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ABSTRACT

Five papers are provided from a symposium organized to present several economic studies relating to income tax structure and reform in agriculture. "Toward an Optimal Income Tax Policy for Southern and U.S. Agriculture" (Harold F. Breimyer) is a structured argument for comprehensive tax reform that increases the equity of the income tax system among farmers. "A Comparison of Effects of the Current Tax Law through the Tax Reform Act of 1984 and the 1985 Proposed Tax Act on Commercial Farms in Texas, Mississippi, and Illinois" (Clair J. Nixon, James W. Richardson) presents a mathematical programming model of farms representing southern and midwestern agriculture. "Tax and Agricultural Policy: Interlinkages and Reform" (Kenneth Baum, et al.) provides a comprehensive examination of tax policy and commodity policy interrelationships. "Farmer Preferences for Tax Reform Issues Using Multi-Chotomous Logit Analysis" (Daniel M. Otto, Gregory D. Hanson) presents a large survey of farmer attitudes toward tax reform and tax policy effects in agriculture. "Effects of Income Tax Reform on Agriculture: Review and New Evidence" (Sermin D. Hardesty, Hoy F. Carman) evaluates symposium findings within the context of research regarding agricultural response to changing income tax law. (YLB)

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Income Tax Reform and Agriculture: A Symposium

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ABSTRACT

Income tax reform became a key issue in agriculture in the 1970's and 1980's. Empirical evidence based upon economic modeling of representative farms and statistical analysis of farmer responses to a tax policy survey, suggests that broad tax reform such as proposed by the U.S. Department of Treasury would lower farm taxes and would also receive substantial support among farmers. The interlinkages among tax policy and commodity program policies were found to be pervasive, and the implications of this for tax reform are developed. A broad, political economy approach to tax misallocation effects in agriculture and the benefits of tax reform is presented. Discussion of the symposium papers and presentation of an alternative economic approach to analyzing tax reform effects are presented in the final two papers.

Keywords: Income tax, tax reform, tax equity, logit, mathematical programming, resource allocation, dynamic modeling.

PREFACE

This symposium was organized by Leon Geyer and Gregory Hanson for the 1984 annual meeting of the Southern Agricultural Economics Association, in Jackson, Mississippi. Agricultural tax issues had become a subject of increasing debate in agriculture. Tax management became an important component of farm business management during the 1970's-80's as nominal farm incomes rose substantially. Tax saving deductions and credits of the Federal Income Tax Code were expanded and State income and Social Security taxes tended to become larger for many farmers. Large incentives existed to lower effective tax rates through income, expense, and investment management.

Active tax management appears to have resulted in reduced tax burdens and also in resource misallocation in the farm sector. Decisions were often made based primarily upon tax reduction rather than economic incentives. Many agricultural economists became concerned that the income tax system was exerting a profound structural effect that encouraged farm expansion with financial leverage. Tax reform was analyzed as an option to lower tax system price and to increase tax system equity among farmers.

This symposium was organized to present several economic studies relating to income tax structure and reform in agriculture. The first four papers presented two empirical studies and two broad treatments of tax and interrelated commodity policies, providing a balance of economic modeling and general economic insights.

Specific subject areas of papers in the session include, first, a strong, structured argument for comprehensive tax reform that increases the equity of the income tax system among farmers. The second paper presents a mathematical programming model of farms representing southern and midwestern agriculture. The third paper provides a particularly comprehensive examination of tax policy and commodity policy interrelationships. The fourth paper presents perhaps the first large survey of farmer attitudes toward tax reform and tax policy effects in agriculture.

The symposium papers were critiqued at the session and revisions were suggested by the discussant, B.R. Eddleman. In addition, Sermin Hardesty and Hoy Carman were requested to edit and review the session papers, and to prepare an additional review of tax reform issues. Gregory Hanson provided project coordination and editing with the assistance of Diane Bertelsen.

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Income Tax Reform and Agriculture: A Symposium

TOWARD AN OPTIMAL INCOME TAX POLICY FOR SOUTHERN AND U.S. AGRICULTURE

Harold F. Breimyer*

"Taxation is . . . a demonstration of ideological belief. Thus in times of intellectual change the tax laws become exceptionally important."

--Joseph Losos

Of all the instruments of Government, other than its authority to declare war, none bears so incisively on the welfare of citizens--privately and in their economic enterprise--as does the power to tax.

Years ago the principles of taxation were as much a part of the teaching of economic theory as was "eventually declining marginal physical returns." By sharp contrast, most textbooks of recent years have given only passing attention to theory of taxation. In works on agricultural policy, Tweeten allocates three pages to the subject, Paarlberg one page, Halcrow (1977) perhaps five pages, Halcrow (1984) about 10 pages, and Knutson, Penn, and Boehm four pages. Among general policy texts, Samuelson and McConnell in successive editions touch on taxes only here and there. However, McConnell in 1984, apparently inspired by Reaganism and supply-side economics, does appreciably better.

Farmers as individuals, farm business units, and agriculture as a sector are highly sensitive to tax policy. Agriculture can be influenced as much by tax policy in all its ramifications as by commodity price-support policy. The farm policy texts referred to devote inch-thick sections to the latter topic.

This paper addresses income tax policy. It manifestly is only a subportion of the economics of taxation in general. Income taxes have crowded property taxes out of the tax-policy limelight. More significant, though, is that the income tax policy bearing on agriculture is not singular to the sector. A favorite Paarlberg phrase trumpets how agriculture is losing its uniqueness (pp. 5-13). Income tax policy bearing on agriculture is not uniquely agricultural; moreover, it focuses not so much on the equity or incentive effects of the income tax as on how tax shelters bear on investment.

To draw on Paarlberg phraseology once again, in the mid-1980's income taxes are on the farm policy agenda (p. 14). They were put there not by agricultural economists nor by the agricultural establishment. We could almost say they got there by force of circumstance, but in 1985 the luminosity surrounding income tax

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policy is attributed in large measure to proposals advanced earlier by three Senators (Kemp, Kasten, and Bradley), one Congressman (Gephardt), and Donald Regan as Secretary of the Treasury. The proposals were variously tagged as tax reform or simplification.

For teaching the principles of taxation, the time-honored trilogy is still appropriate--that taxes serve to raise revenue, influence distribution of wealth and income, and encourage or discourage particular forms of economic activity. Invariably a stock response comes back: why can't a tax do one but not the others? To be sure, it is conceivably possible to manipulate one feature of taxation while trying to minimize the effect on the other two. But multiple consequences are implicit in any taxation policy.

Attributes of a tax system add at least one further consideration, namely, efficiency of collection. This is often expressed in the opposite language, ease of evasion.1/

Any review of objectives runs into economists' tendency to oversimplify. Yet few, if any, economic policies have a single goal. Most have numerous goals that are partially conflicting. If we deal with them responsibly, we find ourselves uncomfortable in an indeterminate situation. But so it is in a democracy. Democracy must be the messiest system of government ever devised.

With regard to choosing an optimal income tax policy for agriculture, the key word is the adjective, optimal. Worth noting, though, is that limiting the scope to income taxes invites too thin an examination of taxation in agriculture. A basic issue that will not go away is how much to rely on real property taxation versus income taxation. This has important jurisdictional aspects as well as economic ones. Contrary to what is now a popular viewpoint, a well-designed real property tax has merit. However, it falls under a shadow for two reasons, namely, that income from property is variable, and that so much property nowadays is not real and readily escapes comparable taxation.

Whatever else about taxation may be mired in some degree of duplosity, one event in the economic history of our Nation is of unquestioned significance. It is the landmark action of 1913 to adopt an income tax of progressive rate structure. To be sure, we had an income tax briefly during the Civil War, and a similar tax was legislated in 1894. But conservative Supreme Courts took a negative stand until a constitutional amendment finally made it clear that the American tradition was not violated by taxing in accordance with ability to pay--that ability being measured by flow of income, not static possession of property.

Only the most egregious cynic or rightist ideologue would reject the ability-to-pay ethic summarily. But like all abstractions, when examined it reveals complications. Offered here is only the comment that implicitly we treat ability to pay not just in terms of income derived from native talent and effort, but equally as much (or perhaps even more) as that arising from rent, luck, and imperfections in the economy. Implicitly we customarily make a distinction between normal and economic profits. The American ethic carries a preference for taxing

1/ Yet another piece in the puzzle is the user charge principle. Is a user charge a tax? Not, presumably, when it pays for services rendered. But what about the social security "tax"? Is it only a user charge for buying an annuity? A warning against too facile a response is in order. If our Federal revenues now finance primarily an armed camp and a welfare state, maybe most Federal taxation is user charge. This is an interesting conundrum.

economic profit--rent, unearned income, and similarly designated kinds of cash flow. Manifestly, it is easier to apply the principle in taxing business income than wages and salaries of individuals. For the latter, we have essentially depended on progressivity alone.

But the policy that has dominated income taxation of recent years has departed far from that principle. Moreover, the present code is characterized mainly not by the nominal levying of a tax, but by the diabolical maze of deductions. The Economic Recovery Tax Act of 1981 (ERTA) added to the retinue of deductions previously in place. With its more than 120 individual deductions the total loss of revenue now attributed to shelters or deductions is estimated at $370 billion a year.

Agriculture is a favorite sector for tax shelters. In a recent year, the loss of revenue from shelters in agriculture exceeded the income tax paid by almost two to one.

The shelters that have proliferated in the last decade have five major features that enter into any normative judgment about the tax code now in force--a judgment based to some degree on its effect on income distribution but much more according to how it influences economic activity.

(1) The shelters erode the progressive feature of income taxes. Indeed, they have attained a scale where, on the average, all progressivity has been ended.
(2) They invite both legal manipulation and illegal evasion.
(3) By their nature they are selectively preferential, rewarding the ingenuity of interest groups that can write, and win acceptance of, subtly tailored provisions.
(4) They distort signals for allocation and distribution that the market system normally generates.
(5) Elaborating on number 4, in agriculture they:
    a. enlarge investment and thereby stimulate overproduction and reduce prices, and
    b. set in motion a transfer of asset ownership to sheltered investors.

A further note on tax deduction or shelter schemes builds on point (5)a above. Most, if not all, tax deductions constitute a subsidy to economic activity. They are just as clearly a subsidy as are direct payments from the Federal Treasury. Yet by some quirk of human cognition, a peculiar sophistry, tax deductions are not generally regarded in that light. Indeed, time and again a deduction has been voted by Congress on grounds that it will accomplish a desired end without involving a cost to Government. It hardly exaggerates to suggest that not fewer than a hundred kinds of economic activity that are subsidized by the tax device would not be endowed equally via appropriation.

