AN ECONOMIC EVALUATION OF SELECTED TAX MANAGEMENT

STRATEGIES AVAILABLE TO SWINE PRODUCERS

FOR THE 1983 TAX YEAR

By

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Bachelor of Science in Agriculture

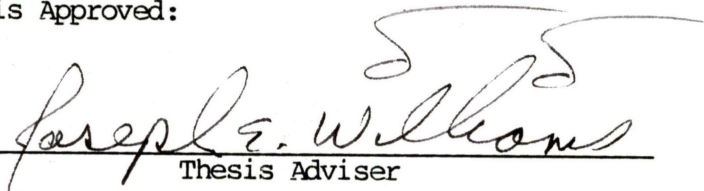Oklahoma State University

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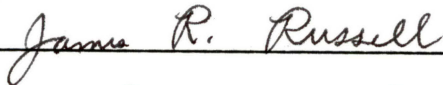for the Degree of
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PREFACE

The purpose of this study concerns tax management and planning strategies for swine producers. The non-corporate tax laws effective for 1983 and an eight year simulation period were used to examine, compare, and evaluate various tax management strategies. Decision criteria and guidelines were developed as an aid to determine when to apply the various tax management strategies. The tax management strategies were evaluated based on the increase of the producer's after-tax net cash flows and net worth.

The author wishes to express thanks and gratitude to his major adviser, Dr. Joseph E. Williams, for assistance and guidance throughout this study. Thanks are also extended to Dr. Michael L. Hardin and Dr. James R. Russell for serving on my committee and providing assistance concerning this study.

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CHAPTER I

INTRODUCTION

The profitability of swine production in Oklahoma has been
consistently good when compared to other enterprises as demonstrated
by OSU enterprise budgets (Oklahoma State University). However, one
of the major problems faced by swine producers is income variability.
Many causes of income variability exist with the greatest cause being
fluctuations in hog and feed prices. Feed accounts for 60 to 70
percent of the total cost of hog production. Fluctuations in
slaughter hog prices also lead to variation in income. Figure 1
depicts weekly slaughter hog prices for a 705 week period beginning in
January 1970 and ending in July 1983. In periods when slaughter hog
prices are high and feed costs are low, large profits may occur and
conversely when slaughter hog prices are low and feed costs are high,
small profits or even losses may occur.

In addition to fluctuating hog prices, government policy has had
an indirect affect on income variability. Government policy such as
the grain embargo of the early 1970's created instability in feed
grain prices (Purcell, 1979). During the period of the embargo prices
of feed grains were low and when the embargo was lifted feed grain
prices rose rapidly. The government also placed price ceilings on
food in an effort to control the effects of inflation. These price
ceilings however kept the prices of slaughter hogs and other livestock

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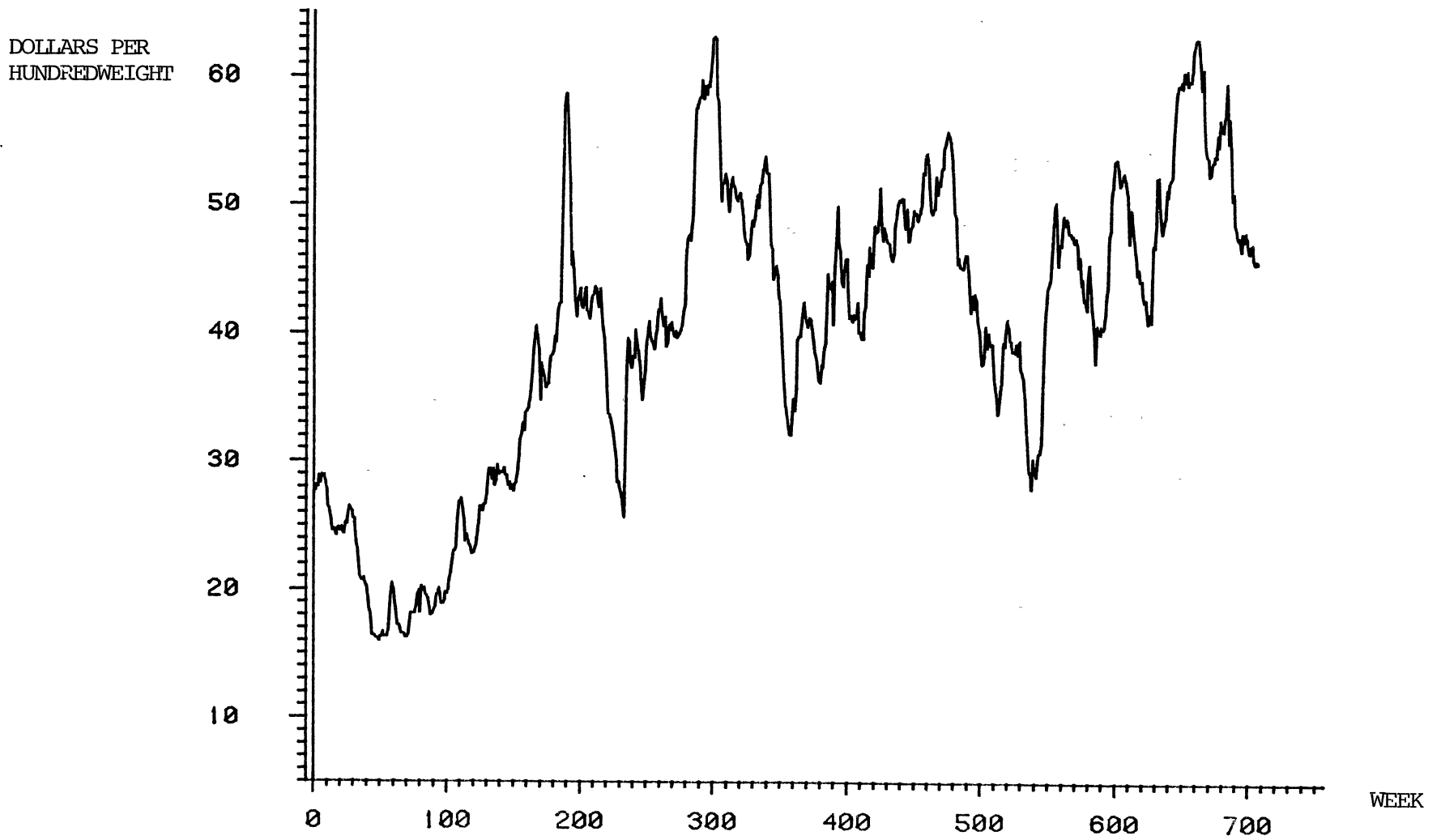
Figure 1. Average Weekly Oklahoma City U.S. #1 and #2 Grade Slaughter Hog Prices, January 1970 to July 1983

commodities from increasing in addition to keeping food prices low. When the price ceilings were removed food prices increased (Purcell, 1979). Through the observations of the events which occurred in the 1970's, government policies have tended to be a cause of income variability.

Table I lists the annual net cash flows associated with a simulated 90 sow farrow-to-finish, continuous production, confinement swine production system for the period of 1973 to 1979. These net cash flow figures represent annual returns to the swine producer (Plain, 1981). Due to the lack of accounting profit data for swine systems, the net cash flow data is used as a proxy for net income. The variability of net cash flows can be observed through the examination of cash flows associated with years 1973 to 1979. The mean annual net cash flow for the seven year period was $28,745. The range of net cash flow dollars was $53,061. From 1976 to 1977, the net cash flow decreased by $50,123 and from 1977 to 1978 net cash flow increased by $53,061.

Problem Situation

Income variability faced by Oklahoma swine producers increases the need for income tax management. Income tax management is the management of income, expenses, and capital in order to maximize after-tax net income over the life of the business (Osburn and Schneeberger, 1983). One example of tax management is for a producer to pay as little income tax in high profit years in order to retain sufficient capital to insure the survival of the farm during low profit years or even years when losses occur.

The adoption of the Economic Recovery Tax Act of 1981 and the Tax Equity and Fiscal Responsibility Act of 1982 amended the tax laws considerably. These changes need to be analyzed with respect to their affects on tax management practices used by swine producers. The new tax laws brought about by these acts need to be analyzed in order to determine tax strategy decision criteria to be used by swine producers. These criteria can then be used to make better tax management decisions to enhance the profit making potential of swine production.

TABLE I

ANNUAL NET CASH FLOW ASSOCIATED WITH A 90
SOW FARROW-TO-FINISH CONFINEMENT SYSTEM

Year	Net Cash Flow
	(dollars)
1973	29,941
1974	23,125
1975	30,674
1976	52,938
1977	2,815
1978	55,876
1979	5,849

Source: Plain, 1981, p. 141.

The Economic Recovery Tax Act of 1981 has been the largest tax reducing bill ever passed into law (Concise Explanation of The

Economic Recovery Tax Act of 1981, 1981). Some of the amendments went into effect in 1981 while others will be phased in gradually over the next four years.

The Tax Equity and Fiscal Responsibility Act of 1982 was the largest revenue increasing bill to ever pass (Concise Explanation of The Economic Recovery Tax Act of 1982, 1982). A majority of the tax laws brought about through the adoption of this act become effective in 1983.

This study will examine the non-corporate tax laws effective for the 1983 tax year and their implications on tax management strategies for Oklahoma swine producers.

Objectives

The major objectives of this study are:

1. To identify, explain, and compare aspects of the Economic Recovery Tax Act of 1981 (ERTA) and the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) pertinent to Oklahoma swine producers.

2. To develop guidelines useful in evaluating the implications of ERTA and TEFRA on a swine producer's income tax management strategies and after-tax net cash flows.

3. To compare and evaluate different tax management strategies useful in maximizing after-tax net cash flows and net worth to an Oklahoma swine producer.

Hypothesis

The hypothesis to be tested in this study is that the Economic Recovery Tax Act of 1981 and the Tax Equity and Fiscal Responsibility Act of 1982 provide swine producers with many tax management strategies that enhances potential to increase after-tax net cash flows and net worth.

Procedures

The following procedures will be used to complete the objectives and test the problem hypothesis:

1. The review of the Federal tax laws effective for 1983 will provide a basis to identify, explain, and compare portions of the tax law of primary interest to swine producers.

2. Economic theory and accounting principles will be used to develop guidelines and illustrate when it is advantageous to apply selected tax management strategies to increase after-tax net income. The basic tax laws applicable for the 1983 tax year will be utilized to examine the effects of various tax management strategies upon a producer's after-tax net cash flows.

3. A swine farm simulation and a tax model will be used to compare different tax management strategies available to swine producers and to evaluate their affect on maximizing after-tax net cash flow and net worth over an eight year period. Guidelines developed in Objective Two will be used to select tax management strategies.

Scope and Limitations

The primary emphasis of this study concerns tax management and planning for Oklahoma swine producers. The scope and major limitation of this study concerns the examination of the 1983 tax laws of primary interest to swine producers. Tax management strategies and guidelines are developed with major emphasis on swine production enterprises. It must be emphasized that the findings of this study are applicable to the 1983 tax laws. Further changes in the tax laws may result in different tax management strategies than those suggested in this study.

Thesis Organization

Chapter II identifies, explains and compares the tax laws in affect for 1983 that are of importance to swine producers.

Chapter III contains a summary of tax management strategies which may be used by swine producers. Also presented is an economic evaluation of tax law alternatives in order to develop tax management strategies and guidelines. Analysis of tax law alternatives are then discussed in order to determine optimum tax management strategies to be applied to the analysis in Chapter V.

Chapter IV presents the step by step procedure for calculating the tax liability for the swine farm. In addition, a swine farm simulation model and a tax calculation model are explained. The two models are then interfaced.

Chapter V reports the results obtained from interfacing the swine farm simulation model and the tax calculation model. Tax management

strategies identified in Chapter III are then analyzed using these results. The tax management strategies are compared and evaluated using the discounted after-tax net cash flows and discounted ending net worth for the swine production enterprise.

Chapter VI summarizes the research, presents the conclusions drawn from this study, and offers suggestions for further research.

CHAPTER II

REVIEW OF SELECTED ASPECTS OF THE ECONOMIC RECOVERY TAX
ACT OF 1981, THE TAX EQUITY AND FISCAL RESPONSIBILITY
ACT OF 1982, AND OTHER TAX LAWS IN EFFECT FOR
THE 1983 TAX YEAR

The Economic Recovery Tax Act of 1981 and the Tax Equity and Fiscal Responsibility Act of 1982 resulted in many tax law changes. This chapter is devoted to identifying and explaining these changes and to explaining other tax laws that may be of direct interest to swine producers.

The Economic Recovery Tax Act of 1981

Tax Rates

The most notable change brought about by ERTA was a general reduction of the tax rates which become fully effective in 1984. For the 1983 tax year, the marginal tax rate is 19 percent less than the 1980 tax rates for all non-corporate taxpayers (Concise Explanation of the Economic Recovery Tax Act of 1981, 1981). Table II lists the 1980 and 1983 tax rate schedules for married individuals filing a joint return.

Depreciation

ERTA changed the rules for depreciating property from the old useful life method to the new Accelerated Cost Recovery System (ACRS)

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TABLE II

TAX RATE SCHEDULES FOR MARRIED INDIVIDUALS
FILING A JOINT RETURN

1980 Taxable Income			% on	1983 Taxable Income			% on
Over	Not Over	Pay +	Excess	Over	Not Over	Pay +	Excess
(dollars)							
0	3400	0	0	0	3400	0	0
3400	5500	0	14	3400	5500	0	11
5500	7600	294	16	5500	7600	231	13
7600	11900	630	18	7600	11900	504	15
11900	16000	1404	21	11900	16000	1149	17
16000	20200	2265	24	16000	20200	1846	19
20200	24600	3273	28	20200	24600	2644	23
24600	29900	4505	32	24600	29900	3656	26
29900	35200	6201	37	29900	35200	5034	30
35200	45800	8162	43	35200	45800	6624	35
45800	60000	12720	49	45800	60000	10334	40
60000	85600	19678	54	60000	85600	16014	44
85600	109400	33502	59	85600	109400	27278	48
109400	162400	47544	64	109400	120000	38702	50
162400	215400	81464	68	120000	150000	44002	50
215400	and over	117504	70	150000	200000	59002	50
				200000	and over	84002	50

Source: 1980 U.S. Master Tax Guide, 1979.
1983 U.S. Master Tax Guide, 1982.

method of depreciation for assets placed in service after December 31, 1980. ERTA has eliminated the use of salvage value to determine the depreciable basis under ACRS. ACRS places property into one of four categories which are three-, five-, ten- or fifteen-year property, respectively.

Three-year property includes such assets as light duty trucks, automobiles, breeding hogs, and other property with a useful life of four years or less. Five-year property includes personal assets not classified as three-year or ten-year property. Examples of five-year property include equipment, single purpose livestock and horticulture facilities, and livestock not included in three-year property. The buildings for housing and feeding swine and for housing and storing feed, machinery, and equipment is included in five-year property. Manufactured homes and certain public utility property are included in the ten-year property class. Property classified as fifteen-year property are farm buildings, land improvements, and other property not classified as five-year or ten-year (Farmer's Tax Guide, 1983).

Table III depicts the annual recovery percentages for all classes of property except fifteen-year property other than utility property. Property which is not utility property requires the use of separate tables. The recovery percentages for non-utility property are based on the month such property is put into service (1983 U.S. Master Tax Guide, paragraph 1165B, 1972).

