A MODEL FOR OPTIMAL INTERSPOUSAL TRANSFERS
IN ESTATE PLANNING

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
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DOCTOR OF PHILOSOPHY

By

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The problem with which this study is concerned is that of determining the optimal transfer of property from a decedent to his surviving spouse. A secondary problem addressed is whether equity between common law states and community property states in the application of the estate tax provisions has been achieved through the allowance of the marital deduction.

The problem was approached by developing a computer model capable of generating the optimal size transfer to a surviving spouse for combinations of seven economic variables. The amount of wealth transferred to secondary beneficiaries at the death of the second spouse was chosen as the criteria for determining the size of the optimal transfer. Variables included in the model were size of the decedent's estate, size of the surviving spouse's estate, life expectancy of the surviving spouse, after-tax rate of return of the surviving spouse, after-tax rate of return of beneficiaries, the projected rate of inflation and lifetime gifts after 1976. Four values were assigned to the first two variables and three values to each of the other five variables. A case was formed
for each possible combination of the variable values, a total of 3,888 cases.

The cases were processed through the model with results which indicated that a transfer of none of the decedent's property to the surviving spouse was optimal in 64.7 per cent of the cases while the normally accepted transfer of 50 per cent of the decedent's property to the spouse was optimal in only 16.8 per cent of the cases.

The outcomes of the cases were processed through the CROSSTABS and DISCRIMINANT subprograms of the Statistical Package for the Social Sciences with the purpose of determining the contribution of the individual variables to the optimal outcomes. From this analysis decision criteria were developed to aid taxpayers and their advisors in determining optimal property transfers to a surviving spouse.

Conclusions of the study were the following:

1. The primary concern when formulating an estate plan should be to determine whether any property should be transferred to the surviving spouse. The literature has stressed qualifying transfers for the marital deduction while giving minimal consideration to the wisdom of doing so. This study indicates that in a majority of estates optimal results are obtained by making no transfers to the surviving spouse.

2. Relative after-tax rates of return of the surviving spouse and other beneficiaries are the most important factors in determining optimal transfers to the spouse. This again
conflicts with the literature which has emphasized relative
estate sizes as the dominant factor.

(3) Rates of inflation have minimal influence in
determining the size of the optimal transfer.

(4) Citizens of common law states are generally favored
as opposed to citizens of community property states in the
application of the estate tax laws. Citizens of these states
have more flexibility in planning transfers to beneficiaries
and may generally do so at a lower tax cost through use of
the marital deduction.

Chapter I contains a statement of the problem and a
preview of the study. A brief legislative and judicial
history of the marital deduction, requirements for claiming
the deduction and a survey of the literature are presented
in Chapter II. The steps followed in development of the
model are contained in Chapter III. Chapter IV presents
the results of the study and the development of decision
criteria. Chapter V contains a summary of the study, con-
cclusions and recommendations for further research.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>iv</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF ILLUSTRATIONS</td>
<td>v</td>
</tr>
</tbody>
</table>

## Chapter

### I. INTRODUCTION
1. Focus of the Study
2. Statement of the Problem
3. Objectives of the Study
4. Preview of the Chapters

### II. BACKGROUND FOR THE STUDY
1. Brief History of the Marital Deduction
2. Requirements for Claiming the Marital Deduction
3. Prior Research on Study Topic

### III. RESEARCH METHODOLOGY
1. Development of the Model
2. Presentation of Preliminary Results
3. Summary

### IV. RESULTS OF THE STUDY
1. Presentation of Results of the Study
2. Development of Decision Criteria
3. Multiple Discriminant Analysis
4. Equity Between Common Law and Community Property States
5. Summary

### V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS
1. Summary
2. Conclusions
3. Recommendations

### APPENDICES
4. 112

### BIBLIOGRAPHY
5. 138
# List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Variables in Illustrative Case</td>
<td>61</td>
</tr>
<tr>
<td>II. Output of Illustrative Case</td>
<td>62</td>
</tr>
<tr>
<td>III. Outcomes of Preliminary Study</td>
<td>67</td>
</tr>
<tr>
<td>IV. Joint Frequency Distributions Preliminary Study</td>
<td>69</td>
</tr>
<tr>
<td>V. Chi-Square Analysis of Variables Preliminary Study</td>
<td>72</td>
</tr>
<tr>
<td>VI. Outcomes of the Study</td>
<td>75</td>
</tr>
<tr>
<td>VII. Joint Frequency Distributions</td>
<td>76</td>
</tr>
<tr>
<td>VIII. Chi-Square Analysis of Variables</td>
<td>77</td>
</tr>
<tr>
<td>IX. Joint Frequency Distributions on DIFF and DIFO</td>
<td>78</td>
</tr>
<tr>
<td>X. Joint Frequency Distributions for DIFF Controlled for DIFO</td>
<td>79</td>
</tr>
<tr>
<td>XI. Joint Frequency Distribution Between EXPC and TRAN, RETS Greater than RETB</td>
<td>87</td>
</tr>
<tr>
<td>XII. Joint Frequency Distribution Between INFL and TRAN, RETS Greater than RETB</td>
<td>89</td>
</tr>
<tr>
<td>XIII. Joint Frequency Distribution Between DIFO and TRAN, RETS Greater than RETB</td>
<td>90</td>
</tr>
<tr>
<td>XIV. Standardized Discriminant Function Coefficients</td>
<td>95</td>
</tr>
<tr>
<td>XV. Values of Variables for Illustrative Case</td>
<td>135</td>
</tr>
<tr>
<td>XVI. Subjective Probability Distributions for Variables in Illustrative Case</td>
<td>136</td>
</tr>
<tr>
<td>XVII. Computation of Expected Values for Illustrative Case</td>
<td>137</td>
</tr>
</tbody>
</table>
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Diagram of Computer Model</td>
<td>60</td>
</tr>
<tr>
<td>2.</td>
<td>Version 1 of Computer Model</td>
<td>117</td>
</tr>
<tr>
<td>3.</td>
<td>Version 3 of Computer Model</td>
<td>126</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

The Federal Estate Tax statutes were first enacted in 1916. Since that time a tax has been imposed upon the transfer of property from a decedent to his heirs or devisees. Current statutory requirements for the tax are contained in Subtitle B, Chapter 11 of the Internal Revenue Code of 1954, as amended.

One of the troublesome problems in the application of the estate tax has been that of assuring equity between citizens of common law states and community property states. In the common law states ownership of property is attributed to the spouse whose services or investment activities generated the property while in community property states property accumulated during marriage, except by gift or

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1 This dissertation will assume what is statistically most prevalent, i.e. that the death of the husband precedes that of the wife. The provisions of the estate tax laws are equally applicable, however, should the death of the wife occur first.

2 Throughout this dissertation the term "Code" will be used in lieu of Internal Revenue Code of 1954, "Section" will be used to refer to section numbers of the Internal Revenue Code of 1954 and "Regulation" will be used to refer to regulations promulgated under the Internal Revenue Code of 1954.

3 There are presently eight community property states: Arizona, California, Idaho, Louisiana, Nevada, New Mexico, Texas and Washington.
inheritance, is owned one-half by each spouse regardless of whose efforts produced the property. Since the estate tax was enacted before the recent mass entry of women into the labor force the typical family structure was a working husband and a wife who remained homebound to care for home and family. In the common law states this resulted in most family property being legally owned by the husband. The full amount of the property was therefore subject to the estate tax upon the death of the husband. In community property states, however, only one-half of the property was generally taxed on the death of the husband since ownership of community property was attributed equally to husband and wife.

Congress attempted to correct this perceived inequity in 1942 by subjecting the entire value of all community property to the estate tax upon the death of the husband. These rules remained in effect until 1948 when Congress again amended the statutes and restored the former provisions as they related to community property. Once again only the decedent's one-half of community property was included in his estate upon his death. In an attempt to provide equitable treatment to citizens of common law states a new provision allowing a deduction to the estate equal to approximately one-half of the noncommunity property included in the estate was also enacted at this time. To qualify for the deduction property at least equal in value to the deduction claimed must be transferred to the surviving spouse.
Thus when the maximum deduction is claimed only one-half of the noncommunity property is subjected to tax upon the death of the first spouse, a result which is comparable to the treatment afforded community property.

The statutes were amended again by the Tax Reform Act of 1976 to allow small estates a minimum deduction of $250,000 for transfers to the surviving spouse.

While the main purpose of the deduction for transfers to the surviving spouse was to equate treatment between common law and community property states the result has been to create a new tax planning opportunity where the estate of an individual includes noncommunity property. Since the deduction allowed is optional an individual may design his estate plan to transfer all his noncommunity property to his spouse, none of it, or any amount in between. The amount transferred will be that amount which best fulfills the estate planning objectives of the individual. It is with this estate planning opportunity that this study will be concerned.

Focus of the Study

The main focus of this study will be on the deduction allowed by Code Section 2056, i.e., the deduction allowed for transfers to a surviving spouse, more commonly referred to as the marital deduction.\(^4\) Section 2056, as presently amended, provides for a marital deduction equal to 50 per cent of

\(^4\)The term "marital deduction" will be used throughout this dissertation when referring to this deduction.
the "adjusted gross estate" but not less than $250,000. The adjusted gross estate is defined by Section 2056(c)(2) as the gross estate minus the deductions allowed by Section 2053 for funeral expense, administrative expenses and liabilities and Section 2054 for casualty losses during administration.

If the gross estate includes community property the adjusted gross estate is further reduced by the value of the excess of the community property included in the gross estate over the deductions under Sections 2053 and 2054 allocable to the community property. The $250,000 minimum marital deduction is also reduced by the same amount.

The marital deduction may also be reduced if the decedent has made lifetime gifts to his spouse. Section 2523 allows a gift tax marital deduction of 100 per cent for the first $100,000 given to a spouse, 0 per cent for the next $100,000 of gifts to a spouse and 50 per cent for all gifts to a spouse in excess of $200,000. The estate tax marital deduction must be reduced by the amount by which the gift tax marital deduction exceeds 50 per cent of lifetime gifts to a spouse. Thus, if a decedent has made lifetime gifts to his spouse of $100,000 or less the estate marital deduction will be reduced by 50 per cent of the gifts to the spouse. If lifetime gifts in excess of $100,000 but less than $200,000 have been made to the spouse the estate tax marital deduction will be reduced by the amount by which $100,000 exceeds one-half of the gifts. Lifetime gifts to a spouse
of $200,000 or more do not directly affect the estate tax marital deduction.

The requirements for claiming the marital deduction are quite complex. Extensive case law has been developed in addition to the Code and Regulations in determining when transfers qualify for the deduction. In general, however, to qualify for the marital deduction a transfer must meet the following requirements:

1. The transferred property must have been included in the gross estate of the decedent.
2. The property must have passed from the decedent to the surviving spouse.
3. The interest transferred must not be a terminable interest, i.e., the interest will be included in the estate of the surviving spouse if not dissipated or disposed of by taxable gift.

These requirements will be explored in additional detail in Chapter II.

Statement of the Problem

The above discussion would seem to indicate that a taxpayer should always arrange his estate plan to allow for the maximum allowable marital deduction. This would undoubtedly result in the lowest possible estate tax upon the death of the first spouse. Some reflection, however, brings this approach into question. If the surviving spouse has a
substantial estate in her own right the effect of the pro-
gressive estate tax rate structure may be to impose a
substantially larger tax in the second estate than would
have been the case had the marital deduction be foregone,
the property taxed in the first estate and transferred to
other beneficiaries.

To illustrate, let us take a rather extreme example.
Assume we have an individual, residing in a common law state,
with an adjusted gross estate of $1,000,000 whose spouse has
an estate of $3,000,000. Ignoring for the moment rates of
return and the effects of inflation, the total tax on the
two estates combined will be $1,637,600 if the full marital
deduction is claimed in the estate of the husband. If the
marital deduction is foregone and the entire property of the
husband transferred to other beneficiaries, the total estate
tax will be only $1,542,600. By foregoing the marital deduc-
tion at the death of the first spouse, additional taxes of
$190,000 are incurred. However, the taxable estate of the
second spouse is reduced and a tax savings of $95,000 between
the two estates and an increase of like amount available for
transfer to beneficiaries of the couple. Thus where the
surviving spouse has a sizeable estate utilization of the
marital deduction can result in higher taxes.

One could also envision other situations where similar
results would be obtained. In periods of very high inflation
the transfer of assets to a surviving spouse could increase
the overall tax since not only the value of the assets but also the appreciation on the assets due to inflation would be taxed in the second estate whereas assets transferred directly from the first estate to beneficiaries other than the spouse would escape this tax on appreciation in value.

An opposite effect might be realized in cases where the surviving spouse might be in a position to realize a much higher rate of return on investment of the assets than would other beneficiaries. In such circumstances it could conceivably be more advantageous to transfer amounts in excess of the amount which can be qualified for the marital deduction (possibly even 100 per cent of the decedent's estate) to the surviving spouse. The increased return by the spouse might well exceed the additional taxes which will result from including some of the property in both taxable estates.

The problem to be addressed in this study is therefore the determination of the optimal transfer\(^5\) to a surviving spouse upon the death of the first spouse. A secondary problem with which this study will be concerned is whether the desired equity between the common law and community property states has been achieved by the allowance of the marital deduction.

\(^5\)A discussion and selection of taxpayer objectives to be optimized is presented in Chapter III.
Objectives of the Study

The problems identified in the previous section were studied by the construction and realization of the following three objectives.

Objective number 1: The development of a computer simulation model capable of determining the optimal transfer to the surviving spouse under a wide range of estate sizes and economic conditions.

Objective number 2: The development of decision criteria which will be helpful to taxpayers and their advisors in determining the optimal amount to be transferred to the surviving spouse as estate plans are developed.

Objective number 3: To reach a conclusion as to whether the avowed congressional intent to equalize estate tax treatment between residents of community property states and non-community property states has been realized. 6

The first objective was implemented by the preparation of a computer program in the COBOL programming language suitable for processing on the IBM 360 computer. This program provides a simulation of the current estate tax statutes and incorporates the economic factors discussed in Chapter III. This simulation is subject to certain simplifying assumptions and limitations, also discussed in Chapter III.

Objective number two was pursued through the use of the CROSSTABS and DISCRIMINANT subprograms of the Statistical Package for the Social Sciences. These programs were utilized to establish relationships between the optimal transfers generated by the computer model and the economic factors included in the model.

The fulfillment of objective number three was pursued by comparing the assets in the hands of the surviving spouse in a common law state, after an optimal transfer, with the assets in the hands of a surviving spouse in a community property state.

Preview of the Chapters

Chapter II includes a brief legislative and judicial history of the marital deduction and a discussion of the statutory requirements for qualifying transfers for the marital deduction. This chapter concludes with a review of previous research on the topic.

Chapter III discusses the methodology employed including the identification of taxpayer objectives, the identification of the economic factors which may influence the attainment of those objectives and the development of the computer model to study the relationship between the economic factors and optimal interspousal transfers. This

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chapter also summarizes the output of the computer model and the statistical analyses indicated above for a preliminary study on the problem of the optimal transfers.

In Chapter IV the results of this study of the problem are presented, and decision criteria are developed for determination of the optimal transfer to a surviving spouse, based on these results. In this chapter are also presented conclusions as to whether equity has been achieved between the common law and community property states in the application of the estate tax.

Chapter V contains a summary of the study, general conclusions, and recommendations for further research in this area of estate planning.
CHAPTER II

BACKGROUND FOR THE STUDY

Brief History of the Marital Deduction

The Federal Estate Tax was first imposed by the Revenue Act of 1916. This act contained no provision for a deduction for transfers to a surviving spouse. The tax was reenacted by the various tax acts between 1916 and 1939 and was encoded in Sections 810 through 813 in the Internal Revenue Code of 1939.

During the early years of the tax, attention focused on its constitutionality. The main question centered on whether the estate tax was a tax on property or upon the transfer of property. If the tax was a tax on property, it would be a direct tax and forbidden under Article I, Section 9, Clause 4 of the Constitution of the United States, which states, "No Capitation, or other direct, tax shall be laid, unless in Proportion to the Census or Enumeration herein before directed to be taken." On the other hand, if the tax is a tax on the transfer of property, it is a tax "laid on the happening of an event, as distinguished from its tangible fruits [and is] an indirect tax."\(^1\) An indirect tax is

\(^1\)Tyler v. United States, 281 U.S., 497, 502 (1930).
permissible under Article I, Section 8, Clause 1 of the constitution, if applied uniformly throughout the United States. This issue was settled by a series of cases decided by the Supreme Court. In 1921 the Court stated that the estate tax "is a tax on the right to transmit, or on the transmission [and] attaches to the whole estate. . . ." In 1924 Justice Holmes, writing for the Supreme Court, stated, "it is a tax upon the transfer of his net estate by a decedent. . . . It comes into existence before and is independent of the receipt of the property by the legatee." Later, in 1929, the Supreme Court, with Justice Holmes again the spokesman, stated, "the tax is on the [transfer] of the testator, not on the receipt of the property by the legatees."

With the question of constitutionality settled, another troublesome problem presented itself in the states which had enacted community property statutes. The primary question was whether the interest granted a wife by the community property statutes was sufficient to constitute ownership of property which had been created by services provided by the husband. If this interest constituted ownership, then there was no transfer of the wife's one-half of community property upon the death of the husband, and therefore no taxable event with regard to this interest.

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Alternately, if the wife's interest was a mere expectancy which was perfected upon the husband's death, then there was a transfer of this interest from husband to wife and it would therefore be included in the husband's taxable estate. Complicating the issue was the fact that in most community property states the husband had substantial powers of management and control over the entire community property. In general, he could dispose of personal property in any manner he chose, except that he could not make gifts without the wife's consent. The husband could dispose of real property, however, only with the wife's written consent.\(^5\) Eisenstein says, "the wife's role is essentially that of a back-seat driver who may carp and criticize, but may not take the wheel."\(^6\) The wife did, however, become sole owner of her interest in the community upon the husband's death, and could dispose of her interest by will in the event that her death preceded that of the husband. The wife was allowed to "drive" only when death of either the husband or wife brought the community to an end.\(^7\)

The Treasury Department took the position this power to control constituted ownership and therefore subjected the husband to taxes on the total income of community property, \(^5\)Louis Eisenstein, "Estate Taxes and the Higher Learning of the Supreme Court," Tax Law Review, III (1947-1948), 536-598. \(^6\)Ibid., p. 539. \(^7\)Ibid.
and upon the death of the husband subjected the entire community property to the estate tax. In 1926, the Supreme Court upheld the Treasury, as Justice Holmes, writing for the Court, stated, "the wife had a mere expectancy while living with her husband" in a California case involving income taxes. The Court later reversed itself in Poe v. Seaborn and United States v. Malcolm. In Poe v. Seaborn the Court found that the wife's share of income from community property of a Washington couple could not be taxed to the husband since the wife's share is "never the property of the husband, but that of the [wife]." In the United States v. Malcolm the Court held that in California a wife has a vested interest in one-half of community property for income tax purposes. While each of these cases was primarily concerned with income taxes, both did establish the principle that the wife had a vested interest in community property and not a mere expectancy. There could, therefore, be no transfer of the wife's share of the community from husband to wife upon the husband's death, no estate tax could be assessed on the wife's share of the community from husband to wife upon the husband's death, and no estate tax could be assessed on the wife's share of the community property. Eisenstein states that "from 1921 on there were repeated attempts to eliminate the consequences

which *Poe v. Seaborn* approved. But the tax advantages of community property managed to sustain themselves.\(^{11}\)

The Revenue Act of 1942 removed the advantages accorded citizens of community property states. Section 811(3)(2) was added to the Internal Revenue Code of 1939 and subjected all property to the estate tax except the portion "shown to have been received as compensation for personal services actually rendered by the surviving spouse or derived originally from such compensation or from separate property of the surviving spouse." This section also provided that in no event, however, was the taxable interest "less than the value of such part of the community property as was subject to the decedent's power of testamentary disposition." The result was that in most cases the entire community property would be included in the estate of the husband should he die first, while one-half of the community property was included in the estate of the wife if her death preceded that of the husband.\(^{12}\)

Section 811(e)(2) of the Internal Revenue Code of 1939 was repealed by the Revenue Act of 1948, and once again only one-half of community property was included in the estate of the first spouse to die. The Revenue Act of 1948 also added Section 812(e)(1) to the Internal Revenue Code of 1939. This section, which was later encoded in the Internal Revenue Code of 1954 as Section 2056, allows a deduction, not to

\(^{11}\)Eisenstein, *op. cit.*, p. 541.