The probability is nigh that the current tax system, so incomprehensible a morass and so subject to evasion, will fall of its own weight. Former Secretary Regan apparently holds to such a view. The irony is that the search for an efficient, collectible tax system is inducing many people, including political liberals, to advocate a consumption tax. That recourse would reverse all the normative considerations that underlay the original adoption of a progressive income tax.

What is recommended for agriculture? The crucial part of the tax question as it bears on agriculture rests in an understanding of how the present system functions and what might be expected from each of various alternatives. A personal recommendation is exactly the same as a number of critics have proposed for many

years. It is to end all opportunities to classify depreciable investment as current operating expense; require farmers to use accrual accounting for tax purposes; tax capital gains in the same manner as earned income; and, in fact, abolish all sheltered deductions. Examples of the first of these are some orchard development costs and various expenditures in livestock production that are genuinely depreciable investment but are now classed as expenses in tax accounting.

The preference to tax capital gains at the same rate as earned income is not exclusively agricultural but has a lot of meaning to agriculture. Taxing them at a lower rate blantantly violates the American ethic.

The proposals named above are rationalized largely on the basis of points (5)a and (5)b. A major consequence of the existing tax code for agriculture is that it has the net effect over time of wresting asset-holding out of the hands of operating farmers. It is not a case, to be sure, that the code has a built-in occupational preference. But it has a clear preference for high-income taxpayers. The majority of shelters are attractive in proportion to the level of tax bracket. Generally, operating farmers are in a lower bracket than their nonfarm competitors for asset-holding. Furthermore, the squeezing-out process can snowball: as more of the total returns from farming go to outside holders of assets, a smaller part will be received by operators, lowering their tax bracket.

It is highly likely that if the tax code is not changed, eventually all real assets in agriculture will be held in shelters.

There is a reason to believe that, with the exception of a few kinds of enterprise, owner-operated farms of moderate size can compete with larger units if they are given protection from tax-subsidized competition. But in any case--call it a philosophical bias if one wishes--if we want to use resources of Government to enhance a particular structure of agriculture, we ought to do it openly and aboveboard.

The furtiveness and the clandestine scheming of the tax subsidy route should be outlawed simply on the grounds of its interference with responsible conduct of Government. In agriculture its empirical consequences offer a further reason for radical change.

But a final note is to urge more attention to the topic of income taxation in agriculture. It deserves more than it received until very recently.

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A COMPARISON OF EFFECTS OF THE CURRENT TAX LAW THROUGH THE TAX REFORM ACT OF 1984 AND THE 1985 PROPOSED TAX ACT ON COMMERCIAL FARMS IN TEXAS, MISSISSIPPI, AND ILLINOIS

Clair J. Nixon and James W. Richardson

Tax law reform has shifted into high gear during the past few years. The myriad of changes in the Federal tax law have in many ways directly affected farm operators. Typically, however, analysis in the literature of the impact of a change in the tax law on farm operator tax liabilities has been limited to enacted provisions of tax bills. A departure from this convention will be utilized in this study. The purpose of this article is to compare the economic impact of proposed tax law reform on farm operator tax liabilities and financial well-being. The provisions of the current tax law and the U.S. Department of Treasury proposed Tax Reform for Fairness, Simplicity, and Economic Growth Act (Treasury I) will be compared by simulating their effect on representative farms in Mississippi, Texas, and Illinois.

Tax Reforms

The literature contains numerous descriptive articles on the provisions of the recent changes in the tax law (Harl; Richardson and Nixon; Prentice-Hall). Yet, analysis comparing the relative impact of proposed tax reform on farm operator tax liabilities has not been addressed. Of course, with the rapid changes occurring in tax policy, there is tremendous uncertainty as to the continuing direction of Federal tax policy, especially with regard to farm operator families.

The key distinctions between the current tax law and proposed tax reform measures having a significant impact on farm operator families are summarized in Table 1. While a change in the tax law generally affects all types of farm operator business enterprises, the focus of this analysis is limited to sole proprietorships. Other forms of business organization (regular corporation, Subchapter S corporation, limited partnerships, trusts, etc.) will be affected differently by the proposed tax legislation.

Current Tax Law

Tax reform in the United States has generally taken an abrupt change since 1981. The Economic Recovery Tax Act of 1981 (ERTA) provided the largest overall tax reduction in history. This tax bill has widesweeping business investment stimuli and personal income tax reductions.

Only a year after ERTA, Congress passed the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) which was the largest revenue generating bill in history. The regular minimum tax was eliminated and farm operators were now required to pay the greater of the regular income tax liability after tax credits and a new version of the alternative minimum tax. Changes were also made in the investment tax credit area. Here, the trend of decreasing the benefit derived from the investment tax credit was initiated.

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Table 1--Major differences in the current law, Treasury I, and Treasury II tax laws for farm operators

Item	Current law	Treasury I	Treasury II
Income tax rates, personal exemption, and zero bracket amount	Provides for 50 percent maximum rate on all income. Marginal tax rates reduced through 1984. Indexing of tax brackets, exemptions and zero bracket amount, based on CPI for all-urban consumers beginning in 1985.	Beginning in 1986, three individual tax brackets 15, 25, and 35 percent. Personal exemptions increase from $1,000 to $2,000 and zero bracket amount to be set for alternative filing groups ($3,800 for married filing jointly).	Same as Treasury I
Depreciation	Provides for four classes of depreciable personal property (Section 1245) using the 150-percent declining balance method. Real property has one class and may be depreciated in as little as 8 years. Salvage value is ignored in depreciation computation.	Eliminate Accelerated Cost Recovery System and replace with Real Cost Recovery System (RCRS). Seven classes of property with fixed recovery rates. Tax basis adjusted annually for inflation.	New Capital Cost Recovery System. Same as Treasury I except six classes of property.
Expensing	First-year expensing on personal property. $5,000 in 1985, 1986, and 1987; $7,500 in 1988 and 1989; and $10,000 in 1990 and thereafter. Expensing reduces the basis for the investment tax credit.	Expensing to stay at $5,000 per year.	Same as Treasury I.
Investment tax credit	Provides for two rate groups based on class life of personal property; 3-year class--6 perent, 5-, 10-, 15-year class--10 percent. Investment tax credit has no effect on basis for depreciation. Used property limitation increased to $125,000 for 1981-87 and to $150,000 for 1988 and thereafter. "At risk" limitations extended to investment tax credit. Individuals have the option of reducing basis for depreciation by half of investment tax credit claimed or taking	Investment tax credit eliminated for property purchased on or after January 1, 1986.	Same as Treasury I.

Table 1--Major differences in the current law, Treasury I, and Treasury II tax laws for farm operators (continued)

Item	Current law	Treasury I	Treasury II
	2 percent less investment tax credit than allowed with no effect on depreciable basis beginning January 1, 1985.		
Investment tax credit recapture	Provides that 2 percent of the credit is earned for each full year that the asset is kept in service except to coincide with investment tax credit rules. The adjusted basis for computing gain or loss is increased by half of the investment tax credit recapture upon disposition. When the maximum investment credit is claimed originally.	To be phased out with elimination of investment tax credit.	Same as Treasury I.
Income averaging	Average of previous 3 tax years as base-period income. Qualify if current year's income exceeds base period average by 140 percent.	Same as Tax Reform Act except if full-time student in any base period year disqualifies use of income averaging.	Income averaging eliminated in 1986.
Alternative minimum tax	Combines regular minimum tax and the alternative minimum tax. Eliminated the adjusted itemized deduction as a preference item. New preference items are added. The exclusion is increased to $40,000 with a flat 20 percent tax rate on the excess.	Alternative minimum tax eliminated after 1989.	Revised alternative minimum tax with lower exemption and reduced tax preference income.
Capital gain treatment	Holding period for long-term capital gains is 6 months for assets acquired after June 11, 1984. One-year holding period reinstituted after 1987.	Long-term capital gains rate would be repealed. All gains and losses treated as ordinary. Inflation adjustment for realized gains on disposition of property. Effective for assets purchased after 1985.	Capital gain deduction reduced from 60 to 50 percent with fewer capital assets qualifying. Other gains and losses will be ordinary after inflation adjustment.
Interest expense	All business interest fully deductible.	Interest deduction restricted by fractional exclusion rate based on inflation.	All business interest fully deductible interest on non-businesses limited to personal residence, net investment income and $5,000 ($3,500 if married filing seperately).

The last piece of major tax legislation affecting the current tax law is the Tax Reform Act of 1984 (TRA). The TRA was the most comprehensive and complex revision of the Federal tax system that had ever been attempted. Many of the provisions in the TRA were aimed at postponing scheduled tax breaks for 1984 and later years (expensing and used investment tax credit property) as well as reducing taxpayer benefits in other areas (income averaging).

Tax Reform for Fairness, Simplicity, and Economic Growth Act of 1985 (Treasury I)

In an attempt to create a more fair and simple tax system that would not inhibit economic growth, Treasury I has been proposed by the U.S. Department of Treasury. This reform measure is intended to be revenue neutral and yet simpler in comprehension and administration. There are, of course, several other tax bills proposing variations of Treasury I (for example, Bradley-Gephardt, Kemp-Kasten, and Treasury II). Treasury II was proposed by President Reagan on May 28, 1985. The differences between Treasury I and Treasury II are shown in table 1. While these two bills are very similar there are a few important differences. For example, the interest expense deduction changes under Treasury I were changed under Treasury II to the benefit of most farm operators. Under Treasury II all interest expense would be deductible and not adjusted for inflation. The focus of this section will, however, be specifically on the potential impact of the Treasury I proposal.

Treasury I would reduce individual tax liabilities an average of 8.5 percent using marginal tax rates on economic income that would be 20 percent lower than current rates. The personal exemption would not be indexed, but rather be increased to $2,000 per individual. In addition, the zero bracket amount would be increased for each of the four filing groups, (married, filing jointly, etc.). The alternative minimum tax would also be repealed.