An individual may elect to use straight line depreciation instead of the ACRS recovery percentages presented in Table III. If an individual elects to use straight line depreciation, the half year convention must be used for the first year in which the asset is

placed in service. The alternative straight line recovery periods for each class of property are:

Three-year property	3, 5, or 12 years
Five-year property	5, 12, or 25 years
Ten-year property	10, 25, or 35 years
Fifteen-year property	15, 35, or 45 years

TABLE III

ACRS DEPRECIATION RECOVERY PERCENTAGES

Recovery Year	Class Property Recovery Percentages			
	Three-year	Five-year	Ten-year	Fifteen-year[1]
	(percent)			
1	25	15	8	5
2	38	22	14	10
3	37	21	12	9
4		21	10	8
5		21	10	7
6			10	7
7			9	6
8			9	6
9			9	6
10			9	6
11				6
12				6
13				6
14				6
15				6

[1]Only includes fifteen-year public utility property.

Source: 1983 U.S. Master Tax Guide

The option to use either the ACRS recovery percentages in Table III or the alternative straight line recovery period must be consistent for all property in a particular class. However, consistency is not required between property classes. For example, all three-year property can be depreciated using the Table III recovery percentages and all five-year property can be depreciated using five year straight line.

Expensing (Section 179)

ERTA replaced first year additional depreciation with an expense deduction for property purchased after 1980. The purpose of the expense deduction is to allow a taxpayer to treat the cost of an asset as a current expense in the year that the asset is purchased. For the 1983 tax year the expense deduction is limited to $5,000. This deduction may be allocated among assets or used with only one. Records must be kept as to specific assets which the expense deduction was allocated and the amount of the cost which was expensed. To qualify for the expense deduction, the asset must be recovery property and eligible for investment tax credit.

The expense deduction is an optional election which the operator must decide whether or not to use in the first year the asset is put in use. If the operator elects to use expensing, the depreciable basis of the asset must be reduced by the amount expensed. In addition the basis eligible for investment tax credit must also be reduced by the amount expensed. Once the election is made it cannot be changed without the approval of the Internal Revenue Service.

Investment Tax Credit

ERTA and TEFRA made several changes with respect to the Investment Tax Credit provisions. Only the changes made by ERTA will be discussed in the following paragraphs while a more comprehensive analysis will be made later in this chapter.

ERTA revised the investment tax credit rules to coincide with the ACRS depreciation methods. The amount of the credit is equal to six percent of the asset's cost for three-year property and ten percent of the asset's cost for property other than three-year. This compares to the old law investment tax credit percentages of 3.33 percent, 6.67 percent and 10.0 percent for assets with useful lives of 3 to 4 years, 5 to 6 years and 7 or more years, respectively (Maynard, 1981).

The carryforward period for unused investment credit has been extended from seven to fifteen years. The three year carryback period was not changed. In addition to increasing the carryforward period, the limit allowed for used property was increased from $100,000 to $125,000.

Net Operating Losses

The purpose for allowing the carryback and carryforward of net operating losses is to provide income tax relief for business losses. This is accomplished by allowing the loss to be used to offset taxable income in other years. ERTA extended the carryforward period for net operating losses from seven to fifteen years. The only losses which may constitute a net operating loss include losses from trade or business operations, casualty losses, or a loss created by the

confiscation of a business by a foreign country (Hoffman, Willis and Phillips, 1982).

A net operating loss occurs when gross income is less than deductions from gross income. Limitations are placed on deductible items which do not reflect business related activities concerning the loss. These items include personal and dependency exemptions, itemized deductions, long-term capital gains deductions, net operating losses from other years, the amount of capital losses in excess of capital gains, and non-business deductions in excess of non-business income (Hoffman, Willis and Phillips, 1982). Capital losses are not included in the net operating loss due to the separate carryover provision for capital losses (Internal Revenue Code, Section 1212).

The carryback and carryforward rules for a net operating loss dictates that the net operating loss must first be carried back to the third year prior to the loss year then to the second year and first year prior to the loss year, respectively. If the net operating loss has not been absorbed in the carryback period, the net operating loss is then carried forward beginning with the first year after the loss year and successively to the fifteenth year. The taxpayer may elect to forego the carryback requirement by notifying the Secretary of the Treasury that the net operating loss is to be carried forward (Internal Revenue Code, Section 172(b)(3)(c)). When the election is made, the net operating loss is then to be carried forward beginning with the first year after the loss year and each successive year not to exceed fifteen years. If a net operating loss occurs for two or more years, the earliest occurring net operating loss is to be absorbed first to insure that it will be fully used before it expires

after the fifteenth year. In addition, each net operating loss is computed and applied separately for each year to which the net operating loss is carried (Hoffman, Willis and Phillips, 1982).

<center>The Tax Equity and Fiscal Responsibility

Act of 1982</center>

TEFRA made additional changes in the tax laws. A majority of these changes are to become effective for the 1983 tax year, however, only a small part of the TEFRA changes were tailored for individual taxpayers.

Investment Tax Credit

TEFRA introduced additional amendments to the investment tax credit provisions established by ERTA. For the 1983 tax year, taxpayers have the option to select either full or reduced investment tax credit for each asset placed in service this year. Full investment tax credit refers to the provisions established by ERTA as discussed earlier. TEFRA made one addition to full investment tax credit by requiring that the assets depreciable basis be reduced by 50 percent of the amount of the credit. If the taxpayer does not wish to reduce the asset's depreciable basis, reduced investment tax credit may be used. The reduced investment tax credit is four percent for three-year property and eight percent for property other than three-year.

TEFRA has lowered the maximum amount of investment tax credit that may be used to offset the tax liability effective in 1983. The amount of the investment tax credit allowed to offset the tax liability is limited to $25,000 plus 85 percent of the tax liability

exceeding $25,000. Any unused investment tax credit is to be carried back to the third previous tax year and successively forward until the fifteenth year after the current year. In the case where more than one year's investment tax credits are being carried to the same year, the allowable investment tax credit for that year includes all investment tax credits which are carried to that year plus that year's investment tax credits. The earliest year's investment tax credits are then used first to the maximum limit with the excess to be carried forward to the next tax year. The purpose of this rule is to prevent investment tax credit carryovers from expiring.

When property is disposed of before the end of its depreciation recovery period a percentage of the investment tax credit must be recaptured depending upon when the asset is disposed. Table IV indicates the percentages of the investment tax credit which must be recaptured.

TABLE IV

INVESTMENT TAX CREDIT RECAPTURE PERCENTAGES

Year Property is Disposed of	Recapture Percentages	
	Three-year Property	Five-,Ten-,and Fifteen-year Property
	(percent)	
Within First Year	100	100
Within Second Year	66	80
Within Third Year	33	60
Within Fourth Year	0	60
Within Fourth Year	0	40
Within Fifth Year	0	20
After Fifth Year	0	0

Source: Hoffman, Willis and Phillips, 1982

Table V combines investment tax credit, expensing, and depreciation alternatives for a $20,000, five-year asset using a five year recovery period. This table is used to illustrate how expensing and investment tax credit alternatives affect the depreciable basis of an asset. In addition, depreciation deductions can be compared between accelerated and straight line using a five year recovery period.

Add-on Minimum Tax

For tax years after 1982, TEFRA has repealed the add-on minimum tax. The add-on minimum tax was established to require a taxpayer to pay an additional tax on the use of tax preference items. These tax preference items have been shifted to the alternative minimum tax. The additional tax was then added to the amount of the normal tax liability thus the name add-on (Hoffman, Willis, and Phillips, 1982).

Alternative Minimum Tax

The alternative minimum tax was adopted to prevent special tax deductions, referred to as tax preference items, which are different than those of the add-on minimum tax from being used to reduce the taxpayer's tax liability to zero. The alternative minimum tax is a tax placed on the use of these tax preference items. TEFRA has expanded the list of tax preference items which are used to compute the amount of the alternative minimum tax. The tax preference items that may be of importance to swine producers include dividend and All-Savers Certificate exclusions, accelerated depreciation on real

TABLE V

AN EXAMPLE OF DEPRECIATION, INVESTMENT TAX CREDIT, AND EXPENSING ALTERNATIVES ASSUMING A $20,000, 5-YEAR DEPRECIABLE ASSET

Depreciation Method	Accelerated Depreciation						Straight Line Depreciation					
Investment Tax Credit Method Selected	None	None	Reduced	Reduced	Full	Full	None	None	Reduced	Reduced	Full	Full
(dollars)												
Investment Tax Credit Amount	0	0	1600	1200	2000	1500	0	0	1600	1200	2000	1500
Expensing Amount	0	5000	0	5000	0	5000	0	5000	0	5000	0	5000
Depreciable Basis	20000	15000	20000	15000	19000	14250	20000	15000	20000	15000	19000	14250
Depreciation Per Year												
Year 1	3000	2250	3000	2250	2850	2138	2000	1500	2000	1500	1900	1425
Year 2	4400	3300	4400	3300	4180	3136	4000	3000	4000	3000	3800	2850
Year 3	4200	3150	4200	3150	3990	2992	4000	3000	4000	3000	3800	2850
Year 4	4200	3150	4200	3150	3990	2992	4000	3000	4000	3000	3800	2850
Year 5	4200	3150	4200	3150	3990	2992	4000	3000	4000	3000	3800	2850
Year 6	--	--	--	--	--	--	2000	1500	2000	1500	1900	1425

property in excess of straight line depreciation, the excess of accelerated depreciation over straight line for leased personal property, and capital gains (Farmers Tax Guide, 1983). Whenever any of these tax preference items is encountered, the alternative minimum tax liability must be calculated.

Other Important Tax Law Provisions

Income Averaging

The rules associated with income averaging were not amended by either ERTA or TEFRA. The purpose for allowing a taxpayer to use income averaging is to reduce a large tax liability resulting from an unusually profitable year. This is done by averaging the current year's income with the income of the four previous years. Swine producers may find themselves in this situation when slaughter hog prices or net income increase rapidly in a particular year.

A taxpayer must meet the following eligibility requirements in order to use income averaging (Internal Revenue Code, Section 1303).

1. The taxpayer must have been a U.S. citizen or have had resident status for the previous five years including the current tax year.

2. The taxpayer must have provided at least 50 percent of his own support for the past five years. If the taxpayer is married, both the husband and wife must have provided at least 50 percent of their support. This requirement may be waived:

a. If the taxpayer is at least 25 years of age and has not been a full time student for any of the previous four years.

b. If the current year's income has been due to the performance of work in two or more of the previous four years.

c. If a taxpayer files a joint return in the current year and his or her spouse was supported by another taxpayer in any of the previous four years and the spouse's contribution in the current year does not exceed 25 percent of the total adjusted gross income.

Providing that an individual meets these eligibility requirements, the taxpayer must have averageable income greater than $3,000 to be able to use income averaging. Averageable income is the amount of current taxable income in excess of 120 percent of the average taxable income of the four previous tax years (Hoffman, Willis, and Phillips, 1982).

Capital Gain Treatment for Business Assets

Section 1231 of the Internal Revenue Codes allows sales, exchanges, or involuntary conversion of business depreciable and real property to qualify for capital gain treatment. The gain is computed by subtracting the asset's adjusted basis (cost less depreciation) from the sales price. Depreciation, for the purpose of determining gain, includes the 50 percent basis adjustment resulting from the use of full investment tax credit and the Section 179 expensing deduction (Farmer's Tax Guide, 1983). In order to prevent the benefit from both

the depreciation deduction and the long-term capital gain deduction, the gain resulting from depreciation is taxed as ordinary income and the excess is given long-term capital gain treatment. The long-term capital gain provisions allows for 60 percent of the gain in excess of depreciation deducted occurring from a sale to be non-taxable if the property is held for more than one year for most property including swine. Cattle and horses held for draft, breeding, dairy, or sport purposes must be held at least two years in order to qualify. If an asset is sold or exchanged before the end of the required holding period, the gain in excess of depreciation deducted is taxed as ordinary income (Farmer's Tax Guide, 1983).

Self-Employment Tax

The self-employment tax is levied on all self-employed individuals to provide social security and medicare benefits (Hoffman, Willis and Phillips, 1982). Farmers must pay self-employment taxes if their net farm income is $400 or more. The self-employment tax is 9.35 percent of net farm income up to a limit of $35,700 for 1983. The maximum amount of the self-employment tax is $3,337.95 (1984 U.S. Master Tax Guide, 1983). The self-employment tax for 1982 was 9.35 percent of net farm income of $32,400. The increase in the maximum amount of the tax for 1983 is $308.55 (1983 U.S. Master Tax Guide, 1982).

A farmer may be able to reduce the amount of his self-employment tax through the use of reduced investment tax credit and expensing. The effects of using these items to reduce the amount of the self-employment tax will be analyzed in Chapter III.

CHAPTER III

THEORY

Hoffman, Willis and Phillips (1982), Osburn and Schneeberger (1983), Plain (1983), Hamilton and Plaxico (1983), and others have completed work dealing with income tax management and planning strategies available to individual taxpayers. Since the adoption of ERTA and TEFRA, additional work needs to be done to analyze the new provisions available. The new tax laws have several provisions which may be beneficial to swine producers.

In order for a farmer to make good tax management decisions he must first understand the existing tax laws. This chapter is devoted to developing, comparing and evaluating alternative tax management strategies of interest to swine producers.

Tax Management Strategies

One objective of tax management is to maximize after-tax net cash income and net worth (Osburn and Schneeberger, 1983). Tax management strategies must be consistent with good farm management decisions in order to achieve this objective. Tax management strategies should be used to reduce the variability of taxable income. The variability of taxable income from year to year causes a farmer to move from one marginal tax bracket to another and ultimately results in increased total taxes paid over the life of the farm (Osburn and Schneeberger, 1983).

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Swine producers have many tax management strategies available to use to reduce the variability of taxable income. Two types of tax management strategies exist. The first type are those that are used to increase taxable income in the current year. Some of these strategies include (Maynard, p. 3, 1982):

1. Selling market or slaughter hogs before the end of the year.

2. Postponing the purchase of feed and supplies until the next year.

3. Using straight line depreciation on assets purchased during the current year.

4. Foregoing the use of the expensing deduction.

5. Use full investment tax credit which reduces the depreciable basis of assets purchased this year.

The second type of tax management strategies are those that are used to decrease the current year's taxable income. Some of these strategies include (Maynard, p. 3, 1982):

1. Postponing the sale of market or slaughter hogs until the next year.

2. Prepurchasing feed and supplies which will be used next year.

3. Using accelerated depreciation and expensing.

4. Obtaining additional depreciation expense by purchasing additional machinery and equipment.

5. Using reduced investment tax credit which does not reduce the depreciable basis.

of maximizing long run after-tax net cash income and net worth. Minimizing taxes in the short run may not be consistent with minimizing taxes in the longer time period.

The tax management strategies evaluated in this chapter include the use of accelerated versus straight line depreciation, expensing versus not expensing, full versus reduced investment tax credit, and the carryback versus carryforward of net operating losses. These options are evaluated in terms of when it is beneficial to use them in order to maximize after-tax net cash income. After-tax net cash income is determined by subtracting the tax liability from net cash income.

Present Value Analysis

The time value of money is an essential consideration in making tax management decisions. Some tax management strategies result in greater tax reductions in early years while others result in constant reductions over time. Thus, the comparison and evaluation of tax management strategies necessitates the use of present value analysis. Present value analysis takes into account the producer's discount rate, often referred to as his opportunity cost of capital, to place a current value on a future income flow. The discount rate is a measure of the time value of money since this is the rate that equates a current sum of money to a future sum (Barry, Hopkin, and Baker, 1979). The present value formula is

$$PV = \sum_{i=1}^{N} I_i (1 + D)^{-i} \tag{1}$$

where

    PV = Present value of income

    N = Number of years being examined

    I = Income in the ith year; where i=1, ...,N

    D = Discount rate

The decision criteria associated with present value analysis of tax management strategies is to maximize the present value of after-tax net cash income.