\(^{12}\)Ibid., p. 542.
exceed 50 per cent of the adjusted gross estate, for transfers to the surviving spouse of the decedent. The adjusted gross estate was a new concept introduced by this Act and was defined by Section 812(e)(2) of the 1939 Code as the "entire value of the gross estate [less] the aggregate amount of deduction under Section 812(b) of the [1939] Code." Section 812(b) allowed deductions for funeral expenses, administrative expense, and liabilities of the decedent.

The deduction allowed for transfers to a surviving spouse was enacted for the purpose of creating equity in the application of the estate tax between the community and non-community property states. A simple example will suffice to show how at least rough equity was achieved by allowing the deduction. Assume we have two couples H and W, who are residents of a community property state, and A and B, who are residents of a noncommunity property state. Assume further that both husbands (H and A) have been employed and have created estates of $1,000,000 each, while the wives (W and B) have not been employed except as housewives. Assume that funeral expenses, administration expenses, and liabilities will equal 5 per cent of the gross estate. Upon his death A provides for a transfer of at least one-half of his estate to his wife. The estate taxes due upon the deaths of H and A would be computed as follows:

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<tr>
<th></th>
<th>H</th>
<th>A</th>
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<tbody>
<tr>
<td>Gross estate</td>
<td>$500,000</td>
<td>$1,000,000</td>
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<tr>
<td>Deduction for funeral expenses, etc.</td>
<td>25,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Adjusted gross estate</td>
<td></td>
<td>$950,000</td>
</tr>
<tr>
<td>Marital deduction</td>
<td></td>
<td>475,000</td>
</tr>
<tr>
<td>Taxable estate</td>
<td>$475,000</td>
<td>$475,000</td>
</tr>
<tr>
<td>Tax due (1979 rates)</td>
<td>$109,300</td>
<td>$109,300</td>
</tr>
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</table>

Thus, each would pay a tax of $109,300 and it would appear that equity has been achieved. The appearance of equity may be somewhat deceiving, however, since the results of the example are valid only if A chooses to transfer 50 per cent of his wealth to B. A has the option of transferring less than 50 per cent of his estate to B if other economic factors so indicate, an option which H, in the community property state, does not have. Tax planning in the noncommunity property state is therefore somewhat more flexible, since any amount from zero to 100 per cent of the couple’s property can be placed in the hands of the surviving spouse, with the decedent only having control over the remaining one-half of the property.

The marital deduction was intended primarily for application to noncommunity property states. Its application was not thus limited, however, since residents of community property states could also claim the marital deduction if separate (noncommunity) property was included in the decedent’s estate. In such cases, however, Section 812(e)(2) of the 1939 Code as amended by the Revenue Act of 1948 required that the adjusted gross estate be reduced by the excess of community
The marital deduction was encoded in the Internal Revenue Code of 1954 as Section 2056, and remained virtually unchanged until 1976. In 1976, as part of a substantial revision of the estate tax statutes, Section 2056 was amended to include a minimum marital deduction of $250,000. Thus under current law the marital deduction is the greater of $250,000 or 50 per cent of the adjusted gross estate where no community property is included in the gross estate. Where the gross estate includes community property, Sections 2056(c)(1)(C) and 2056(c)(2) require that both the adjusted gross estate and the $250,000 minimum be reduced by the excess of the value of the community property over the amount of Section 2053 and Section 2054 expenses allocable to the community property.

This reduction of the adjusted gross estate for community property included in the gross estate prevents an unfair advantage from accruing to residents of community property states. Since only one-half of the community property is included in the gross estate initially, the allowance of a marital deduction from the community property could result in only one-fourth of the community property being taxed in the first estate, whereas in the noncommunity
property states, one-half the estate is taxed unless reduced below this level by the minimum marital deduction.

The reduction of the minimum marital deduction for community property is also consistent with the intent of this provision, that of allowing a minimum amount of wealth to be transferred to the spouse tax free. In community property states, the exclusion of the spouse's one-half accomplishes this purpose if it exceeds $250,000, and therefore no marital deduction is necessary. For small estates a marital deduction from the decedent's share of the community property of the amount by which $250,000 exceeds one-half of the community property allows at least $250,000 of property to be placed, free of estate tax, into the hands of the surviving spouse.

Requirements for Claiming the Marital Deduction

There are three primary requirements which must be met before a transfer to a surviving spouse will qualify for the marital deduction. (1) Section 2056(a) requires that there be an "interest in property which passes or has passed from the decedent to his surviving spouse . . . ." (2) Section 2056(a) also limits the deduction "to the extent that such interest is included in determining the value of the gross estate," and (3) Section 2056(b)(1) provides that "where, on the lapse of time, on the occurrence of an event or contingency, or on the failure of an event or contingency to occur, an interest passing to the surviving spouse will terminate or fail, no
deduction shall be allowed . . . with respect to such interest. . . ." Each of the requirements is discussed below.

The Passing Requirement

"In general, if a husband owned or was treated as owning property and somehow the wife became the owner of that property, the 'passing requirement' of the marital deduction will probably be satisfied." Thus there are several ways that an interest may be transferred to a spouse to meet the requirement. It should be borne in mind that a transfer may meet the passing requirement and still fail to generate a marital deduction by virtue of its failure to meet one of the other requirements. For example, a gift of property from the decedent to the spouse four years prior to his death would meet the passing requirement but would fail to meet the second requirement since it would not be included in the decedent's gross estate. Several modes of transfer which fulfill the passing requirements are discussed in the following paragraphs.

Will or inheritance.—The most direct and probably the most common form of passing property to the surviving spouse is by provision of the decedent's will or by inheritance under

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the laws of the state in which the married couple reside. This mode of transfer is validated by Sections 2056(d)(1)-(2), which state, "an interest in property shall be considered as passing from the decedent to any person if . . . such interest is bequeathed or devised . . . [or] . . . is inherited by such person from the decedent." The term inherited is broadly interpreted and would include "a surviving spouse's interest in a testamentary trust [passed] to her from the decedent testator whether it is an immediate interest, or a future interest . . ., as long as . . . it is a beneficial interest." 15

Dower or curtesy.—The American Heritage Dictionary defines dower as "the part or interest of a deceased man's real estate allotted by law to his widow for her lifetime." 16 Curtesy is defined as "the life tenure which by common law is held by a man over the property of his deceased wife if children with rights of inheritance were born during the marriage." 17 These forms of transfer meet the passing requirement under Section 2056(d)(3). The claim for dower or curtesy must be filed in time to meet the passing requirement. 18 In some cases a spouse may elect to receive property


17Ibid., p. 326.

passed to her by will, rather than exercise her rights under the dower statutes. This will not effect the marital deduction, since the amount received by will is deemed to pass to her and satisfies the passing requirement. It should be obvious, however, that the estate cannot take a deduction for both the property passed under the will and the property which could have been passed under the dower provisions.\textsuperscript{19}

\textbf{Inter vivos gifts.} --Section 2056(d)(4) declares that "an interest in property shall be considered as passing from the decedent to any person if . . . such interest has been transferred to such person by the decedent at any time." Therefore, gifts made by the decedent to his spouse before his death will meet the passing requirement for the marital deduction. Once again we point out that meeting the passing requirement does not qualify the transfer for the marital deduction unless the transfer also meets requirements two and three. In general, an \textit{inter vivos} gift will be included in the gross estate under Section 2035, and therefore meet requirement two only if the gift was completed within three years of the decedent's death.

\textbf{Jointly owned property.} --Property held jointly, with right of survivorship, by husband and wife either as joint tenants or as tenants by the entirety, is deemed to pass to the surviving spouse under Section 2056(d)(5).

\textsuperscript{19}Ibid., pp. 5-69.
Powers of appointment.—A person has a power of appointment over property if he has the right to determine who will have a beneficial interest in the property. For example, if A, through his will, makes a testamentary disposition of a lifetime interest in the income of real estate to B, and gives C the power to determine who is to receive the real estate upon the death of B, then C has a power of appointment. C may have a general power of appointment under which he can appoint himself or anyone else beneficial owner of the real estate, or he may have a limited power of appointment by which he can appoint only specified individuals (maybe D or E) as beneficial owners. For estate tax purposes, Section 2041(b) provides a somewhat more restrictive definition of a general power of appointment held by a decedent. This Section requires that a power of appointment be treated as a general power if it "is exercisable in favor of the decedent, his estate, his creditors, or the creditors of his estate. . . ." For purposes of the marital deduction, Section 2056(d)(6) provides that property passes from the decedent to the spouse if "the decedent had a power . . . to appoint such interest and if he appoints or has appointed such interest to [the spouse]." Section 2056(d)(6) also provides that if a decedent had the power to appoint but defaults, and by virtue of the default the property passes to the spouse, the receipt

20 Ibid., pp. 4-183.
of the property by the spouse will constitute a passing of
the property from the decedent. For example, A makes a
gift of an income interest in property to B for life and
gives B a power of appointment over the remainder, but pro-
vides that if B fails to exercise the power of appointment
before his death, the property will pass to C (B's wife).
If B fails to exercise the power of appointment, the property
has passed to C from B and the marital deduction will be
allowed if other requirements are met.

Life insurance.—Section 2056(d)(7) states, "an inter-
est . . . shall be considered as passing from the decedent
. . . if . . . such interest consists of proceeds of
insurance on the life of the decedent." Thus proceeds of
insurance on the life of the decedent received by the spouse
as beneficiary of the policy will meet the passing require-
ment.

The passing requirement can therefore be complied with
in a variety of ways. The essential element of compliance
is that property under the control of the decedent spouse
has in some way, either before the decedent's death or upon
his death, come under the control of the surviving spouse.

Property Included in the Gross Estate

Section 2056(a) requires that the property transferred
to surviving spouse must be included in the gross estate of
the decedent spouse before it can serve as the base for a
marital deduction. While a detailed discussion of the requirements for inclusion of property in the gross estate is beyond the scope of this study, a discussion of some of the more important provisions is essential if one is to understand the role the marital deduction plays in constructing an estate plan. Property owned outright by the decedent and included in his probate estate is included in his gross estate. The concept of the gross estate is not limited to such property however. Property, which the decedent has disposed of during his lifetime and to which he has no legal claim at death may be "swept" back into his estate by various provisions of the Code. The following discussion emphasizes some of the more important provisions governing inclusion of property interests in the gross estate.

**Property owned outright by decedent.**—Under Sections 2031 and 2033 all property in which the decedent held beneficial interests will be included in the gross estate. In common law states, this would include all property accumulated by the decedent during his lifetime in which no beneficial interest has been transferred to others. In community property states, the entire value of the decedent's separate property, plus the value of his one-half interest in community property, is included in the gross estate.

**Gifts within three years of decedent's death.**—Section 2035 requires that the gross estate shall include the value
of any gifts of interest in property made by the decedent within three years of his death. Prior to 1977 there was a rebuttable presumption that all gifts made within three years of death were in "contemplation of death" and therefore includable in the decedent's gross estate. If the executor of the estate could prove that motives other than estate tax savings prompted the gift, then the presumption could be defeated and the gift excluded from the gross estate. The Tax Reform Act of 1976 amended Section 2035 and replaced the rebuttable presumption with a statutory requirement that all gifts in excess of $3,000 per donee per year made by the decedent within three years of death be included in the gross estate. It should be noted that it is the value of the gift property at date of death, not the value of the gift property at the date of the gift, which is included in the gross estate. This may create valuation problems, since the property may no longer be in existence at the decedent's death. For example, the value of government bonds maturing July 1, 1980, given to a donee on July 1, 1979, would be included in the gross estate of a decedent dying on December 31, 1981, even though the bonds have matured and been "cashed in" almost eighteen months prior to the decedent's death.

Transfers with retained life estate.—Under Section 2036 the value of the gross estate will include the value of property transferred during his lifetime, without adequate
consideration, in which the decedent has retained for life "the possession or enjoyment of, or the right to income from, the property or . . . the right to . . . designate persons who shall possess or enjoy the property or the income therefrom." Thus if a decedent makes a gift of real estate to his children but retains the right to the income for life, the full value of the real estate will be included in the decedent's gross estate.

**Revocable transfers.**—Section 2038 requires inclusion in the gross estate of "the value of all property [in] which the decedent has at any time made a transfer . . . where the enjoyment thereof was subject at the date of his death to any change through the exercise of a power . . . by the decedent . . . to alter, amend, revoke, or terminate" the interest transferred. This section also requires inclusion if the power to alter, amend, revoke or terminate is relinquished within three years of the decedent's death.

**Annuities.**—Section 2039 requires that the gross estate include "the value of an annuity or other payment receivable by any beneficiary by reason of surviving the decedent under any form of contract . . . if, under such contract . . . the decedent possessed the right to receive such annuity or payment . . . for any period ascertainable without reference to his death. . . ." Under this provision no part of an annuity payable only to the decedent during his lifetime but with
payments ceasing upon his death would be included in the gross estate. An annuity contract which called for payments to the husband for life with equal payments to the wife for her life, should she survive the husband, would result in the present value of the payments to be made to the wife being included in the husband's gross estate upon his death. Under Subsection (b), this result will hold only to the extent to which the husband provided the purchase price of the annuity.

Section 2039(c) exempts from these provisions annuity payments made from trusts which are exempt from tax under Section 401(a), to the extent that such payments are not attributable to the decedent's contributions to the plan.

Joint interest.—Property held by the decedent and any other person as joint tenants or tenants by the entirety is included in the gross estate under Section 2040, except to the extent that it can be shown that the property was provided by the persons other than the decedent. Thus if a father and son establish a joint savings account and the son provides 25 per cent of the funds for the account from his separate property and the father 75 per cent of the funds, 75 per cent of the account will be included in the father's estate if his death precedes that of the son.

An exception to the above rule is provided by Section 2040(b) for property held jointly by husband and wife. Under this section only one-half of the value of joint property is
included in the gross estate of the first spouse to die if (1) the joint interest was created by the decedent, the decedent's spouse or both, (2) a gift was reported if one spouse provided more than one-half of the joint property, and (3) there are no joint tenants other than the decedent and his spouse. For (2) above, the transfer of disproportionate amounts to a joint tenancy by husband and wife always results in a gift equal to the excess transferred over one-half of the total value of the property from the spouse transferring the larger amount, if the property is personal (i.e. not real property). However, if the property is real estate, an election must be made under Section 2515(c) before the transfer is treated as a gift.

Power of appointment.—One of the more complex provisions of the estate tax statutes is Section 2041, which requires that property over which the decedent held a general power of appointment be included in the gross estate under some circumstances. This Section establishes different rules for powers created on or before October 21, 1942, and for powers created after this date. In the prior instance, the property interest over which the power of appointment is held is included in the gross estate only if it is exercised by will of the decedent. Exercise of the power prior to death will not cause inclusion in the gross estate unless the exercise is effected in such a manner as to bring the
transfer under Sections 2035 through 2038. For example, an exercise within three years of death might result in the property being included in the gross estate under Section 2035 as a gift within three years of death. Complete release or failure to exercise the power does not constitute an exercise and will not result in inclusion of the property in the gross estate.

Section 2041(a)(2) requires that the gross estate include the value of any property over which the decedent held a general power of appointment created after October 21, 1942. In this instance it is not necessary that the power be exercised. The mere possession of the power is sufficient to cause inclusion of the property interest in the gross estate. The release of a power created after October 21, 1942 is the equivalent of an exercise of the power. The lifetime exercise or release of the power may trigger inclusion of the property in the gross estate under Sections 2035 through 2038, in the manner indicated above.

An individual may disclaim (refuse to accept) a power of appointment and possibly prevent inclusion of the property in his estate. The disclaimer must be timely made, and in writing. Section 2518 provides detailed rules for effecting the disclaimer.21

21For a more detailed treatment of powers of appointment see Stephens, op. cit., pp. 4-183 through 4-211.
Proceeds of life insurance.—The proceeds of life insurance on the life of the decedent will be included in the gross estate under Section 2042 if the proceeds are payable to the estate or if the "decedent possessed at his death any of the incidents of ownership" over the life insurance policies. Regulation 20.2042-1(c) (2)-(4) contains the following discussion of what constitutes incidents of ownership.

(2) For purposes of this paragraph, the term "incidents of ownership" is not limited in its meaning to ownership of the policy in the technical legal sense. Generally speaking, the term has reference to the right of the insured or his estate to the economic benefits of the policy. Thus, it includes the power to change the beneficiary, to surrender or cancel the policy, to assign the policy, to revoke an assignment, to pledge the policy for a loan, or to obtain from the insurer a loan against the surrender value of the policy, etc.

(3) The term "incidents of ownership" also includes a reversionary interest in the policy or its proceeds, whether arising by the express terms of the policy or other instrument or by operation of law, but only if the value of the reversionary interest immediately before the death of the decedent exceeded 5 per cent of the value of the policy.

(4) A decedent is considered to have an "incident of ownership" in an insurance policy on his life held in trust if, under the terms of the policy, the decedent (either alone or in conjunction with another person or persons) has the power (as trustee or otherwise) to change the beneficial ownership in the policy or its proceeds, or the time or manner of enjoyment thereof, even though the decedent has no beneficial interest in the trust.

An individual can generally avoid inclusion of insurance proceeds in the gross estate by transferring complete ownership of a policy to his spouse or other beneficiaries and
divesting himself all the incidents of ownership indicated above. This will usually result in a taxable gift but tax savings may still be realized since the gift tax value will be the replacement value of the policy\textsuperscript{22} whereas the estate tax value would be the full proceeds of the policy.

In the preceding paragraphs we have discussed briefly the requirements for inclusion of the value of property interests in the decedent's gross estate. This was not intended to be an exhaustive discussion of the requirements for inclusion but was intended to present a general overview of these requirements. The fact that a property interest does not come under one of the provisions cited above would not rule out inclusion of the property interest in the gross estate. Section 2031 requires the inclusion of all property "real or personal, tangible or intangible, wherever situated." Therefore no property in which the decedent had an interest escapes the long arms of the estate tax statutes. The specific provision which triggers inclusion in the gross estate is not material, however, in determining whether a transfer qualifies for the marital deduction. It is sufficient that it be included in the gross estate regardless of the basis for inclusion.

\begin{quote}
**The Terminable Interest Rules**

Section 2056(b)(1) provides that
\end{quote}

\textsuperscript{22}Regulation 25.2512-6(a).
where, on the lapse of time, on the occurrence of an event or contingency, or on the failure of an event or contingency to occur, an interest passing to the surviving spouse will terminate or fail, no [marital] deduction shall be allowed . . . with respect to such interest—

(A) if an interest in such property passes . . . from the decedent to any person other than the surviving spouse . . . ; and (B) by reason of such passing such person . . . may possess or enjoy . . . such property after . . . termination . . . of the interest . . . [of] the surviving spouse.

The above requirement is known as the "terminable interest rule" and can be paraphrased as follows. If property is passed by the decedent to the spouse in a manner such that it will pass to another person without being subject to gift tax or inclusion in the gross estate of the surviving spouse, then no marital deduction will be allowed as a result of the transfer of this property interest to the surviving spouse.