On the business side, a new capital cost recovery system would replace the accelerated cost recovery system (ACRS). This new system, the Real Cost Recovery System, or RCRS, would allow cost recovery of the real or inflation-adjusted cost of business assets. All property would be assigned to one of seven classes with fixed rates of depreciation. There would no longer be the option to use straight-line or accelerated depreciation. The RCRS inflation-adjusted basis of an asset would also be used to compute gain or loss on the disposition of the asset. All gains and losses under the proposed law would be treated as ordinary income or loss since the favorable capital gains rules would be phased out. There would also be no provision for recapture of depreciation because inflation-adjusted values will be used in the depreciation calculation. Furthermore, there would be no need to adjust the basis for investment tax credit allowances because of the proposed elimination of this and other credits. Most farm machinery would fall into a class which would recover the cost of equipment over a 12-year period. The fixed rate would be 18 percent annually. The basis for depreciation would change each year based on the previous year's depreciation deduction and the percentage change in the all-urban consumers price index (CPI). In addition, the first year's depreciation would be based on the month that the asset was placed in service. For example, a tractor costing $50,000 purchased in December would have a depreciation deduction in the year of purchase of $750 ($50,000 x .015). If inflation were 10 percent the following year, the depreciation deduction for that year would be $9,751.50 ([$50,000 - $750] x 1.1 x .18). Therefore, under this proposal, more than 100 percent of the original cost of the asset may be depreciated.

As mentioned above, the investment tax credit would be repealed. This credit has long been an important means of reducing farm income tax liabilities. The

preferential tax rate for long-term capital gains would also be repealed. All gains and losses on property transactions would be treated as ordinary income or loss. The repeal of the favorable long-term capital gains treatment is coupled with an inflation adjustment for realized gains on property dispositions.

A number of other changes in the proposed tax laws are shown in table 1. In most cases, the proposed effective date for implementation of the changes is January 1, 1986. This allows farm operators to plan for these changes during 1985. The Firm Level I Policy Simulator Model (FLIPSIM V) was used to evaluate the impact of the current law (1984) and proposed Treasury I provisions on selected representative farms.

Simulation Model

FLIPSIM V is a firm level, recursive, simulation model which simulates the annual production, farm policy, marketing, financial management, growth, and income tax aspects of a farm over a multiple-year planning horizon. The computer program is capable of simulating a case farm situation for 1 to 10 years. The model recursively simulates a typical farm by using the ending financial position for year 1 as the beginning position for the second year, and so on. An option to use a programming algorithm (LP or QP) to select the optimal (profit or utility maximizing) crop mix for years 2 to 10 is included in the model. The model, however, is a simulation model rather than a programming model. This comes from the fact that FLIPSIM V does not include an overall objective function to be optimized but rather analyzes the outcome of a given set of input data and assumptions for a typical farm. Accounting equations and identities constitute most all of the computational components of the model. Virtually no econometric relationships with fixed parameters are included in the model. A brief overview of how the model operates is presented below.

As indicated in figure 1, the model simulates a given farm situation for 1 to 10 years (inner loop YEARS), and repeats this multiple-year planning horizon for 50 iterations (middle loop ITER) during a stochastic analysis. At the end of each iteration, the model records the results for future analysis. Prior to simulating iterations 2 through 50, the model reinitializes the farm to the beginning situation used for the first iteration. The model is capable of simulating up to 300 iterations. Upon completion of the last iteration, the model performs a statistical analysis of from 39 to 489 output variables, develops cumulative probability distributions for these output variables, and estimates the probability of the farm operator remaining solvent for the duration of the planning horizon. An outer loop (NOFARM) allows the model to analyze additional farm situations if they have been provided.

Annual prices and yields for up to 10 crops are determined by the analyst in the deterministic mode. When the model is run using stochastic prices and yields, annual crop prices and yields are drawn at random from probability distributions specified by the analyst. The analyst can select from independent or multivariate distributions for annual crop prices and yields. Variable cost of production for each crop enterprise is summed to obtain total input costs. Labor cost is the sum of updated, full-time employee salaries and benefits plus wages paid to part-time employees.

Annual values for exogenous fixed costs are calculated by inflating their initial values by the appropriate annual percentage changes provided by the analyst. Property taxes are calculated as the product of the appropriate property tax rate and the market value of owned land in the previous year.

Existing and new long- and intermediate-term loans are amortized based on their respective loan life, initial amount borrowed, and annual interest rate. These values are provided at the outset by the analyst.

The market value of land and farm machinery is updated annually. The market value for used equipment is adjusted using the percentage changes in used equipment prices supplied by the analyst.

Next, the model calculates depreciation for each item in the machinery complement. For depreciable items purchased prior to 1981, the model calculates depreciation using the analyst's specified method, either the double declining balance or the straight line method. Depreciable items placed into service after 1980 and prior to 1986, are cost recovered using either an accelerated or straight line method. Machinery placed into service after 1985 can either be Class II or Class III equipment. The recovery life for equipment and livestock can be set by the analyst at 3, 5, or 12 years. Farm equipment that has reached the end of its economic life is traded-in or sold and a replacement purchased. The farm operator is permitted to replace an obsolete piece of equipment if sufficient cash is available (including the market value of the old piece of equipment) to meet, for example, a 30-percent down payment, and the additional debt does not cause the intermediate-term equity ratio to fall below the minimum.1/ Additional first year expensing can be taken for all purchases of equipment, as well as investment tax credit. If equipment is sold rather than traded-in, the capital gains or losses realized from the sale are calculated and used in computing personal income taxes. Additionally, depreciation recapture is calculated when applicable.

An option in the model permits the farm operator to lease some or all of the farm equipment. Equipment is leased on a multiyear basis and can be re-leased or purchased at the end of the lease. When leased equipment is purchased, the model depreciates (cost recovers) the equipment base on options selected by the analyst.

At this point in the simulated crop year, the operator has sufficient information to plan the marketing strategy for crops and thus reduce personal income taxes for the current year. By marketing a crop in the next tax year, a cash-basis farm operator may reduce the income tax burden in the current year. This is done in the model by calculating the operator's expected income tax deductions and cash receipts from all sources to determine the proportion of all crops to market in the current year. A seasonal price index for each crop allows the operator to also take advantage of seasonal price differentials available to producers who normally store their crops to take advantage of seasonal price differences. Annual cash receipts are calculated for that portion of the crop marketed in the current tax year, plus the receipts for selling crops stored from the previous year. Crop cash receipts are adjusted to reflect the share of the crop paid to the landowner for share-rented cropland.

1/ The model presently does not keep track of the number of hours each machine is used. Machinery operating expenses and replacement are therefore not a function of actual hours used. As a result, annual machinery operating expenses do not increase if the farm operator is unable to replace a particular machine when it is scheduled for replacement. To minimize the effects of this limitation the operator may put off replacement of machinery for a maximum of 1 year. Refinements in this section of the model are being planned.

The farm programs in the model are activated separately by options specified by the analyst. For example, when the net loan rate (price support) for a crop is greater than its market price, the operator's share of the crop is placed in the Commodity Credit Corporation loan or farmer-held reserve (FOR), if available. Stocks are withdrawn from the loan the next year if their market price exceeds the loan rate plus interest costs. Low-yield disaster payments, or Federal crop-insurance indemnity payments, are made if a crop experiences a yield lower than its guaranteed yield. Premiums for Federal crop insurance are calculated annually based on the acres of each crop insured and their respective per-acre premium rates. As the loss ratio for Federal crop insurance increases (or decreases) the per-acre premium rate is increased (or decreased), based on schedules published by the Federal Crop Insurance Corporation.

Personal-income taxes and self-employment taxes are calculated annually for the farm operator, assuming the operator is married, filing a joint income tax return, and itemizing personal deductions. The regular income tax liability is computed using two methods: (a) income averaging (if qualified) and (b) standard tax tables. The model selects the tax strategy which results in the lower income tax liability. All investment tax-credit allowances are deducted from the regular income tax liability with the result being compared with the income tax liability under the alternative minimum tax. The operator pays the excess of the alternative minimum tax over the sum of the regular income tax liability and the regular minimum tax. If the operator purchases additional machinery in conjunction with growth, the income tax liability is recomputed based on the additional cost recovery allowances and investment tax credits. When additional machinery is purchased, it is assumed the property qualifies under the accelerated cost recovery system (ACRS). This allows the operator to utilize first-year expensing and investment tax credit for the purpose of reducing the current year's income tax liability. Income tax rate schedules for 1981, 1982, 1983, and 1984 are included in the model, as well as an optional procedure to develop tax rate schedules for 1985-90 based on changes in the CPI.

Growth in terms of purchasing or leasing additional cropland is considered at the end of each tax year if the analyst has selected this option. The availability of cropland for lease and/or purchase can be predetermined each year, or can be viewed to be random with the probability distributions for land availability being provided by the analyst.

After simulating the growth aspects of the farm, the model computes the farm's end-of-year financial statements. The model then updates the farm size and prepares to simulate the next year of the planning horizon. The annual process described above is repeated until the entire planning horizon has been simulated. For a deterministic analysis, the model prints various output tables at this point.

Representative Farms

Six representative farms from three States were simulated with the model under the two income tax scenarios. Each scenario was simulated for 6 years beginning in 1985 and the planning horizon was replicated 50 times using crop prices and yields drawn randomly from multivariate empirical probability distributions. The short simulation period (6 years) is used due to the short-lived nature of recent tax reforms.

The six representative farms used for the study are: 1,088- and 5,570-acre Texas High Plains cotton farms; 1,433- and 6,184-acre Mississippi Delta cotton, rice,

soybean, and wheat farms; 640- and 1,630-acre Illinois corn and soybean farms. The six representative farms were developed from primary and secondary data by Richardson, Eddleman, and Sundquist for the Office of Technology Assessment (OTA). The salient characteristics of the six representative farms are summarized in table 2.

Table 2--Characteristics of two representative farms in the Texas High Plains, Mississippi Delta, and South-Central Illinois

Item	Texas cotton farms		Mississippi crop farms		Illinois grain farms	
Total acres	1,088	5,570	1,443	6,184	640	1,630
Acres owned	707	2,117	910	3,120	380	1,172
Value of owned cropland ($1,000)	222	2,015	799	4,596	900	1,538
Value of machinery ($1,000)	144	714	379	1,210	92	129
Total assets 1/ ($1,000)	443	3,029	1,339	6,306	1,037	1,769
Initial net worth ($1,000)	275	2,033	749	4,048	855	1,106
Initial equity ratio	.62	.67	.56	.64	.82	.62
Total cash receipts ($1,000)	206	783	591	1,962	265	555

1/ Total assets exceeds the sum of machinery and cropland because it includes cash on hand and off-farm assets.