Present Value Analysis of Depreciation Methods

Whether to select accelerated or straight line depreciation is a decision faced by many swine producers. The selection of the wrong method can increase the producer's total tax liability over a period of years. In order to provide a producer with a basis to make better decisions concerning which depreciation method to use the present value of after-tax net cash income associated with each method will be analyzed. Two equations will be used to calculate the present value of after-tax net cash income. Equations 2 and 3 are used to calculate the present value of after-tax net cash income when accelerated and straight line depreciation are used respectively.

$$PV = \sum_{i=1}^{RP+1} NCI_i - [((NCI_i - ACD_i - EXP_i) \times TR_i) +$$

$$SET_i - ITC_i] (1+D)^{-(i-1)} \tag{2}$$

$$PV = \sum_{i=1}^{RP+1} NCI_i - [((NCI_i - SLD_i - EXP_i) \times TR_i) +$$

$$SET_i - ITC_i] (1+D)^{-(i-1)} \tag{3}$$

where

PV = Present value of after-tax net cash income

RP = Recovery period

NCI_i = Net cash income in year i; where i=1, ..., RP + 1

ACD_i = Amount of accelerated depreciation expense in the ith year; where i=1, ..., RP + 1

EXP_i = Amount expensed in the first year; when i≠1, EXP_i = 0

TR_i = Marginal tax rate in the ith year; where i=1, ..., RP + 1

SET_i = Self-employment tax liability for the ith year; where i=1, ..., RP + 1

ITC_i = Amount of investment tax credit in the first year; when i≠1, ITC_i = 0

D = Discount rate

SLD_i = Amount of straight line depreciation expense in the ith year; where i=1, ..., RP + 1

The net cash income for all future years must be projected in order to complete the analysis. The amount expensed and the investment tax credit option of either full or reduced must be identical in both equations in order to prevent them from influencing the results. The recovery period is increased one year because of the half-year convention when using straight line depreciation. Thus in the last year of the analysis the depreciation expense for accelerated depreciation will be zero while straight line will have one-half years depreciation expense (Farmer's Tax Guide, 1983).

The decision criteria used to select either accelerated or straight line depreciation requires the use of the producer's discount

rate. The discount rate is required in both equations. The depreciation method selected is the one that has the larger present value of after-tax net cash income.

Present Value Analysis of Expensing

Like depreciation, the election to expense may increase or decrease the producer's tax liability and hence change his after-tax net cash income. Because the use of expensing reduces the depreciable basis of an asset and also the amount of investment tax credit allowed, the inappropriate use of expensing may have an even more adverse effect on the total tax liability than the selection of the wrong depreciation method.

The method used to determine when to elect or not elect to use the expensing deduction is similar to the method used to select between the depreciation methods. Equations 4 and 5 are used to analyze the election of expensing and not expensing respectively.

$$PV = \sum_{i=1}^{RP} NCI_i - [((NCI_i - DEP_i - EXP_i) \times TR_i) +$$

$$SET_i - ITC_i] \ (1+D)^{-(i-1)} \qquad (4)$$

$$PV = \sum_{i=1}^{RP} NCI_i - [((NCI_i - DEP_i) \times TR_i) + SET_i -$$

$$ITC_i] \ (1+D)^{-(i-1)} \qquad (5)$$

where

DEP_i = Amount of depreciation expense in the ith year; where

i=1, ..., RP

Other variables as previously defined

The depreciation and investment tax credit options must be the same in both equations to evaluate the effect of the expensing option. When straight line depreciation is used the recovery period must be increased by one year due to the use of the half-year convention. Again, the net cash income must be projected for future years.

The decision criteria is the same as that used for selecting the depreciation method to use. The producer's discount rate is again applied to both equations and the method which results in the larger present value of after-tax net cash income is selected.

Present Value Analysis of Investment Tax Credit

The new investment tax credit provisions as amended by TEFRA allow the taxpayer to select either full or reduced investment tax credit. When full investment tax credit is used the depreciable basis must be reduced by one-half of the amount of the credit. The depreciable basis is not reduced if reduced investment tax credit is used. The trade off between depreciation and investment tax credit must be analyzed in order to determine when to use either full or reduced investment tax credit. Equations 6 and 7 are used to evaluate the implications of selecting full or reduced investment tax credit.

$$PV = \sum_{i=1}^{RP} NCI_i - [((NCI_i - DEP_i - EXP_i) \times TR_i) +$$

$$SET_i - FITC_i] (1+D)^{-(i-1)} \tag{6}$$

$$PV = \sum_{i=1}^{RP} NCI_i [((NCI_i - DEP_i - EXP_i) \times TR_i) +$$

$$SET_i - RITC_i] (1+D)^{-(i-1)} \tag{7}$$

where

FITC_i = Amount of full investment tax credit in the first year; when $i{\neq}1$, $\text{FITC}_i = 0$

RITC_i = Amount of reduced investment tax credit in the first year; when $i{\neq}1$, $\text{RITC}_i = 0$

Other variables as previously defined

The depreciation method used and the amount expensed must be the same for both equations. When the straight line depreciation method is used, the recovery period must be increased one year due to the half-year convention. Again the net cash income for future years must be projected.

The decision criteria is also the same as the two previous situations. The investment tax credit method which maximizes the present value of after-tax net cash income is selected.

Decision Criteria Analysis

The decision criteria previously developed for selecting depreciation, investment tax credit, and expensing alternatives are analyzed in this section. To simplify the analysis and the compilation of results, four investment tax credit and expensing combinations have been created. These four combinations are full investment tax credit with expensing, full investment tax credit without expensing, reduced investment tax credit with expensing, and reduced investment tax credit without expensing. All four of these combinations are then used with accelerated depreciation and straight line depreciation. A total of eight combinations are analyzed. These

eight combinations are analyzed using three future net cash income projections. The future net cash incomes are income increasing by $5,000 per year, income constant, and income decreasing by $5,000 per year from the initial levels.

A $30,000 and an $80,000 initial net cash income levels have been selected to analyze the decision criteria used to determine the optimum depreciation, investment tax credit and expensing options. The $30,000 level of initial net cash income was selected because it is less than the $35,700 upper limit of the self-employment tax. This net cash income level will be used to examine the effect of using reduced investment tax credit and expensing to reduce the amount of the self-employment tax. The $80,000 level of initial net cash income was selected to analyze the decision criteria when the taxpayer must pay the maximum self-employment tax of $3,337.95. Table VI lists the annual net cash incomes used in this analysis.

The asset used in this analysis has a cost basis of $40,000, is classified as five-year property, and qualifies for investment tax credit and expensing. The recovery period used for both accelerated and straight line depreciation is five years. The 12- and 25-year recovery periods for the straight line method are not analyzed and compared since they do not coincide with the accelerated depreciation recovery period.

The tax rate schedule for married individuals filing a joint return effective for 1983 (see Table II) is used to compute the annual tax liability and determine the amount of annual after-tax net cash income.

TABLE VI

ANNUAL NET CASH INCOME PROJECTIONS

Year	Net Cash Income			Net Cash Income		
	Increasing	Constant	Decreasing	Increasing	Constant	Decreasing
	(dollars)					
1	30,000	30,000	30,000	80,000	80,000	80,000
2	35,000	30,000	25,000	85,000	80,000	75,000
3	40,000	30,000	20,000	90,000	80,000	70,000
4	45,000	30,000	15,000	95,000	80,000	65,000
5	50,000	30,000	10,000	100,000	80,000	60,000
6	55,000	30,000	5,000	105,000	80,000	55,000

Equations 2 through 7 are used with each of the annual net cash income projections presented in Table VI in order to analyze the use of the depreciation, investment tax credit, and expensing options. Discount rates ranging from 0 to 50 percent are used in order to better illustrate the selection process over a wider range of opportunity costs. The present values of after-tax net cash incomes are compiled in Tables VII through XVIII. Tables VII through XII present the results from using the $30,000 initial net cash income level and Tables XIII through XVIII present the results from using the $80,000 initial net cash income level. The present values of after-tax net cash income associated with increasing, constant, and decreasing projected net cash incomes are analyzed within each group.

TABLE VII

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING A $30,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME INCREASING $5,000 PER YEAR USING ACCELERATED DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	196919	184413	173269	163304	154363	146313	139044	132460	126480	116059	107327	99941	93640	83527
(B) Full ITC without Expensing	167500	184920	173709	163684	154688	146589	139274	132649	126631	116144	107355	99922	93579	83400
(C) Reduced ITC with Expensing	196832	184310	173152	163176	154224	146166	138889	132299	126313	115883	107145	99755	93451	83337
(D) Reduced ITC without Expensing	197412	184805	173572	163526	154511	146395	139066	132428	126397	115889	107083	99635	93281	83085

Rank	(strategy)													
1 (Highest Present Value)	B	B	B	B	B	B	B	B	B	B	B	A	A	A
Breakeven Discount Rate (Percent)											32.90			
2	D	D	D	D	D	D	D	A	A	A	A	B	B	B
Breakeven Discount Rate (Percent)								16.00						
3	A	A	A	A	A	A	A	D	D	D	C	C	C	C
Breakeven Discount Rate (Percent)										25.40				
4 (Lowest Present Value)	C	C	C	C	C	C	C	C	C	C	D	D	D	D

TABLE VIII

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING A $30,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME INCREASING $5,000 PER YEAR USING STRAIGHT LINE DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	197121	184500	173260	163214	154204	146096	138778	132152	126136	115660	106889	99476	93156	83025
(B) Full ITC without Expensing	197673	184962	173641	163523	154448	146282	138911	132238	126179	115628	106795	99330	92966	82764
(C) Reduced ITC with Expensing	197054	184407	173145	163080	154053	145930	138599	131962	125936	115443	106659	99236	92909	82767
(D) Reduced ITC without Expensing	197603	184848	173488	163334	154228	146033	138636	131938	125858	115268	106402	98908	92520	82279
Rank	(strategy)													
1 (Highest Present Value)	B	B	B	B	B	B	B	B	B	A	A	A	A	A
Breakeven Discount Rate (Percent)									22.80					
2	D	D	D	D	D	A	A	A	A	B	B	B	B	C
Breakeven Discount Rate (Percent)					10.67								49.50	
3	A	A	A	A	A	D	D	C	C	C	C	C	C	B
Breakeven Discount Rate (Percent)								16.50						
4 (Lowest Present Value)	C	C	C	C	C	C	C	D	D	D	D	D	D	D

TABLE IX

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING A $30,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME CONSTANT AT $30,000 PER YEAR USING ACCELERATED DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	149482	141043	133494	126719	120617	115104	110107	105565	101424	94171	88052	82841	78367	71120
(B) Full ITC without Expensing	149909	141404	133797	126968	120818	115261	110225	105646	101472	94162	87994	82742	78231	70928
(C) Reduced ITC with Expensing	149338	140886	133327	126543	120433	114913	109911	105364	101219	93961	87838	82626	78151	70906
(D) Reduced ITC without Expensing	149756	141228	133601	126755	120590	115018	109969	105379	101195	93867	87685	82422	77903	70585

Rank	(strategy)													
1 (Highest Present Value)	B	B	B	B	B	B	B	B	B	A	A	A	A	A
Breakeven Discount Rate (Percent)									24.14					
2	D	D	D	D	A	A	A	A	A	B	B	B	B	B
Breakeven Discount Rate (Percent)				8.87										
3	A	A	A	A	D	D	D	D	C	C	C	C	C	C
Breakeven Discount Rate (Percent)								18.50						
4 (Lowest Present Value)	C	C	C	C	C	C	C	C	D	D	D	D	D	D

TABLE X

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT
TAX CREDIT AND EXPENSING STRATEGIES ASSUMING A $30,000 INITIAL NET CASH
INCOME AND FUTURE NET CASH INCOME CONSTANT AT $30,000 PER YEAR
USING STRAIGHT LINE DEPRECIATION BASED ON A $40,000,
5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	149494	140957	133327	126483	120324	114762	109725	105148	100979	93682	87533	82303	77816	70559
(B) Full ITC without Expensing	149979	141360	133656	126747	120528	114913	109828	105208	100999	93634	87428	82150	77622	70301
(C) Reduced ITC with Expensing	149465	140904	133253	126391	120216	114640	109590	105002	100823	93510	87348	82107	77612	70344
(D) Reduced ITC without Expensing	149838	141180	133441	126500	120253	114612	109503	104862	100633	93234	86998	81695	77146	69789

Rank								(strategy)						
1 (Highest Present Value)	B	B	B	B	B	B	B	B	B	A	A	A	A	A
Breakeven Discount Rate (Percent)									21.42					
2	D	D	D	D	A	A	A	A	A	B	B	B	B	C
Breakeven Discount Rate (Percent)				7.96									41.70	
3	A	A	A	A	D	C	C	C	C	C	C	C	C	B
Breakeven Discount Rate (Percent)					11.42									
4 (Lowest Present Value)	C	C	C	C	C	D	D	D	D	D	D	D	D	D

TABLE XI

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING A $30,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME DECREASING $5,000 PER YEAR USING ACCELERATED DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	95403	91627	88201	85082	82234	79626	77231	75027	72992	69364	66233	63509	61121	57144
(B) Full ITC without Expensing	95407	91598	88141	84995	82122	79491	77076	74853	72801	69143	65986	63239	60832	56825
(C) Reduced ITC with Expensing	95107	91330	87904	84785	81937	79331	76937	74734	72701	69078	65952	63232	60850	56884
(D) Reduced ITC without Expensing	95066	91249	87785	84632	81754	79118	76699	74472	72416	68753	65592	62843	60434	56425

Rank	(strategy)													
1 (Highest Present Value)	B	A	A	A	A	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)	0.31													
2	A	B	B	B	B	B	B	B	B	B	B	B	C	C
Breakeven Discount Rate (Percent)													36.32	
3	C	C	C	C	C	C	C	C	C	C	C	C	B	B
Breakeven Discount Rate (Percent)														
4 (Lowest Present Value)	D	D	D	D	D	D	D	D	D	D	D	D	D	D

TABLE XII

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING A $30,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME DECREASING $5,000 PER YEAR USING STRAIGHT LINE DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	94971	91166	87715	84577	81714	79094	76691	74480	72440	68808	65676	62954	60571	56608
(B) Full ITC without Expensing	94840	90998	87516	84349	81460	78817	76392	74162	72105	68442	65285	62542	60141	56150
(C) Reduced ITC with Expensing	94654	90842	87388	84246	81381	78759	76354	74141	72101	68468	65338	62617	60236	56278
(D) Reduced ITC without Expensing	94474	90613	87113	83929	81025	78368	75931	73688	71620	67938	64764	62007	59593	55579
Rank	(strategy)													
1 (Highest Present Value)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)														
2	B	B	B	B	B	B	B	B	B	C	C	C	C	C
Breakeven Discount Rate (Percent)									20.56					
3	C	C	C	C	C	C	C	C	C	B	B	B	B	B
Breakeven Discount Rate (Percent)														
4 (Lowest Present Value)	D	D	D	D	D	D	D	D	D	D	D	D	D	D

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TABLE XIII

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT
TAX CREDIT AND EXPENSING STRATEGIES ASSUMING AN $80,000 INITIAL NET CASH
INCOME AND FUTURE NET CASH INCOME INCREASING $5,000 PER YEAR
USING ACCELERATED DEPRECIATION BASED ON A $40,000,
5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	372249	349659	329502	311450	295230	280606	267381	255386	244475	225424	209416	195840	184228	165523
(B) Full ITC without Expensing	372719	350017	329759	311615	295311	280610	267315	255255	244285	225127	209029	195374	183693	164874
(C) Reduced ITC with Expensing	372349	349717	329523	311437	295186	280534	267283	255264	244332	225241	209200	195595	183957	165210
(D) Reduced ITC without Expensing	372833	350084	329783	311600	295260	280528	267203	255116	244120	224918	208781	295093	183383	164517

Discount Rate	0.0	.025	.05	.075	.10	.11	.125	.15	.175	.20	.25	.30	.35	.40 [1]
Rank	(strategy)													
1 (Highest Present Value)	D	D	D	B	B	B	B	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)			6.50					12.65						
2	B	B	B	D	D	A	A	B	·C	C	C	C	C	C
Breakeven Discount Rate (Percent)						10.70			16.90					
3	C	C	C	A	A	D	C	C	B	B	B	B	B	B
Breakeven Discount Rate (Percent)			6.50				12.30							
4 (Lowest Present Value)	A	A	A	C	C	C	D	D	D	D	D	D	D	D

[1] The rank of the strategies does not change at the .50 discount rate.