The most common example of this rule is the transfer by a decedent of a life income interest in property to the spouse, with the remainder to another individual, usually a child or other family member, upon the death of the spouse. Since the spouse has only a life interest, no interest survives her which would be included in her gross estate. Since the property passes to a person other than the spouse in a manner which would not require inclusion in the gross estate or the reporting of a taxable gift, the requirements of Section 2056 (b)(1) are met and no marital deduction will be allowed with

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23Section 2036 would not be operative here since it requires inclusion only if the decedent has retained a life interest in property.
respect to this transfer. The marital deduction could be salvaged, however if the spouse were given a general power of appointment over the remainder. Her interest would no longer be terminable, since Section 2041 would now require the property to be included in her gross estate.

An interest in property will also be terminable if the interest will terminate after a stated number of years or upon the happening of an event, such as a remarriage of the spouse. Section 2056(b)(3) provides, however, that a transfer to a spouse conditional upon the spouse's surviving the decedent for a period not to exceed six months is not a terminable interest if the spouse does survive the decedent for the required period of time.

The reason for this rule can be best understood by referring to the objective of the marital deduction. The purpose of the deduction was to equalize the estate tax treatment of residents of community property and noncommunity property states. In community property states, the wife's one-half of community property is not included in the husband's gross estate and can be passed to others only through taxable gift or through her gross estate. If a marital deduction were allowed in the noncommunity property states for property transferred to the spouse in such a way that it could later be transferred to other persons while escaping both gift taxes and estate taxes, an unfair advantage would be accorded to residents of such states. Therefore, to qualify
for the marital deduction, property must be transferred in such a manner that it must be either consumed by the surviving spouse, transferred by taxable gift, or included in the gross estate of the spouse.

**Other Observations on Marital Deduction Requirements**

An observation regarding property transfers which qualify for the marital deduction would seem to be appropriate at this point. The property transferred to the spouse does not have to consist of the decedent's separate property, but may consist of the decedent's share of community property. A transfer of this share of the community property which meets the passing requirement, is included in the decedent's gross estate, and is transferred in such a manner as to meet the terminable interest requirement could serve as a basis for the marital deduction. It must be borne in mind, however, that the marital deduction is limited to 50 per cent of the adjusted gross estate or $250,000, whichever is greater, with both the adjusted gross estate and the $250,000 being reduced by the amount of community property included in the gross estate. Therefore, except for small estates where the community property included in the gross estate is less than $250,000, no marital deduction will be allowed unless the gross estate includes noncommunity property, as there will be no adjusted gross estate.
This result can be illustrated by the following example. H and W are residents of a community property state. Upon H's death, his gross estate consists of his 50 per cent share of $1,200,000 of community property, which he bequeaths outright to W and $400,000 of noncommunity property, which he bequeaths to the couple's children. Under applicable state law and Section 2056(c)(2), administration expenses of $50,000 are allocated $30,000 to the community property and $20,000 to the separate property. H's will provides that all estate taxes and administrative expenses are to be paid out of the share passing to the spouse. The marital deduction for H's estate would be computed as follows:

Gross estate:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>H's share of community property</td>
<td>$600,000</td>
</tr>
<tr>
<td>H's noncommunity property</td>
<td>$400,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,000,000</strong></td>
</tr>
</tbody>
</table>

Less:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community property adjustment</td>
<td>$570,000</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>$50,000</td>
</tr>
<tr>
<td>Adjusted gross estate</td>
<td><strong>$380,000</strong></td>
</tr>
</tbody>
</table>

Qualifying transfers to spouse:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 per cent of community property</td>
<td>$600,000</td>
</tr>
</tbody>
</table>

Less:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taxes</td>
<td>$205,200</td>
</tr>
<tr>
<td>Administrative expenses</td>
<td>$50,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$255,200</strong></td>
</tr>
</tbody>
</table>

Tenative marital deduction:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 per cent of adjusted gross estate</td>
<td><strong>$190,000</strong></td>
</tr>
</tbody>
</table>

Minimum marital deduction

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>$250,000</strong></td>
</tr>
</tbody>
</table>

Less: Community property adjustment

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>570,000</strong></td>
</tr>
</tbody>
</table>

24 Computed from rate schedule in Section 2001 using a marital deduction of $190,000. If the qualifying transfer had been less than $190,000 after reduction for taxes a computation utilizing simultaneous equations would be required.
The marital deduction would be $190,000. All requirements for the deduction (passing, inclusion on gross estate, and absence of terminable interest) have been met by passing the community property to the spouse. The separate property included in the estate has generated an adjusted gross estate of $380,000. A marital deduction of 50 per cent of this amount is allowed.

One final point in regard to the marital deduction should be made. The deduction is not optional. Section 2056(a) requires that the taxable estate be reduced by transfers to the surviving spouse, subject to the limitations based on the adjusted gross estate and the minimum marital deduction. While the circumstances under which a waiver of the deduction would be economically feasible are quite limited, the executor of the estate has no such power, and the deduction must be claimed when all requirements are met.

The surviving spouse may, however, disclaim an interest in property passing to her, and defeat the marital deduction by defeating the passing requirement. Section 2518, which provides requirements for disclaimers, requires that the disclaimer be timely filed in writing, and that the property pass to another person not designated by the person making the disclaimer. This power to disclaim offers an opportunity for post-mortem tax planning when a decedent has provided for a marital deduction which proves to have undesirable tax consequences.

Prior Research on the Topic

There have been thousands of lines written about the marital deduction since its inception in 1948. There has, however, been limited discussion of the conditions under which it would be desirable to transfer property interests to a surviving spouse in amounts other than those which would qualify the estate for the maximum marital deduction. There has also been a very limited amount of substantive research in this area. While the vast majority of research and publication in this area has been oriented toward qualifying transfers for the maximum marital deduction, there have been those who have recognized that less than desirable results may be realized by transferring the exact amount of property necessary to claim the maximum marital deduction.

The earlier writings in this area generally recognized that the size of the estates of both the decedent and the surviving spouse were important factors in determining the size of the most beneficial transfer to the surviving spouse. In a 1958 article, Trachtman and Manning use an illustration to show that where both spouses have estates of $1,000,000, the transfer of 50 per cent of the estate of the first to die to the survivor will increase the total estate tax for the two estates by $22,500. They do question whether this "conclusion can be applied generally to all situations where a

husband and wife have equal estates." They also recognized that the extra tax may "represent a reasonable cost for the use of $177,000 of tax money" which will be saved if the maximum marital deduction is qualified in the first estate. They have thus implicitly recognized that investment rates of return of the surviving spouse and other potential beneficiaries are important when planning the marital deduction although they do not explore this idea further.

In a 1959 article, Sammond declares that "although the marital deduction has proved to be a substantial tax-savings device for many thousands of taxpayers, it is not a perfect instrument and it cannot be used indiscriminately." In 1964, Lewis also recognized the potential problems of unwise use of the marital deduction and stated that

... even though a property interest ... is considered to pass to the wife and to satisfy all the conditions necessary to qualify such interest for the federal estate tax marital deduction, it may not be advantageous to take the deduction. The wife's independent assets may be so substantial that the additional federal estate tax in her estate, resulting from the inclusion of the property subject to the marital deduction which has passed to her ... may more than offset the initial federal estate tax saving on the husband's estate. However, if the wife is young and has a relatively long life expectancy, the investment yield from such initial saving may partially or wholly compensate for the increase in the combined estate taxes in the husband's and wife's estates. And, the wife's invasion of the corpus of the marital deduction trust which may be authorized under the provisions of the husband's will, coupled with the spending or

27Ibid., p. 294.  
28Ibid.  
gifting of such withdrawn corpus during her lifetime, may reduce, or perhaps even eliminate, the additional federal estate tax in the wife’s estate when she dies and thus convert the initial federal estate tax saving into a real saving.  

Lewis has recognized several factors which may be important in determining the extent to which transfers should be made to a surviving spouse including the size of the decedent’s estate, the size of the estate of the spouse, the life expectancy of the spouse and the manner in which the spouse will utilize the property transferred. Lewis gives several examples illustrating the effect the interaction of various combinations of the estate sizes and levels of transfer to the surviving spouse. From these illustrations he reaches the conclusion that “sometimes it is and sometimes it is not advantageous to take the maximum . . . marital deduction in the husband's estate, [but] even if it is not advantageous to take a partial . . . deduction in such husband's estate.”

In his illustration Lewis uses the amount of total estate tax in the combined estates as his criteria in judging whether qualifying for the marital deduction is advantageous. He does not give any consideration to estate planning objectives such as maximizing wealth transferred to other beneficiaries.

While the articles discussed above are by no means an exhaustive survey of the research for this time period, they


31Ibid., p. 226.
are representative of the level of inquiry into utilization of the deduction for transfers to the surviving spouse. There was a general recognition that the maximum use of the deduction did not always result in the most advantageous estate tax plan, but there was no comprehensive inquiry into the interrelationships of the variables which determined the optimal use of the marital deduction. The major emphasis was on minimizing estate taxes, with very little consideration given to other tax planning objectives.

The most comprehensive research study in this area was conducted by Edward J. Schnee in 1974. In this study, Schnee developed a computer model to study the effect of the interaction of five variables on the optimum size transfer to a surviving spouse. The variables included in Schnee's model were size of the decedent's estate, size of the surviving spouse's estate, after-tax rate of return to surviving spouse, after-tax rate of return to other beneficiaries, and the life expectancy of the surviving spouse. Schnee chose the amount of wealth transferred to other beneficiaries from the estates of both spouses as the objective to be optimized by his model. The results of the study indicated that a 50 per cent transfer of the adjusted gross estate resulted in an optimal transfer of wealth to the other beneficiaries in only about 10 per cent of the cases. Optimal results were realized in

approximately 56 per cent of the cases, by making no transfers to the surviving spouse and foregoing the marital deduction entirely.  

While Schnee's study made a substantial contribution to our understanding of the problem of planning the optimal transfer to the surviving spouse, it appears to suffer from at least two deficiencies. First, Schnee limited the size of the estates studied to $2,000,000 or less. This figure includes the estates of the vast majority of the population, but encompasses only about 20 per cent of the progressive rate schedule which taxes estates at progressively larger rates until the maximum rate is reached for estates over $10,000,000. Thus, it is questionable whether the conclusions reached can be extended to larger estates in the high marginal tax brackets, where tax planning is most productive. Schnee also chose not to include a variable in his model for what seems to be an economic fact of life, the rate of inflation.

Schnee's study also was conducted prior to 1977, the point at which the Tax Reform Act of 1976 introduced a new unified rate schedule which makes marginal estate tax rates dependent on lifetime taxable gifts and introduces a highly progressive step in a tax rate structure, a jump from a marginal rate of 0 per cent for estates of $175,625 or less

33Ibid., p. 226.
to a marginal rate of 32 per cent for estates slightly in excess of this amount. This Act also coordinates the estate tax marital deduction with the gift tax marital deduction, and requires reduction of the estate tax marital deduction in some cases. The Act also introduces the concept of a minimum marital deduction of $250,000. The substantial changes in the statutes cast some doubt on the continuing validity of Schnee's conclusions.

Research and publications since the passage of Tax Reform Act of 1976 have been primarily concerned with unraveling the provisions of the Act, and very little substantive research into the effect it may have on the marital deduction as a tax planning tool has been forthcoming. Clay gives some examples of the interaction of the marital deduction and the new unified tax credit, and concludes "that utilization of the maximum marital deduction will not always be beneficial." In a similar study, Capouano and Rinsky demonstrate that, under the Tax Reform Act of 1976, a husband can now transfer to his surviving spouse amounts up to $607,250 completely free of estate and gift tax. They recognize, however, that such a transfer may be poor tax planning, since one of the goals of estate planning is to minimize the estate taxes assessed on both estates, not just the tax on the first to die.


Other articles of interest during this time period, which approach the topic from the same general point of view and reach substantially the same conclusions, are by Neis, Cunningham, Gamble, Trapp, and Rednor. These studies all recognize that the marital deduction is a powerful planning tool which must be carefully used. None, however, are a comprehensive study into the conditions under which transfers should be made or not made to the surviving spouse.

In summary, there has been much written about the subject of transfers to a spouse, but with the exception of Schnee's study, little research has been conducted on the topic, an omission which this study is designed to correct.

CHAPTER III

RESEARCH METHODOLOGY

The objectives of this study, as stated in Chapter I, were the following:

1. To develop a computer simulation model capable of determining the optimal transfer to the surviving spouse,

2. To develop decision criteria which will be helpful to taxpayers and their advisors in determining the optimal transfer to the surviving spouse, and

3. To reach a conclusion as to whether the marital deduction has equalized estate tax treatment between residents of community and noncommunity property states.

The goals of this chapter are twofold. First will be presented the steps followed in the development of the model. Once this has been accomplished, there will be presented the results of a preliminary study the purpose of which was to test the significance of the contribution of each of the economic variables chosen toward determination of the optimal transfer to the surviving spouse.
Development of the Model

The computer model was developed in the following steps:

1. The objective to be optimized was identified,
2. The economic variables which influence the objectives of the model were identified,
3. Mathematical formulas were developed to express the relationship between the economic variables, statutory requirements, and the objective chosen to be optimized, and
4. The mathematical formulas were expressed in a computer program in the COBOL programming language, suitable for processing on the IBM 360 computer.

Objective to Be Optimized

The taxpayer and his professional advisors may be faced with many, often conflicting, objectives when developing an estate tax plan. For most married individuals, the primary objective may well be to insure the financial and psychological security of the surviving spouse and other family members. For others the primary objective may be to insure that use and enjoyment of the property accumulated by the decedent is restricted to individuals of his choice or denied to others. For some, due to political or social ideologies, estate tax minimization may become a primary objective. For most, however, estate tax minimization will generally be a
secondary objective and is important only because minimization of estate taxes contributes to a more important primary objective, that of conserving wealth which can be passed on to those of the decedent's choice. Other individuals may have other objectives, and each estate plan must be formulated to fit the needs of the individual.

While all of the above objectives are valid and must be considered by those responsible for developing estate plans, a study of this type requires a more structured and quantitatively determinable objective. Therefore, the following objectives have been considered as candidates for optimization.

**Maximum transfer of wealth to spouse.**--It has been indicated above that one objective of estate planning may be to provide the surviving spouse with the highest degree of financial and psychological security possible. If the spouse is deemed to have the financial management ability necessary to wisely invest and preserve the assets, this objective can be achieved by transferring the entire estate of the decedent to the surviving spouse. Where the spouse is not blessed with management and investment abilities, substantially the same result can be achieved by placing the assets under the control of a qualified trustee, with the spouse as income beneficiary. To effect the maximum transfer, the spouse must, as a minimum, be given a power of appointment
to dispose of the assets by will. This will qualify the transfer for the marital deduction, minimize estate taxes in the decedent's estate and insure the maximum transfer of wealth to the trust for the spouse's benefit.

While this objective is perfectly valid, particularly for small estates where the need to provide for the surviving spouse may outweigh other planning objectives, it leaves little room for research since it will always be realized by transferring 100 per cent of the estate to the surviving spouse. This will result in the maximum marital deduction, the lowest possible tax on the decedent's estate and a maximum transfer of wealth to the spouse.

Minimization of total estate tax.--An estate planning objective often cited as primary is the minimization of the combined estate taxes in the estates of both spouses. The realization of this objective requires estate planning be viewed from the perspective of the combined estates of husband and wife. The utilization of tax savings provisions in the estate of the first to die can be considered satisfactory only if they do not increase the tax by a greater

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1 An exception would exist if part or all of the assets not qualifying for the marital deduction were bequeathed to charitable organizations. However, since the highest marginal tax rate is less than 100 per cent such transfers would reduce the wealth transferred to the spouse.

amount in the second estate. The marital deduction can be a powerful tool in realizing this objective. Since the estate of each spouse is taxed on separate progressive rate structures the deduction can often be used to transfer property from high marginal tax brackets in the estate of the first decedent to lower marginal rates in the second estate.

Undesirable consequences may result from an unyielding adherence to this objective, however. First, the minimization of tax will often require the transfer of property to the surviving spouse in order to qualify for the marital deduction. This may place property in the hands of a spouse unable or unwilling to wisely invest and maintain the property. The results may be the dissipation of the property with reduced benefits to both the spouse and other beneficiaries. While this consequence can be mitigated by the use of a marital trust and an independent trustee, the spouse as a minimum, must be given the power to dispose of the trust property by will. This may result in conflict with other estate planning objectives of the first decedent by passing property to individuals other than those chosen by him.

Another potential negative result of overemphasis on tax minimization is the failure to recognize the importance of the timing of tax payments. In some instances absolute minimization of taxes may require that some or all of the marital deduction be foregone in the estate of the first
decedent with a resulting larger tax payment at this time. Where the surviving spouse is elderly, with a limited life expectancy, this may not be of major importance. However, when the surviving spouse has a life expectancy of several years, the investment revenue lost on the funds used to make the earlier tax payment may exceed the increased taxes resulting from utilizing the marital deduction and reducing taxes in the first estate.

Maximum transfer of wealth to other beneficiaries.--A third objective which merits consideration is the arrangement of the affairs of the spouses in such a way that a maximum amount of wealth will be placed in the hands of the couple's chosen beneficiaries upon the death of the second spouse. Harris states, "the general purposes of all estate planning [is] so to arrange the affairs of the family unit as to obtain the maximum benefits of principal and income for the family and to the fullest extent possible pass on family property with the least diminution."\(^3\) This was the objective chosen to be optimized by Schnee in his 1974 study.\(^4\)

The realization of this objective and the realization of the objective discussed in the previous section, that of minimization of estate taxes, may occur concurrently in many

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cases. A reduction in the outflow of funds for tax payments will directly increase the funds available for transfer to the desired beneficiaries. As previously noted, however, minimization of taxes may place assets in the hands of those least qualified to invest and protect the assets. Also other factors, after-tax rates of return of the spouse and other beneficiaries, life expectancy of the spouse, and projected inflation rates must be considered before it can be determined if the estate plan which minimizes taxes will also maximize the transfer of wealth to other beneficiaries.

For purposes of this study, the objective chosen to be optimized is the latter of those discussed above, that of maximizing the transfer of wealth to other beneficiaries, measured as of the date of death of the last spouse to die. The choice of this objective does not mean that it is the only legitimate estate planning objective to be considered, however. The model will not tell an individual the most satisfactory plan for disposing of his estate. It can only indicate the size of the transfer to the surviving spouse which will result in the maximum transfer of wealth to secondary beneficiaries under a given set of economic parameters. If this objective is accepted as primary by the individual, then the model could provide the basis for his estate plan. If the individual considers other estate planning objectives to be of greater importance, the model
can still provide significant input into his decision making by indicating the opportunity cost of selecting alternate planning objectives.

**Selection of Variables**

The literature surveyed in the previous chapter and the discussion of estate planning objectives in the previous sections have isolated a number of variables which will influence the objective chosen for optimization in the model. In selecting variables for a model of this type, there is always a conflict between the necessity to include all variables which might have a material impact on the outcome and the desire to keep the model as compact as possible, to facilitate analysis of the results. For example, a model which contains 5 variables, each of which is assigned 3 values, will have 243 outcomes; but if the number of variables is increased to 8 and each is assigned 6 values, there will be 1,679,616 outcomes, a volume of data very difficult to analyze. The variables discussed below were chosen because they are those which previous studies and good judgment indicate should be influential in realizing the stated objective. Parenthetical abbreviations will be used to identify these variables in future analyses and discussions.

**Size of decedent's estate (DEST).**—The first value to be included in the model is the size of the decedent's estate. The size of the estate can be expressed in several
different ways (i.e., gross estate, adjusted gross estate, taxable estate). The adjusted gross estate has been chosen for use in the model. The choice of the gross estate for use in the model would necessitate the inclusion of variables for administration expenses, claims against the estate and losses during administration. This would substantially increase the number of cases to be analyzed. Since the adjusted gross estate can be estimated with reasonable accuracy in most instances it was felt the increased accuracy of the model would not justify the increase in data to be analyzed as a result of including these variables in the model.