The 1,088-acre Texas cotton farm has the smallest annual cash receipts ($206,000) while the 6,184-acre Mississippi Delta farm produces the greatest annual cash receipts ($1,962,000). The initial equity positions for the Mississippi and Texas farms were obtained from producer and banker surveys, while the initial equity positions for the Illinois farms were provided by USDA from the 1979 Agricultural Finance Survey. Machinery complements for the Mississippi and Texas farms were developed from producer surveys and the equipment items were assumed to initially be of varying ages. The machinery complements for the Illinois farms were developed from the USDA Cost of Production Survey. Production costs for the individual crops produced on these farms were inflated to reflect 1984 costs of production.

Due to the importance of inflation rates in the proposed 1985 depreciation procedure, particular care was taken in specifying the macroeconomic input values for the model. To ensure that the rates of inflation in input costs were consistent with the percentage change in the CPI and with the interest rates for various loans, a published projection of these variables was used. Hughes and Penson provide several 6-year projections of annual percentage changes in input prices and annual interest rates under alternative monetary and fiscal policies using the CONGEM model. Their projections for a restrictive fiscal policy and a moderate monetary policy were selected. Under an economic scenario of restrictive fiscal and moderate monetary policy, COMGEM projects declines in long-term interest rates from 11.5 percent in 1985 to 8.8 percent in 1990 and similar declines in intermediate-term interest rates. The percentage change in prices paid for inputs is projected to be about 2.9 percent in 1985 and decline steadily to about -1.5 percent in 1990. The CPI is projected to increase from 317.6 in 1985 to 323.7 by 1990.

The six representative farms were assumed to participate in the farm program provisions and to comply with a $50,000-payment limitation. The announced provisions of the 1985 farm program were used for 1985. These policy values were also used for 1986-90 for all crops except rice and wheat. The 1985 acreage-reduction levels for rice and wheat were reduced to 20 and 25 percent, respectively, for 1986-90. Mean prices received for crops were held constant in 1985-90 at their 1984 season average levels. This assumption is reasonable considering the general economic scenario used to develop interest rates and percentage changes in input prices.

All values used to describe the six representative farms, the farm policy variables, and the macroeconomy were held constant across the three income tax scenarios evaluated. This ensured that the results observed from the simulation model were due to the different income-tax scenarios and not to differences in assumptions about the farms or the policy variables.

Simulation Results

The results of simulating the six representative crop farms under the current and proposed tax law scenarios are summarized in table 3. All farms had a 100-percent chance of remaining solvent for 6 years under the two tax scenarios analyzed.

Given that the purpose of Treasury I was to tighten loopholes and keep Federal revenue neutral, it appears to be a failure as far as these six representative farms are concerned. None of the six representative farms experienced an increase in average annual income taxes compared to tax payments under the current law. Over the 6-year planning horizon, the Treasury I provisions would have saved the three larger farms a combined total of $207,000 in income taxes, compared with the current tax law.

The reduction in marginal Federal income tax rates under Treasury I had a greater impact on the representative farm's income tax payments than the change in depreciation allowances. The increase in average annual net farm income ranged from 3.8 to 8.8 percent for the six farms due to reductions in average annual depreciation allowances under Treasury I. Similar percentage increases in average annual taxable income were also experienced by these farms. Despite this increase in net farm income, average annual income tax payments for all six farms declined. The marginal income tax rates for the smaller farms decreased to 25 and 35 percent under Treasury I. The 6,184-acre Mississippi farm experienced the greatest reduction in marginal income tax rates, declining from 50 to 35 percent. These

reductions in the marginal tax rate account for declining average annual income tax payments even though the farms experienced rising net farm incomes and taxable incomes.

Table 3--Results of simulating six representative farms under 1984 Federal income tax laws and a proposed Federal income tax policy

Item	Texas cotton farms		Mississippi cotton and grain farms		Illinois grain farms	
	1984 tax act	1985 tax proposal	1984 tax act	1985 tax proposal	1984 tax act	1985 tax proposal
	1,088-acre farm		1,443-acre farm		640-acre farm	
Average ending net worth ($1,000)	625.8	689.3	1,444.6	1,463.7	1,007.3	1,033.4
Average annual net farm income ($1,000)	52.5	53.7	62.6	66.9	57.1	60.1
Average annual income tax payment ($1,000)	15.1	10.4	18.0	14.9	11.1	8.9
	5,570-acre farm		6,184-acre farm		1,630-acre farm	
Average ending net worth ($1,000)	3,082.1	3,199.2	5,952.8	6,023.9	1,175.6	1,197.2
Average annual net farm income ($1,000)	141.4	146.7	151.6	163.5	66.7	72.2
Average annual income tax payment ($1,000)	62.0	44.5	75.2	63.0	18.3	13.5

Average annual income taxes for the six representative farms differ only slightly within each State, if they are expressed as a ratio of total cash receipts. Income tax as a fraction of receipts is 0.073 for the 1,088-acre Texas cotton and 0.079 for the larger Texas farm. Similarly, these fractions are 0.033 and 0.038 for the 1,443-acre and 6,184-acre Mississippi farms, respectively. The 640-acre Illinois farm pays only slightly more income taxes per dollar of receipts (0.042) than the 1,630-acre Illinois farm (0.033). These results suggest that within a given farm type, the Federal income tax provisions are relatively neutral with respect to structure. This same conclusion is drawn whether the current law or Treasury I is used.

The proposed change in the interest expense deduction has little impact on the farmer's income tax liability. The annual average percentage change in the CPI was less than 1 percent under the restrictive fiscal and moderate monetary policy projections by Hughes and Penson. Larger changes in the CPI could alter the results in this study as interest is both a significant expense and income tax deduction for farm operators.

Summary and Conclusion

Major changes in the Federal income tax law have been enacted during the past few years. In addition, widesweeping changes have been proposed for 1985 and beyond. The impact of alternative tax laws, one enacted and one proposed, on selected representative medium- and large-sized farms in Texas, Miss. ippi, and Illinois was analyzed. The tax provisions in this study included the current tax law through the Tax Reform Act of 1984 (TRA) and the proposed Tax Reform for Fairness, Simplicity, and Economic Growth Act of 1985 (Treasury I).

The results of the analysis indicate the net effect of changing investment tax credit, the depreciation procedure, and the marginal income tax rates under Treasury I was to substantially reduce income taxes for all six representative farms. These reductions in income taxes were observed although Treasury I eliminated investment tax credit and extended the depreciation life of machinery. The primary reason for the decrease in taxes under Treasury I was the reduction in the marginal income tax rates. Again, these results are based on profitable crop farming operations. Livestock operations would likely be affected differently.

Under all three tax provisions analyzed, the income tax burden (dollar tax/dollar receipts) for the larger farms appeared to be about the same as for the smaller (moderate-size) farms.

The above results are based on proposed changes in the tax law. The probability of the entire Treasury I or even a revised Treasury II being enacted is slim. Nevertheless, several major changes, such as repeal of the investment tax credit, are included in each of the tax reform bills being seriously considered by Congress. Whether the entire Treasury proposal or just a portion of it becomes law, farm operator's tax liabilities will be affected as well as their future profitability.

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TAX AND AGRICULTURAL POLICY: INTERLINKAGES AND REFORM

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Introduction

The Federal tax system and commodity policies of the last half century have affected the quality and mix of resource use in the farm sector (Davenport, Durst, Rasmussen). As a consequence, the economic performance of the farm sector has also been affected in ways both intended and unintended by those citizens concerned with nurturing the ability of farmers to produce a steady and assured supply of food and fiber for the Nation.

Most sectors of the economy have provisions in the Federal tax code exempting some income or redefining some expense within the normal tax structure. Tax impacts may be compounded by State taxation policies which generally follow Federal law. Almost every year, additional exceptions affecting a particular business activity or class of taxpayer are voted by Congress or State legislatures to influence economic growth, consumption, savings, investment, or incentives to work in one or more of these subsectors. These actions are a prerogative of Government and reflect, in theory, efforts within the social contract to increase the national welfare. In this context, the agricultural sector, or more specifically the farm sector, should be viewed as a primary economic activity fundamentally affected by both tax provisions and price and income support programs.

How will the process of structural or organizational adjustment in the farm sector be changed or maintained? What are the special problems concerning agriculture that the public should be aware of for informed policymaking? Who will or should control the resources used in the farm sector and make the decisions affecting the supply of food and fiber? How will tax policy impact upon resource allocation decisions in agriculture. These complex questions raise issues of how to measure, quantify, monitor, and forecast the farm sector's productive capacity, efficiency, resource use, financial stability, and economic well-being.

The remainder of this paper will review the current economic status of the farm sector, briefly discuss the last 50 years of farm programs and current administration proposals, review current tax policy and current proposals for tax reforms, and then conclude with a discussion of efforts to provide data and analysis to monitor and analyze the effects of tax and commodity policies on the farm sector through the national Farm Cost and Returns Survey conducted by USDA.

Economic Methodology

The farm sector and operators must simultaneously allocate inputs or resources among crop, livestock, and off-farm (income producing) activities based on prices of inputs and outputs and various resource or financial constraints. Each of these values may be partially determined by commodity price or income support programs, or various tax code provisions or both. These inputs may be differentiated by quality, type, and quantity and include land, labor, capital, and management.

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The specification and identification of the constraint structure characterizing an individual farm or the farm sector are critical. However, it is almost impossible to explicitly determine. The decision process affecting behavior is partially derived from the constraint system and is dependent upon the incorporation of dynamic feedback interactions from financial resources and other variables. The expected, relative, before- and after-tax returns on assets and production activities are in turn dependent upon proper specification of price (value) and (after tax) cost information from both output and input markets.

Simultaneous and sequential optimizing decision and planning processes by individual producers have been characterized by Kausser and others in terms of a putty-clay model. Day characterizes this process as myopic optimizing or adaptive programming. These conceptual approaches describe a situation where assets are fixed in the short run, limiting the choice of input mix and output. Over time, the quality, cost, and quantity of inputs are more variable, thus changing input and output flexibility. Myopic optimizing in adaptive economic models further describes a situation where decisionmaking is costly and decisionmakers have imperfect information.

