatsvall, Rebecca J. "Capital Gain/Ordinary Income Treatment of Real Estate Sales." Ph.D. dissertation, University of South Carolina, 1978.
- Pindyck, Robert S. and Daniel L. Rubinfeld. Econometric Models and Economic Forecasts. New York: McGraw-Hill Book Co., 1976.
- Prentice-Hall. Citator. Englewood Cliffs: Prentice-Hall, Inc., 1981a.
- _____. Federal Taxes. Englewood Cliffs: Prentice-Hall, Inc., 1981b.
- Public Bill H.R. 3262. 97th Congress, 1st Sess., 127 Cong. Rec. H 1523 (April 27, 1981).

- Public Law No. 96-481, Equal Access to Justice Act.
- Research Institute of America, Inc. Federal Tax Coordinator, 2d. New York: Research Institute of America, Inc., 1981.
- Russell, Lillian M. and Norfleet W. Rives, Jr. "Household Migration Plans - A Multivariate Probit Model." Sociological Methods and Research, 8 (August, 1979), pp. 95-109.
- Sanathanan, Lalitha P. "Discriminant Analysis." Introductory Multivariate Analysis, ed. Daniel J. Amick and Herbert J. Walberg. Berkeley: McCutchan Publishing Co., 1975.
- Seat, Donald L. "A Logical and Empirical Investigation of the Relevant Decision Variables in Supreme Court Estate and Gift Tax Cases." Ph.D. dissertation, University of Kentucky, 1980.
- Stopher, Peter R. and Arnim H. Meyburg. Survey Sampling and Multivariate Analysis for Social Scientists and Engineers. Lexington: Lexington Books, 1979.
- Streer, Paul J. "An Empirical and Analytical Investigation of Ordinary and Necessary Business Expenses for Federal Income Tax Purposes." Ph.D. dissertation, University of Illinois at Urbana-Champaign, 1978.
- Taylor, Ronald L. "Defining Capital Gains in Real Estate Transactions by Applying Discriminant Analysis to Definitional Elements." Ph.D. dissertation, University of Tennessee, 1978.
- Theil, Henri. Principles of Econometrics. New York: John Wiley and Sons, 1971.
- U.S. Congress. House. Committee on Ways and Means. Brief Description of Tentative Decisions Made by the Committee on Ways and Means for Drafting Purposes on Tax Reform Proposals. 93rd Congress, 2nd Sess., August 22, 1974. Washington: U.S. Government Printing Office, 1974.
- U.S. Congress. Senate. Committee on Finance. Tax Reform Act of 1969. 91st Congress, 1st Sess. S. Rept. 552 to Accompany H.R. 13270. Washington: U.S. Government Printing Office, 1969.
- _____. Revenue Act of 1971. 92nd Congress, 1st Sess. S. Rept. 437 to Accompany H.R. 10947. Washington: U.S. Government Printing Office, 1971.
- _____. Tax Reform Act of 1976. 94th Congress, 2nd Sess. S. Rept. 938 to Accompany H.R. 10612. Washington: U.S. Government Printing Office, 1976.

- Uretz, Lester R. "The Chief Counsel's Policy Regarding Acquiescence and Nonacquiescence in Tax Court Cases." Tax Counselor's Quarterly, 14 (June, 1970), pp. 129-146.
- Watson, Peter L. The Value of Time: Behavioral Models of Modal Choice. Lexington: Lexington Books, 1974.
- Westin, Richard B. and Peter L. Watson. "Reported and Revealed Preferences as Determinants of Mode Choice Behavior." Journal of Marketing Research, 12 (August, 1975), pp. 282-289.
- Whittington, Ray and Gerald Whittenburg. "Judicial Classification of Debt Versus Equity - An Empirical Study." Accounting Review, 55 (July, 1980), pp. 409-418.