The values assigned to this variable in the analyses will be $500,000, $2,000,000, $3,500,000, and $5,000,000. The minimum value of $500,000 was chosen to insure that a taxable estate would exist for the decedent in all cases. Under the Tax Reform Act of 1976, estates of up to $425,625 may be tax free if the marital deduction and unified credit are fully utilized. The maximum value coincides with the value of the taxable estate at which the maximum marginal tax rate is assessed. The values therefore encompass the entire range of the progressive rate structure.

Size of estate of surviving spouse (SFST).--The taxable estate of the surviving spouse measured at the date of death of the first spouse and before allowance for transfers from
the first decedent was used as the second variable in the model. The taxable estate was chosen as the variable measure for the spouse, since the adjusted gross estate has no meaning in the estate of an unmarried individual. The adjusted gross estate has meaning only in estates eligible to claim the marital deduction. It should be noted, however, that the taxable estate will be equal to the adjusted gross estate where no community property is included in the estate and no marital deduction or deduction for charitable transfers are claimed, conditions which will be imposed on the surviving spouse in this study. The values chosen for this variable are $500,000, $2,000,000, $3,500,000, and $5,000,000. The size of the spouse's estate may therefore be equal to, larger than, or less than the decedent's, at several different levels of estate size.

Life expectancy of surviving spouse (EXPC).--The life expectancy of the surviving spouse is important to the study for three reasons. First, it will determine the time period in which transfers to the spouse and other beneficiaries are invested before final measurement of the amount of wealth transferred to other beneficiaries is made. Second, the impact of inflation on the assets transferred will also be a function of the life expectancy of the spouse. Third,

5See discussion of limitations and simplifying assumptions in succeeding section.
Section 2013 allows a credit against the estate tax where property taxed in the estate of another decedent within the previous ten years is included in the gross estate. This credit is phased out over the ten-year period with a full credit for extra taxes paid if the property was transferred within two years of death, while the credit is only 20 percent of the extra tax if the property was received more than eight but less than ten years prior to death. This credit will therefore reduce the impact of the difference in marginal tax rates on transfers where the spouse's life expectancy is less than ten years. Values chosen for this variable are five, ten, and fifteen years. These values will provide input to the model for situations where the spouse has a relatively short life expectancy, as well as those cases where the life expectancy is of medium or long duration.

Average after-tax rate of return of surviving spouse (RET$_S$).

The rate of investment return to the surviving spouse is important to the study, since it will influence the extent to which the assets transferred to the spouse will accumulate and be available for transfer to the beneficiaries upon her death. This variable will also influence the amount of additional estate taxes payable upon the death of the spouse. After-tax rate of return was chosen to avoid the necessity for introducing an additional variable for spouses with different marginal tax rates. Values chosen for this
variable were 0 per cent, 10 per cent, and 20 per cent, to determine the effect of low, medium, and high rates of return on the determination of the optimal transfer to the spouse.

**Average after-tax rate of return to other beneficiaries (RETB).**—The after-tax rate of return of other beneficiaries will influence the extent to which assets not transferred to the spouse will accumulate by the time of her death. The values chosen for this variable are also 0 per cent, 10 per cent, and 20 per cent, to allow the construction of cases where the spouse's rate of return is less than, equal to, or greater than that of the other beneficiaries.

**Projected rate of inflation (INFL).**—The rate of inflation will influence the optimal size of transfer to the spouse, since the inflated value of both the spouse's original estate and transfers to the spouse will be taxed upon her death. Appreciation in assets due to inflation will escape this second tax for one or more generations when transferred directly to other beneficiaries. Values chosen for this variable were 5 per cent, 10 per cent, and 15 per cent. These values appear reasonable, since annual rates of inflation have been below 5 per cent only twice since 1969, and

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recent inflation rates have exceeded an annual rate of 12 per cent.  

**Lifetime gifts to spouse (GIFS).**—The Tax Reform Act of 1976 enacted Section 2056(c)(1)(B), which requires that the estate tax marital deduction be reduced by the amount by which the gift tax marital deduction exceeds 50 per cent of gifts to a spouse after 1976. Section 2523 contains the provision for the gift tax marital deduction, and is structured in such a way as to provide a deduction of exactly 50 per cent if gifts exceed $200,000. For gifts of less than $200,000, the deduction varies from 50 per cent to 100 per cent. Therefore, the estate tax marital deduction is affected by this provision only if lifetime gifts to the spouse were less than $200,000. Accordingly, values of $0, $50,000, and $150,000 were assigned to this variable.  

**Lifetime gifts to others (GIFO).**—The Tax Reform Act of 1976 replaced the separate tax rate schedules for gifts after 1976 and transfers at death with a single unified rate schedule. Estate tax marginal tax rates are not only dependent on the size of the decedent's estate, but are also influenced by gifts made by the decedent after 1976. It is therefore necessary that the model include a variable for

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such gifts of both the decedent and the surviving spouse. Section 2513 provides that where gifts are made by one spouse to a third party the gifts may be reported as if made one-half by each spouse. Since this election will usually result in the lowest tax payment at the time of the gift our model was developed on the assumption that this election was made with respect to all lifetime gifts made by either spouse during the decedent's lifetime. We will further assume no gifts are made by the surviving spouse after the death of the first spouse.

Values assigned to this variable are $0, $2,000,000, and $4,000,000.

Transfers to surviving spouse (TRAN).—The final variable entered into our model will be the percentage of the decedent's estate transferred to the surviving spouse. The objective of the model will be to determine the value of this variable which results in the maximum transfer of wealth to the beneficiaries from the two estates for a given combination of the other variables.

Values from 0 per cent to 100 per cent by increments of 25 per cent were assigned to this variable.

The model constructed for this study was designed to accept the values of the variables assigned as input values rather than to generate estimates. While it is believed that the values assigned are representative of tax planning
situations encountered in real life no significant research has been conducted into the problem of variable estimation. The objective of this study was not to generate forecasts of the values of these variables, but to determine the effect of the variables on estate planning decisions, once reasonable estimates have been made.

Development of Mathematical Equations

The next step in the development of the model was the introduction of mathematical equations to formalize the relationships between the statutory requirements of Sections 2001 through 2057 and the economic variables. To facilitate the development of these equations, Figure 1 was developed to present pictorially the process by which the model generates the total wealth transferred to other beneficiaries.

The model functions in the following manner. The minimum values of the variables discussed in the previous section are assigned to each variable, with the exception of the variable TRAN. This constitutes the first case. The value 0 per cent is then assigned to TRAN, and a series of computations, explained below, is made to determine the amount of wealth in the hands of the couple's beneficiaries upon the death of the second spouse. TRAN is then successively incremented to 25 per cent, 50 per cent, 75 per cent, and 100 per cent, and the computations are repeated for each value. The value of TRAN which results in the largest
amount of wealth in the hands of the beneficiaries is then chosen as the optimal transfer.

The value of a variable other than TRAN is then incremented to the next level, creating a new case, and the above computations are repeated. This process is repeated until a case has been formed for all possible combinations of the variables and the optimal transfer has been determined for each case.

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Fig. 1—Diagram of Computer Model
To illustrate the operation of the model, let us assume that the model variables have the values indicated in Table I. The variable TRAN is first set at zero, and the estate tax of $108,800 is computed on the estate of the decedent. Since none of the estate is transferred to the spouse, the remaining $391,200 passes to the other beneficiaries. With an average inflation rate of 5 per cent, this amount would accumulate to $391,200(1.25)^5 = $1,193,847 in the five years of the spouse's life expectancy. We would next compute the taxable value of the estate of the surviving spouse, which would be $500,000(1.05)^5 = $638,140. Tax on $638,140 would be $159,911, leaving $478,229 for transfer to other beneficiaries. Thus the total transferred to the beneficiaries, measured at the date of death of the spouse, would be $1,193,847 plus $478,229, or $1,672,076.

**TABLE I**

**VARIABLES IN ILLUSTRATIVE CASE**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEST</td>
<td>$500,000</td>
</tr>
<tr>
<td>SEST</td>
<td>500,000</td>
</tr>
<tr>
<td>EXPCE</td>
<td>5 years</td>
</tr>
<tr>
<td>RETS</td>
<td>20%</td>
</tr>
<tr>
<td>RETB</td>
<td>20%</td>
</tr>
<tr>
<td>INFL</td>
<td>5%</td>
</tr>
<tr>
<td>GIPS</td>
<td>-0-</td>
</tr>
<tr>
<td>GIFO</td>
<td>-0-</td>
</tr>
</tbody>
</table>

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^See section on limitations and simplifying assumptions p. 65.
The variable TRAN would then be incremented to 25 per cent and the calculations repeated. TRAN would be successively incremented to 50 per cent, 75 per cent, and 100 per cent, and the calculation repeated for each value. The five outcomes are presented in Table II.

**TABLE II**

**OUTPUT OF ILLUSTRATIVE CASE**

<table>
<thead>
<tr>
<th>Value of TRAN</th>
<th>Wealth Transferred to Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 per cent</td>
<td>$1,672,076</td>
</tr>
<tr>
<td>25 per cent</td>
<td>1,654,844</td>
</tr>
<tr>
<td>50 per cent</td>
<td>1,625,120</td>
</tr>
<tr>
<td>75 per cent</td>
<td>1,463,328</td>
</tr>
<tr>
<td>100 per cent</td>
<td>1,327,086</td>
</tr>
</tbody>
</table>

Thus, for this illustrative case, the optimal transfer to the surviving spouse is zero, since this results in the largest transfer of wealth to the beneficiaries, the objective chosen to be optimized.

The mathematical equations developed for the model are presented in Appendix A.

**Preparation of Computer Program**

The mathematical equations for the model were programmed in the COBOL programming language. This language was chosen for its flexibility in output format and because of the author's programming proficiency in this language, as compared to other programming languages whose use might have been appropriate for the computer model.
The computer program was verified by choosing a random sample of the cases studied and performing the calculations manually to assure that all necessary relationships had been included in the program.

A printout of the computer program is presented in Appendix B.

**Limitations and Simplifying Assumptions**

The development of a model of this type requires that limitations be placed on its scope, and that certain simplifying assumptions be made. This model is subject to the following limitations and assumptions.

**Behavioral variables.** The model includes only quantifiable economic variables. No allowance is made for behavioral reactions of the spouse or other beneficiaries to estate planning decisions based upon the model's output. The model does not attempt to assess, for example, the reaction of an elderly widow to the transfer to other beneficiaries of assets which she may rightly regard as belonging to her. Neither is any consideration given to the wishes of the decedent as to the use and enjoyment of his property. While these are certainly valid estate planning considerations, they are extremely difficult to quantify in a model of this type. This model will assess the economic consequences of various combinations of transfers to the spouse and other beneficiaries. Once those consequences
are known they must be weighed against other planning objectives in formulating an estate plan.

Exclusion of community property.—The model is limited to those estates which contain no community property. The primary objective of the study is to develop decision criteria for use of interspousal transfers in developing estate plans. These criteria can best be developed by limiting the model to those instances where the tax planner has the greatest amount of discretion in choosing the size of the transfer. Once these criteria are developed for this restricted case they can be extended to the more general case where both separate and community property are included in the gross estate. An expanded discussion of this topic is contained in Chapter V.

Type of assets included in estate.—The model does not distinguish between various types of assets (cash, securities, real estate, etc.) transferred to the spouse nor does it attempt to assess the desirability of the transfer of one asset over another. The model assumes a homogeneous asset set, infinitely divisible, which will appreciate at the rate of inflation and with sufficient liquidity to meet tax payments when due.

Mode of transfer of assets.—Assets may be transferred outright to the spouse or other beneficiaries or they may be
transferred in trust with the spouse and other beneficiaries receiving specified income and remainder interests. While the mode of transfer may determine the degree of control exercised over the assets and thus influence rates of return it should not substantially affect the output of our model as long as the effects are impounded in rates of returns. The model assumes all transfers of assets to be outright transfers to the recipient.

Spouse's living expenses.—The model assumes that the spouse will consume the entire income from her original estate and nothing else. Assets in her original estate plus any transfers from the decedent will appreciate due to inflation and assets received from the decedent will accumulate in accordance with the spouse's after-tax rate of return. Note that this limitation deals only with the property passing to the spouse and does not limit the economic interest of the spouse through income interests, powers of appointment and limited invasion of corpus, and others.

Estate tax statutes and tax rates.—The provisions of the Tax Reform Act of 1976 will become fully implemented for decedents dying after 1980. The model assumes the death of the first spouse occurs after this date. The model also assumes that the statutes and tax rates will remain unchanged for at least the duration of the spouse's life
expectancy. This assumption has been realistic in the past; major changes in the estate and gift tax law have occurred infrequently.

State death tax credit.—Section 2011 allows a credit against the estate taxes for state death taxes paid subject to a maximum based on the size of the taxable estate. While some states assess a death tax in excess of the allowable credit, many states have enacted what Stephens refers to as a "pick up" tax.\(^9\) Under these provisions, the state tax assessed is the maximum credit allowed against the federal tax. The effect is simply to shift a portion of the tax equal to the credit to the state, without increasing the overall tax. The model makes no provision for state death taxes or the state death tax credit, based upon the assumption that the state of domicile has enacted a "pick up" tax and that the federal tax before this credit represents the total tax burden to the estate.

Other assumptions.—The model also assumes that the surviving spouse will not remarry, and that all gifts included for the variable GIFO were made at least three years prior to the death of the first spouse. In the latter case, gifts made within three years of the death of the first spouse.

\(^9\)Stephens, op. cit., pp. 3-5.
spouse would be included in the gross estate of the decedent and would be impounded in that variable.

Presentation of Preliminary Results

The preceding section presented the stages through which the research model was developed. In this section are presented the results of a preliminary study whose objective was to evaluate whether each of the model variables makes a significant contribution toward determining the optimal transfer to the surviving spouse.

In this preliminary study, only the maximum and minimum values assigned to each variable were used, to generate a total of 256 cases. These cases were processed through the computer program, and the outcomes are presented in Table III.

**TABLE III**

**OUTCOMES OF PRELIMINARY STUDY**

<table>
<thead>
<tr>
<th>Optimal Transfer</th>
<th>Number of Cases</th>
<th>Per Cent of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 per cent</td>
<td>167</td>
<td>65.2</td>
</tr>
<tr>
<td>25 per cent</td>
<td>24</td>
<td>9.4</td>
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<tr>
<td>50 per cent</td>
<td>16</td>
<td>6.3</td>
</tr>
<tr>
<td>75 per cent</td>
<td>30</td>
<td>11.7</td>
</tr>
</tbody>
</table>

The total number of cases is 256, which is 100.0%

The significance of the contribution of each variable toward determining the optimal transfer was tested through
use of the subprogram CROSSTABS of the Statistical Package for the Social Sciences. This program provides a joint frequency distribution according to two or more variables. These joint frequency distributions can then be statistically analyzed to determine whether they are statistically independent. This program provides as part of the output a chi-square test of statistical independence, and it is this test which was used to evaluate the results of the preliminary study.

Joint frequency distributions were determined between each of the eight variables and the distribution of the optimal transfers as presented in Table III. These joint frequency distributions are presented in Table IV.

In testing the significance of the contribution of each variable to the determination of the optimal transfer to the spouse, we first formulate the null hypothesis for each variable (Ho): that no significant relationship exists between the variable and the placement of the case in the output groups (i.e., 0 per cent transfer, 25 per cent transfer, etc.). We then compute a value for chi-square by the formula

$$\chi^2 = \sum_i \frac{(O_i - E_i)^2}{E_i}$$

where $E_i$ equals the expected number of cases in each cell of the joint frequency distribution if no relationship exists between the variable and the outcomes, and $O_i$ equals

\[10\] Nie, op. cit., p. 218.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Optimal Transfers</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
<th>Total</th>
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</thead>
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<td>19</td>
<td>30</td>
<td>256</td>
</tr>
<tr>
<td>GIFS</td>
<td>$ 50,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>85</td>
<td>9</td>
<td>10</td>
<td>6</td>
<td>18</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>150,000</td>
<td>82</td>
<td>15</td>
<td>6</td>
<td>13</td>
<td>12</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>167</td>
<td>24</td>
<td>16</td>
<td>19</td>
<td>30</td>
<td>256</td>
</tr>
<tr>
<td>GIPO</td>
<td>$ -0-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>86</td>
<td>10</td>
<td>8</td>
<td>0</td>
<td>24</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>4,000,000</td>
<td>81</td>
<td>14</td>
<td>8</td>
<td>19</td>
<td>6</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>167</td>
<td>24</td>
<td>16</td>
<td>19</td>
<td>30</td>
<td>256</td>
</tr>
</tbody>
</table>
the observed number of cases in each cell. If the observed number of cases in each cell equaled the expected number of cases, there would be no relationship between the variable and the outcomes, and chi-square would be zero. Thus the larger the value of chi-square, the stronger the relationship between the variable and the outcomes. Since the values being tested are only a sample of a larger universe, we are also interested in the probability that any relationship indicated is the result of sampling error rather than a true relationship between the variables. Since the size of chi-square is influenced by both the number of cells in the joint frequency distribution and the difference between the expected number of cases and the observed number of cases, both must be considered in determining this probability. The effects of the number of cells is commonly referred to as the degrees of freedom, and is computed by \( d.f. = (n-1)(m-1) \) where \( n \) and \( m \) are the number of values for the two variables in the joint frequency distribution. Once the value of chi-square and the degrees of freedom are determined, a table of the chi-square distribution can be consulted to determine the probability that any indicated relationship is the result of sampling error.

We can now test \( H_0 \) by comparing this probability to a predetermined acceptable level of significance. For example, if we establish a level of significance of 10 per cent, we reject the null hypothesis for all variables where
chi-square indicates a probability of less than 10 per cent that the indicated relationship is from sampling error, and we accept an alternate hypothesis that a significant relationship exists between the variables.

To illustrate the above discussion, chi-square will be computed for the joint frequency distribution between DEST and TRAN which is presented in Table IV. First we compute the expected number of cases in each cell. For the value of TRAN equal to zero, there are 167 cases. We would therefore expect 83.5 cases in each cell in this column. Likewise, the expected value for TRAN equal to 25 per cent is 12 in each cell, for 50 per cent 8 in each cell, for 75 per cent 9.5 in each cell, and for 100 per cent 15 in each cell. Therefore,

\[ \chi^2 = \frac{(96-83.5)^2}{83.5} + \frac{(71-83.5)^2}{83.5} + \frac{(2-12)^2}{12} + \frac{(22-12)^2}{12} + \frac{(5-8)^2}{8} + \frac{(11-8)^2}{8} + \frac{(7-9.5)^2}{9.5} + \frac{(12-9.5)^2}{9.5} + \frac{(18-15)^2}{15} + \frac{(12-15)^2}{15} = 25.17494, \]

and

degrees of freedom = (2-1)(5-1) = 4.

Reference to a table of chi-square values indicates a probability of less than 1 in 10,000 that a chi-square value this large would be obtained where no relationship exists between DEST and TRAN. We would therefore reject Ho at any significance level of .001 per cent or greater.
The output of the CROSSTABS program provides chi-square, degrees of freedom and significance levels. These are summarized in Table V for the variables in the model.