The constraint structure is developed from assumptions about the producer's access to and control over durable and nondurable inputs. The nondurable inputs, such as fertilizer and water, are assumed to be available at a given price for the farm. However, the availability of the durable inputs, such as land, machinery, financial and human capital, and information, is more price inelastic from the point of view of the producer. The supplies of durable inputs accessible by the farmer act as the effective constraints within the system. For example, assume the amount and type of land acreages owned or leased by the ith farmer, Ac_i, can be represented by vectors $L_i = (L_{i1},\ldots,L_{ij})$ and $Z_i = (Z_{i1},\ldots,Z_{ij})$. The farmer may buy or sell parcels of land, L_{ij}, or lease additional land, Z_i from or to other landowners. In each production period, the acreage utilized by the ith farmer from crop or livestock production must satisfy the following constraint:

$$(1)\quad 0 \leq AC_i \leq L_i + Z_i + L_i + \Delta Z_i.$$

The acreage diversion programs often limit the aggregate production of crops by controlling specific crop acreage. The diversion requirement $(1 - w)$ is the percentage of cropland acreage controlled by the farmer which is set aside and not used for production. An incentive or diversion payment, P, to partly recompense farmers for nonuse of this cropland may also be available. If so, this payment, $(1 - w)\ AC_i * P$, would be included in expected net returns for each affected commodity. Thus, with commodity-price changes, price-support levels, and other related Government program payments, the expected profit is also altered. The farmer's decision problem of choosing an optimal mix of production activities then becomes extremely complex and uncertain.

Other durable input and resource constraints may also be important. For example, consider the distribution of various types of capital stock, where $S = 1,\ldots,s$ are technologies available to the farmer. Given the methodological assumptions of the putty-clay model, the farmer may either continue operating with existing technology embodied in the owned machinery complement, $K_i = (K_{i1},\ldots K_{is})$, or buy new equipment, ΔK_i. This investment cost may be amortized in each production period (given associated tax code or economic depreciation, and other factors such as investment credits) into a fixed number of production periods, $Y\Delta K_i + Y^{o}OK_i$. Machinery may also be rented to and from farmers or rented from the service sector at a cost of δK_i.

Each available technology may be thought of as specifying a matrix or input-output coefficients, A_{sj}, where each element is the amount of input, X, required per acre of type j land using technologies. Each technology may be thought of as also being associated with an output vector from expected activity output levels, y_i, where each element, y_{sj}, is the yield per acre or pound of livestock produced with each technology. Finally, each technology may be associated with a linear capacity constraint schedule,

$$(2) \quad c_s \, AC_i \leq b_s$$

where b_s is the maximum proportion of land acreage or other resource available for particular uses given a financial risk, resource, or technological capacity constraint.

In order to maximize expected utility by increasing accrued economic benefits, the producer must be able to calculate expected before and after tax revenues and costs for alternative activities, including land and capital disposal or acquisition. If the producer faces competitive markets, then input, output, and rental prices (expenses) are determined exogenously for the producer. Total revenue is the sum of Py_sAC_s where P is a vector of output prices. The vector before tax variable (cash) costs of production per acre is f_sAC_s, where f_s is a vector of average costs per acre. Finally, if $W = (w_1,\ldots,w_j)$ and $R = (r_1,\ldots,r_j)$ are competitive price vectors for land types, then new investment in land is WL_i and net rental expense is RZ_i. Nominal capital appreciation on land holdings can then be written as $[W_i^* - (1 + \theta)W_i](L_i + \Delta L_i)$ where θ is the effective interest rate on land investments, and W_i^* is the vector of expected prices at the end of the production period. The effective interest rate, can be thought of as the vector of time weighted interest rates during the fiscal year that reflect length of ownership.

However, the determination of net returns for each activity is not as simple as this theoretical formulation suggests because of the influence of various agricultural policies on prices and resource-use restriction. The profit of the farm can be substantially altered and optimal activity mix changed when loan and target prices, acreage, deficiency payments for acreage diversion, or low market prices are introduced as part of the external environment facing individual farmers.

The final set of financial related constraints reflects the fact that investment in alternative technologies must always satisfy the availability of cash flow for investment, m_i:

$$(3) \quad \Delta K_i + W\Delta L_i \leq m_i.$$

Investment funds at any particular time, depend on cash on hand, IC, the value of durable assets (off-farm investments, machinery, commodity stocks, land, etc.), IA, and outstanding debt, ID. Thus, farm credit is endogenized because credit becomes a function of the farm's debt-equity position and ability to maintain a cash flow sufficient to cover debt amortization. Consequently, it would not be unreasonable to specify tax payments, payment of outstanding principle, renegotiated loans, a minimum debt-equity ratio, or minimum living expenses, as additional, simultaneous, or sequential constraints.

The farmer's total realized and unrealized financial gains for the production period can now be expressed as:

$$(4) \quad = (Py_e - f_e)AC_i - \kappa Z_i - (Y^{\Delta}K_i + Y^{o}K_i) - \delta K_i + [W_i^{*} - (1+\theta)W_i](L_i + \Delta L_i) + GP_i$$

where GP_i is Government program payments. Thus, the farmer's production decisions become a static problem of maximizing Equation 4 subject to the constraints in equations (1), (2), and (3), and a dynamic problem if production occurs over several periods. The producer must choose among production technologies, make land and other capital portfolio adjustments, consider financial constraints, and choose the quantity of various inputs simultaneously with expected output levels given a set of expected before- and after-tax net returns for each activity and the current or expected set of commodity-price and income-support programs.

The Farm Sector Today

The farm sector today can be characterized as (1) large commercial farms depending on farming for income, (2) midsize farms (family farms), and (3) smaller farms operated for a variety of reasons including to protect nonfarm income (tax-loss farming), retirement farming (pension farming), and part-time farming (weekend farming). All these farms are integrated with the domestic and international economy because of the increased use of purchased inputs, changes in banking laws, and trade relationships with the international agricultural economy.

The large number of technological changes after World War II greatly increased farm productivity. The tax code which often allowed full depreciation before the end of the economic life encouraged such investments. Larger machines needed larger tracts of land to be used efficiently, farmers leased or purchased additional land, and the number of farms and farmers declined. But this increased efficiency led to supplies of agricultural products increasing at a faster rate than domestic and international demand. The prices of farm products declined relative to the prices farmers paid for production inputs over the last 30 years. Increased efficiency and output were then needed by producers to maintain farm income. This circumstance has led farmers in turn to purchase more machinery and land to increase efficiency and preserve farm income, contributing to a continuous resource adjustment pattern in the farm sector.

Most farms, nearly 90 percent, are operated by families as sole proprietorships. Corporations account for about 2 percent of all farms, but almost all have sales of over $100,000 and produce over one-fifth of farm output. Note that 90 percent of corporate farms are family held and specialize in cattle, poultry, fruits, and vegetables. Obviously for these operations and for partnerships (the other 6 percent of farms), the tax-code and estate-planning considerations have influenced the choice of business organization and the degree of taxation of farm income. The vast majority of crop production affected by Government commodity policy are family operated farms.

Federal Farm Programs Today

Commodity policy has been directed toward output price-support programs and output-supply restrictions for selected agricultural products--balancing supply and demand to achieve commodity-price goals (Rasmussen).

Current farm programs are driven by the Government's attempt to increase domestic and uncertain international demand while managing excess supplies. Four major tools are used in these programs to stabilize market prices and support farm incomes: farmer- and Government-owned grain reserves, deficiency payments, acreage reduction, and nonrecourse loans. The nonrecourse loan and grain reserve programs are intended to stabilize market prices by building stocks when prices

are low and the reverse when prices are higher than normal. The deficiency payments and acreage reduction programs have been intended to increase farm incomes. The deficiency payment, based on the difference between a target price and the market price, acts to increase an operator's income directly during low-price periods.

From World War II to the early 1970's, commodity programs raised and stabilized farm prices and incomes over what free-market levels would likely have been. This was a period of excess supply, and the U.S. price was above the world market clearing price, even though on the average over 50 million acres a year were idled. Increases in farm size, productivity, and investment in larger farm machinery resulted.

The internationalization of the farm sector's markets in the early 1970's acted to greatly reduce the influence of farm programs on farm incomes. During this period, world prices were higher than domestic-support prices and exports grew rapidly. The primary Government problem was price stabilization, because domestic prices were increasingly dependent on weather and crop production in other countries, as well as changes in foreign countries' food-import policies and a flexible exchange rate. This additional export-market volatility added to income instability.

Farm program legislation has not addressed tax code changes directly or indirectly. Taxation policy may have further aggravated farm surpluses by the creation of surplus productive capacity through lower cost inputs and resource fixity.

Federal Tax Policy and the Farm Sector: An Overview

Unlike commodity programs designed to restrict the quantity of inputs available, such as land, or to change output price levels, tax policies affect the farm sector through investment and production decisions. These decisions are based on the relative prices of various inputs. The decision system is simultaneous because output decisions affect input mix decisions and the relative cost of inputs and input mix may change the level of output. Nevertheless, tax policy should be viewed in terms of changing the input mix, the economic efficiency of these resources, and the output capacity of the farm firm. If so, the analytical problem for tax-related research is to quantify the differential tax treatment of inputs used in the farm sector to test the hypothesis that some inputs may be overutilized in agriculture without economical justification based on a prevailing market price. It is the distinction between prevailing market price (the theoretical cost) and the after-tax (cashflow) cost that is the critical determinant of the real effects of tax policy in the farm sector. Harl has suggested that:

> Even though the tax system in the United States has undergone dramatic and unprecedented change in the past decade, it is entirely possible to overstate the direct effects of taxation upon the structure of the agriculture sector, the nature of firms within that sector and the economic fortunes of those involved in farming and agribusiness. If the indirect effects of taxation were considered as well, the combined impacts would, however, rank among the most significant variables affecting agriculture even in these economically troubled times (p. 199).

Harl in his concluding statement postulates that "tax policy should not (1) decrease the cost of production for larger over smaller farms, (2) induce investment in agriculture from nonfarm investors to a greater degree than other sectors, and (3) encourage concentration of land ownership in the hands of a 'land gentry'."

In effect, tax policy is increasingly cited as an important factor affecting the organization and economic well-being of the sector.

If the premise is accepted that the farm sector is now a business rather than a "way of life" populated by small family farms, then it should be no surprise that the farm sector benefits from a variety of special tax provisions. The role of research is to quantify whether agriculture has benefited more or less than other industries and then establish the relative importance of tax policy among other commodity, credit, and Government programs that have affected the organization, allocation, and control of farm resources.