TABLE XIV

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING AN $80,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME INCREASING $5,000 PER YEAR USING STRAIGHT LINE DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	372356	349621	329340	311184	294873	280173	266882	254830	243871	224740	208674	195055	183410	164662
(B) Full ITC without Expensing	372841	349973	329574	311311	294903	280115	266745	254620	243594	224346	208181	194476	182758	163891
(C) Reduced ITC with Expensing	372461	349677	329353	311157	294811	280078	266758	254679	243695	224522	208419	194768	183096	164305
(D) Reduced ITC without Expensing	372961	350038	329588	311280	294832	280007	266603	254447	243393	224096	207889	194148	182399	163482

Rank	(strategy)													
1 (Highest Present Value)	D	D	D	B	B	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)			5.77			10.83								
2	B	B	B	D	A	B	C	C	C	C	C	C	C	C
Breakeven Discount Rate (Percent)				9.22			14.33							
3	C	C	C	A	D	C	B	B	B	B	B	B	B	B
Breakeven Discount Rate (Percent)			5.77			10.56								
4 (Lowest Present Value)	A	A	A	C	C	D	D	D	D	D	D	D	D	D

TABLE XV

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOME FOR SELECTED INVESTMENT
TAX CREDIT AND EXPENSING STRATEGIES ASSUMING AN $80,000 INITIAL NET CASH
INCOME AND FUTURE NET CASH INCOME CONSTANT AT $80,000 PER YEAR
USING ACCELERATED DEPRECIATION BASED ON A $40,000,
5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	331419	312189	295008	279602	265740	253226	241895	231604	222231	205835	192023	180281	170213	153941
(B) Full ITC without Expensing	331809	312456	295163	279656	265703	253107	241701	231342	221906	205399	191494	179672	169534	153148
(C) Reduced ITC with Expensing	331489	312214	294991	279548	265653	254109	241750	231434	222038	205600	191755	179983	169889	153575
(D) Reduced ITC without Expensing	331889	312483	295144	279595	265604	252973	241532	231147	221685	205132	191187	179331	169164	152730
Rank	(strategy)													
1 (Highest Present Value)	D	D	B	B	A	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)		3.96		8.98										
2	B	B	D	A	B	C	C	C	C	C	C	C	C	C
Breakeven Discount Rate (Percent)			7.38		12.44									
3	C	C	A	D	C	B	B	B	B	B	B	B	B	B
Breakeven Discount Rate (Percent)		3.96		8.70										
4 (Lowest Present Value)	A	A	C	C	D	D	D	D	D	D	D	D	D	D

TABLE XVI

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING AN $80,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME CONSTANT AT $80,000 PER YEAR USING STRAIGHT LINE DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate (dollars)													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
(A) Full ITC with Expensing	331419	312321	295251	279940	266160	253716	242444	232204	222875	206549	192790	181087	171048	154812
(B) Full ITC without Expensing	331809	312606	295441	280043	266183	253667	242329	232028	222643	206216	192371	180592	170488	154144
(C) Reduced ITC with Expensing	331489	312352	295248	279904	266095	253624	242328	232066	222716	206353	192562	180831	170768	154492
(D) Reduced ITC without Expensing	331889	312642	295437	280002	266109	253562	242196	231869	222460	205991	192110	180300	170168	153778

Rank	(strategy)													
1 (Highest Present Value)	D	D	B	B	B	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)		4.71				10.80								
2	B	B	D	D	A	B	B	C	C	C	C	C	C	C
Breakeven Discount Rate (Percent)				8.85			15.06							
3	C	C	A	A	D	C	C	B	B	B	B	B	B	B
Breakeven Discount Rate (Percent)		4.71				10.46								
4 (Lowest Present Value)	A	A	C	C	D	D	D	D	D	D	D	D	D	D

TABLE XVII

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING AN $80,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME DECREASING $5,000 PER YEAR USING ACCELERATED DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	288860	273435	259610	247177	235958	225800	216576	208176	200504	187029	175620	165871	157472	143806
(B) Full ITC without Expensing	289170	273646	259733	247218	235924	225699	216412	207954	200228	186659	175168	165348	156887	143118
(C) Reduced ITC with Expensing	288901	273439	259582	247119	235872	225689	216442	208020	200329	186819	175379	165605	157183	143479
(D) Reduced ITC without Expensing	289217	273651	259700	247151	235826	225572	216259	207776	200028	186419	174893	165044	156557	142745

Rank						(strategy)								
1 (Highest Present Value)	D	D	B	B	A	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)		2.82			8.85									
2	B	B	D	A	B	B	C	C	C	C	C	C	C	C
Breakeven Discount Rate (Percent)			6.92			13.08								
3	C	C	A	D	C	C	B	B	B	B	B	B	B	B
Breakeven Discount Rate (Percent)		2.82			8.52									
4 (Lowest Present Value)	A	A	C	C	D	D	D	D	D	D	D	D	D	D

TABLE XVIII

PRESENT VALUE AND RANKINGS OF AFTER-TAX NET CASH INCOMES FOR SELECTED INVESTMENT TAX CREDIT AND EXPENSING STRATEGIES ASSUMING AN $80,000 INITIAL NET CASH INCOME AND FUTURE NET CASH INCOME DECREASING $5,000 PER YEAR USING STRAIGHT LINE DEPRECIATION BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Investment Tax Credit (ITC) and Expensing Strategies	Discount Rate													
	0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	(dollars)													
(A) Full ITC with Expensing	288754	273210	259285	246767	235474	225255	215978	207531	199820	186283	174828	165045	156621	142924
(B) Full ITC without Expensing	289049	273390	259361	246749	235372	225075	215728	207217	199447	185806	174263	164404	155915	142110
(C) Reduced ITC with Expensing	288789	273202	259240	246687	235363	225115	215812	207342	199609	186034	174546	164735	156287	142551
(D) Reduced ITC without Expensing	289089	273381	259309	246658	235244	224915	215538	207001	199206	185521	173940	164050	155533	141683

Discount Rate	0.0	.025	.05	.06	.07	.075	.10	.125	.15	.175	.20	.25	.30	.35[1]
Rank	(strategy)													
1 (Highest Present Value)	D	B	B	B	B	A	A	A	A	A	A	A	A	A
Breakeven Discount Rate (Percent)		2.05				7.01								
2	B	D	D	A	A	B	B	C	C	C	C	C	C	C
Breakeven Discount Rate (Percent)				5.42				10.44						
3	C	A	A	D	C	C	C	B	B	B	B	B	B	B
Breakeven Discount Rate (Percent)		2.04				6.74								
4 (Lowest Present Value)	A	C	C	C	D	D	D	D	D	D	D	D	D	D

[1] The rank of the strategies does not change from the discount rate of .35 to .50.

Table VII presents the results from using equations 4, 5, 6, and 7 with accelerated depreciation, initial net cash income of $30,000, and projected net cash income increasing. The top half of Table VII lists the present values of after-tax net cash income using the four investment tax credit and expensing alternatives. These four alternatives are then ranked from largest to smallest present value in the bottom half of the table. The breakeven discount rate is the discount rate at which one investment tax credit and expensing strategy changes rank. This point is determined by finding the discount rate which equates the two equation's strategies being compared. For example, the optimum expensing and investment tax credit strategy is B (full investment tax credit without expensing) when the discount rate is less than 32.90 percent. If the discount rate is greater than 32.90 percent, the optimum strategy is A (full investment tax credit with expensing). At the 32.90 percent discount rate the present value of after-tax net cash income is the same for strategies A and B. The optimum strategy refers to the investment tax credit and expensing strategy which produces the largest present value of after-tax net cash income at a particular discount rate.

This procedure is repeated to determine the optimum investment tax credit and expensing strategies for each of Tables VIII through XVIII. A comparison of accelerated and straight line depreciation methods with the four investment tax credit and expensing options is accomplished using Tables VII through XII assuming a $30,000 initial net cash income. The same comparison is also made using Tables XIII through XVIII with an assumed initial net cash income of $80,000.

Once the optimum strategy is determined for each table, the comparison of accelerated depreciation to straight line depreciation

must be made in order to determine the optimum depreciation, investment tax credit, and expensing strategy. This is accomplished by analyzing the tables with identical initial and projected net cash incomes. Tables VII and VIII, IX and X, XI and XII, XIII and XIV, XV and XVI, and XVII and XVIII are analyzed in pairs because they have identical initial and projected net cash incomes. The first table in each pair presents the results from using accelerated depreciation and the second table in each pair presents the results from using straight line depreciation. The optimum strategies from these pairs are compiled in Table XIX.

Examination of Table XIX reveals that straight line depreciation is the optimal solution when projected net cash income is either increasing or constant and the discount rate is low. When the initial net cash income is $30,000 the switch from straight line to accelerated depreciation occurs at a discount rate of 3.42 percent when projected net cash income is increasing and at a discount rate of 1.49 percent when projected net cash income is constant. For the initial net cash income of $80,000 the switch from straight line to accelerated depreciation occurs at a discount rate of 1.80 percent when projected net cash income is increasing. When the projected net cash income is constant, the switch occurs at a discount rate greater than zero.

Further examination of Table XIX reveals that reduced investment tax credit (strategies D and H) is used when the initial net cash income is $80,000 and the discount rate is low. Reduced investment credit is used when the discount rate is less than 5.77, 4.71, and

TABLE XIX

SUMMARY OF OPTIMUM DEPRECIATION, INVESTMENT TAX CREDIT, AND EXPENSING STRATEGIES[1,2]

Initial Net Cash Income	Projected Net Cash Income	Discount Rate													
		0.0	.025	.05	.075	.10	.125	.15	.175	.20	.25	.30	.35	.40	.50
	Increasing	F	F	B	B	B	B	B	B	B	B	B	A	A	A
30,000 Dollars	Constant	F	B	B	B	B	B	B	B	B	B	A	A	A	A
	Decreasing	B	A	A	A	A	A	A	A	A	A	A	A	A	A
	Increasing	H	D	D	B	B	B	A	A	A	A	A	A	A	A
80,000 Dollars	Constant	D/H	D	B	B	B	A	A	A	A	A	A	A	A	A
	Decreasing	D	D	B	B	A	A	A	A	A	A	A	A	A	A

[1]
A = Accelerated Depreciation, Full Investment Tax Credit, and Expensing.
B = Accelerated Depreciation, Full Investment Tax Credit, and No Expensing.
C = Accelerated Depreciation, Reduced Investment Tax Credit, and Expensing.
D = Accelerated Depreciation, Reduced Investment Tax Credit, and No Expensing.
E = Straight Line Depreciation, Full Investment Tax Credit, and Expensing.
F = Straight Line Depreciation, Full Investment Tax Credit, and No Expensing.
G = Straight Line Depreciation, Reduced Investment Tax Credit, and Expensing.
H = Straight Line Depreciation, Reduced Investment Tax Credit, and No Expensing.

[2]
Strategies C, E, and G are never optimal strategies in this analysis.

2.82 percent when projected net cash income is increasing, constant, and decreasing respectively.

The change from one depreciation, investment tax credit and expensing method to another is a result of the time value of money as related to the tax savings and the difference in the marginal tax rates. As current dollar values of tax savings become greater than the value of future tax savings, the optimum strategy changes.

The decision to use or not use expensing is based upon the discount rate, the marginal tax rate, and the projected net cash income (Plain, 1983). For initial net cash income of $30,000, expensing is used when projected net cash income is decreasing or when the discount rate is high. Expensing also becomes useful when the marginal tax rate and the opportunity cost of capital is high.

This procedure for selecting the optimum depreciation method, investment tax credit alternative, and the expensing option may or may not minimize the first year's tax liability. However, the present value of after-tax net cash income will be maximized which is the goal of good income tax management.

Self-Employment Tax Analysis

To analyze the use of reduced investment tax credit and expensing to reduce the amount of the self-employment tax liability, the $30,000 initial net cash income with a constant projected future net cash income is selected. With projected net cash income held constant, the analysis is not affected by income variations. The $40,000, five-year depreciable asset previously discussed is used in this analysis to compare self-employment tax, income tax, and total tax liabilities

associated with the use of reduced investment tax credit with expensing and full investment tax credit without expensing. Accelerated and straight line depreciation are both used in the analysis of the tax liabilities.

The use of reduced investment tax credit with expensing results in a larger total depreciation deduction compared to the depreciation deduction associated with the use of full investment tax credit without expensing. This is a result of the requirement that the depreciable basis of the asset be reduced by one-half the amount of the investment tax credit when full investment tax credit is used.

Both accelerated and straight line depreciation methods are used to determine if the longer recovery period of one year associated with the use of straight line depreciation has an affect on the total self-employment tax liability.

Table XX presents the self-employment tax, income tax, and total tax liabilities using accelerated depreciation with full investment tax credit without expensing and with reduced investment tax credit with expensing. Reduced investment tax credit with expensing results in a $13,090.02 self-employment tax liability over the six year life. This is $186.98 less than the $13,277.00 total self-employment tax liability resulting from the use of full investment tax credit without expensing. However, the use of reduced investment tax credit results in a larger total income tax liability. The total income tax liabilities associated with reduced investment tax credit with expensing and with full investment tax credit without expensing and with full investment tax credit without expensing are $17,527.00 and $16,814.00, respectively. This is a difference of $758.00. The total

TABLE XX

SELF-EMPLOYMENT TAX, INCOME TAX, AND TOTAL TAX LIABILITIES ASSUMING A
$30,000 ANNUAL NET CASH INCOME, AND ACCELERATED DEPRECIATION
BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Year	Full Investment Tax Credit Without Expensing			Reduced Investment Tax Credit With Expensing		
	Self-Employment Tax Liability	Income Tax Liability	Total Tax Liability	Self-Employment Tax Liability	Income Tax Liability	Total Tax Liability
	(dollars)					
1	2272.05	0	2272.05	1846.63	0	1846.63
2	2023.34	2562.20	4585.54	2085.05	2882.50	4970.55
3	2058.87	3062.60	5121.47	2117.78	3207.50	5325.28
4	2058.87	3062.60	5121.47	2117.78	3207.50	5325.28
5	2058.87	3062.60	5121.47	2117.78	3207.50	5325.28
6	2805.00	5064.00	7869.00	2805.00	5064.00	7869.00
TOTAL	13277.00	16814.00	30091.00	13090.02	17572.00	30662.02

tax liability when reduced investment tax credit with expensing is used is $571.02 greater than the total tax liability associated with the use of full investment tax credit without expensing.