**TABLE V**

**CHI-SQUARE ANALYSIS OF VARIABLES**
**PRELIMINARY STUDY**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi-Square</th>
<th>Degrees of Freedom</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEST</td>
<td>25.17</td>
<td>4</td>
<td>0.0000</td>
</tr>
<tr>
<td>SEST</td>
<td>10.91</td>
<td>4</td>
<td>0.0275</td>
</tr>
<tr>
<td>EXPC</td>
<td>23.80</td>
<td>4</td>
<td>0.0001</td>
</tr>
<tr>
<td>RETS</td>
<td>77.70</td>
<td>4</td>
<td>0.0000</td>
</tr>
<tr>
<td>RETB</td>
<td>92.05</td>
<td>4</td>
<td>0.0000</td>
</tr>
<tr>
<td>INFL</td>
<td>8.50</td>
<td>4</td>
<td>0.0749</td>
</tr>
<tr>
<td>GIFS</td>
<td>6.33</td>
<td>4</td>
<td>0.1756</td>
</tr>
<tr>
<td>GIFO</td>
<td>30.62</td>
<td>4</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

A predetermined significance level of 10 per cent was established to test the relationship between the model variable and the optimal transfers. Based on the summary in Table V, we reject Ho for all variables except GIFS, and accept an alternate hypothesis that a significant relationship exists between these variables and the optimal transfers. Ho is accepted for the variable GIFS, since there is a probability of over 17 per cent that the difference between expected and observed numbers of cases in the cells is a result of sampling error, and this variable has no power to determine optimal transfers. This variable was therefore eliminated from the model for all further analyses.
Summary

In this chapter were presented the steps followed in the development of the computer model. Alternate taxpayer objectives have been discussed as candidates for optimization, and the one which was believed to best represent the goal of most estate tax planning was selected. The economic variables which the literature has indicated would have an impact on the realization of this objective have been isolated and discussed. A limited number of cases were then formulated and processed through the model to test whether the variables did indeed have a significant impact on the objective of the model, that of determining the interspousal transfer which would result in the maximum amount of wealth in the hands of secondary beneficiaries.

The results of this preliminary study indicate that seven of the variables tested had a significant impact upon the determination of the optimal interspousal transfer. One variable, lifetime gifts to a spouse after 1976, failed to exert a significant effect on the outcomes, and was eliminated from the model.
CHAPTER IV

RESULTS OF THE STUDY

The first goal of this chapter will be to present the results of a study of the relationship between the seven economic variables and the optimal transfer to a surviving spouse. In this chapter will also be developed decision criteria to guide individuals and their professional advisors in the development of their estate plans. Once this has been accomplished, the model outcomes will be further analyzed, and a conclusion will be presented as to whether equity between the common law states and community property states in the application of the estate tax has been realized.

Presentation of Results of the Study

The results of the preliminary study in the previous chapter indicated that all the economic variables except GIFS made a significant contribution to the determination of the optimal size transfer to the surviving spouse. A value of zero was assigned to GIFS and an expanded group of cases was formed, assigning all values discussed in Chapter III to the remaining seven variables. This resulted in 3,888 cases ($4^2 \times 3^5$), representing all possible combinations of the values assigned to these variables. These variables were
then processed through the computer model, with the results presented in Table VI.

**TABLE VI**

**OUTCOMES OF THE STUDY**

<table>
<thead>
<tr>
<th>Optimal Transfer</th>
<th>Number of Cases</th>
<th>Per Cent of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 per cent</td>
<td>2,516</td>
<td>64.7</td>
</tr>
<tr>
<td>25 per cent</td>
<td>189</td>
<td>4.9</td>
</tr>
<tr>
<td>50 per cent</td>
<td>655</td>
<td>16.8</td>
</tr>
<tr>
<td>75 per cent</td>
<td>135</td>
<td>3.5</td>
</tr>
<tr>
<td>100 per cent</td>
<td>393</td>
<td>10.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,888</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Joint frequencies were then computed for these cases, using the CROSSTABS program. These joint frequencies are presented in Table VII, and chi-square values, degrees of freedom, and significance levels for the variables are presented in Table VIII. The significance levels indicate that we can once again reject Ho for all values at a significance level of .001 per cent. While not strictly comparable, due to varying degrees of freedom, the magnitude of the chi-square values indicates that the after-tax returns of the spouse and the beneficiaries exert the greatest influence on the size of the optimal transfer to the surviving spouse. The relatively low chi-square value for INFL would tend to substantiate what was initially indicated in the preliminary
### Table VII
**Joint Frequency Distributions**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Optimal Transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td><strong>DEST</strong></td>
<td></td>
</tr>
<tr>
<td>$ 500,000</td>
<td>701</td>
</tr>
<tr>
<td>2,000,000</td>
<td>650</td>
</tr>
<tr>
<td>3,500,000</td>
<td>604</td>
</tr>
<tr>
<td>5,000,000</td>
<td>561</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
</tr>
<tr>
<td><strong>SEST</strong></td>
<td></td>
</tr>
<tr>
<td>$ 500,000</td>
<td>505</td>
</tr>
<tr>
<td>2,000,000</td>
<td>653</td>
</tr>
<tr>
<td>3,500,000</td>
<td>679</td>
</tr>
<tr>
<td>5,000,000</td>
<td>579</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
</tr>
<tr>
<td><strong>EXPC</strong></td>
<td></td>
</tr>
<tr>
<td>5 years</td>
<td>852</td>
</tr>
<tr>
<td>10 years</td>
<td>824</td>
</tr>
<tr>
<td>15 years</td>
<td>840</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
</tr>
<tr>
<td><strong>RETS</strong></td>
<td></td>
</tr>
<tr>
<td>0 Per Cent</td>
<td>1,227</td>
</tr>
<tr>
<td>10 Per Cent</td>
<td>852</td>
</tr>
<tr>
<td>20 Per Cent</td>
<td>437</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
</tr>
<tr>
<td><strong>RETB</strong></td>
<td></td>
</tr>
<tr>
<td>0 Per Cent</td>
<td>403</td>
</tr>
<tr>
<td>10 Per Cent</td>
<td>860</td>
</tr>
<tr>
<td>20 Per Cent</td>
<td>1,253</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
</tr>
</tbody>
</table>
study: the rate of inflation has the least influence of any of the variables on the size of the optimal transfer to the surviving spouse. These indications will be explored further in the following section.

TABLE VIII
CHI-SQUARE ANALYSIS OF VARIABLES

<table>
<thead>
<tr>
<th>Variable</th>
<th>Chi-Square</th>
<th>Degrees of Freedom</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEST</td>
<td>173.13</td>
<td>12</td>
<td>0.0000</td>
</tr>
<tr>
<td>SEST</td>
<td>329.82</td>
<td>12</td>
<td>0.0000</td>
</tr>
<tr>
<td>EXPC</td>
<td>434.62</td>
<td>8</td>
<td>0.0000</td>
</tr>
<tr>
<td>RETS</td>
<td>1,191.18</td>
<td>8</td>
<td>0.0000</td>
</tr>
<tr>
<td>RETB</td>
<td>1,564.30</td>
<td>8</td>
<td>0.0000</td>
</tr>
<tr>
<td>INF</td>
<td>70.15</td>
<td>8</td>
<td>0.0000</td>
</tr>
<tr>
<td>GIFO</td>
<td>343.28</td>
<td>8</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
While the chi-square values for DEST, SEST, RETS, and RETB all indicate a significant impact on the size of the optimal marital deduction, it might be theorized that the relative values of these variables would be of more significance than the absolute values. To test this theory, two new variables were created from the existing variables. The first new variable was created from DEST and SEST, and has three values, depending on whether DEST is greater than, equal to, or less than SEST. This variable is abbreviated as DIFF. The second new variable (abbreviated as DIFO) also has three values, depending on whether RETS is greater than, equal to, or less than RETB. Frequency distributions between these new variables and the optimal outcomes were then computed, and are presented in Table IX.

**TABLE IX**

JOINT FREQUENCY DISTRIBUTIONS ON DIFF AND DIFO

<table>
<thead>
<tr>
<th>Variable</th>
<th>0%</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEST &gt; SEST</td>
<td>813</td>
<td>169</td>
<td>280</td>
<td>67</td>
<td>129</td>
<td>1,458</td>
</tr>
<tr>
<td>DEST = SEST</td>
<td>655</td>
<td>12</td>
<td>166</td>
<td>34</td>
<td>105</td>
<td>972</td>
</tr>
<tr>
<td>DEST &lt; SEST</td>
<td>1,048</td>
<td>8</td>
<td>209</td>
<td>34</td>
<td>159</td>
<td>1,458</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
<td>189</td>
<td>655</td>
<td>135</td>
<td>393</td>
<td>3,888</td>
</tr>
<tr>
<td>DIFO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RETS &gt; RETB</td>
<td>83</td>
<td>33</td>
<td>652</td>
<td>135</td>
<td>393</td>
<td>1,296</td>
</tr>
<tr>
<td>RETS = RETB</td>
<td>1,142</td>
<td>151</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1,296</td>
</tr>
<tr>
<td>RETS &lt; RETB</td>
<td>1,291</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1,296</td>
</tr>
<tr>
<td>Total</td>
<td>2,516</td>
<td>189</td>
<td>655</td>
<td>135</td>
<td>393</td>
<td>3,888</td>
</tr>
</tbody>
</table>
Finally, three more frequency distributions were computed to examine the interaction between DIFF and DIFO. A joint frequency distribution for DIFF and the optimal outcomes was computed for all cases where RETS was greater than RETB, another where the two rates were equal, and a third where RETS was less than RETB. These joint frequency distributions are presented in Table X.

**TABLE X**

**JOINT FREQUENCY DISTRIBUTIONS FOR DIFF CONTROLLED FOR DIFO**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Optimal Transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>RETS is Greater Than RETB:</td>
<td></td>
</tr>
<tr>
<td>DEST &gt; SEST</td>
<td>0</td>
</tr>
<tr>
<td>DEST = SEST</td>
<td>7</td>
</tr>
<tr>
<td>DEST &lt; SEST</td>
<td>76</td>
</tr>
<tr>
<td>Total</td>
<td>83</td>
</tr>
<tr>
<td>RETS is Equal to RETB:</td>
<td></td>
</tr>
<tr>
<td>DEST &gt; SEST</td>
<td>332</td>
</tr>
<tr>
<td>DEST = SEST</td>
<td>324</td>
</tr>
<tr>
<td>DEST &lt; SEST</td>
<td>486</td>
</tr>
<tr>
<td>Total</td>
<td>1,142</td>
</tr>
<tr>
<td>RETS is Less Than RETB:</td>
<td></td>
</tr>
<tr>
<td>DEST &gt; SEST</td>
<td>481</td>
</tr>
<tr>
<td>DEST = SEST</td>
<td>324</td>
</tr>
<tr>
<td>DEST &lt; SEST</td>
<td>486</td>
</tr>
<tr>
<td>Total</td>
<td>1,291</td>
</tr>
</tbody>
</table>
Development of Decision Criteria

The second goal of this chapter is to present decision criteria which can serve as a guide to taxpayers and their advisors in estate plan development. The results presented in Table X serve as the initial base for the development of these criteria. We can segment the output of this table into three major areas, depending on whether the after-tax rate of return of the spouse is greater than, equal to, or less than that of the beneficiaries. These areas can be further subdivided, depending on whether the decedent’s estate is greater than, equal to, or less than that of the surviving spouse. This results in nine different situations which may be faced by the estate planner, if he looks at only these four variables. In four of the nine situations, these four variables provide definitive guides to the size of the optimal transfer. In one situation, these variables provide guidance except in some extreme cases, while in four situations these variables provide less than desirable results, and the remaining variables, EXPC, INFL, and GIPO must be introduced to arrive at useful decision criteria. Each of the nine combinations of the four variables is discussed below.

After-Tax Rate of Return of Spouse Less Than After-Tax Rate of Return of Beneficiaries

Decedent’s estate less than that of surviving spouse.—When this combination of variables exists, make no transfer
of assets to the surviving spouse. This was true for all 486 cases in the study where this combination of variables existed. To make a transfer to the spouse would place the assets in the hands of the individual least qualified to invest them. It would also transfer taxability of assets from the relatively lower marginal tax rates of the decedent's estate into higher marginal tax rates in that of the surviving spouse. These two adverse results outweigh any additional investment income which would be generated by claiming the marital deduction and reducing tax payments in the first estate.

**Decedent's estate equal to that of surviving spouse.** Once again this combination of variables provides a definitive guide to the size of the optimal transfer. In all 324 cases where this combination of variables existed, most favorable results were realized by transferring none of the assets to the surviving spouse. The reasons presented in the previous subsection are equally appropriate to this case.

**Decedent's estate greater than that of surviving spouse.** In all but 5 of 486 cases where this combination of variables existed, optimal results were obtained by transferring no assets to the surviving spouse. In these cases, the benefits derived by transferring taxability of assets from the relatively high marginal tax brackets of the decedent's estate to lower marginal rates in the spouse's estate, and the delay
in timing of tax payments through use of the marital deduction, could not offset the adverse consequences of placing the assets in the hands of the spouse whose after-tax rate of return is less than that of other beneficiaries. In the five cases where it was desirable to make a transfer, the optimal amount was a 25 per cent transfer. An analysis of these five cases shows that in each case the decedent's estate was $5,000,000 while the spouse's estate was $500,000. Thus, there was a very substantial difference in estate size. Also in each of these five cases, the surviving spouse's life expectancy was at the minimum value considered in the study, five years. Thus in this case, the tax saving from the very large difference in marginal tax rates in the two estates was sufficient to overcome the adverse consequences of placing the assets in the hands of the spouse with a low after-tax rate of return. This is true, however, only where the spouse has a relatively short life expectancy and the loss of investment revenue will be of limited duration.

We can therefore state the following decision criterion for this combination of variables. Make no transfer of assets to the surviving spouse unless the decedent's estate is substantially larger than that of the surviving spouse (this study would indicate at least seven times larger, since the next lowest value for DEST was $3,500,000, which is seven times the size of the estate of the surviving spouse, where
any transfers were optimal) and the spouse has a minimal life expectancy.

**After-Tax Rate of Return of Spouse Equal to After-Tax Rate of Return of Beneficiaries**

**Decedent's estate less than that of surviving spouse.**—No transfer should be made to the surviving spouse when this combination of variables exists. This was true for all 486 cases in the study where such combination occurs. The controlling factor here is the difference in marginal tax rates. The benefits of claiming the marital deduction and delaying payment of taxes are outweighed by the increased taxes which would result from moving assets taxed at relatively low marginal rates in the decedent's estate into the higher marginal rates of the estate of the surviving spouse.

**Decedent's estate equal to that of surviving spouse.**—The conclusions reached and the decision criteria developed for the preceding subsection are also appropriate here. There were 324 cases in this group, and in each case the optimal transfer to the surviving spouse was zero. Therefore, no transfer of assets to the surviving spouse would be advisable when these conditions are anticipated.

**Decedent's estate greater than that of surviving spouse.**—The decision criteria become less clearly defined for this combination of after-tax returns and estate sizes, and the other model variables have a more pronounced effect on the
size of the optimal transfer. For this group, a zero transfer was optimal for 332 cases, or about 68 per cent of the total of 486; a 25 per cent transfer was optimal for 151 cases, or about 31 per cent; and a 50 per cent transfer was optimal for three cases, or about 1 per cent. An analysis of the three cases where a 50 per cent transfer was optimal reveals that in all three DEST was $5,000,000 and SEST was $500,000. Also, in all three cases the spouse had the minimum life expectancy of five years, the inflation rate was also at a minimum of 5 per cent, and both after-tax rates of return were zero.

An analysis of the 151 cases where a 25 per cent transfer was optimal reveals that in 135 of the cases, the ratio of the DEST to SEST was four to one or greater, and in the remaining cases the ratio was two and one half to one. In this latter group of sixteen cases, the life expectancy was at the minimum of five years in all but three cases. In these three cases, and in all but five of the other thirteen cases, the rate of inflation was at the minimum of 5 per cent.

Therefore the following decision criteria for this group of cases can be constructed. Make a 50 per cent transfer only if the ratio of the decedent's estate to the estate of the surviving spouse exceeds seven to one, the spouse's life expectancy is five years or less, the anticipated rate of inflation is 5 per cent or less, and both surviving spouse and beneficiaries have minimal rates of return. While it is
difficult to define precise criteria for cases where a 25 per cent transfer is optimal, the characteristics of these cases include a high ratio (7-to-one or greater) of DEST to SEST, or a moderately high (2½-to-1 or greater) DEST to SEST ratio, with either EXPC or INFL, or both, at minimum levels. In a small number of cases, lifetime gifts had an impact on this group, with maximum gifts tending to place a case in this group while medium or minimal gifts tended to place a case in the zero transfer group. The explanation for this last effect lies in the fact that very large gifts tend to push the marginal rates in both estates to the maximum marginal rates, thus tending to equate the marginal rates in the two estates and lessening the impact of marginal rates of tax on the transfer from a large estate to a smaller one.

**After-Tax Rate of Return of Spouse Greater Than After-Tax Rate of Return of Beneficiaries**

Decision criteria become more difficult to develop for the remaining cases, those where the spouse's after-tax rate of return exceeds that of other beneficiaries. As indicated by Table X, the optimal transfers are much more widely distributed than in the cases where the rates of return were equal, or where that of the beneficiaries was greater than that of the spouse. The impact of rates of return on the size of the optimal transfer is demonstrated quite forcefully, however, by comparing this group of cases with the other two groups. Where RETB equaled or exceeded RETS, a
transfer of any size produced optimal results in only 159 cases out of a total of 2,592 cases, or on only about 6 per cent of the cases. In only three cases (.1 per cent) was a transfer as large as 50 per cent optimal. However, in this group, where RETS exceeds RETB, the size of the optimal transfer was 50 per cent, or greater, in 1,180 cases out of a total of 1,296, or about 91 per cent of the cases. There is, therefore, an almost complete reversal of results when RETS advances past RETB.

Another point which should be recognized while interpreting results for this group of cases is that this situation is less likely to occur in actual practice than is the case where RETB equals or exceeds RETS. An elderly widow is more likely to invest conservatively and realize low rates of return than are younger, more aggressive individuals, who will generally comprise the other beneficiaries.

Since DIFF and DIFO did not yield definitive results for this group of cases, additional joint frequency distributions were constructed for this group for EXPC, INFL, and GIFO. These joint frequency distributions are presented in Tables XI, XII, and XIII. From these tables and Table X have been developed the following general decision criteria for this group.

**Decedent's estate less than that of surviving spouse**.-- In this group of cases, a transfer of less than 50 per cent was optimal in 84 out of 486 cases. Reference to Table XI
indicates that in eighty-one of the eighty-four cases, the spouse's life expectancy was the minimum of five years, while in the other three cases, the life expectancy was ten years.

TABLE XI

JOINT FREQUENCY DISTRIBUTION BETWEEN EXPC AND TRAN, RETS GREATER THAN RETB

<table>
<thead>
<tr>
<th>Variable</th>
<th>Optimal Transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>EXPC (DEST is Greater Than SEST:)</td>
<td></td>
</tr>
<tr>
<td>5 yrs.</td>
<td>0</td>
</tr>
<tr>
<td>10 yrs.</td>
<td>0</td>
</tr>
<tr>
<td>15 yrs.</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
</tr>
<tr>
<td>DEST is Equal to SEST:</td>
<td></td>
</tr>
<tr>
<td>5 yrs.</td>
<td>7</td>
</tr>
<tr>
<td>10 yrs.</td>
<td>0</td>
</tr>
<tr>
<td>15 yrs.</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
</tr>
<tr>
<td>DEST is Less Than SEST:</td>
<td></td>
</tr>
<tr>
<td>5 yrs.</td>
<td>73</td>
</tr>
<tr>
<td>10 yrs.</td>
<td>3</td>
</tr>
<tr>
<td>15 yrs.</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
</tr>
</tbody>
</table>

This indicates that the adverse effect of transferring assets from the relatively low marginal tax rates of the decedent's estate to the higher marginal tax rates in the estate of the surviving spouse can be overcome by the high rates of return.
only where the spouse has a medium or long life expectancy in which to invest the assets.

The general decision criteria for this group of cases can now be stated. A transfer of 50 per cent or more of the decedent's estate should be made unless the spouse has a very short life expectancy. Where the spouse has a minimal life expectancy, computations should be made to determine if a smaller transfer will provide optimal results.