The tax research literature relating to the farm sector is substantial and a number of quasi-subjective conclusions have been reached concerning the tax code and the farm sector. Much of this research has focused on micro- or farm-level types of quantitative analysis because national sector level models have not yet been able to simultaneously incorporate an input demand and supply schedule, a financial sector, and the Federal tax code (Penson and others, Baum and Harrington). Durst has summarized these findings as the following:

> Tax-induced distortions in the capital stock may have caused greater amounts of capital to flow into agriculture than would otherwise be warranted.
>
> Nonneutral tax depreciation and tax credit policies may have reduced the productive efficiency of the farm-capital stock.
>
> Tax incentives for capital investment combined with increased taxes on labor have altered the mix of capital and labor employed in agriculture.
>
> The estate and income tax laws may have encouraged a large number of family farms to incorporate.
>
> The tax laws have encouraged the growth and expansion of existing farm business.
>
> Favorable tax provisions have stimulated tax motivated investments in the sector, thus distorting relative input and commodity prices.
>
> Federal tax laws have altered the patterns and timing of input purchases and crop and livestock sales.
>
> Various tax provisions may have encouraged farmers to alter management practices.
>
> During times of inflation, various tax provisions may have encouraged farmers to increase their use of debt capital to expand.

Several income tax provisions are postulated to be responsible for these hypotheses: cash accounting, deducting certain "capital expenditures" against current income, capital-gains tax treatment, capital-cost recovery system (including single-purpose agricultural structures), tax treatment of land, and the corporate income tax.

Cash Accounting. Most farmers with sole-proprietor operations use a cash accounting rather than the more complicated accrual method of bookkeeping for expenses and income. As a consequence, it is possible to mismatch income and

associated expenses by building inventories in early years to be taxed in a later year. The Tax Reform Act of 1976 and 1984 prohibited tax deductions for prepaid expense by cash-basis "tax shelters" until economic performance actually occurs and by corporations with gross receipts in excess of $1 million (excepting closely held family corporations). Livestock production is primarily affected by this provision.

Some of the effects of income tax rules can be seen by comparing individuals who reported farm profits with those who reported farm losses to the Internal Revenue Service in 1976 (the most recent published data). It seems highly likely that most of the 12,000 persons who reported farm losses of $50,000 or more, averaging $104,000, were primarily interested in farming to offset those losses against off-farm incomes that averaged $122,000 (Carlin and Woods).

Expenses. Capital expenditures are made to acquire or develop assets that will be used over a long period of time and generally are written off over the period of time used (depreciation). However, in agriculture, pre-production costs for selected fruit products prior to production maturity, land-clearing costs, soil and water conservation expenses, and other input purchases prior to year of actual use may be deducted in the tax year of purchase against ordinary income. These provisions permit expenses (losses) to be written off against other farm income and has led to tax motivated rather than economic investment in citrus and almond groves and vineyards. Special tax legislation and the 1976 Tax Reform Act have restricted certain of these tax motivated investments. Livestock and dairy breeding stock and noncitrus orchards still receive such benefits.

Capital gains. Most agricultural land, machinery, equipment, and livestock held for draft, dairy, breeding, or sporting purposes are eligible for capital-gains treatment. Sixty percent of the gain from the sale is excluded from income taxation. The most beneficial results of capital gains occur with the cash method of accounting and the deductibility of capital expenditures. An excellent example is the capital treatment of the sale of livestock held for breeding purposes. The cost of raising a cow is deductible from current income as ordinary and necessary expenses and receipts from her sale made after she is placed into production are eligible for capital-gains treatment. Current tax liability is reduced, ordinary income is converted into capital-gain income, and the taxation of such gains are deferred (Durst and Jeremias, 1984).

Capital Cost Recovery. The farm sector requires a large annual investment in depreciable assets. The tax code now includes accelerated depreciation methods (to partially account for inflation which has since disappeared), investment tax credits, and the shortening of tax lives to 5 years for most machinery, equipment, and single-purpose agricultural buildings. Such fast write-offs have encouraged excess capacity in some farm sectors such as the swine industry.

Business Organization and Estate Planning. Income tax considerations and deductions for various fringe benefits all played various roles in doubling the number of corporate farms (Boehlje and Krause). The estate tax and the gift tax have several provisions which can influence the ownership of farms and the maintenance and accumulation of wealth across generations, primarily special valuation of farm assets and deferred payment of estate taxes (Boehlje). Special-use valuation within certain limits allows farm assets to be valued on the basis of the prevailing rental rates for these assets capitalized at the Federal Land Bank interest rate. This method of valuing agricultural assets ignores several components that contribute to the fair-market value of farmland as an inflation hedge, growth stock, and tax shelter. These components have been estimated to contribute up to

50 percent of the fair-market value of farmland (Harrington). The deferred payments of estate taxes are financially valuable to heirs. Access to these provisions is focused toward farmers by requiring material participation and qualified-use tests for eligibility.

Future Tax Policy Issues. Tax policy issues are being debated with increasing frequency (Doye and Boehlje). The Reagan administration's proposal was published by the U.S. Department of the Treasury (Table 1). This proposal would lower tax rates without lowering or changing the Government's total receipts. The proposal would reduce the overall tax burden on individuals while substantially raising the share paid by corporations. Of particular interest to the farm sector are details of a depreciation scheme that would replace the 4-year-old Accelerated Cost Recovery System and the treatment of capital gains as ordinary income.

The debate over proper, fair, or correct taxation of the farm sector in terms of tax reform will have to confront the possible inconsistencies of farm-commodity policies acting to decrease the supply of crops and milk and tax policies acting to increase investment and add resources to the farm sector, thereby increasing its productive capacity and efficiency. The existence of tax sheltered investments in the farm sector developed over many years and sudden changes in the allowability of cash accounting methods, capital expenditures, and capital gain income could severely affect livestock production, shortrun investment patterns, and asset prices. Nevertheless, the number of farms reporting losses for tax purposes has increased from one-third to two-thirds of all farms since 1970. This is due both to lower commodity prices and tax loss farming. Federal tax revenues have suffered because these losses are often used to shelter nonfarm income. Addressing farm policy without addressing tax issues would only address one portion of the profit function.

Monitoring the Effect of Tax and Financial Stress in Commodity Policy and the Cattle Sector

Whole farm surveys such as the USDA Farm Costs and Returns Survey (Johnson and Baum) can be used for a detailed analysis and future research relating to the effects of tax policy and commodity programs on the livestock sector and other commodity subsectors. Use of this survey for tax research depends upon the further development of an applied and empirical tax research program in agriculture either in ERS or in conjunction with interested universities (for example, Harrison and Woods). Such research necessarily includes farmers' actual use of tax-code provisions, investment decisions, cash flow requirements, effective tax rates, and other issues by size and type of farm in different regions. Information separating or demonstrating the interlinkages of tax policy with commodity policy could be provided.

For example, the Cattle and Feed Report released October 18, 1984, showed a dramatic increase in the number of heifers placed on feed. The usual explanations for this type of placement occurrence, such as poor range conditions and low future-price relationships, were not strong enough by themselves to justify this apparent major change in producer behavior. The additional placement of heifers on feed appeared to be due partially to financial stress of farms with cow-calf operations and their decision to sell part or all of their beef herd to improve their short-term financial position. Were these financial difficulties exacerbated by tax policy affecting initial livestock investment decisions?

Table 1--Treasury's tax reform proposal: major provisions affecting farmers

Individual Tax Rates and Deductions

Current law:

The current tax system contains 14 brackets with rates ranging from 11 to 50 percent. By 1986, the current proposal exemption would be $1,090 and the zero bracket amount would be $3,710 (joint returns). Rate brackets, personal exemptions, and the zero bracket amount are indexed for inflation.

Proposed change:

The proposed modified flat tax system would contain only three rates: 15, 25, and 35 percent. The personal exemption would be increased to $2,000 and the standard deduction to $3,800 (joint returns). Rate brackets, personal exemptions, and the zero bracket amount would continue to be indexed for inflation. The income tax base would be broaden by restricting a number of personal deductions and taxing some fringe benefits.

Potential impact:

Treasury estimates that 78 percent of all individuals would experience no change or a decrease in taxes while individual marginal tax rates would be reduced by an average of 20 percent. Most individuals with farm income would pay a 15-percent rate. These reduced tax rates in combination with other aspects of Treasury's proposal will reduce the attractiveness of tax shelters. Individuals with farm earnings should be affected to a lesser extent than the general population by the base broadening provisions due to the emphasis on taxing fringe benefits and restricting itemized deductions.

Corporate Tax Rates

Current law:

Corporate tax rates are graduated and range from 15 to 46 percent.

Proposed change:

A flat rate of 33 percent.

Potential impact:

This change would increase the tax burden for many small family farm corporations which have incorporated over the last decade. These corporations currently pay an average tax rate of 25.75 percent on the first $100,000 of taxable income. This proposal would eliminate the incentive to incorporate the farm business for income tax purposes.

Investment Tax Credit

Current law:

A 6- or 10-percent tax credit is allowed for qualifying capital investments. Most farm machinery, equipment, certain livestock, and many farm structures quality for the full 100-percent tax credit.

Table 1--Treasury's tax reform proposal: major provisions affecting farmers (cont'd)

Proposed change:

The investment tax credit would be repealed.

Potential impact:

(See Depreciation)

Depreciation

Current law:

The Accelerated Cost Recovery System permits depreciable assets to be written off at an accelerated rate over 3, 5, 10, 15, or 18 years. Most depreciable farm assets can be written off over a 5-year period. These deductions are based on historical cost. Up to $5,000 per year may be expensed. This is scheduled to increase to $10,000 by 1989.

Proposed change:

The Treasury proposal for depreciation would approximate the actual decline in the value of depreciable capital (economic depreciation). Deductions would be indexed for inflation. Write-off periods could resemble those in effect prior to 1981. Thus, most farm machinery and equipment would be written off over a 20- to 25-year period. The expensing options would be permanently restricted to $5,000 per year.

Potential impact:

At current levels of inflation effective tax rates for investment on most types of depreciable farm capital are well below statutory rates and in some cases actually negative. The elimination of the investment tax credit and the lengthening of write-off periods would increase these rates and thus the after-tax cost of capital. This could reduce investment. The impact would be the greatest for field crop, dairy, and general beef cattle farms. As the inflation rate increases the gap between tax rates under the current system and under the proposed system would narrow. The equating of tax and economic depreciation through indexing eliminates the fluctuations in the tax rates that occur as a result of inflation. It would also reduce the distortions in resource allocation that occur as a result of non-neutral tax depreciation and credit policies both within agriculture and various industries within the economy.