Comparing the present value of after-tax net cash income found in Table IX for both strategy B (full investment tax credit without expensing) to strategy C (reduced investment tax credit with expensing), strategy B results in a greater present value of after-tax net cash income throughout the entire range of discount rates. Therefore using reduced investment tax credit with expensing to reduce the self-employment tax liability results in a greater total tax liability and a lower present value of after-tax net cash income when compared to full investment tax credit without expensing.

Table XXI presents the self-employment tax, income tax, and total tax liabilities resulting from the use of straight line depreciation with both full investment tax credit without expensing and reduced investment tax credit with expensing. The total self-employment tax liability associated with the use of reduced investment tax credit with expensing is $13,090. This is a reduction of $187 compared to the $13,277 total self-employment tax liability when full investment tax credit without expensing is used. The total income tax liability resulting from the use of reduced investment tax credit is $17,445. This is $701 greater than the total income tax liability of $16,744 associated with the use of full investment tax credit without expensing. The total tax liability is $514 greater when reduced investment tax credit with expensing is used instead of full investment tax credit without expensing.

TABLE XXI

SELF-EMPLOYMENT TAX, INCOME TAX, AND TOTAL TAX LIABILITIES ASSUMING A
$30,000 ANNUAL NET CASH INCOME, AND STRAIGHT LINE DEPRECIATION
BASED ON A $40,000, 5-YEAR DEPRECIABLE ASSET

Year	Full Investment Tax Credit Without Expensing			Reduced Investment Tax Credit With Expensing		
	Self-Employment Tax Liability	Income Tax Liability	Total Tax Liability	Self-Employment Tax Liability	Income Tax Liability	Total Tax Liability
			(dollars)			
1	2449.70	72.00	2521.70	2010.25	143.00	2153.25
2	2094.40	3150.00	5244.40	2150.50	3288.00	5438.50
3	2094.40	3150.00	5244.40	2150.50	3288.00	5438.50
4	2094.40	3150.00	5244.40	2150.50	3288.00	5438.50
5	2094.40	3150.00	5244.40	2150.50	3288.00	5438.30
6	2449.70	4072.00	6521.70	2477.75	4150.00	6627.75
TOTAL	13277.00	16744.00	30021.00	13090.00	17445.00	30535.00

Examination of the present value of after-tax net cash income found in Table X for both strategy B (full investment tax credit without expensing) and strategy C (reduced investment tax credit with expensing) reveals that strategy B results in a larger present value of after-tax net cash income until the discount rate becomes equal to 41.70 percent. At a discount rate greater than 41.70 percent, strategy C results in a larger present value of after-tax net cash income. However, the change to strategy C is not a function of the self-employment tax liability reduction but is a result of the timing of the cash flows and the time value of money. The use of reduced investment tax credit with expensing reduced the self-employment tax liability and results in a larger total tax liability and a smaller present value of after-tax net cash flows compared to the use of full investment tax credit without expensing.

Comparing the total self-employment tax liabilities in both Table XX and XXI, the use of full investment tax credit with both accelerated and straight line depreciation methods result in the same total self-employment tax liability. In addition, the total self-employment tax liability is the same when reduced investment tax credit is used with both accelerated and straight line depreciation. Therefore, the additional one year recovery period does not affect the total self-employment tax liability when compared to the use of accelerated depreciation. However, the total tax liabilities are different for both depreciation methods.

Net Operating Loss Analysis

A net operating loss can be carried back or forward to other tax years as explained in Chapter II. The problem of determining whether the net operating loss should be carried back or forward to maximize the tax benefit arises from the fact that when a net operating loss is carried back a tax refund is obtained by filing an amended tax return for the year to which the net operating loss is carried (1984 U.S. Master Tax Guide, 1983). If the net operating loss is carried forward the tax savings are not realized until the future year's tax return is filed. Present value analysis is used to compare the present value of tax savings from the carry forward to the amount of the refund resulting from the carryback provisions. Equation 8 is used to calculate the present value of tax savings.

$$PV = (NOL \times TR)(1 + D)^{-1} \qquad (8)$$

where

PV = Present value of tax savings

NOL = Amount of the net operating loss

TR = Marginal tax rate

D = Discount rate

The decision to carry the net operating loss either backward or forward is accomplished by selecting the strategy with the larger value of the refund or the discounted tax savings. The decision process can be further simplified by solving for the breakeven marginal tax rate that will equate the refund to the present value of the tax savings (equation 9).

$$RF = (NOL \times BETR)(1 + D)^{-1} \qquad (9)$$

where

RF   = Refund

BETR = Breakeven marginal tax rate

Other variables are as previously defined

Equation 9 is redefined to further simplify the calculation of the breakeven marginal tax rate (equation 10) that will equate the refund to the present value of the tax savings.

$$BETR = RF\ (1 + D)^1/NOL \tag{10}$$

where

All variables are as previously defined

The breakeven marginal tax rate can be determined using equation 10. The breakeven marginal tax rate is then compared to the taxpayer's expected marginal tax rate for the next year to determine whether or not to carry the net operating loss forward. For example, if the taxpayer's expected marginal tax rate is larger than the breakeven marginal tax rate the net operating loss should be carried forward because the tax savings resulting from the carry forward of the net operating loss is greater than the amount of the refund. Alternatively, if the taxpayer's expected marginal tax rate is less than the breakeven marginal tax rate the net operating loss should be carried back and the refund obtained.

A large net operating loss which may not be fully absorbed in the first carryforward year requires further examination to determine whether the tax savings resulting from carrying the net operating loss forward for two or more years will be greater than the amount of the tax refund. The following equation is used to calculate the present value of the tax savings when a net operating loss is carried forward for two or more years.

$$PV = \sum_{i=1}^{N} (NOL_i \times TR_i)(1 + D)^{-i} \qquad (11)$$

where

PV   = Present value of tax savings

N   = Number of years the net operating loss is expected to be carried forward

NOL_i = Amount of the net operating loss; where i=1, . . ., N

TR_i = Marginal tax rate in year i; where i=1, . . ., N

D   = Discount rate

The present value of the tax savings is then compared to the amount of the refund to determine whether the net operating loss should be carried forward or back. The net operating loss should be carried forward if the present value of the tax savings is greater than the amount of the refund. If the present value of the tax savings is less than the amount of the refund the net operating loss should be carried back thus obtaining the refund.

The procedures discussed in this chapter will be used in Chapter V to examine the optimum depreciation, investment tax credit and expensing strategies when a swine farm is simulated.

CHAPTER IV

THE SWINE PRODUCTION ENTERPRISE AND THE TAX MODEL

A 90 sow full confinement farrow-to-finish swine enterprise will
be used to analyze the income tax management strategies illustrated in
the previous chapter. A swine production simulation model developed
by Plain (1981) is used to simulate an actual swine production system.
The simulation model generates annual income and expense data for a
swine farm. The time period being examined represents two hog cycles
of approximately four years in length. The starting point for the
analysis is a trough which occurred in week 233 as depicted in Figure
1. This point is assumed to be the first week in year 1 to allow for
the examination of eight annual tax periods. The weeks included in
this eight year period are week 233 through week 652 or from April
1973 to April 1982.

In addition to the simulation model, a tax computation model will
be developed and interfaced with the simulation model and used to aid
in the calculation of the tax liability for each of the eight years
being examined. Both models are described in this chapter.

The Tax Model

The calculation of the producer's tax liability has been
simplified by the use of a computer model. The model is designed to
calculate the tax liability using the 1983 tax laws. The tax rate

schedule is used instead of the tax tables. The tax rate schedules more closely approximate a continuous tax function. However, it must be noted that a taxpayer must use the tax tables unless the taxpayer has taxable income greater than or equal to $50,000, uses income averaging, or files a tax return for a period of less than 12 months (1984 U.S. Master Tax Guide, 1983). The tax rate schedule is used as a proxy for the tax tables.

A flow chart of the tax model is shown in Figure 2. The model operates in the following manner. First, the amount of gross farm income is inputted into the model. Gross farm income broadly defined includes sales of crops, slaughter hogs, and other livestock that are not breeding animals.

The second item inputted into the model is the amount of farm expenses. Farm expenses include both cash expenses such as feed and supply costs, interest payments, repair costs, etc., and non-cash expenses including depreciation and the expense deduction. A more detailed listing of allowable farm income and expense items can be found in the 1984 U.S. Master Tax Guide, paragraphs 771-773 and 1051, (1983).

The farm income and expense data are netted to determine the amount of net farm income. The self-employment tax liability is then calculated. The self-employment tax liability is 9.35 percent of the net farm income ranging from $400 to $35,700. The amount of the self-employment tax is then input in the other taxes portion of the model. Net farm income is then carried into the calculation of gross income.

Gross income includes income generated from farm and non-farm sources. Net farm income and income generated from the sales of
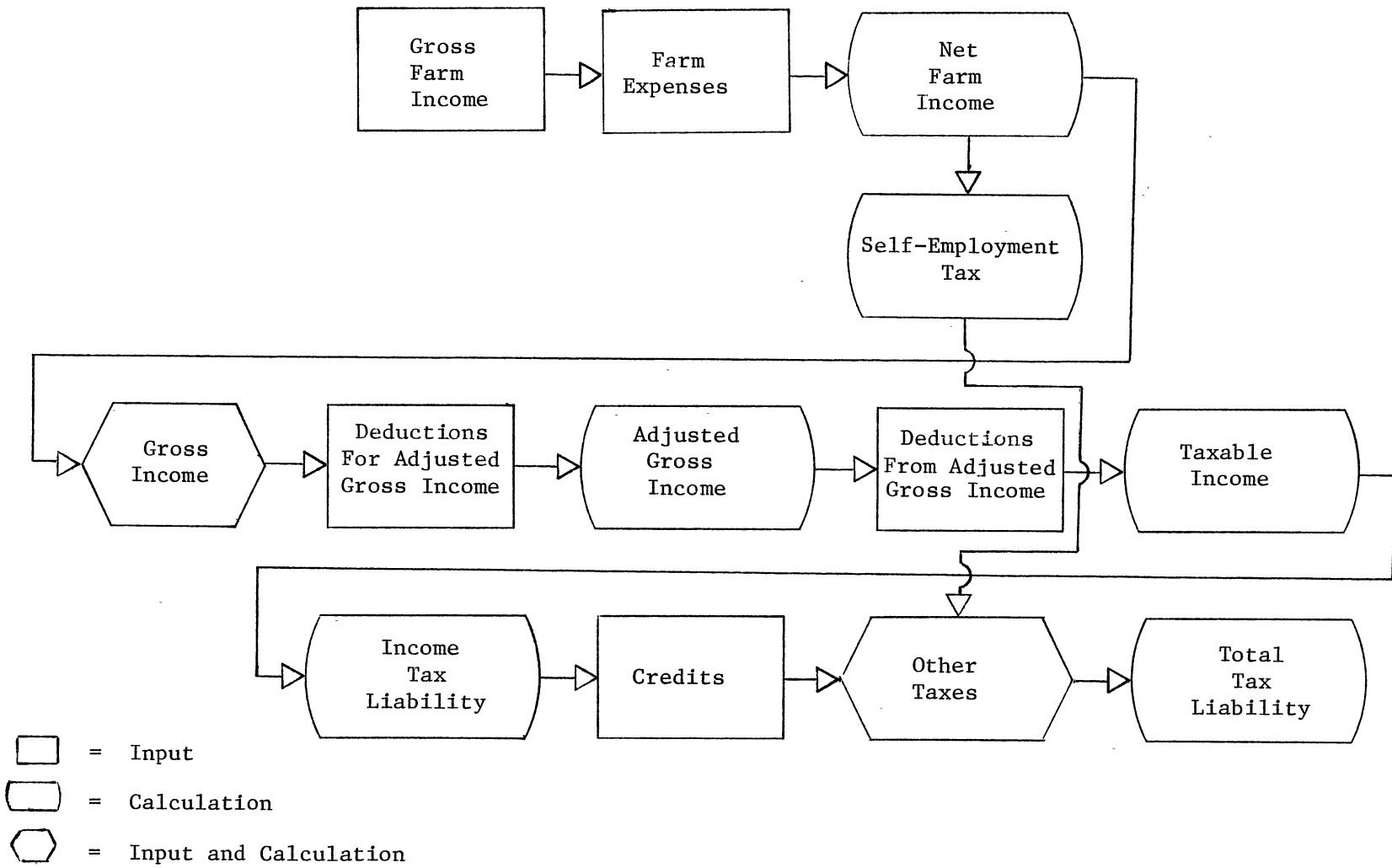
Figure 2.   Flow Chart of the Tax Calculation Model

breeding livestock and other assets used in the farm business which qualify for Section 1231 capital gain treatment are included in gross income. Non-farm sources of income include wages, salaries, interest income, dividends, taxable capital gain income, and unemployment income. A more detailed listing of all income sources can be found in the 1984 U.S. Master Tax Guide, paragraph 51 (1983).

The deductions for adjusted gross income are subtracted from gross income to determine the amount of the taxpayer's adjusted gross income. These deductions include moving expenses, employee business expenses, Individual Retirement Arrangement (IRA's) deductions, and other deductions specified in the 1984 U.S. Master Tax Guide, paragraph 53, (1983).

Deductions from adjusted gross income, more commonly known as itemized deductions, are subtracted from the adjusted gross income to determine the amount of taxable income. Itemized deductions include medical and dental expenses, taxes such as state, local, real estate, sales, and property taxes, interest expense on home mortgages, on credit cards, and on charge accounts, charitable contributions, casualty and theft losses, union and professional dues, and tax preparer's fees. A more comprehensive list of itemized deductions can be found in the 1984 U.S. Master Tax Guide, paragraph 53 (1983). In arriving at the amount of taxable income, the tax laws contain a provision which gives all taxpayers a guaranteed deduction called a zero bracket amount. The zero bracket amount is based on the taxpayer's filing status (1984 U.S. Master Tax Guide, Paragraph 126, 1983). Table XXII lists the zero bracket amounts associated with each filing status.

TABLE XXII

ZERO BRACKET AMOUNTS

Filing Status	Zero Bracket Amount
	(dollars)
Single and Heads of Household	2300
Married Filing a Joint Return	3400
Surviving Spouse	3400
Married Filing a Single Return	1700

Source: 1984 U.S. Master Tax Guide, 1983.

The zero bracket amounts have been incorporated in the tax rate schedules and tax tables for 1983. In order to determine the amount of taxable income, the total of the itemized deductions is compared to the zero bracket amount. If the zero bracket amount is greater than the total of the itemized deductions, the zero bracket amount is used to determine the tax liability. However, if the sum of the itemized deductions is greater than the zero bracket amount, the excess of the itemized deductions over the zero bracket amount is used to compute the tax liability (1984 U.S. Master Tax Guide, 1983).

Once the producer's taxable income is determined, the tax rate schedules are used to calculate the income tax liability. The tax liability is then reduced by tax credits and then increased by other taxes payable to arrive at the total taxes due. This is the amount that is to be paid to the Internal Revenue Service.

Tax credits reduce the amount of the tax liability. The list of tax credits include credit for the elderly, investment tax credit,

foreign tax credit, credit for political contributions, dependent and child care credit, jobs credit, and residential energy credit (Farmer's Tax Guide, 1983).