Decedent's estate equal to that of surviving spouse.—A transfer of less than 50 per cent was optimal in this group in only nineteen cases out of a total of 324. Reference to Table XII again indicates that these cases all occur where EXPC is five years with only one exception. Reference to Table XIII reveals that all nineteen occur where GIFO is $2,000,000 or less. The discussion from the previous subsection and the decision criteria developed therein are therefore also applicable to this group of cases. There can be added to the decision criteria a provision that less than a 50 per cent transfer would be considered only where either no lifetime gifts have been made, or where limited gifts have been made.

Decedent's estate greater than that of surviving spouse.—For this group of cases a zero transfer was never optimal, and a transfer of 25 per cent was optimal in only thirteen cases out of a total of 486. For all thirteen cases, EXPC was five
TABLE XII

JOINT FREQUENCY DISTRIBUTION BETWEEN INFL AND TRAN RETS GREATER THAN RETB

<table>
<thead>
<tr>
<th>Variable</th>
<th>Optimal Transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>INFL</td>
<td></td>
</tr>
<tr>
<td>DEST is Greater Than SEST:</td>
<td></td>
</tr>
<tr>
<td>5 Per Cent</td>
<td>0</td>
</tr>
<tr>
<td>10 Per Cent</td>
<td>0</td>
</tr>
<tr>
<td>15 Per Cent</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
</tr>
<tr>
<td>DEST is Equal to SEST:</td>
<td></td>
</tr>
<tr>
<td>5 Per Cent</td>
<td>0</td>
</tr>
<tr>
<td>10 Per Cent</td>
<td>2</td>
</tr>
<tr>
<td>15 Per Cent</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
</tr>
<tr>
<td>DEST is Less Than SEST:</td>
<td></td>
</tr>
<tr>
<td>5 Per Cent</td>
<td>20</td>
</tr>
<tr>
<td>10 Per Cent</td>
<td>26</td>
</tr>
<tr>
<td>15 Per Cent</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
</tr>
</tbody>
</table>

years, and in eleven of the thirteen cases, GIPO was zero.

Analysis of these thirteen cases reveals that a transfer of 25 per cent is optimal where a transfer of this size tends to equalize the size of the two taxable estates. Thus a larger transfer would move assets taxed at lower marginal rates in the first estate into higher marginal rates in the second estate. This effect can be overcome only where the spouse has a medium or long life expectancy. For this group
one should therefore always make a transfer of at least 25 per cent to the surviving spouse. A transfer of less than 50 per cent should be considered only where the spouse has a minimal life expectancy, and where either no lifetime gifts have been made or limited lifetime gifts have been made.

For all three groups where RETS exceeds RETB, the likelihood that a transfer of more than 50 per cent will be optimal increases as the life expectancy of the spouse increases.
Where EXPC is five years, a transfer in excess of 50 per cent was optimal in only 45 out of 432 cases. Where EXPC is fifteen years, a transfer in excess of 50 per cent was optimal 336 times out of 432 cases. Thus, as the life expectancy of the spouse increases it may be beneficial to transfer amounts to the spouse in excess of the amount allowed as a marital deduction. This will result in these assets being taxed in both estates, but this adverse consequence is more than offset by the spouse's higher earning power over a longer period of time.

Decision criteria for this group of cases have been much less definite than for the cases where RETB was greater than or equal to RETS. In these cases, the relative after-tax rates of return and estate sizes become less definite and the other variables, particularly the spouse's life expectancy, begin to exert a more pronounced influence on the size of the optimal transfer. This results in a wider distribution of outcomes and make the decision criteria less precise.

It is in circumstances such as these that a model of the type developed in this study can be particularly useful. Hand calculations in this area are time-consuming and laborious, and only a limited number of alternatives can be investigated. With a computer model, however, the almost instantaneous turnaround time allows the estate planner to investigate different levels of transfer to the spouse based on estimates of
the model variables. Sensitivity analysis can also be used to vary the model variables over a range of values, to evaluate the effect of estimation errors on optimal outcomes.

Probability distributions could also be introduced for the variables least susceptible to precise evaluation, and expected values could be computed for transfers of varying magnitude. Appendix C contains an illustration of how subjective probability distributions could be incorporated in the model.

**Summary of Decision Criteria**

The decision criteria developed in this section can be summarized as follows:

(1) Where RETS is less than or equal to RETB, and DEST is less than or equal to SEST, make no transfer to the surviving spouse.

(2) Where RETS is less than or equal to RETB, and DEST is greater than SEST, make a 25 per cent transfer to the surviving spouse if there is a substantial difference between DEST and SEST and if both EXPC and INFL are at minimal levels. Make a 50 per cent transfer if there is at least a 7-to-1 ratio between DEST and SEST, both EXPC and INFL are at minimal levels, and the rates of return are minimal for both the spouse and other beneficiaries. A transfer in excess of 50 per cent is never optimal.

(3) Where RETS is greater than RETB, decision criteria become less definitive, but as a general guideline, a transfer
of less than 50 per cent will be optimal only where the spouse has a short life expectancy and either medium or small amounts of lifetime gifts have been made. A transfer of more than 50 per cent will generally be optimal only where the spouse has a life expectancy in excess of five years.

**Multiple Discriminant Analysis**

One additional test was performed to establish the relationship between the variables used in the study and optimal transfers to a surviving spouse. Three of the original variables, EXPC, INFL, and GIFO, plus the two derived variables DIFF and DIFO, were processed through subprogram DISCRIMINANT of the Statistical Package for the Social Sciences. This program performs a multiple discriminant analysis which tests the ability of a group of discriminating variables (EXPC, INFL, GIFO, DIFF, AND DIFO) to distinguish statistically between two or more groups (0 per cent transfers, 25 per cent transfers, etc.) of cases. Discriminant analysis does this by forming one or more linear combinations of the variables called discriminant functions of the form

$$D = a_1 Z_1 + a_2 Z_2 + \ldots + a_m Z_m,$$

where $D$ is the score for the case on the discriminant function, the $Z$'s are the standardized values of the discriminating variables, and the $a$'s are weighting coefficients for
the variables. The variables are standardized by the transformation

\[ Z = \frac{X - \bar{X}}{S}, \]

where \( X \) is the raw value, \( \bar{X} \) the mean value, and \( S \) the standard deviation for the variable. This converts the distribution for each variable into a distribution with a mean value of zero and a standard deviation of one. With all variables stated in the same unit, the coefficient of each variable indicates the relative contribution of the variable to the case score for the discriminant function. Where the variables have the capability of discriminating between groups, the scores for cases within a group should be of similar magnitude, while the scores of cases in different groups should differ significantly on at least one of the discriminant functions. The number of functions will be either one less than the number of groups or one less than the number of variables, whichever is smaller. In this study, four functions were derived but only three were used to analyze the data, since these three functions contained in excess of 98 per cent of the total discriminatory power of the functions. The coefficients and relative discriminatory power of these functions are presented in Table XIV.

The statistics of multiple discriminant analysis assume that the variables have a multivariate normal distribution and

\(^{1}\text{Nie, op. cit., pp. 434-435.}\)
TABLE XIV
STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Function</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>DIFF</td>
<td>-0.11822</td>
<td>0.50091</td>
<td>0.11138</td>
<td></td>
</tr>
<tr>
<td>EXPC</td>
<td>0.05885</td>
<td>0.85594</td>
<td>-0.20529</td>
<td></td>
</tr>
<tr>
<td>DIFO</td>
<td>-0.98992</td>
<td>-0.01205</td>
<td>-0.06042</td>
<td></td>
</tr>
<tr>
<td>INFL</td>
<td>-0.03732</td>
<td>-0.03316</td>
<td>0.02967</td>
<td></td>
</tr>
<tr>
<td>GIPO</td>
<td>0.03453</td>
<td>-0.12380</td>
<td>-0.97005</td>
<td></td>
</tr>
<tr>
<td>Relative Percentage</td>
<td>89.9%</td>
<td>5.62%</td>
<td>2.71%</td>
<td></td>
</tr>
</tbody>
</table>

equal variance-covariance matrices within each group. The first assumption is violated in this study, since all variables are discrete rather than continuous. No test was made of compliance with the second assumption. However, Nie states that "the technique is very robust and these assumptions need not be strongly adhered to."²

The absolute value of the coefficients of the standardized discriminant functions indicate the relative ability of the variables to discriminate between groups. An analysis of Function 1 confirms what was concluded in the previous section; the relative rates of return (DIFO) are the most powerful variables in determining the optimal transfer to the surviving spouse. This variable has a coefficient

²Ibid., p. 435.
with an absolute value of .98992, while the next most powerful discriminating variable DIFF has a coefficient with an absolute value of .11883. The other variables have relatively little discriminatory power. The coefficient of .85594 for EXPC in Function 2 would indicate that where DIFF and DIPO are not determinative, the spouse's life expectancy is the next most powerful discriminator, while the absolute of .97005 for GIFO in Function 3 indicates that where these three variables are not determinative, lifetime gifts would have some discriminating power. The low values of the coefficients of INFL verify what was concluded earlier: that the rate of inflation has a relatively small impact on the size of the optimal transfer. This agrees almost precisely with the decision criteria developed in the preceding section. Thus, the analysis of the joint frequency distributions in the previous section is confirmed by the multiple discriminant analysis.

Equity Between Common Law and Community Property States

One of the objectives established for this study was to reach a conclusion as to whether the marital deduction has resulted in equitable treatment for citizens of common law states as compared to citizens of community property states in the application of the estate tax statutes. The *American Heritage Dictionary* defined equity as "the state, ideal or
quality of being just, impartial, and fair."\textsuperscript{3} It is in this sense of fairness rather than a sense of equality that one must evaluate the results of the marital deduction. The marital deduction does not provide for equal treatment between community property states and common law states, and it is perhaps impossible to provide equal treatment for what are by their very nature two unequal situations. Since fairness is a subjective evaluation criterion, not all readers will be satisfied as to whether equity has been achieved in this area. However, results of our study will be evaluated and conclusions will be offered in the following sections.

The cases will be separated into three groups for purposes of this evaluation, depending on whether the decedent's estate is greater than, equal to, or less than that of the surviving spouse. In all cases it will be assumed that the estates consist entirely of community property or noncommunity property, with no mixture of the two types of property.

Decedent's Estate Greater Than That of Surviving Spouse

In order to evaluate this condition, a computation was made for all cases where DEST was greater than S\textsuperscript{\textregistered}EST, to determine whether the total assets in the hands of the

\textsuperscript{3}Morris, op. cit., p. 443.
surviving spouse after an optimal transfer were less than, equal to, or greater than one-half the combined estates of the two spouses. Since at least one-half of the total value of community property must be placed in the hands of the surviving spouse, equity could be achieved with the common law states only in those cases where 50 per cent or more of the assets were placed in the hands of the surviving spouse after an optimal transfer. In those cases where less than 50 per cent of the assets are in the hands of the surviving spouse after an optimal transfer, the citizen of the common law state has a distinct advantage over his counterpart in the community property state, who does not have the option of placing less than 50 per cent of the total estates in the hands of the surviving spouse. For example, consider two couples H and W, who live in a common law state, and A and B, who live in a community property state. H has an estate of $3,500,000 and W an estate of $500,000. A and B have a combined estate of $4,000,000. Assume that in each case the surviving spouse (W or B) has an expected after-tax rate of return of zero, while other beneficiaries have an expected after-tax rate of return of 20 per cent. Our model shows that, regardless of the values of the other variables, optimal results are obtained by making a zero transfer of assets to W in the common law state. In the community property state, however, at least $2,000,000 (one-half the community property) must be left with the surviving spouse.
The computation referred to above shows that of the 1,458 cases where DEST was greater than SEST, the optimal transfer left less than 50 per cent of the assets in the hands of the surviving spouse in 976 cases, or 67 per cent of the time. This indicates that in a substantial majority of the cases, the citizen of the common law state has a flexibility not available to those in community property states.

If we reverse the after-tax rates of return for the example in the previous paragraph, with the wives (W and B) having 20 per cent rates of return and the other beneficiaries having zero rates, it becomes optimal in both the common law and community property states to transfer 100 per cent of the decedent's property to the surviving spouse, and it appears that equity would be achieved. On closer examination, however, it becomes apparent that the citizen of the common law state will still realize an advantage. A marital deduction of $1,750,000 (50 per cent times 3,500,000) will be allowed in the common law state and the estate will be taxed on only $1,750,000, while in the community property state, no marital deduction will be allowed and the estate will be taxed on the full $2,000,000 of H's share of community property. Depending on the amount of gifts made prior to H's death, the tax on this amount will equal or exceed $112,500.

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4 No marital deduction would be allowed, since the adjusted gross estate and minimum marital deduction are reduced by the community property included in the gross estate.
In summary, where DEST exceeds SEST, citizens of common law states have a distinct advantage over their counterparts in community property states. First, they have much more flexibility in determining the amount transferred to the surviving spouse; and second, when transfers to the surviving spouse are desirable, they receive a deduction not available to those in the community property states.

Decedent's Estate Equal to That of Surviving Spouse

Equity would seem to be most nearly achieved in those cases where the spouses with equal estates in a common law state are compared to a couple in a community property state with an estate of equal size. For example, if in the example in the previous subsection, H and W each have estates of $2,000,000 and A and B have a combined estate of $4,000,000: upon the deaths of H and A, each surviving spouse will automatically retain $2,000,000 of the wealth. H and A have the option of passing their $2,000,000 to W and B, or to other beneficiaries. Thus, it appears that equity is achieved; and indeed it is, if both H and A pass their estates to beneficiaries other than the surviving spouse. However, in those cases where it is desirable to pass the decedent's estate to the surviving spouse, the citizen of the common law state has a distinct advantage, for his estate may claim a marital deduction of an amount equal to 50 per cent of the property transferred to the
spouse, while no such deduction is available in the community property state. In this example, this would mean a difference in taxes paid on the first estate of at least $426,000.

In summary, it appears that in this case the allowance of the marital deduction has converted what was essentially an equitable situation into one which may substantially favor the citizens of common law states.

**Decedent's Estate Less Than That of Surviving Spouse**

A conclusion as to whether equity has been achieved becomes somewhat more difficult when comparing a couple in a common law state where the first decedent's estate is less than that of the surviving spouse, with a couple with a combined estate of equal size in a community property state. In those circumstances where it is desirable for a substantial amount of the assets to be placed in the hands of the surviving spouse, the common law estate seems to hold the advantage. A substantial part of the assets may already be in the hands of the survivor in a common law state, while in the community property state this can be accomplished only by transfer after payment of estate tax. In those circumstances where it is desirable to place the assets with other beneficiaries, it generally can be accomplished at lower marginal tax rates in the community property states, due to the equal size of the two estates.
In order to summarize this section reference is made once again to the original intent of the marital deduction, to provide equity of treatment between the citizen of the community property state and the citizen of the common law state, where all the property of a couple was in the estate of the first to die, and where it was desirable to transfer 50 per cent or more of the estate to the surviving spouse. It has been shown by example in Chapter II that essential equity does exist in this situation. This study has indicated, however, that this set of circumstances may be comparatively rare. The conclusion therefore is that the current statutes tend to favor the common law states. In these states a great deal more flexibility exists in determining the amount of assets placed with the surviving spouse. Also, where transfers to the spouse are desirable, the marital deduction reduces the tax impact of such transfers as compared to similar transfers in community property states.

Summary

In this chapter have been presented the results of a study of the marital deduction, in which was determined the optimal size of transfer for 3,888 cases. Analysis of the results led to decision criteria which should be helpful to those responsible for determining the amount of assets which should be transferred to a surviving spouse in the development of estate plans.
Comparisons have also been made concerning the application of the estate tax statutes to common law and community property states under several different assumptions as to relative estate size, with the conclusion that current statutes tend to favor citizens of common law states as opposed to those of community property states.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The goals of this chapter are threefold: first, to summarize the study presented in the previous chapters; next, to state several conclusions based on the results of this study; and finally, to make recommendations as to what direction future research in this area might take.

Summary

The problem of providing equity of treatment between citizens of common law and community property states in the application of the estate tax statutes has been a difficult problem in tax administration from the birth of the estate tax in 1916. Congress has tried several plans to provide equitable treatment, finally enacting the marital deduction as a solution in 1948. While a portion of this study has been concerned with whether the desired equity has been achieved, the main focus has been on the tax planning opportunities provided by the marital deduction.

In Chapter I were set three goals of the study: (1) to develop a computer model capable of determining the optimal transfer to the surviving spouse, (2) to develop decision criteria which would be helpful to individuals and their advisors in determining the amount of property to be
transferred to a surviving spouse, and (3) to reach a conclusion as to whether the desired equity between common law and community property states has been achieved.

Background material was presented in Chapter II, consisting of a brief legislative and judicial history of the marital deduction, requirements for claiming the marital deduction, and a review of prior research in the area.

The steps followed in the development of the computer model were presented in Chapter III, followed by the results of a preliminary study to evaluate the significance of the variables chosen for the model. Based on the results of the preliminary study, seven variables were chosen as having significant effect on the size of the optimal transfer to a surviving spouse. These variables were

(1) Size of the decedent's estate,
(2) Size of the surviving spouse's estate,
(3) Life expectancy of the surviving spouse,
(4) After-tax rate of return of surviving spouse,
(5) After-tax rate of return of other beneficiaries,
(6) Projected rate of inflation, and
(7) Lifetime gifts by decedent.

In Chapter IV the results of a study of 3,888 cases were presented. The results of the study were classified and analyzed using subprograms CROSSTABS and DISCRIMINANT of the Statistical Package for the Social Sciences. From this analysis, decision criteria were developed which should
be helpful to taxpayers in establishing their estate plans. Chapter IV concluded with a discussion of the conclusion as to whether the desired equity between the common law and community property states has been achieved.

Throughout this study it has been assumed that the husband has predeceased the wife. The male gender was therefore used when referring to the decedent. This was done to recognize what is statistically most prevalent, that the death of the husband precedes that of the wife, and should not be interpreted as an indication of any sexual bias either on the part of the author or in the application of the estate tax statutes. The decision criteria developed in this study and the conclusions of the study are equally applicable should the death of the wife precede that of the husband.

Conclusions

Several conclusions emanate from the results of this study. Some have been previously and explicitly stated. Others have only been implied in the discussion of the study and its results. This section will organize and explicitly state the conclusions.

The literature in this area has emphasized procedures for qualifying for the marital deduction, while giving only minimal attention to the wisdom of claiming the deduction. The results of this study indicate that this emphasis should
be reversed. In 2,516 of the 3,888 cases in this study, optimal results were obtained by foregoing the marital deduction entirely and transferring the decedent's entire estate to other beneficiaries. It is therefore concluded that the primary concern of the estate planner should be that of determining whether any transfer to a surviving spouse is desirable. It is also observed that of the 1,372 cases where a transfer to the spouse was desirable, 1,213 were included in the group where the after-tax rate of return of the spouse was greater than that of the beneficiaries, the situation least likely to be encountered in practice. This supports the conclusion that the first order of business for the estate planner is to ascertain the desirability of any transfer to the surviving spouse. Only after this issue has been settled does the mode of transfer become important in the minority of cases where a transfer is desirable.

The study indicates that the relative values for after-tax rates of return between surviving spouse and other beneficiaries are the most important factors in determining the optimal transfer to the surviving spouse. Once again this conflicts with the traditional emphasis of the literature in this area. Where it has been recognized that a transfer smaller than that necessary to qualify for the full marital deduction may be desirable, the emphasis has generally been placed on relative estate sizes and marginal estate tax rates. The general rule has been to make a transfer less
than 50 per cent only in those cases where a 50 per cent transfer will result in the taxable estate of the surviving spouse being greater than that of the decedent. This study indicates that, while relative estate sizes are important, their role in determining the optimal size transfer must be subordinated to that of relative after-tax rates of return.

Another, rather surprising, conclusion of the study is that the projected rate of inflation has very little influence in determining the optimal size of transfer to a surviving spouse. A preliminary study showed this variable to be the least significant of the seven variables retained in the model. The results of the chi-square test for the cases in this study and the multiple discriminant analysis support this conclusion. This seems to indicate that in future studies, this variable would be eliminated and its effects impounded in after-tax rates of return.