Capital Gains

Current law:

Sixty percent of nominal long-term capital gains are excluded from income. In addition, tax on the appreciation in asset values is postponed until realized (normally through the sale of the asset).

Table 1--Treasury's tax reform proposal: major provisions affecting farmers (cont'd)

Proposed change:

The proposed law would continue to defer taxation of gains until realized through a sale or other disposition. However, the 60-percent exclusion would be eliminated in favor of an inflation adjustment. The cost (basis) of capital assets would be adjusted for inflation which occurred after the purchase of the asset or January 1, 1965, whichever is later. Thus, most capital assets would be completely adjusted for inflation.

Potential impact:

The current 60-percent exclusion does a poor job of taxing real capital gains. It overcompensates when inflation is low, holding periods are long and real appreciation is high. It undercompensates when inflation is high, holding periods are short, and real gains are low. Treasury's proposal would more accurately tax real capital gains. The implementation of the system would reduce the "lock-in effect" which occurs with respect to farmland and other capital assets during periods of high inflation.

Interest Income and Expenses

Current law:

Nominal interest income is fully taxed and nominal interest expenses are fully deductible.

Proposed change:

Both interest income and expenses would be adjusted for inflation. Thus, that portion of interest income attributed to inflation would not be taxed while that portion of the interest expenses attributable to inflation would not be deductible as a business expense.

Potential impact:

Adjusting interest expenses for inflation would increase the after-tax cost of borrowing, particularly for high-bracket investors. This would reduce the incentive to debt-finance investments, particularly speculative investment during high inflation periods. This reduced incentive to borrow combined with the increased incentive to save arising from the adjustment to interest income should result in lower interest rates. The end result for low bracket farmers could be a reduction in the after-tax cost of borrowing.

Cash Accounting

Current law:

Most farmers are eligible for the cash method of accounting. Some corporations with gross receipts in excess of $1 million are prohibited from using the cash method of accounting. In addition, farm syndicates and cash-basis tax shelters are prohibited from prepaying expenses for feed, seed, fertilizer, and other supplies.

Table 1--Treasury's tax reform proposal: major provisions affecting farmers (cont'd)

Proposed change:

The use of the cash method of accounting would be restricted to those businesses that do not use the accrual method for financial accounting purposes, carry no inventories, and have gross reciepts of less than $5 million.

Potential impact:

Although the proposal is not entirely clear, a substantial number of farms could be required to use the accrual method of accounting as a result of the carrying of inventories. This would impose additional accounting burdens on a number of small farms. However, it would also reduce the potential to mismatch income and expenses which is the foundation for many tax shelters in agriculture.

Deducting Development and Other Expenditures

Current law:

Farmers are permitted to deduct the cost of developing certain capital assets. For example, the cost of raising dairy, drafting, breeding, or sporting livestock to maturity; the cost associated with caring for orchards and vineyards prior to their producing crops; the cost of clearing land, soil, and water conservation expenditures; and expenditures for lime, fertilizer, and other materials may be deducted in the tax year in which they are paid.

Proposed change:

Treasury's proposal would require these expenditures to be capitalized (added to the basis of the asset) and recovered when the asset is sold or depreciated.

Potential impact:

Requiring expenditures to be capitalized would increase the after-tax cost of these expenditures and thus could reduce soil and water conservation and related expenditures. However, it would also reduce the tax-motivated investment which has been attracted into agriculture due to the deferral potential associated with the deductibility of development expenditures.

Tax-Exempt Bonds

Current law:

Interest on bonds issued by State and local governments are tax exempt.

Proposed change:

Treasury proposed to eliminate the exemption for interest on bonds issues for nongovernmental purposes. This would include industrial development bonds which are growing in importance as a source of farm credit.

Table 1--Treasury's tax reform proposal: major provisions affecting farmers (cont'd)

Potential impact:

In recent years, several States have issued tax-exempt industrial development bonds to provide low-interest loans for the purchase of farmland. Elimination of the tax-exempt status of such bonds would eliminate this source of low-cost financing. However, other provisions contained within the proposal could lower interest rates and reduce the need for alternative sources of financing.

Retirement contributions

Current law:

Farmers may contribute $2,000 per year to any Individual Retirement Account (IRA). A farmer and a nonworking spouse may contribute $2,250 to a spousal IRA.

Proposed change:

The contribution limit to an IRA would be increased to $2,500. A farmer and spouse could contribute $5,000 per year to a spousal IRA.

Potential impact:

This should stimulate additional savings and permit farmers (especially those with nonworking spouses) to increase retirement savings to supplement social security benefits.

Summary and Conclusions

Farm commodity programs have been enacted to support family-owned and operated farms. The programs have directly supported commodity prices and indirectly supported farm income. Research strongly suggests that such benefits are distributed in direct proportion to the volume of output and have discouraged small farms and encouraged greater expansion and concentration in farming.

Coupled with farm programs, Federal and, analogously, State income tax policies have also encouraged greater expansion and concentration in farming. Federal income tax policy has encouraged investment in capital over labor in concentrated animal production units and in tax sheltered livestock and dairy breeding operations. Further, income distortion results from current expensing of certain capital improvements and cash-basis accounting. Tax-loss farming may encourage unneeded production by part-time farmers.

One of the challenges facing policymakers is to secure adequate data to determine how the farm sector "farms" the tax code and how tax changes would affect farm production, organization, and concentration.

As this paper has suggested, there are a number of questions yet to be answered. For example: Are the positive goals of commodity-price and income-support programs counteracted by after-tax decisions made by farmers? Can and should farm capital cost recovery be more closely related to an asset's economic life? Can the effects of tax decisions be more readily identified to provide more neutral tax policy decisions for the farm economy?

One of our challenges is to create the correct information base to begin answering these and other questions. Another challenge for the profession is to then more adequately provide the quantitative research and analysis about commodity policy alternatives and the effects of tax policy on the farm sector.

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FARMER PREFERENCES FOR TAX REFORM ISSUES USING MULTI-CHOTOMOUS LOGIT ANALYSIS

Daniel M. Otto and Gregory D. Hanson

Introduction

Since the views and interests of farmers are often used as justification for developing special tax provisions affecting agriculture, a survey to explore farmer views of various tax issues and problems was conducted in Iowa and Alabama. Among the issues explored were farmers' preferences for: (a) a flat-rate tax structure in place of the present progressive system, (b) lower tax rates with fewer special farm tax provisions, and (c) "fairness" in the tax system.

Farmer attitudes toward these tax reform issues are expected to be influenced by various personal characteristics such as age and education as well as economic factors. A better understanding of how farmers' socioeconomic characteristics relate to their attitude on tax issues can give policymakers information on the feasibility or acceptability of various tax reform proposals. If significant relationships exist between certain classes of farmers and their attitude toward tax reform, this analysis could help identify special farm interest groups for whom further educational efforts may be useful. A multi-chotomous logit model is used to examine how various demographic and farm characteristics influence farmers' level of acceptance of several tax reform issues.

Theory and Related Literature

Statistical analysis of models with qualitative dependent variables can be viewed as the problem of predicting probabilities for the various possible responses of the dependent variables. In the agricultural economics literature, probit and logit analysis are two well-known techniques for analysis in cases where there are only two possible outcomes, usually the occurrence or nonoccurrence of some event (Hill and Kau, 1973; Epperson and others, 1980). More recently the logit and probit techniques have been extended to cases of three or more categorical responses in the dependent variable (Schmidt and Strauss, 1975). The logit and probit formulations have very similar characteristics. Both the standard normal and the logistic distributions are symmetric about 0, the mean of their distribution. The distribution functions are also very similar in mid-range with the logistic distribution having slightly fatter tails than the standard normal distribution. Although logit or probit should give similar results. The multi-chotomous logit model was chosen for use in this study because of software availability. The derivation of the multi-chotomous logit model is presented in the appendix. The reader is referred to Amemiya (1981) for a recent comprehensive review of literature on use of qualitative response variables, which includes the multi-chotomous logit model.

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The Data

A multi-chotomous logit model was used to predict a farmer's degree of acceptance of several tax reform proposals based on personal and economic characteristics. Personal characteristics include education level and age of the operator and years in farming, which were measured continuously in terms of years. Economic variables include value of machinery and building assets, 1982 operating expenses, and usual level of farm sales (all measured as dummy variables over three intervals $0-$39,999, $40,000-$99,999, and $100,000 or more) and size of farm (measured in acres). A dummy variable for State was used with Iowa = 0 and Alabama = 1.

Previous information from tax simulation studies has suggested that higher income farmers would have a reduction in their tax bill under a flat-rate tax plan (Doye and Boehlje, 1984) so that farmers with larger operations were expected to be more agreeable to flat-rate tax reforms. However, the larger farmers with larger and more diverse holdings were expected to be better able to take advantage of special tax provisions to shelter their income so that a hypothesized relationship for these variables was not made. Education and years in farming were expected to increase farmer awareness and experience with tax systems so that these variables were hypothesized to be inversely related to agreement with tax changes; that is, farmers would be reluctant to drop a tax system with which they are familiar (or alternatively, to discontinue a system providing flexibility to legally manipulate the tax system to lower tax bills).

Using these explanatory variables individual farmers were predicted to have one of a range of five responses to each tax reform proposal. These responses ranging from strongly disagree to strongly agree are listed in table 1. The observations used to estimate the model in this study were based on a pooled sample of Alabama and Iowa farmers in the Alabama-Iowa Farm Tax Issues and Problems Survey (Otto and Hanson, 1983) conducted in the spring of 1983. Complete data on all variables were collected for a sample of 252 farmers in Iowa and 260 in Alabama.