After the tax liability has been reduced by tax credits, it is then increased by other taxes. Other taxes include the self-employment tax, the alternative minimum tax, tax on the recapture of investment tax credit, taxes on IRA distributions, social security taxes on tips, and the railroad retirement tax (RRTA) (Farmer's Tax Guide, 1983).

The tax calculation model is used to calculate the swine producer's annual tax liability for each of the eight years analyzed using the results of the swine production simulation model.

The Swine Production Simulation Model

The model used to simulate a 90 sow full confinement farrow-to-finish swine production system was developed by Plain (1981). The model is a deterministic computer model which simulates selected production and marketing strategies over a ten year period beginning with January of 1970. The model uses actual price data for the period of 1970 through 1979 instead of forecasting future prices thus allowing for the simulation of actual events which occurred during this time period. The simulation model is used to examine returns, marketings, and production for different management strategies and price prediction methods for a pasture and a full confinement farrow-to-finish swine production enterprise.

This study utilizes the full confinement system assuming all future input and output prices are known with complete certainty. Sow

numbers are held at the 90 head capacity throughout the simulation period. Purchase and sales of feeder pigs are not allowed and no hedging strategies are used. All feed is prepurchased and stored on the farm until it is fed.

Several changes and additions were made in the swine simulation model. The prices for both slaughter hogs and sows were updated to July 1983. Price data were obtained from the Livestock, Meat Wool Market News (1980-1983). Slaughter hog and sow prices are based on the weekly average of Oklahoma City prices for U.S. #1 and #2 grade 230 pound barrows and gilts and 400 pound sows. The price per pound of 325 pound non-breeder gilts is estimated at 90 percent of the slaughter hog price. The price per pound of boars is 80 percent of the sow price (Plain, 1981).

In addition to updating hog prices, feed prices were updated to July 1983. Monthly average prices for hog feed and hog concentrate were updated using the prices published in Agricultural Prices (1980-1983). The prices of the four rations used in the model are as follows. The grower ration cost is equal to the Oklahoma price for 14-18 percent hog feed. The cost of the finishing ration is 94 percent of the price for the grower ration. The sow-boar ration is equal to 50 percent of the finishing ration plus 19 percent of the cost of 100 pounds of hog concentrate. The starter ration is valued at 150 percent of the cost of the sow-boar ration. These prices are for premixed rations. Due to the addition of a feedmill for on-farm feed processing, the prices of the grower, finishing, and sow-boar rations must be adjusted to allow for the purchase of bulk feed stuffs and on farm feed processing. The adjustment for premixed feed is $.60

per hundredweight (Russell, 1983). This $.60 is subtracted from the cost of the growing, finishing, and sow-boar rations. The starter ration is purchased premixed, hence, no price adjustment is necessary.

The investment requirements for facilities, machinery, and equipment are presented in Table XXIII. A feedmill has been added to the investment requirements presented by Plain (1981). These prices represent 1983 dollars. In addition, a pickup has been assumed to be already owned by the producer. This pickup is assumed to be fully depreciated when the system is put into use. The purpose of this assumption is to allow for the purchase of another pickup, valued at $12,000 in 1983 dollars which will be used to test the depreciation, investment tax credit, and expensing tax management decision criteria discussed in Chapter III. No other facilities, machinery, or equipment are added or replaced during the eight year simulation period. All of these investment costs are deflated to correspond with dollar values of similar assets in previous years. For example, the investments other than the pickup are deflated to correspond to week 233 dollars using the deflator demonstrated in Plain's simulation model (Plain, 1981). The pickup cost will be deflated to correspond to the year which it is purchased.

The simulation model developed by Plain was designed to examine cash flows and profitability of various management strategies and production decisions. Because of this, several changes in his model were required to determine the taxable income for a 90 sow farrow-to-finish full confinement enterprise.

The depreciation expenses, as calculated by the simulation model, have been removed. This will allow for the use of the ACRS

TABLE XXIII

FACILITIES, MACHINERY, AND EQUIPMENT INVESTMENT REQUIREMENTS
FOR A 90 SOW FARROW-TO-FINISH CONFINEMENT SYSTEM

Item	Life	Investment[1]
	(years)	(dollars)
Gestation and Breeding:		
Facilities	20	39,200
Equipment	10	19,000
Subtotal		58,200
Farrowing-Growing:		
Facilities	20	54,600
Equipment	10	17,500
Subtotal		72,100
Finishing:		
Facilities	20	49,600
Equipment	10	9,500
Subtotal		59,100
Feedmill:		
Facilities	20	3,200
Equipment	10	23,050
Subtotal		26,250
Supportive Facilities, Machinery, and Equipment:		
Lagoon	20	4,000
Water delivery system	20	3,200
Generator	20	4,000
L. P. supply	20	800
Loading chute	8	400
Stock trailer	10	2,200
Subtotal		14,600
Total Facilities, Machinery, and Equipment		230,250

[1] 1983 dollars.

depreciation methods, expensing deduction, and investment tax credit options available under the 1983 tax laws.

The cost of operator labor and the opportunity cost of capital have also been removed because they are not tax deductible expenses.

Interest cost of debt and interest receipts from savings have also been removed from the simulation model. The interest expense and principle payments for both the operating and the capital loan are placed on separate schedules. The use of the interest expense in the tax model is discussed later in this section. Both the capital loan and the operating loan are assumed to have a nine percent interest rate and are based on a seven and a five year repayment schedule, respectively. These loan terms are assumed to be representative of Production Credit Association loan terms (Alvey, 1983). The operator is assumed to have unlimited capital available throughout the eight year simulation period.

Off-farm feed storage costs have been removed from the model due to the addition of the feedmill and feed storage facilities.

All other expenses and receipts have not been adjusted or removed from the simulation model.

<div align="center">

Interfacing the Tax Model and the Swine

Production Simulation Model

</div>

The annual receipt and expense data obtained from the swine simulation model is entered into the tax model to calculate the tax liability for each of the eight years. The annual receipts from the swine simulation model include sales of slaughter barrows and gilts, nonbreeder gilts, cull sows, and cull boars. The receipts from the

sale of cull sows is removed from the farm receipts section of the tax model and are given Section 1231 capital gains treatment since they are held for more than one year. The receipts, other than cull sow receipts, are inputs in the farm income section of the tax model.

The annual expenses associated with feed, utilities, and other items are also computed in the simulation model. These expenses plus interest and depreciation expenses are required input data in the farm expenses section of the tax model. The purchase value of gilts for the first two years have been removed from farm expenses. The cost of gilts are matched to the receipts when these gilts are sold as cull sows and the net sales revenue is placed in the gross income section of the tax model.

The tax model subtracts the total farm expenses from gross farm income to determine the producer's net farm income. The self-employment tax liability is calculated at this point and is placed as input data in the other taxes section of the model. The net farm income amount is then included in the gross income section of the model in addition to the net sow receipts.

The net revenue from the sales of cull sows is determined by subtracting their cost as gilts from their sales receipts. Gilts are only purchased for the first two years. Beginning in year three raised gilts are used to replace the sows that are culled. Because raised gilts are used in the sow herd, when they are sold as cull sows, they have a zero cost basis.

Scenarios Analyzed

The analysis of the tax management strategies for depreciation, investment tax credit and expensing alternatives is accomplished using

two scenarios. The first scenario is used to examine the initial startup of the swine production enterprise assuming no additional capital assets are purchased. This provides a basis to be used for the analysis of a capital asset purchase later in the simulation period. The capital asset purchase and tax management implications are described and analyzed in the second scenario.

The second scenario is used to examine the eight various depreciation, investment tax credit and expensing alternatives described in Chapter III for the additional capital asset purchase. The net operating loss carryback and carryforward provisions, the alternative minimum tax, and income averaging will also be examined.

Initial Scenario

Table XXIV lists the depreciation, investment tax credit, and expensing amounts for the facilities, machinery and equipment described in Table XXIII. Accelerated depreciation, full investment tax credit, and no expensing were selected for the facilities, machinery and equipment. This combination of depreciation, investment tax credit and expensing was selected for the initial startup situation.

A net operating loss occurs in the first year the operation begins. This net operating loss is a result of the time lag which occurs from the time the gilts are bred until the first slaughter hogs are sold approximately eleven months later. The initial net operating loss is carried forward. The purpose of this assumption is to allow the net operating loss to be used to offset future taxable income.

TABLE XXIV

FACILITIES, MACHINERY, AND EQUIPMENT
DEPRECIATION, INVESTMENT TAX
CREDIT AND EXPENSING
SCHEDULE

	(dollars)[1]
Investment Tax Credit Amount	12,170.38
Expensing Amount	0.00
Depreciable Basis	115,618.60
Depreciation per Year	
Year 1	17,342.80
Year 2	25,342.80
Year 3	24,279.90
Year 4	24,279.90
Year 5	24,279.90

[1]Beginning of year one dollars.

The amount of the net operating loss which is carried to future years is an input in the gross income section of the tax model. For the year in which a net operating loss occurs, the amount of the net operating loss is not included in the gross income section.

The Second Scenario

To test the depreciation, investment tax credit, and expensing option decision criteria outlined in Chapter III, a pickup is to be purchased at two points within the eight year simulation period. The eight different depreciation, investment tax credit and expensing combinations will be examined for both pickups. The first analysis concerns a pickup purchased when taxable income is increasing. Year two is the point selected to purchase the pickup for this analysis.

The deflated cost of the pickup in year two dollars is $5,810. For the second analysis, the pickup is purchased in year five when taxable income is decreasing. The deflated cost of the pickup in year five dollars is $7,381. Tables XXV and XXVI lists the dollar amounts associated with depreciation, investment tax credit, and expensing strategies for a pickup purchased in year two and five, respectively.

Optimal Tax Management Strategy Selection

The process used in this study to select the optimum depreciation, investment tax credit, and expensing strategy is based upon the maximization of discounted after-tax net cash flows. Therefore, the annual tax liability for each strategy must be determined. The tax computation for the optimum strategy selection process does not include the use of the alternative minimum tax and the use of income averaging. The purpose of excluding the alternative minimum tax and income averaging is that they do not affect the determination of the optimum strategy. Their exclusion also simplifies the analysis. The effects of the alternative minimum tax and the use of income averaging will be analyzed after the optimum depreciation, investment tax credit and expensing strategies have been identified.

The decision criteria used to select the optimum depreciation, investment tax credit and expensing strategy is based on the maximization the present value of after-tax net cash flows. To determine the after-tax net cash flow, each year's net cash receipts from the swine enterprise plus non-farm income are summed. The total cash expenditures are subtracted from this sum to determine the

TABLE XXV

DEPRECIATION, INVESTMENT TAX CREDIT, AND EXPENSING ALTERNATIVES FOR THE PICKUP PURCHASED DURING THE SECOND YEAR AT A COST OF $5,810

Depreciation Method	Accelerated Depreciation				Straight Line Depreciation			
Investment Tax Credit Method	Full	Full	Reduced	Reduced	Full	Full	Reduced	Reduced
	(dollars)							
Investment Tax Credit Amount	48.60	348.60	32.40	232.40	48.60	348.60	32.40	232.40
Expensing Amount	5000.00	0	5000.00	0	5000.00	0	5000.00	0
Depreciable Basis	785.60	5635.70	810.00	5810.00	785.60	5635.70	810.00	5810.00
Depreciation Per Year								
Year 1	196.43	1408.93	202.50	1452.50	130.95	939.28	135.00	968.33
Year 2	298.57	2141.57	307.80	2207.80	261.90	1878.57	270.00	1936.67
Year 3	290.70	2085.20	299.70	2149.70	261.90	1878.57	270.00	1936.67
Year 4	---	---	---	---	130.95	939.28	135.00	968.33

TABLE XXVI

DEPRECIATION, INVESTMENT TAX CREDIT, AND EXPENSING ALTERNATIVES
FOR THE PICKUP PURCHASED DURING THE
FIFTH YEAR AT A COST OF $7,381

Depreciation Method	Accelerated Depreciation				Straight Line Depreciation			
Investment Tax Credit Method	Full	Full	Reduced	Reduced	Full	Full	Reduced	Reduced
				(dollars)				
Investment Tax Credit Amount	142.86	442.86	95.24	295.24	142.86	442.86	95.24	295.24
Expensing Amount	5000.00	0	5000.00	0	5000.00	0	5000.00	0
Depreciable Basis	2309.57	7159.57	2381.00	7381.00	2309.57	7159.57	2381.00	7381.00
Depreciation Per Year								
Year 1	577.39	1789.89	595.25	1845.25	384.93	1193.26	396.83	1230.17
Year 2	877.64	2720.64	904.78	2804.78	769.86	2386.52	793.67	2460.33
Year 3	854.54	2649.04	880.97	2730.97	769.86	2386.52	793.67	2460.33
Year 4	----	----	----	----	384.93	1193.26	396.83	1230.17

after-tax net cash flows. The cash expenditures include principle and interest payments, family living expenses, the producer's tax liability, and capital expenditures when incurred. The annual after-tax net cash flows are then discounted and totaled. A six percent discount rate is used to determine the present value of the after-tax net cash flows. This discount rate is based on comparable interest rates for tax free securities during this period.

Net Worth Analysis

The present value of the producer's ending net worth is used as another means to examine the decision concerning the carryback and carryforward of net operating losses the alternative minimum tax and income averaging. The carryforward of the net operating loss will be examined with and without the use of income averaging for each pickup purchase.

The producer's ending net worth equals the total value of the assets less the total value of the liabilities at the end of the eight year simulation period. The asset's values at the end of year eight are determined as follows. The facilities, machinery, equipment and the pickup purchased in the second year, or the pickup purchased in the fifth year are assigned a salvage value equal to ten percent of their original cost. This ten percent amount is not intended to represent the actual value of these assets but is used for comparison purposes. The producer's assets also include the discounted after-tax net cash flows. The producer's liabilities include the balance due on operating loans at the end of the eight year simulation period.

Other Supportive and Tax Data

Additional farm expense and income data includes interest expense and non-farm income. Two loans are necessary to begin the swine production enterprise. The first loan is a capital loan for the purchase of the required facilities, machinery, and equipment identified in Table XXIII. The deflated cost of the facilities, machinery and equipment is $121,703.80. It is assumed that the producer finances 100 percent of the cost of the facilities, machinery and equipment with this loan. The loan repayment schedule for the capital loan is presented in Table XXVII.

The second loan is a $60,000.00 operating loan used to purchase feed, gilts and boars for the first year. Table XXVIII presents the loan repayment schedule for this operating loan.

The producer has non-farm income each year which is also an input in the gross income section of the tax model. Non-farm income is based on the average Oklahoma non-farm income for 1982 of $22,533.07 (Farm Business Management, 1982). Plain's deflator was applied to determine the annual non-farm income for each of the eight years. The producer's family living expenses are assumed to be 75 percent of annual non-farm income. Table XXIX lists the annual non-farm income and family living expenses for the producer. All non-farm income is assumed to be exempt from the self-employment tax or social security withholding. The purpose of this assumption is to require the amount of the self-employment tax to be based only on the amount of the producer's net farm income.