Discussion in the preceding chapter on the subject of equity of treatment between common law and community property states did not result in any firm conclusions. In some cases substantial equity between similarity situated taxpayers has been achieved, while in other situations one group or the other tends to be favored. As a general conclusion, however, the provision for the marital deduction tends to favor citizens of common law states. Citizens of these states have a great deal more flexibility in planning for disposition of their property. Where transfers to the spouse
are desirable, the marital deduction can usually be utilized to effect these transfers at a lower tax cost. The lack of major change in this area of estate taxation since 1948 indicates, however, that most citizens of community property states accept the current provisions as being equitable. Where a state of perceived inequity exists, there is usually taxpayer discontent and agitation for change, conditions which have not manifested themselves in this area. This lack of recognition of possible inequities may result from many causes, one of which may be the limited amount of substantial research conducted in this area.

Recommendations

The model developed in this study can provide significant benefits for taxpayers and their advisors in the development of estate plans. The speed with which computer calculations can be made allows the exploration of several alternatives in establishing an original estate plan. Perhaps more importantly, the model provides the ability to update an estate plan frequently, and at a minimal cost, as changes in the economic variables indicate a need for revision. There are, however, two areas in which additional research could be conducted, which might add new information to that generated by this study. The integration of this information into the model might well increase its value as a tax planning model.
The first of these areas concerns the scope of the model, which was designed to evaluate interspousal transfers only where no community property was included in the gross estate of the decedent. The increased mobility of our population and substantial amounts of inherited property have created many estates which include both community and non-community property. Many of the conclusions reached and criteria developed in this study appear to be equally applicable to these situations. However, the value of the model could be enhanced if its scope were expanded to allow for inclusion of both types of property in the gross estate. This is recommended as one potentially productive area for future research.

The second area in which additional research should prove worthwhile also concerns the scope of this study, but in somewhat different context. One of the objectives of the 1976 Tax Reform Act was to reduce substantially the benefits of lifetime gifts in lieu of transfers through an estate.¹ A 1976 study by Byars indicates that this Act may have failed to accomplish that objective, and that there may still be substantial benefits to be realized from the use of

lifetime transfers in lieu of transfers at death. The model has implicitly assumed that a prior decision has been made by both spouses to pass their property through their estate rather than by gift, and that neither will make additional lifetime gifts. It is therefore recommended, as an area in which future research might be productive, that a study be conducted which would integrate our model with the results of the Byars study. The result of such a study could provide a comprehensive model for optimal property transfers which would include both lifetime gifts and estate transfers for each spouse.

APPENDICES
APPENDIX A

MATHEMATICAL EQUATIONS FOR MODEL

The mathematical equations for the model are presented below. The section immediately following presents an explanation of the notation used in the equations. The equations presented in the succeeding section are in outline form with equation I the basic equation of the model. Equations A, B, and C define computed variables introduced in equation I, while equations A1, A2, A3, and A4 define computed variables introduced in equation A. This outline form is followed throughout.

Notation

Independent Variables:

\[ D \] = Size of decedent's estate
\[ S \] = Size of spouse's estate
\[ E \] = Spouse's life expectancy
\[ RS \] = After-tax rate of return of spouse
\[ RB \] = After-tax rate of return of beneficiaries
\[ I \] = Rate of inflation
\[ F \] = Total gifts to spouse
\[ H \] = Taxable gifts to others
\[ TR \] = Per cent of decedent's estate transferred to surviving spouse.
Computed Variables:

\[ B = \text{Wealth in hands of beneficiaries date of death of spouse.} \]

\[ TD = \text{Estate taxes payable on decedent's estate.} \]

\[ V = \text{Amount of property transferred to spouse.} \]

\[ TS = \text{Estate taxes payable on spouse's estate.} \]

\[ G = \text{Taxable gifts to spouse.} \]

\[ HD = \text{One-half of taxable gifts to others.} \]

\[ M = \text{Marital deduction.} \]

\[ R = \text{Composite rate schedule.} \]

\[ TG = \text{Gift tax paid by decedent on lifetime gifts.} \]

\[ GM = \text{Adjustment to estate tax marital deduction for gift tax marital deduction.} \]

\[ TI = \text{Gift tax paid by spouse on lifetime gifts.} \]

\[ CR = \text{Credit for prior transfer.} \]

\[ HS = \text{One-half of taxable gifts to others.} \]

\[ P = \text{Applicable percentage.} \]

Mathematical Equations

I: \[ B = (D - TD - V)(1 + RB + I)^E + [S(1 + I)^E + V(1 + RS + I)^E] - TS \]

A: \[ TD = (D + G + HD - M)(R) - TG - 47,000 \]

A1: \[ G = \begin{cases} 0 & \text{If } F \leq 100,000 \\ F - 100,000 & \text{If } 100,000 < F \leq 200,000 \\ .5F & \text{If } F > 200,000 \end{cases} \]

A2: \[ HD = .5H \]

A3: \[ M = \text{Max} \left[ \begin{array}{c} \text{Max} \\ V \end{array} \left[ .5D - GM \right] \right] \]
A3a: \[ GM = \begin{cases} 
0 & \text{if } F > 200,000 \\
100,000 - 0.5F & \text{if } 100,000 < F < 200,000 \\
0.5F & \text{if } F \leq 100,000 
\end{cases} \]

A4: \[ TG = (G + HD)(R) - 47,000 \]

B: \[ V = \min \left( \frac{(D)(TR)}{D - TD} \right) \]

C: \[ TS = (S(1 + I)^E + V(1 + RS + I)^E + HS)(R) - TI - CR - 47,000 \]

C1: \[ HS = 0.5H \]

C2: \[ TI = (HS)(R) - 47,000 \]

C3: \[ CR = (P) \min \left( \frac{(V - M)(TD)}{D - M - TD} \right) \]

\[ (R)[S(1 + I)^E + V(1 + RS + I)^E + HS] - (R)[S(1 + I)^E + (1 + RS + I)^E + HS - (V - M)] \]

C3a: \[ P = \begin{cases} 
1.00 & \text{if } E \leq 2 \\
0.80 & \text{if } 2 < E \leq 4 \\
0.60 & \text{if } 4 < E \leq 6 \\
0.40 & \text{if } 6 < E \leq 8 \\
0.20 & \text{if } 8 < E \leq 10 \\
0.00 & \text{if } E > 10 
\end{cases} \]
Computer printouts of the model used in this study are presented in Figure 2 and Figure 3. Version 1 of the model, the one utilized in this study, was designed to generate internally the cases used in the study. Version 2 is the same model, but is designed to accept card input for the values of the variables used in the study.

These two models are designed to produce only the optimal values for a given set of economic parameters. With only minor changes, however, the programs can generate all values for a set of parameters where they are desired for purposes of analysis.
Fig. 2—Version 1 of Computer Model

IDENTIFICATION DIVISION.
PROGRAM-NAME DATA.
AUTHORS: GEORGE MILLER.
ENVIRONMENT DIVISION.
INPUT-OUTPUT DIVISION.
FILE-CONTROL.
SELECT CARD-FILE ASSIGN TO UR-S-SYSIN.
SELECT PRINT-FILE ASSIGN TO UR-S-PRINTER1.
SELECT PUNCH ASSIGN TO UR-S-PUNCH.
DATA DIVISION.
FILE SECTION.
INPUT-OUTPUT SECTION.
SELECT CARD-FILE LABEL RECORDS ARE OMITTED.
SELECT CARD-RECORD.
CASE PIC S9(9).
FILLER PIC XX.
FILLER PIC 9(7).
FILLER PIC 99.
FILLER PIC 99.
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FILLER PIC 99.
0065  02 FILLER  PIC X.
0066  02 TOTPRA  PIC 7ZZ7ZZZ7ZZZ.
0067  02 FILLER  PIC Y.
0068  02 TOTPER  PIC 7ZZ7ZZZ7ZZZ.
0069  02 FILLER  PIC XX.
006A  LOC  CARDS-Bench LABEL RECORDS ARE OMITTED.
006B  01 CAR-FUN.
006C  02 CASE  PIC 99(7).
006D  02 FILLER  PIC XX.
006E  02 REST  PIC 99(7).
006F  02 FILLER  PIC XX.
0070  02 REST  PIC 99(7).
0071  02 FILLER  PIC XX.
0072  02 REST  PIC 99(7).
0073  02 FILLER  PIC XX.
0074  02 IMPR  PIC 99.
0075  02 FILLER  PIC XX.
0076  02 GIFTSP  PIC 99(7).
0077  02 FILLER  PIC XX.
0078  02 GIFTED  PIC 99(7).
0079  02 FILLER  PIC XX.
007A  06 OPTPNA  PIC 9999.
007B  02 FILLER  PIC XX.
007C  02 GROUP  PIC 9.
007D  02 FILLER  PIC YY.
007E  02 FILLER  PIC 99(12).
007F  WORKING-STORAGE SECTION.
0080  77 HI  PIC 99(7).
0081  77 D  PIC 99(7).
0082  77 C  PIC 99(7).
0083  77 H  PIC 99(7).
0084  77 E  PIC 99(7).
0085  77 C1  PIC 99(12).
0086  77 CP  PIC 99(12).
0087  77 JS  PIC 99(12).
0088  77 VI  PIC 99(12).
0089  77 L  PIC 99(12).
008A  77 T  PIC 99(12).
008B  77 M1  PIC 99(12).
008C  77 T1  PIC 99(12).
008D  77 T2  PIC 99(12).
008E  77 T3  PIC 99(12).
008F  77 T4  PIC 99(12).
0090  77 T5  PIC 99(12).
0091  77 T6  PIC 99(12).
0092  77 T7  PIC 99(12).
0093  77 T8  PIC 99(12).
0094  77 T9  PIC 99(12).
0095  77 T10  PIC 99(12).
0096  77 T11  PIC 99(12).
0097  77 T12  PIC 99(12).
0098  77 T13  PIC 99(12).
0099  77 T14  PIC 99(12).
009A  77 T15  PIC 99(12).
009B  77 T16  PIC 99(12).
009C  77 T17  PIC 99(12).
009D  77 T18  PIC 99(12).
009E  77 T19  PIC 99(12).
009F  77 T20  PIC 99(12).
0100  77 T21  PIC 99(12).
0101  77 T22  PIC 99(12).
0102  77 T23  PIC 99(12).
0103  77 T24  PIC 99(12).
0104  77 T25  PIC 99(12).
0105  77 T26  PIC 99(12).
0106  77 T27  PIC 99(12).
0107  77 T28  PIC 99(12).
0108  77 T29  PIC 99(12).
0109  77 T30  PIC 99(12).
010A  77 T31  PIC 99(12).
010B  77 T32  PIC 99(12).
010C  77 T33  PIC 99(12).
010D  77 T34  PIC 99(12).
010E  77 T35  PIC 99(12).
010F  77 T36  PIC 99(12).
MOVE SPACES TO PRINT-LINE.
MOVE HEATS TO PRINT-LINE.
WRITE PRINT-LINE.
MOVE SPACES TO PRINT-LINE.

PROCEDURE DIVISION.

021 START
021 OPEN INPUT CARD-FILL OUTPUT PRINT-FILE CARD-PUNCH.
022 MOVE SPACES TO PRINT-LINE.
023 MOVE HEATS TO PRINT-LINE.
024 WRITE PRINT-LINE.
025 MOVE SPACES TO PRINT-LINE.

0253 LOOP-1
0254 IF F < 0 GO TO ERROR.
0255 IF F > 250000 MOVE D TO M1 GO TO LOOP-2.
0256 IF F < 250001 MOVE 250000 TO M1 GO TO LOOP-2.
0257 COMPUTE M1 = F + 1.
0258 LOOP-2
0259 IF F < 0 MOVE M1 TO M2 GO TO LOOP-3.
0260 IF F < LOOP-1 COMPUTE M2 = M1 - 5 * F GO TO LOOP-3.
0261 COMPUTE M2 = M1 - (100000 - (.5 + F)).
0262 LOOP-3
0263 IF M2 < 0 MOVE ZERO TO M2.
0264 COMPUTE V = T + F.
0265 IF V < 0 GO TO ERROR.
0266 IF V > M2 MOVE M2 TO V GO TO LOOP-4.
0267 IF V = M2 MOVE M2 TO V GO TO LOOP-4.
0268 IF V < M2 MOVE V TO M2 GO TO LOOP-4.
0269 LOOP-4
0270 COMPUTE M2 = M2 * 1.5.
0271 IF M2 < 0 GO TO ERROR.
0272 COMPUTE A = D + M + R.
0273 IF A < 0 GO TO ERROR.
0274 MOVE 1 TO C.
0275 GO TO TAXCOMP.
0276 CRSTAY.
0277 MOVE A TO M1.
0278 MOVE ZERO TO A.
0279 COMPUTE A = D + M.
0280 MOVE 2 TO C.
0281 MOVE T TO T1.
0282 GO TO TAXCOMP.
0283 NEI TAX.
0284 MOVE T TO T2.
0285 COMPUTE T5 = T5 - 47000.
0286 IF T5 < 0 MOVE ZERO TO T5.
0287 COMPUTE T4 = T4 - T3 - 47000.
0288 IF T4 < 0 MOVE ZERO TO T4.
0289 COMPUTE W = D - T4.
0290 IF W < V MOVE W TO V.
0291 COMPUTE B1 = D - T4 - V.
0292 IF B1 < 0 GO TO ERROR.
0293 MOVE ZERO TO K1.
0294 LOOP-5
0295 COMPUTE T1 = B1 * (1 + I + R5).
0296 COMPUTE M1 = K1 + 1.
0297 IF M1 < 0 GO TO LOOP-9A.
0298 MOVE M1 TO R2.
0299 IF R2 < 0 GO TO ERROR.
0300 MOVE ZERO TO K.
0301 MOVE V TO V1.
0302 LOOP-6
0303 COMPUTE V1 = V1 * (1 + R8 + J).
0304 COMPUTE M = K + 1.
0305 IF M < 0 GO TO LOOP-5.
0306 MOVE ZERO TO K.
0307 MOVE 9 TO J.
0308 LOOP-7
0309 COMPUTE U = = (1 + 1).
COMPUTE K = K + 1.
IF K < 1 GO TO LOOP-7A.
COMPUTE J = J + 1.
MOVE K TO G.
MOVE J TO C.
GO TO TACOMP.

LOOP-5A.
COMPUTE T3 = T - 47000.
IF T3 < 0 MOVE ZERO TO T3.
MOVE 2 TO C.
COMPUTE F = J + H.
GO TO TACOMP.

LOOP-7A.
COMPUTE T1 = T5 - CP - T3 - 47000.
IF T1 < 0 MOVE ZERO TO T1.
COMPUTE T3 = J - T.
IF T3 < 0 GO TO ERROR.
COMPUTE T1 = T6 + T.
IF T1 < 0 GO TO ERROR.
COMPUTE T4 = T5 + D2.
IF T4 < 0 GO TO ERROR.
IF T4 > Y MOVE T4 TO Y3 MOVE T5 TO Y1 MOVE TR TO Y2.
IF TR < 1.00 GO TO LOOP-7.

LOOP-7.
MOVE SPACES TO PRINT-LINE.
MOVE PI TO GIFTOT IN PRINT-LINE.
MOVE S TO GIFTOP IN PRINT-LINE.
MOVE E TO INFEL IN PRINT-LINE.
MOVE H To REIS IN PRINT-LINE.
MOVE O TO PERF IN PRINT-LINE.
MOVE E TO EXPECT IN PRINT-LINE.
MOVE S TO REST IN PRINT-LINE.
MOVE O TO REST IN PRINT-LINE.
MOVE J To CASE IN PRINT-LINE.
MOVE Y To TRANS IN PRINT-LINE.
MOVE Y1 TO TOOTAX IN PRINT-LINE.
MOVE Y To TOOTOS IN PRINT-LINE.
WHITE PRINT-LINE.
MOVE SPACES TO CAR-PUN.
MOVE J To CASE IN CAR-PUN.
MOVE S TO REST IN CAR-PUN.
MOVE E To EXPECT IN CAR-PUN.
MOVE H To REST IN CAR-PUN.
MOVE H To REST IN CAR-PUN.
MOVE E To EXPECT IN CAR-PUN.
MOVE H To REST IN CAR-PUN.
MOVE E To REST IN CAR-PUN.
MOVE H2 To GIFTOT IN CAR-PUN.
MOVE Y To OPTPAR IN CAR-PUN.
IF Y2 = .60 MOVE 1 To GRUP IN CAR-PUN GO TO LOOP-7A.
IF Y2 = .61 MOVE 2 To GRUP IN CAR-PUN GO TO LOOP-7A.
IF Y2 = .65 MOVE 3 To GRUP IN CAR-PUN GO TO LOOP-7A.
IF Y2 = .70 MOVE 4 To GRUP IN CAR-PUN GO TO LOOP-7A.
MOVE 5 To GRUP IN CAR-PUN.

LOOP-7.
WHITE CAR-PUN.

LOOP-7.
```plaintext
IF TR = .00 MOVE .00 TO TR GO TO LOOP-1.
0402
IF TR = .25 MOVE .25 TO TR GO TO LOOP-1.
0404
IF TR = .50 MOVE .50 TO TR GO TO LOOP-1.
0406
IF TR = .75 MOVE 1.00 TO TR GO TO LOOP-1.
0408
IF TR = 1.00 MOVE ZER0 TO TR.
0410
WRITE PRINT-LINE.
0412
GO TO CYCL-7.
0414
MOVE SPACE5 TO PRINT-LINE.
0416
MOVE ZERO TO Y.
0418
MOVE ZERO TO Y1.
0420
MOVE TR TO Y2.
0422
IF TR < 1.00 GO TO LOOP-1.
0424
GO TO LOOP-6A.
0426
WRITE PRINT-LINE.
0428
GO TO CYCL-7.
0430

0432
IF A < 100001 COMPUTE T = A * .18 GO TO GRS.
0434
IF A < 200001 COMPUTE T = 1500 + .2 * (A - 100000) GO TO GRS.
0436
IF A < 300001 COMPUTE T = 3000 + .22 * (A - 200000) GO TO GRS.
0438
IF A < 400001 COMPUTE T = 5200 + .24 * (A - 300000) GO TO GRS.
0440
IF A < 500001 COMPUTE T = 9000 + .26 * (A - 400000) GO TO GRS.

0442
IF A < 1000001 COMPUTE T = 18200 + .28 * (A - 800000) GO TO GRS.
0444
IF A < 2000001 COMPUTE T = 23900 + .3 * (A - 1000000) GO TO GRS.
0446
IF A < 2500001 COMPUTE T = 38800 + .32 * (A - 1500000) GO TO GRS.
0448
IF A < 5000001 COMPUTE T = 70800 + .34 * (A - 2500000) GO TO GRS.
0450
IF A < 7500001 COMPUTE T = 155800 + .37 * (A - 5000000) GO TO GRS.
0452
IF A < 10000001 COMPUTE T = 248300 + .39 * (A - 7500000) GO TO GRS.
0454
IF A < 12500001 COMPUTE T = 345800 + .41 * (A - 10000000) GO TO GRS.
0456
IF A < 15000001 COMPUTE T = 443300 + .43 * (A - 12500000) GO TO GRS.
0458
IF A < 20000001 COMPUTE T = 555600 + .45 * (A - 15000000) GO TO GRS.
0460
IF A < 25000001 COMPUTE T = 780800 + .49 * (A - 20000000) GO TO GRS.
0462
IF A < 30000001 COMPUTE T = 1025800 + .53 * (A - 25000000) GO TO GRS.
0464
IF A < 35000001 COMPUTE T = 1290800 + .57 * (A - 30000000) GO TO GRS.
0466
IF A < 40000001 COMPUTE T = 1555800 + .61 * (A - 35000000) GO TO GRS.
0468
IF A < 45000001 COMPUTE T = 1820800 + .65 * (A - 40000000) GO TO GRS.
0470
IF A < 50000001 COMPUTE T = 2205800 + .69 * (A - 45000000) GO TO GRS.
```

```
```
125

[computer code]

GRS

IF C = 1 GO TO CRSTAN.
IF C = 2 GO TO RETRY.
IF C = 3 GO TO GRR.
IF C = 4 GO TO TCR-1.
IF C = 5 GO TO LOOP-17.
CLOSE CARD-FILE PRINT-FILE STOP RUN.