TABLE XXVII

CAPITAL LOAN REPAYMENT SCHEDULE

Year	Principle Payment	Interest Payment	End of Year Loan Balance
		(dollars)	
1	---	---	122,000.00
2	17,429.00	10,980.00	104,571.00
3	17,429.00	9,411.39	87,142.00
4	17,429.00	7,842.78	69,713.00
5	17,429.00	6,274.17	52,284.00
6	17,429.00	4,705.56	34,855.00
7	17,429.00	3,136.95	17,426.00
8	17,426.00	1,568.34	---

TABLE XXVIII

OPERATING LOAN REPAYMENT SCHEDULE

Year	Principle Payment	Interest Payment	End of Year Loan Balance
		(dollars)	
1	---	---	60,000.00
2	12,000.00	5,400.00	48,000.00
3	12,000.00	4,320.00	36,000.00
4	12,000.00	3,240.00	24,000.00
5	12,000.00	2,160.00	12,000.00
6	12,000.00	1,080.00	---

TABLE XXIX

ANNUAL NON-FARM INCOME AND FAMILY LIVING EXPENSES

Year	Non-Farm Income	Family Living Expenses
	(dollars)	
1	13090.67	9819.00
2	14270.97	10703.72
3	15451.27	11588.45
4	16631.57	12473.68
5	17811.87	13358.90
6	18992.17	14244.13
7	20172.47	15129.35
8	21352.77	16014.58

Additional data and assumptions are required for the calculation of the producer's income tax liability. It is assumed that the producer does not have any deductions for the calculation of adjusted gross income. Therefore, adjusted gross income is equal to gross income.

The deductions from adjusted gross income includes the producer's itemized deduction. The producers files a joint tax return for each year and does not itemize his deductions. Instead, the $3,400 zero bracket amount is utilized.

The last input necessary for the calculation of the producer's taxable income is the number of exemptions. The producer's family consists of four members. Hence, he has four exemptions.

At this point, the producer's income tax liability is calculated. After the income tax liability is calculated, the amount of the

credits are inputted into the model and the amounts of other taxes are either inputted or calculated. The only tax credit that is used is investment tax credit. Taxes other than the self-employment tax, the alternative minimum tax and income tax are ignored.

CHAPTER V

RESULTS

The swine production simulation model was used to determine the
annual cash flows for the eight year period. The tax model was then
used to calculate the annual tax liability for each of the eight
periods. The two models are used in conjunction with each other to
examine the effects of depreciation methods, investment tax credit
options, and expensing options on the producer's after-tax net cash
flows and ending net worth. In addition, the use of income averaging,
the net operating loss carryback and carryforward provisions, and the
alternative minimum tax are applied to the optimum depreciation,
investment tax credit, and expensing strategy and examined in relation
to their affects on the producer's after-tax net cash flows and ending
net worth.

Initial Scenario

As stated in Chapter IV, the startup of the swine production
system coincides with week 233 of the 13 and one-half year period
depicted in Figure 1. Table XXX lists the net cash flows as
calculated from the swine simulation model, the net sales of sows
eligible for Section 1231 capital gain treatment, and the farm income
or loss to be used in the tax model for each of the eight annual
periods beginning with week 233.

TABLE XXX

ANNUAL NET CASH FLOW FROM THE SWINE SIMULATION MODEL,
NET INCOME FROM SOW SALES, AND FARM INCOME

Year	Net Cash Flow[1]	Net Income From Sow Sales[2]	Farm Income (Loss) For Use In The Tax Model[3]
		(dollars)	
1	(53744.72)	0.00	(47898.72)
2	87537.63	9670.00	73197.63
3	43585.13	5997.00	37075.13
4	63934.31	11279.00	52655.31
5	88951.63	5301.00	83650.63
6	(15494.00)	7326.00	(22820.00)
7	42153.06	5522.00	36631.06
8	29779.25	9994.00	19785.25

[1]The net cash flow as directly generated from the modified simulation model.

[2]Net income from sow sales is the difference between sales value of sows and the purchase value of gilts. Amount eligible for Section 1231 capital gain treatment.

[3]Farm income from the simulation model as adjusted for sow sales and gilt purchases.

Due to the loss which occurs in year six (see Table XXX), additional operating capital must be borrowed to make the interest and principle payments for both the capital and operating loan and to offset the negative cash flow. A total of $45,960.50 must be borrowed in year six to cover all the cash outflows. The repayment schedule for this operating loan is presented in Table XXXI.

TABLE XXXI

SIXTH YEAR OPERATING LOAN REPAYMENT SCHEDULE[1]

Production Year	Principle Payment[2]	Interest Payment	End of Year Loan Balance
		(dollars)	
6	---	---	45,960.50
7	9,281.09	4,596.05	36,679.41
8	7,362.75	3,667.94	29,316.66

[1]This is a flexible repayment loan.

[2]The amount of the principle payment is determined by the amount of cash on hand in years seven and eight after the tax liability and other cash expenditures are paid.

The net operating loss which occurs in the sixth year can be carried back to year three or carried forward to year seven. When the net operating loss is carried back, the largest marginal tax bracket for year three is 17 percent. However, if the net operating loss is

carried forward to year seven, the smallest marginal tax bracket is 35 percent. Therefore, every dollar of the net operating loss which is carried back will result in $.17 refund while the tax savings will result in at least $.35 for every dollar of the net operating loss which is carried forward. Using this method of analysis, the net operating loss is to be carried forward in order to reap the largest tax benefit for both the analysis of the second year pickup purchase and the analysis of the fifth year pickup purchase. This method of analyzing the carryback versus carryforward of a net operating loss is the principle which was used to develop the decision criteria used in Chapter III (Hoffman, Willis, and Phillips, 1982). The exact dollar amounts of the refund and the tax savings will be presented for the optimum depreciation, investment tax credit, and expensing strategy for the second and fifth year pickup purchases later in this chapter.

Table XXXII presents the annual taxable income, tax liability and after-tax net cash flows for the eight year simulation period assuming accelerated depreciation, full investment tax credit and no expensing is used for the facilities, machinery and equipment. Table XXXII serves as a basis for the analysis of the depreciation, investment tax credit and expensing options for the second and fifth year pickup purchases.

Analysis of the Second Year Pickup Purchase

The after-tax net cash flows assuming eight different depreciation, investment tax credit, and expensing strategies for the pickup purchased during the second year are presented in Table XXXIII.

TABLE XXXII

ANNUAL TAXABLE INCOME, TAX LIABILITY, AND AFTER-TAX NET CASH
FLOW FOR THE EIGHT YEAR SIMULATION PERIOD USING
ACCELERATED DEPRECIATION, FULL INVESTMENT
TAX CREDIT, AND NO EXPENSING FOR THE
FACILITIES, MACHINERY AND EQUIPMENT

Year	Taxable Income	Tax Liability	After Tax Net Cash Flow
		(dollars)	
1	0.00	0.00	9823.71
2	0.00	2934.17	42359.24
3	8371.56	0.00	4287.59
4	34230.60	1616.86	26233.59
5	66868.83	17156.72	38384.73
6	0.00	0.00	0.00
7	44991.94	12753.10	0.00
8	35899.34	8229.10	0.00
Undiscounted Total	190362.00		121089.00
Discounted Total	136557.00		100030.00

TABLE XXXIII

ANNUAL, SUM OF UNDISCOUNTED, AND SUM OF DISCOUNTED AFTER-TAX NET CASH FLOWS AND THEIR RELATIVE RANK FOR THE PICKUP PURCHASED DURING THE SECOND YEAR

Depreciation, Investment Tax Credit (ITC) and Expensing Strategies	Year								Sum of Undiscounted Cash Flows	Sum of Discounted Cash Flows	Rank of Discounted Cash Flows
	1	2	3	4	5	6	7	8			
					- (dollars) -						
(A) A/D, Full ITC with Expensing	9823.71	37035.10	4287.59	26260.77	39140.25	0.00	0.00	0.00	116547.00	95877.60	7
(B) A/D, Full ITC without Expensing	9823.71	36680.97	4287.59	26428.56	39822.25	0.00	0.00	0.00	117043.00	96204.90	3
(C) A/D, Reduced ITC with Expensing	9823.71	37035.67	4287.59	26261.61	39126.75	0.00	0.00	0.00	116535.00	95868.70	8
(D) A/D, Reduced ITC without Expensing	9823.71	36685.05	4287.59	26434.59	39731.65	0.00	0.00	0.00	116963.00	96145.60	4
(E) SLD, Full ITC with Expensing	9823.71	37028.98	4287.59	26258.08	39189.25	0.00	0.00	0.00	116588.00	95906.60	5
(F) SLD, Full ITC without Expensing	9823.71	36637.06	4287.59	26409.24	40091.45	0.00	0.00	0.00	117249.00	96351.70	1
(G) SLD, Reduced ITC with Expensing	9823.71	37029.39	4287.59	26258.83	39177.25	0.00	0.00	0.00	116577.00	95898.60	6
(H) SLD, Reduced ITC without Expensing	9823.71	36639.78	4287.59	26414.67	40016.55	0.00	0.00	0.00	117182.00	96302.50	2

A/D = Accelerated Depreciation

SLD = Straight Line Depreciation

This analysis corresponds to a period when taxable income is increasing.

The after-tax net cash flow for year six is zero due to the borrowing of only enough additional operating capital to cover the cash expenses. The excess capital available in years seven and eight is used to reduce the operating loan balance. Therefore, the after-tax net cash flows for years seven and eight are also zero.

The optimum depreciation, investment tax credit, and expensing strategy using the six percent discount rate is strategy F. Strategy F uses straight line depreciation, full investment tax credit and no expensing. The selection of straight line depreciation, full investment tax credit, and no expensing is a result of the large net operation loss which is carried forward from year one and the depreciation deduction associated with the facilities, machinery, and equipment. Straight line depreciation spreads the recapture of the cost of the pickup over four years and is more beneficial in maximizing the producer's after-tax net cash flows. By using straight line depreciation and no expensing, the tax savings are shifted to future higher income years.

Table XXXIV presents the tax liabilities, after-tax net cash flows, and the present value of the ending net worth associated with the year six net operating loss carryforward and carryback for strategy F. The effects of the alternative minimum tax and income averaging on the tax liability, after-tax net cash flows, and the present value of ending net worth are also presented for the carryforward of the net operating loss.

TABLE XXXIV

THE TOTAL TAX LIABILITY, AFTER-TAX NET CASH FLOWS, AND THE PRESENT VALUE OF ENDING
NET WORTH ASSOCIATED WITH THE CARRYFORWARD AND CARRYBACK OF THE YEAR SIX NET
OPERATING LOSS, THE ALTERNATIVE MINIMUM TAX AND INCOME AVERAGING FOR THE
PICKUP PURCHASED DURING THE SECOND YEAR USING STRAIGHT LINE
DEPRECIATION AND FULL INVESTMENT TAX CREDIT WITHOUT
EXPENSING (STRATEGY F)

Year	Net Operating Loss Carryforward[1]		Net Operating Loss Carryback[1]		Alternative Minimum Tax Applied to Net Operating Loss Carryforward		Income Averaging Applied to Net Operating Loss Carryforward[2]	
	Total Tax Liability	After-Tax Net Cash Flows	Total Tax Liability	After-Tax Net Cash Flows	Total Tax Liability	After-Tax Net Cash Flows	Total Tax Liability	After-Tax Net Cash Flows
				(dollars)				
1	0	9824	0	9824	0	9824	0	9824
2	2846	36637	2846	36637	2846	36637	2846	36637
3	0	4288	0	4288	0	4288	0	4288
4	1441	26409	1441	26409	2004	25577	2004	25577
5	15450	40091	15212	40329	15450	40091	8164	47405
6	0	0	0	0	0	0	0	0
7	12753	0	13628	0	12753	0	12263	490
8	8229	0	8190	0	8229	0	8229	0
Sum of Undiscounted After-Tax Net Cash Flows	117249		117487		116417		124220	
Sum of Discounted After-Tax Net Cash Flows	96352		96530		95692		101483	
Present Value of Ending Net Worth	125552		125231		124892		130683	

[1]The carryforward and carryback of the net operating loss results in different ending loan balances reflected
in the present value of ending net worth.
[2]The alternative minimum tax is included.

Net Operating Loss

If the decision had been made to carry the sixth year net operating loss back to year three, the refund would amount to $238 without income averaging. Carrying the net operating loss back to year three frees up investment tax credit and is not fully used. The net operating loss is then carried to year four and again is not fully used and frees up more investment tax credit. In year five, the unused net operating loss and the additional investment tax credit, which is shifted forward, results in a total tax liability of $15,212 compared to the total tax liability $15,450 when the net operating loss is carried forward. The tax savings related to the carryforward of this net operating loss amounts to $875. The year seven total tax liability is $12,753 and $13,628 when the net operating loss is carried forward and carried back, respectively. Thus, carrying the net operating loss forward results in less taxes paid.

Examination of the discounted after-tax net cash flows for both the carryforward and the carryback of the sixth year net operating loss reveals that the discounted after-tax net cash flows are maximized when the net operating loss is carried back. The discounted after-tax net cash flow is $96,530 when the net operating loss is carried back and $96,352 when the net operating loss is carried forward. However, the carryforward of the net operating loss is the optimum strategy since the present value of ending net worth is maximized at $125,552 compared to $125,231 when the net operating loss is carried back. The difference in the discounted after-tax net cash flow is due to the use of the annual after-tax net cash flows for years seven and eight to reduce the sixth year operating loan balance.

The sixth year operating loan balance at the end of year eight is $29,316.66 when the net operating loss is carried forward and $30,239.93 when the net operating loss is carried back. When the net operating loss is carried back, the tax liability in year five is less and the tax liability in year seven is greater than in when the net operating loss is carried forward. Due to the difference in the tax liabilities, the discounted after-tax net cash flows are maximized when the net operating loss is carried back. However, the difference of the loan balance in year eight must be considered when selecting the optimum strategy concerning the carryback or carryforward of the net operating loss. Therefore, the present value of ending net worth must be compared for both the carryforward and carryback of the net operating loss to determine the optimum strategy.

Had the seventh year's taxable income not been known, equation 10 in Chapter III is used to calculate the breakeven marginal tax rate to aid in making the decision concerning whether to carry the net operating loss back or forward. The amount of the net operating loss is $2,287. The breakeven marginal tax rate calculated using equation 10 with the six percent discount rate is 21.2 percent. Therefore, the producer must have taxable income in excess of $20,200 in order for the tax savings to be greater than the amount of the refund. If the producer expects his taxable income to be less than $20,200 he should carry the net operating loss back to year three, otherwise the net operating loss should be carried forward to year seven.

Alternative Minimum Tax

The alternative minimum tax is only assessed in year four due to the $6,767 capital gain deduction. The alternative minimum tax payable is $562. The discounted after-tax net cash flow resulting from the addition of the alternative minimum tax is $95,692 when the net operating loss is carried forward. The discounted after-tax net cash flow without the alternative minimum tax is $96,352. The alternative minimum tax results in a $660 reduction in the discounted after-tax net cash flows. The producer is legally obligated to pay the alternative minimum tax when applicable.

Income Averaging

Income averaging reduces the tax liability in year five and year seven. Other years do not allow for the use of income averaging because the $3,000 test is not met. The tax reduction which results from the use of income averaging and the alternative minimum tax is $7,286 in year five and $490 in year seven. Income averaging in years five and seven results in a $5,131 increase in the discounted after-tax net cash flow. The discounted after-tax net cash flows increased from $96,352 to $101,483. The total discounted after-tax net cash flow when both income averaging and the alternative minimum tax are applied is $101,483 assuming the net operating loss is carried forward.

Analysis of the Fifth Year Pickup Purchase

Table XXXV presents the after-tax net cash flows for the pickup purchased during the fifth year. This corresponds to a period when

TABLE XXXV

ANNUAL, SUM OF UNDISCOUNTED, AND SUM OF DISCOUNTED AFTER-TAX NET CASH FLOWS AND THEIR RELATIVE RANK FOR THE PICKUP PURCHASED DURING THE FIFTH YEAR

Depreciation, Investment Tax Credit (ITC) and Expensing Strategies	Year								Sum of Undiscounted Cash Flows	Sum of Discounted Cash Flows	Rank of Discounted Cash Flows
	1	2	3	4	5	6	7	8			
	- - - - - - - - - - - (dollars) - - - - - - - - - - -										
(A) A/D, Full ITC with Expensing	9823.71	42359.24	4287.59	26233.59	33600.65	0.00	436.10	0.00	116741.00	96745.00	1
(B) A/D, Full ITC without Expensing	9823.71	42359.24	4287.59	26233.59	32234.15	0.00	1877.00	0.00	116815.00	96682.20	4
(C) A/D, Reduced ITC with Expensing	9823.71	42359.24	4287.59	26233.59	33560.85	0.00	449.50	0.00	116714.00	96724.20	2
(D) A/D, Reduced ITC without Expensing	9823.71	42359.24	4287.59	26233.59	32110.85	0.00	1935.00	0.00	116750.00	96628.60	6
(E) SLD, Full ITC with Expensing	9823.71	42359.24	4287.59	26233.59	33515.95	0.00	385.60	58.08	116664.00	96684.60	3
(F) SLD, Full ITC without Expensing	9823.71	42359.24	4287.59	26233.59	31971.65	0.00	1668.40	404.57	116749.00	96601.10	7
(G) SLD, Reduced ITC with Expensing	9823.71	42359.24	4287.59	26233.59	33473.56	0.00	397.50	59.87	116635.00	96661.90	5
(H) SLD, Reduced ITC without Expensing	9823.71	42359.24	4287.59	26233.59	31840.25	0.00	1720.00	416.01	116680.00	96544.40	8

A/D = Accelerated Depreciation

SLD = Straight Line Depreciation

taxable income is projected to be decreasing. Strategy A (accelerated depreciation, full investment credit, and expensing) is the optimum depreciation, investment tax credit, and expensing strategy. Strategy A allows for increased farm expenses, hence a lower income tax liability during a high income year. Shifting the depreciation expenses associated with the pickup to future lower income years is not as beneficial. The after-tax net cash flows for year six are zero due to the loss which occurs in year six. The after-tax net cash flows for strategies A, B, C, and D in year eight are zero because the use of accelerated depreciation results in the pickup being fully depreciated by year seven. Straight line depreciation extends the depreciation deduction to year eight and thus decreases the tax liability and increases the after-tax net cash flows. The optimum strategy in this analysis coincides with the optimum strategy found in Table XIX in Chapter III when taxable income is decreasing assuming a six percent discount rate.

Table XXXVI presents the tax liabilities, after-tax net cash flows, and the present value of ending net worth associated with the carryforward and carryback of the year six net operating loss for strategy A. The effects of the alternative minimum tax and income averaging on the tax liability, after-tax net cash flows, and the present value of the ending net worth are also presented for the carryforward of the net operating loss.

Net Operating Loss

Analyzing the carryback versus carryforward of the year six net operating loss, a refund of $278 would result if both the alternative

TABLE XXXVI

THE TOTAL TAX LIABILITY, AFTER-TAX NET CASH FLOWS, AND THE PRESENT VALUE OF ENDING
NET WORTH ASSOCIATED WITH THE CARRYFORWARD AND CARRYBACK OF THE YEAR SIX NET
OPERATING LOSS, TEH ALTERNATIVE MINIMUM TAX AND INCOME AVERAGING FOR THE
PICKUP PURCHASED DURING THE FIFTH YEAR USING ACCELERATED DEPRECIATION,
AND FULL INVESTMENT CREDIT WITH EXPENSING
(STRATEGY A)

Year	Net Operating Loss Carryforward[1]		Net Operating Loss Carryback[1]		Alternative Minimum Tax Applied to Net Operating Loss Carryforward		Income Averaging Applied to Net Operating Loss Carryforward[2]	
	Total Tax Liability	After-Tax Net Cash Flows	Total Tax Liability	After-Tax Net Cash Flows	Total Tax Liability	After-Tax Net Cash Flows	Total Tax Liability	After-Tax Net Cash Flows
					(dollars)			
1	0	9824	0	9824	0	9824	0	9824
2	2934	42359	2934	42359	2934	42359	2934	42359
3	0	4288	0	4288	0	4288	0	4288
4	1617	26234	1617	26234	2555	25026	2555	25026
5	14560	33601	14282	33879	14560	33601	8628	39532
6	0	0	0	0	0	0	0	0
7	12317	436	13484	144	12317	436	11886	867
8	8229	0	8190	0	8229	0	8229	0
Sum of Undiscounted After-Tax Net Cash Flows	116741		116728		115533		121896	
Sum of Discounted After-Tax Net Cash Flows	96745		96760		95788		100507	
Present Value of Ending Net Worth	126660		125331		125073		129792	

[1]The carryforward and carryback of the net operating loss results in different ending loan balances reflected in the present value of ending net worth.
[2]The alternative minimum tax is included.

minimum tax and income averaging are not applied and the net operating loss is carried back. Again, carrying the net operating loss back to year three results in the freeing of investment tax credit and the net operating loss not being fully used in years three and four. The unused net operating loss and investment tax credit results in a $14,282 total tax liability for year five compared to $14,560 when the net operating loss is carried forward.

A tax savings of $1167 results from carrying the net operating loss forward without the alternative minimum tax and income averaging in year seven. The total tax liability is $12,317 when the net operating loss is carried forward. If the net operating loss is carried back, the total tax liability is $13,484 for year seven.

The discounted after-tax net cash flows are maximized at $96,760 when the net operating loss is carried back. However, the present value of ending net worth for the carryforward of the net operating loss is greater than the present value of ending net worth when the net operating loss is carried back. The present value of ending net worth is $126,660 when the net operating loss is carried forward and is $125,331 when the net operating loss is carried back. Again, this difference is due to the use of the after-tax net cash flows to reduce the loan balance as previously explained. Therefore, the present value of ending net worth must be compared to determine the optimum strategy concerning the carryback or carryforward of the net operating loss.

If the seventh year's taxable income had not been known, equation 10 would again be used to determine whether to carry the $3,165 net

operating loss back or forward. The breakeven marginal tax rate is 17.0 percent. The net operating loss should be carried back if the producer expects that his taxable income will be less than $11,900, otherwise, he should carry the net operating loss forward.

Alternative Minimum Tax

The alternative minimum tax is only assessed in year four and amounts to $938 in additional tax. Again, the alternative minimum tax is a result of the capital gain deduction. The discounted after-tax net cash flow for strategy A after the alternative minimum tax is paid is $95,788, a reduction of $957 from the $96,745 discounted after-tax net cash flow without the alternative minimum tax.

Income Averaging

Income averaging can only be used in years five and seven. The tax reductions which result from the use of income averaging are $5,932 in year five and $431 in year seven. The increase in the discounted after-tax net cash flow associated with the use of income averaging with strategy A is $3,762. When both income averaging and the alternative minimum tax are applied, the discounted after-tax net cash flow is $100,507 assuming the net operating loss is carried forward.

Analysis of the Present Value of

the Ending Net Worth

The producer's ending net worth equals the value of the assets less the liabilities at the end of year eight. The inventories of hogs and feed on hand at the end of year eight are valued at $70,612 by Plain's simulation model. The liabilities or loan balance at the end of year eight is $29,316.66 assuming the net operating loss is carried forward. The loan balance is $30,239.93 if the sixth year net operating loss had been carried back. These end of year eight values are then discounted back to year zero and combined with the discounted after-tax net cash flows.

Table XXXVII presents the present values of the producer's ending net worth when the sixth year net operating loss is carried back and carried forward with and without the use of income averaging. Only the optimum depreciation, investment tax credit, and expensing strategy for the second year pickup purchase (strategy F) and the fifth year pickup purchase (strategy A) are analyzed.

The present value of the producer's ending net worth is maximized at $130,683 and $129,792 when the sixth year net operating loss is carried forward and income averaging is used for both the second and fifth year pickup purchase, respectively. If the producer had not used income averaging the present value of the ending net worth would be $5,791 less for the second year pickup purchase and $4,719 less for the fifth year pickup purchase.

Had the producer elected to carry the sixth year net operating loss back to year three and applied income averaging for the second year pickup purchase, the present value of the ending net worth is

$124,362. This is $6,321 less than the $130,683 ending net worth if the net operating loss had been carried forward for the second year pickup purchase. The ending net worth for the fifth year pickup purchase when the net operating loss is carried back and income averaging is used is $6,082 less than the ending net worth of $129,792 when the net operating loss is carried forward and income averaging used.

TABLE XXXVII

PRESENT VALUE OF ENDING NET WORTH WHEN THE SIXTH YEAR
NET OPERATING LOSS IS CARRIED BACK AND CARRIED
FORWARD WITH AND WITHOUT INCOME AVERAGING

Year Six Net Operating Loss	Income Averaging	Ending Net Worth	
		Second Year Pickup Purchase (Strategy F)	Fifth Year Pickup Purchase (Strategy A)
		(dollars)	
Carryforward	Not Used	124,892	125,073
Carryforward	Used	130,683	129,792
Carryback	Not Used	118,858	119,137
Carryback	Used	124,362	123,710

[1]Net worth in year zero dollars

The proper decision concerning the carryback and carryforward of a net operating loss and the use of income averaging has a substantial affect on the growth of a producer's net worth. Good decision making tools are a necessity for a producer to make useful tax management decisions, which results in the maximization of the producer's after-tax net cash flows and net worth.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary of Problem and Procedures

Income variability as caused by fluctuating hog and feed prices
is a problem faced by swine producers. Variability of income brings
about the need for income tax management in order to maximize the
producer's after-tax net cash flows and net worth over the life of the
farm. For a producer to make good tax management decisions, an
understanding of the tax law is necessary.

The changes in the tax laws brought about by the adoption of the
Economic Recovery Tax Act of 1981 and the Tax Equity and Fiscal
Responsibility Act of 1982 necessitates the development of additional
income tax management guidelines. Better decision making criteria is
also needed for other tax law provisions so that swine producers may
use them more effectively. The problem and primary objective of this
study is the development of income tax management decision criteria to
assist Oklahoma swine producers to make better tax management
decisions.

The procedures used in this study to develop tax management
decision guidelines require a review of the 1983 tax laws which may be
of primary interest to swine producers. The effectiveness of these
tax management decision guidelines is analyzed using historical price

data and the 1983 tax laws. A swine production simulation model and a tax computation model are used to examine the effects that various tax management strategies have on a producer's after-tax net cash flows and net worth.

Summary of Results

The decision criteria used to select either accelerated or straight line depreciation, either full or reduced investment tax credit, and either to use or not use expensing is based upon the producers expected future income flows and discount rate. The strategy selected maximizes the present value of the after-tax net cash flows.

Accelerated depreciation is selected when the producer's expected future income is decreasing or his discount rate is high. The use of accelerated depreciation recovers the cost of the asset quickly resulting in more depreciation expense when the producers income is high thus reducing his tax liability and increasing his after-tax net cash flow. Alternatively, when the producer's discount rate is high, the time value of money associated with the larger after-tax net cash flows in the early years is greater than the value of the tax reductions in later years, hence accelerated depreciation is selected.

When the producer expects his future income to be increasing and he has a lower discount rate, straight line depreciation is selected. Straight line depreciation spreads the recovery of the assets costs over a longer period of time. Therefore, as the producer's income gets larger in later years, the depreciation deduction from straight

line depreciation is carried to these high income years and reduces the producer's tax liability thus increasing his after-tax net cash flow and net worth.

The selection of full versus reduced investment tax credit depends on the substitution of additional investment tax credit for additional depreciation and on the time value of money. The use of full investment tax credit arises when the producer's initial net income level is low or when his discount rate is large. When the producer's initial net income level is high and discount rate is small, reduced investment tax credit is selected. Full investment tax credit allows for a larger credit and less depreciation while reduced investment tax credit allows for more depreciation and less credit.

The Section 179 expensing deduction is selected when the producer's expected taxable income is decreasing or his discount rate is large. Expensing reduces the depreciable basis of the asset thus as the current value of the tax reduction from expensing becomes greater than the value of future tax reduction from depreciation, the expensing deduction is selected.

Selection of the correct depreciation, investment tax credit, and expensing strategy will increase the producer's after-tax net cash flows and net worth over the life of the swine production enterprise.

The use of reduced investment tax credit and expensing to reduce the amount of the self-employment tax liability results in an increase in the total tax liability in addition to decreasing the amount of the self-employment tax.

The increase in the producer's after-tax net cash flows and net worth resulting from the carryback or carryforward of a net operating

loss is a function of the amount of the net operating loss and the marginal tax rate for the year to which it is carried. The net operating loss is to be carried back if the refund is greater than the expected tax savings from carrying the net operating loss forward. If the refund is less than the expected future tax savings, the net operating loss should be carried forward. For every net operating loss which occurs the refund must be compared to the expected future tax savings in order for the producer to make the proper decision concerning the carryback or carryforward of a net operating loss.

Income averaging allows the producer to reduce a large tax liability which results from an unusually profitable year through the averaging of the taxable income of the previous four years. Income averaging results in a direct decrease in the producer's tax liability thus increasing his after-tax net cash flows and net worth. Swine producers will find it beneficial to use income averaging whenever possible due to the resulting tax savings.

Conclusions

Producers can increase their after-tax net cash flows and net worth with proper tax management decisions. However, the optimum tax management strategies found in this study may not be applicable to every swine producer. Whenever an asset is purchased or a net operating loss occurs, the decision criteria and the equations developed in Chapter III must be used to determine what tax management strategy should be selected based on the producer's expected future income flows and discount rate.

The optimum depreciation method, investment tax credit option, and expensing option will increase the producer's after-tax net cash flows and net worth when compared to the after-tax net cash flows and net worth from other depreciation, investment tax credit, and expensing strategies. In addition, the correct decision concerning the carryback or carryforward of a net operating loss will result in an increase in the producer's after-tax net cash flows and net worth.

Income averaging is beneficial to swine producers who experience abnormally profitable years. The income averaging provisions were developed to absorb some of the tax consequences resulting from these abnormal or unusual profits. Therefore income averaging is beneficial to swine producers who meet the requirements for using income averaging due to the tax savings it provides.

Tax management is a useful and necessary tool in swine production to aid producer's in maximizing their after-tax net cash flows and net worth. Producers who understand and use income tax management will benefit from the tax reducing provisions built into the tax laws.

Limitations

The most significant limitation of this study concerns the examination of only the 1983 tax laws which are of primary importance to swine producers. Future amendments in the tax laws may affect the tax management guidelines developed and analyzed. In addition, the analysis of these guidelines was completed using historical data and the conclusions drawn may or may not be the same for the future.

Future Research Suggestions

Several possible areas of additional research stem from this study. The use of historical price data simplifies the analysis of income tax management strategies. However, the inclusion of risk and uncertainty associated with future events would make the analysis of income tax management more realistic. In addition, the use of a longer analysis period and the liquidation of the production entity would allow for the examination of estate transfers and planning for swine producers.

The changes in the 1984 tax laws concerning the increase in the self-employed tax rate from 9.35 percent to 14.0 percent and the increase in the Section 179 expensing deduction from $5,000 to $7,500 may result in different income tax management strategies (1984 U.S. Master Tax Guide, 1983).

A final research recommendation concerns the examination of all the tax laws, in addition to those described in this study, and the development of tax management guidelines that may be used with these tax laws.

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VITA ℒ

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