TRGF

MOVE T TO T6.
IF T6 < .1 MOVE ZERO TO CF GO TO LOOP-6.
IF T6 > 10 MOVE ZERO TO CF GO TO LOOP-6.
COMPUTE W = 2 - " - T6.
IF V = 0 MOVE ZERO TO CR GO TO LOOP-6.
IF (V - M) > K GO TO FACK.
COMPUTE CR3 = V - M.
COMPUTE CR4 = CR2 / V.
COMPUTE CR = CR4 + T4.
MOVE 4 TO C.
COMPUTE A = A - (V - N).
IF A < 0 MOVE ZERO TO CR GO TO LOOP-6.
GO TO TAYCOMP.

TRCR-1.

COMPUTE CR1 = T6 - T.
IF CR1 < 0.00 MOVE ZERO TO CR1.
IF CR1 < CR MOVE CR1 TO CR.
IF E < .3 GO TO LOOP-6.
COMPUTE CR = .8 * CR.
IF E < .6 GO TO LOOP-6.
COMPUTE CR = .75 * CR.
IF E < .7 GO TO LOOP-6.
COMPUTE CR = (.9 * CR) / 3.
IF E < .9 GO TO LOOP-6.
COMPUTE CR = .8 + CR.
GO TO LOOP-6.

ERROR.

MOVE SPACES TO PRINT-LINE.
MOVE C6 TO CASE IN ERRRS.
MOVE ERRRS TO PRINT-LINE.
WRITE PRINT-LINE.
CLOSE CARD-FILE PRINT-FILE CARD-PUNCH STOP RUN.
Fig. 3—Version 2 of Computer Model.

IDENTIFICATION DIVISION.

PROGRAM-ID. MARDEO.

AUTHOR. DALE PULLIAM.

ENVIRONMENT DIVISION.

INPUT-OUTPUT SECTION.

FILE-COMPUT.

SELECT CARD-FILE ASSIGN TO UR-S-SYSIN.

SELECT PRINT-FILE ASSIGN TO UR-S-PRINTER1.

SELECT CARD-PUNCH ASSIGN TO UR-S-PUNCH.

DATA DIVISION.

FILE SECTION.

FC. CARD-FILE LABEL RECORDS ARE OMITTED.

01 CARD-RECORD.

02 CASE PIC 9(6).

02 FILLER PIC XX.

02 CEST PIC 9(7).

02 FILLER PIC YX.

02 SESI PIC 9(7).

02 FILLER PIC YX.

02 EXPECT PIC Y9.

02 FILLER PIC YX.

02 RETS PIC V99.

02 FILLER PIC YX.

02 RETB PIC V99.

02 FILLER PIC YX.

02 INFL PIC V99.

02 FILLER PIC YX.

02 GIFTSP PIC 9(7).

02 FILLER PIC YX.

02 GIFTOT PIC 5(7).

02 FILLER PIC X(22).

FC. PRINT-FILE LABEL RECORDS ARE OMITTED.

01 PRINT-LINE.

02 FILLER PIC Y.

02 CASE PIC 7ZZZZZ.

02 FILLER PIC Y.

02 CEST PIC ZZZZZZZ.

02 FILLER PIC Y.

02 CEST PIC 7ZZZZZZ.

02 FILLER PIC YXXXX.

02 EXPECT PIC 79.

02 FILLER PIC X(8).

02 RETS PIC -98.

02 FILLER PIC X(8).

02 RETB PIC -98.

02 FILLER PIC X(7).

02 INFL PIC -98.

02 FILLER PIC XXXX.

02 FILLER PIC YX.

02 GIFTSP PIC 7ZZZZZZ.

02 FILLER PIC Y.

02 GIFTOT PIC 7ZZZZZZ.

02 FILLER PIC Y(6).

02 TRANS PIC 7-99.
<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>056</td>
<td>02 FILLER PIC X.</td>
</tr>
<tr>
<td>056</td>
<td>02 TOTAL PIC 777,777,777.</td>
</tr>
<tr>
<td>057</td>
<td>02 FILLER PIC X.</td>
</tr>
<tr>
<td>058</td>
<td>02 TOTAL PIC 777,777,777,777.</td>
</tr>
<tr>
<td>059</td>
<td>02 FILLER PIC XXX.</td>
</tr>
<tr>
<td>060</td>
<td>FC CARD-PUNCH LABEL RECORDS ARE OMITTED.</td>
</tr>
<tr>
<td>061</td>
<td>01 CARD-PUNCH</td>
</tr>
<tr>
<td>062</td>
<td>02 CASE PIC 9(6).</td>
</tr>
<tr>
<td>063</td>
<td>02 FILLER PIC XX.</td>
</tr>
<tr>
<td>064</td>
<td>02 EST PIC 9(7).</td>
</tr>
<tr>
<td>065</td>
<td>02 FILLER PIC XX.</td>
</tr>
<tr>
<td>066</td>
<td>02 EST PIC 9(7).</td>
</tr>
<tr>
<td>067</td>
<td>02 FILLER PIC XX.</td>
</tr>
<tr>
<td>068</td>
<td>02 EXPECT PIC 99.</td>
</tr>
<tr>
<td>069</td>
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</tbody>
</table>
PROCEDURE DIVISION.

START. OPEN INPUT CARD-FILE OUTPUT PRINT-FILE CARD-PUNCH.

MOVE SPACES TO PRINT-LINE.

MOVE HEADS TO PRINT-LINE.

WRITE PRINT-LINE.

MOVE SPACES TO PRINT-LINE.
MOVE HDGS TO PRINT-LINE.
WRITE PRINT-LINE.

LCCP. READ CARD-FILE AT END CLOSE CARD-FILE PRINT-FILE
CARD-PUNCH STOP FUN.
IF GRTSP IN CARD-RECORD IS NOT NUMERIC GO TO ERROR.
IF GRTCT IN CARD-RECORD IS NOT NUMERIC GO TO ERROR.
IF I NFL IN CARD-RECORD IS NOT NUMERIC GO TO ERROR.
IF GIFTSP IN CARD-RECORD IS NOT NUMERIC GO TO ERROR.
IF GIFTCT IN CARD-RECORD IS NOT NUMERIC GO TO ERROR.
MOVE ZERC TO TR, Y1, Y2.
MOVE DEST IN CARD-RECORD TO D.
MOVE EXPECT IN CARD-RECORD TO E.
MOVE SEST IN CARD-RECORD TO S.
MOVE RETSP IN CARD-RECORD TO RS.
MOVE RETCT IN CARD-RECORD TO RR.
IF F < 0 GO TO ERROR.
IF F < 100000 MOVE ZERO TO G GO TO LOOP-1.
IF F < 200000 COMPUTE G = F - 100000 GO TO LOOP-1.
IF F > 200000 IF F > 200000 COMPUTE G = F + .5 GO TO LOOP-1.
IF F < 200000 MOVE M1 = D + E.
IF D < 250001 MOVE D TO M1 GO TO LOOP-2.
IF D < 500001 MOVE 250000 TO M1 GO TO LOOP-2.
COMPUTE M1 = M1 - .5 * F GO TO LOOP-3.
IF M2 < 0 MOVE ZERC TO H2.
COMPUTE V = TR * D.
IF V < 0 GO TO ERROR.
IF V > M2 MOVE M2 TO M GO TO LOOP-4.
IF V < M2 MOVE M2 TO M GO TO LOOP-4.
COMPUTE H = M1 + .5.
IF H < 0 GO TO ERROR.
COMPUTE A = C + G + H - M.
IF M = 0 GO TO ERROR.
MOVE 1 TO C.
GO TO TAXCOMP.
MOVE A TO A1.
MOVE ZERO TO A.
COMPUTE A = G + H.
MOVE 2 TO C.
MOVE T TO T1.
GO TO TAXCOMP.
NETTAX.
MOVE T TO T3.
COMPUTE T3 = T3 - 47000.

IF T3 < 0 MOVE ZERO TO T3.

COMPUTE T4 = T4 - T3 - 47000.
IF T4 < 0 MOVE ZERO TO T4.

COMPUTE W = W - T4.

IF W < V MOVE W TO V.

COMPUTE B1 = I - T4 - V.
IF B1 < 0 GO TO ERCR.

MOVE ZERO TO K1.

LOOP-4.

COMPUTE B1 = B1 * (1 + I - R3).
COMPUTE K1 = K1 + 1.
IF K1 < E GO TO LOOP-4A.

MOVE B1 TO B2.
IF B2 < 0 GO TO ERCR.

MOVE V TO VI.

LOOP-5.

COMPUTE V1 = V1 * (1 + R2 + 1).
COMPUTE K = K + 1.
IF K < E GO TO LOOP-5.

MOVE ZERO TO K.

MOVE S TO J.

LOOP-6.

COMPUTE J = J * (1 + I).
COMPUTE K = K + 1.
IF K < E GO TO LOOP-6A.

COMPUTE J = J + VI.

MOVE H TO A.

MOVE 5 TO C.

GO TO TAXCOMP.

LOOP-7.

COMPUTE T3 = T3 + E2.

COMPUTE A = J + 1.

GO TO LOOP-7.

IF T < 0 MOVE ZERO TO T.

COMPUTE B3 = J - T.

IF B3 < 0 GO TO ERCR.

COMPUTE T5 = T4 + T.

IF T5 < 0 GO TO ERCR.

COMPUTE B4 = B3 - E2.

IF B4 < 0 GO TO ERCR.

IF B4 > Y MOVE B4 TO Y MOVE T5 TO V1 MOVE TR TO Y2.

IF TR < 1.00 GO TO LOOP-7.

MOVE SPACES TO PRINT-LINE.

MOVE H1 TO GIFTST IN PRINT-LINE.

MOVE F TO GIFTSP IN PRINT-LINE.

MOVE I TO INFL IN PRINT-LINE.

MOVE PS TO RETI IN PRINT-LINE.

MOVE RB TO RETI IN PRINT-LINE.

MOVE E TO EXPECT IN PRINT-LINE.
MOVE S TO SEST IN PRINT-LINE.
MOVE D TO DEST IN PRINT-LINE.
MOVE CASE IN CARD-RECORD TO CASE IN PRINT-LINE.
MOVE Y2 TO TOTTR IN PRINT-LINE.
MOVE Y1 TO TOTTRX IN PRINT-LINE.
WRITE PRINT-LINE.
MOVE SPACES TO CAR-PUN.
MOVE CASE IN CAR-RECORD TO CASE IN CAR-PUN.
MOVE D TO DEST IN CAR-PUN.
MOVE E TO EXPECT IN CAR-PUN.
MOVE RS TO RETS IN CAR-PUN.
MOVE I TO INFL IN CAR-PUN.
MOVE F TO GIFTSF IN CAR-PUN.
MOVE HI TO GIFTCT IN CAR-PUN.
MOVE Y2 TO OPTR IN CAR-PUN.
IF Y2 = .00 MOVE 1 TO GRUP IN CAR-PUN GO TO LOOP-7A.
IF Y2 = .25 MOVE 2 TO GRUP IN CAR-PUN GO TO LOOP-7A.
IF Y2 = .50 MOVE 3 TO GRUP IN CAR-PUN GO TO LOOP-7A.
IF Y2 = .75 MOVE 4 TO GRUP IN CAR-PUN GO TO LOOP-7A.
MOVE 5 TO GRUP IN CAR-PUN.

LCCP-7A.
WRITE CAR-PUN.

LOOP-7.
IF TR = ZERO MOVE .25 TO TR GO TO LOCP.
IF TR = .25 MOVE .50 TO TR GO TO LOCP.
IF TR = .50 MOVE .75 TO TR GO TO LOCP.
IF TR = .75 MOVE 1.00 TO TR GO TO LOCP.
IF TR = 1.00 MOVE ZERO TO TR.
MOVE SPACES TO PRINT-LINE.
WRITE PRINT-LINE.
GO TO LOOP.

LOOP-A.
MOVE ZERO TO Y.
MOVE ZERO TO Y1.
MOVE TR TO Y2.
IF TR < 1.00 GO TO LOOP-7.
GO TO LOOP-EA.

ERRS.
MOVE SPACES TO PRINT-LINE.
MOVE IE TO CASE IN ERRS.
MOVE ERRS TO PRINT-LINE.
WRITE PRINT-LINE.
GO TO LOOP.

TAXCONF.
IF A < 100001 COMPUTE T = A * .19 GO TO GRS.
IF A < 20001 COMPUTE T = 1800 + .22 * (A - 10000) GO TO GRS.
IF A < 400001 COMPUTE T = 1800 + .22 * (A - 20000) GO TO GRS.
IF A < 600001 COMPUTE T = 2200 + .24 * (A - 40000) GO TO GRS.
IF A < 800001 COMPUTE T = 3000 + .26 * (A - 60000) GO TO GRS.
IF A < 1000001 COMPUTE T = 19200 + .32 * (A - 80000) GO TO GRS.
IF A < 1500001 COMPUTE T = 23800 + .34 * (A - 100000) GO TO GRS.
IF A < 250001 COMPUTE T = 26800 + .32 * (A - 150000) GO TO GRS.
IF A < 500001 COMPUTE T = 70800 + .34 * (A - 250000) GO TO GRS.
IF A < 1000001 COMPUTE T = 155800 + .37 * (A - 500000) GO TO GRS.
IF A < 1500001 COMPUTE T = 248300 + .39 * (A - 750000) GO TO GRS.
IF A < 1250001 COMPUTE T = 345800 + .41 * (A - 1000000) GO TO GRS.
IF A < 1500001 COMPUTE T = 448300 + .43 * (A - 1250000) GO TO GRS.
IF A < 2000001 COMPUTE T = 555800 + .45 * (A - 1500000) GO TO GRS.
IF A < 2500001 COMPUTE T = 780600 + .49 * (A - 2000000) GO TO GRS.
IF A < 3000001 COMPUTE T = 1025800 + .53 * (A - 2500000) GO TO GRS.
IF A < 3500001 COMPUTE T = 1250000 + .57 * (A - 3000000) GO TO GRS.
IF A < 4000001 COMPUTE T = 1575300 + .61 * (A - 3500000) GO TO GRS.
IF A < 4500001 COMPUTE T = 1880800 + .65 * (A - 4000000) GO TO GRS.
IF A < 5000001 COMPUTE T = 2205800 + .69 * (A - 4500000) GO TO GRS.
IF A < 5500001 COMPUTE T = 2550800 + .74 * (A - 5000000) GO TO GRS.
IF A < 7500001 COMPUTE T = 3425800 + .78 * (A - 6500000) GO TO GRS.
IF A < 10500001 COMPUTE T = 4375300 + .82 * (A - 8000000) GO TO GRS.
IF A < 13500001 COMPUTE T = 5315800 + .86 * (A - 9500000) GO TO GRS.
IF A < 15000001 COMPUTE T = 555800 + .9 * (A - 1000000) GO TO GRS.
IF A < 20000001 COMPUTE T = 655800 + .94 * (A - 1250000) GO TO GRS.
IF A < 25000001 COMPUTE T = 755800 + .97 * (A - 1500000) GO TO GRS.
IF A < 30000001 COMPUTE T = 855800 + .99 * (A - 1750000) GO TO GRS.
IF A < 35000001 COMPUTE T = 955800 + 1.0 * (A - 2000000) GO TO GRS.

GRS.

IF C = 1 GO TO GRSTAX.
IF C = 2 GO TO TRCR.
IF C = 3 GO TO TRCR.
IF C = 4 GO TO TRCR.
IF C = 5 GO TO LOOP-5B.
CLOSE CARD-FILE PRINT-FILE STOP RUN.

TRCR.

MOVE T TO TC.
IF TR < .51 MOVE ZERO TO CR6 GO TO LOOP-6.
IF E < 10 MOVE ZERO TO CR7 GO TO LOOP-6.
COMPUTE W = V - W.
IF (V - W) > W GO TO ERROR.
COMPUTE CR2 = V - M.
COMPUTE CR4 = CR2 / W.
COMPUTE CR = CR4 + T4.
MOVE 4 TO C.
COMPUTE A = A - (V - M).
IF A < 2 MOVE ZERO TO CR GO TO LOOP-6.
GO TO TAXCOMP.

TRCR.

COMPUTE CR1 = TC - T.
IF CR1 < 0.06 MOVE ZERO TO CR1.
IF CR1 < CR MOVE CR1 TO CR.
IF E < 3 GO TO LOOP-6.
COMPUTE CR = .9 * CR.
IF E < 5 GO TO LOOP-6.
COMPUTE CR = .75 * CR.
IF E < 7 GO TO LOOP-6.
COMPUTE CR = (2 * CR) / 3.
IF E < 3 GO TO LOOP-C.
COMPUTE CR = .5 * CR.
GO TO LOOP-C.

ERCOR.
MOVE SPACES TO PRINT-LINE.
MOVE JP TO CASE IN ERRRS.
MOVE ERRRS TO PRINT-LINE.
WRITE PRINT-LINE.
CLOSE CARD-FILE PRINT-FILE CARD-PUNCH STOP RUN.
APPENDIX C

ILLUSTRATIVE CASE

The following is an example as to how the model output could be combined with subjective probability distributions for decision making under conditions of uncertainty. The example assumes that four of the variables can be estimated with acceptable accuracy, the values of which are presented in Table XV. It is further assumed that discrete subjective probability distributions can be established for the other three variables. These are presented in Table XVI.

<table>
<thead>
<tr>
<th>TABLE XV</th>
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<tbody>
<tr>
<td>VALUES OF VARIABLES FOR ILLUSTRATIVE CASE</td>
</tr>
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<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
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<tr>
<td>DEST</td>
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</tr>
<tr>
<td>SBEST</td>
<td>500,000</td>
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<tr>
<td>RETS</td>
<td>5%</td>
</tr>
<tr>
<td>GIFO</td>
<td>$ 0-</td>
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The three variables with three possible outcomes each indicate a total of twenty-seven possible outcomes, which are presented in Table XVII, along with the probability of occurrence for each outcome [P(C)] and expected values for a transfer of 0 per cent [E(0)], 25 per cent [E(25)], 50 per cent [E(50)], 75 per cent [E(75)] and 100 per cent [E(100)].
For example, the probability of Case 1, where all variables are at the minimum values in the distributions, is

\[ P(1) = P(5)P(0\%)P(0\%) = (0.1)(0.2)(0.1) = 0.002. \]

The twenty-seven possible outcomes were processed through the model, modified to produce all values, with the results presented in Table XVII.

**TABLE XVI**

**SUBJECTIVE PROBABILITY DISTRIBUTIONS FOR VARIABLES IN ILLUSTRATIVE CASE**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Value</th>
<th>Probability</th>
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</table>

Expected values were then computed, with a zero transfer having the highest expected value of $5,819,000. This would indicate that, subject to other estate planning considerations, no transfer of property should be made to the surviving spouse.
# TABLE XVII

**COMPUTATION OF EXPECTED VALUES ILLUSTRATIVE CASE**

<table>
<thead>
<tr>
<th>Case</th>
<th>EXP</th>
<th>REL</th>
<th>INIT</th>
<th>P(C)</th>
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**Totals** | . | . | 1.000 | . | $5,819 | . | $5,115 | . | $4,314 | . | $2,801 | . | $1,932 |

*Note: All dollar amounts are in thousands of dollars.*
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