The Empirical Model

The individual equations to be estimated in the multi-chotomous response model are designed to be contrasted with a particular category of response. In this particular study, the second through the fifth categories are contrasted with the first, the strongly disagree category. These four contrasts mean that four equations need to be estimated for each response variable. These individual equations are in the form:

$$\log (P_2/P_1) = B_{10} + B_{11}X_{1i} + \ldots. B_{1j}X_{ji}$$
$$\log (P_3/P_1) = B_{20} + B_{21}X_{1i} + \ldots. B_{2j}X_{ji}$$
$$\log (P_4/P_1) = B_{30} + B_{31}X_{1i} + \ldots. B_{3j}X_{ji}$$
$$\log (P_5/P_1) = B_{40} + B_{31}X_{1i} + \ldots. B_{4j}X_{ji}$$

In the logit specification, the sum of the individual probabilities equal 1 so that the remaining equations can be derived from these four equations. For example, since

$$\log(P_3/P_2) = \log (P_3/P_1) - \log (P_2/P_1),$$

the subsequent model can be derived as

$$\log (P_3/P_1) = (B_{20}-B_{10}) + (B_{21}-B_{11})X_{1i}, \ldots. + (B_{2j}-B_{1j})X_{ji},$$

Table 1--Response of Alabama and Iowa farmers to tax reform issues

Item	Units	Attitude scale: Strongly disagree	Disagree	No opinion	Agree	Strongly agree	
Flat-rate tax preferred to progressive tax structures	Alabama N	16	21	96	56	63	252
	Percent	25.0	22.2	38.1	8.3	6.4	100
	Iowa N	51	68	70	40	31	260
	Percent	19.6	26.1	26.9	15.4	11.9	100
	Total N	67	89	166	96	94	512
	Percent	13.1	17.4	32.4	18.7	18.4	100
Lower tax rates with fewer special provisions preferred	Alabama N	4	15	60	91	82	252
	Percent	1.6	6.0	23.5	36.2	32.7	100
	Iowa N	6	20	54	116	62	260
	Percent	2.3	7.7	20.8	44.6	23.8	100
	Total N	10	35	116	207	144	512
	Percent	2.0	6.9	22.3	40.6	28.2	100
Lower tax rate with fewer special provisions would be fairer	Alabama N	5	15	62	69	101	252
	Percent	2.0	6.0	24.3	27.5	40.2	100
	Iowa N	1	25	50	99	86	260
	Percent	.4	9.6	18.8	38.1	33.0	100
	Total N	6	40	112	168	187	512
	Percent	1.2	7.8	21.9	32.8	36.5	100

N is the number of observations

where (P_3/P_2) is the probability of choosing the third level of response instead of the second.

Study Results

The estimated coefficients and their estimated asymptotic standard errors for these functions are presented in tables 2 to 4 for the three tax reform proposals. The parameter estimates for the multi-chotomous logit model are the incremental probability of being in a higher (or lower) response category from a unit change in the independent variable. As an example, the generally negative coefficients for the education variables imply that higher education levels decrease the probability that farmers will agree with the tax reform assertions. Specifically, the value of -.075 for the education variable in the log (P_4/P_3) equation of table 2 can be interpreted as a decrease in the probability of choosing an agree response (P_4) relative to a no-opinion response (P_3).

The statistical results presented in tables 2 to 4 indicate the high level of support among all classes of farmers for a flat-rate tax and lower rates with fewer provisions. The lack of a large number of significant coefficients among the variables measuring levels of current expense, farm sales, and acres suggests there is no systematic pattern in the nature of the support for these tax reform issues. The broad intervals used for these independent variables may have contributed to the nonsignificance of these results. The age-of-farmer variable was most consistently significant with predominately negative coefficients suggesting that older farmers were less supportive of these tax reforms than were younger farmers. Other characteristics of these older farmers such as farm size and income could also have contributed to the negative relationship between farmers' age and their support for tax reform. Level of education also appears to have a number of significant coefficients with negative values suggesting that farmers with more education were less supportive of these tax reform issues. The coefficients associated with the State variables provide an estimate of the differences in the probability of agreeing with a tax reform proposal by State of residence. Since Alabama was coded with value = 1, the largely negative coefficients for the State variable in tables 2 and 4 indicate a lower level of agreement with these tax reform proposals for Alabama farmers than among Iowa farmers.

There was an almost even distribution of positive and negative coefficients in the various farm-size variables (acres, current expense level, and farm sales) which was consistent with the lack of a statistically significant relationship between these size variables and the tax issues variables. This lack of a relationship was counter to our original expectation that larger farmers would favor the tax reform proposals since they would be expected to benefit most from the changes. Iowa farmers appeared to be less in favor of the flat-rate tax proposal, but more supportive of the progressive tax rate with fewer special provisions compared to Alabama farmers as indicated by the negative coefficients for the State variables. Since the farm sales variable was a volume measure closely related to the current expense-level variable and was not significant, it was not included in the models presented in table 4.

It is also possible to use these multi-chotomous logit results to evaluate the probability of a farmer choosing a particular response to tax issues given farm and personal characteristics. Table 5 contains examples of these probabilities for the three tax issues evaluated at the sample mean for farmer education level, years in farming, farm size, and modal value for the categorical farm sales and current expense variable for Alabama and Iowa. These probabilities are another way of evaluating the level of support for these tax reform issues. Individual probabilities were obtained using the following expression for the first category:

$$P_{1t} = \frac{1}{1 + \sum_{j=2}^{N} e^{X_t B_j}} \quad \text{and} \quad P_{it} = \frac{e^{X_t B_i}}{1 + \sum_{j=2}^{N} e^{X_t B_j}}$$

for (i = 2,....N) for the N equations.

The pattern of probability of response for these various categories of support for tax reforms is similar to the pattern of response presented in table 1. The usefulness of the procedure is in being able to estimate the level of response to tax issues based upon individual characteristics of farmers. Tables of probabilities

Table 2. Estimated coefficients and standard errors of Alabama and Iowa farmer preferences for flat tax rate over present tax system.

	Constant	Education	Acres	Age	Years in farming	Current Expense C1	Current Expense C2	Farm Sales S1	Farm Sales S2	State
log (P_2/P_1)	-2.67	.106*	.00007	-.208**	.005	.339	1.78*	.699	-.438	.982*
	(1.59)	(.066)	(.0008)	(.023)	(.020)	(.607)	(.902)	(.525)	(.890)	(.423)
$\log(P_3/P_1)$	-.271	.026	-.0007	-.026	.009	.623	1.32	.967*	.180	.709*
	(1.46)	(.064)	(.0008)	(.021)	(.019)	(.568)	(.872)	(.507)	(.837)	(.399)
$\log(P_4/P_1)$	2.18	-.049	.0007	-.0202	.004	.297	.753	.393	-.224	-.148
	(1.20)	(.053)	(.0007)	(.018)	(.015)	(.547)	(.840)	(.444)	(.782)	(.334)
$\log(P_5/P_1)$	.767	.0017	-.0004	-.0109	.007	-.112	.670	1.166*	.467	-.157
	(1.31)	(.058)	(.0008)	(.019)	(.016)	(.571)	(.900)	(.465)	(.849)	(.364)
$\log(P_3/P_2)$	2.94	-.08*	-.00077	-.0052	.004	.284	-.46	.268	.621	-.273
	(1.01)	(.047)	(.00063)	(.015)	(.012)	(.463)	(.719)	(.359)	(.653)	(.270)
log (P_4/P_2)	4.85	-.155	.00063	-.0005	-.0001	-.042	-1.027	-.306	.214	-1.13*
	(.961)	(.042)	(.00063)	(.014)	(.011)	(.457)	(.716)	(.356)	(.648)	(.272)
log (P_5/P_2)	3.43	-.104*	-.00047	.0099	.002	-.451	-1.11	.467	.905	-1.139*
	(.967)	(.042)	(.00063)	(.014)	(.011)	(.458)	(.71)	(.352)	(.644)	(.266)
log (P_4/P_3)	2.45	-.075*	.0014	.0058	-.005	-.326	-.567	-.574	-1.191*	-.857*
	(.963)	(.042)	(.0006)	(.014)	(.011)	(.457)	(.707)	(.345)	(.643)	(.268)
log (P_5/P_3)	1.04	-.024	.0003	.015	-.002	-.616	-.65	.199	-.5	-.866**
	(.970)	(.043)	(.0006)	(.014)	(.011)	(.459)	(.710)	(.354)	(.645)	(.264)
log (P_5/P_4)	-1.41	.051	-.0611	.0093	.003	-.29	-.083	.773*	.691	-.009
	(.957)	(.042)	(.0006)	(.014)	(.011)	(.458)	(.704)	(.353)	(.641)	(.266)

*Significant at the 10 percent level.
**Significant at the 5 percent level.

Table 3. Estimated coefficients and standard errors for Alabama and Iowa farmer's preferences for lower tax rates with fewer special provisions.

	Constant	Education	Acres	Age	Years in farming	Current Expense C1	Current Expense C2	Farm Sales S1	Farm Sales S2	State
log (P_2/P_1)	6.45 (4.86)	-.143 (.264)	.0014 (.0001)	-.094 (.074)	-.086 (.102)	-2.30 (3.32)	-13.01 (40.4)	1.132 (1.69)	5.75 (3.71)	-2.80* (1.374)
log(P_3/P_1)	-3.39 (1.74)	.064 (.055)	.00001 (.0006)	.007 (.026)	-.022 (.022)	-.264 (.755)	.763 (.931)	-.457 (.624)	.389 (.952)	.702 (.435)
log(P_4/P_1)	.386 (1.08)	.009 (.038)	.0001 (.0005)	-.033* (.016)	.016 (.013)	.146 (.438)	.375 (.696)	-.343 (.392)	-.411 (.680)	.202 (.302)
log(P_5/P_1)	1.13 (.980)	-.028 (.039)	.00008 (.0004)	-.027* (.015)	-.012 (.013)	-.321 (.365)	-.062 (.583)	.439 (.332)	.841 (.569)	.262 (.264)
log (P_3/P_2)	-9.84 (.662)	.207* (.025)	-.0013 (.00031)	.101* (.01)	.064* (.026)	2.036 (2.81)	13.77 (43.80)	-1.59 (2.68)	-5.36 (4.21)	3.50* (.187)
log (P_4/P_2)	-6.06 (.71)	.152* (.025)	-.0013 (.00031)	.061* (.021)	.102* (.029)	2.446 (2.62)	13.38 (43.7)	-1.47 (2.41)	-6.16 (4.20)	3.002* (.189)
log (P_5/P_2)	-5.32 (.757)	.115* (.029)	-.0013 (.003)	.067* (.011)	.085* (.026)	1.98 (2.81)	12.94 (43.7)	-.693 (.798)	-4.91 (4.44)	3.062* (.20)
log (P_4/P_3)	3.77 (.692)	-.055 (.029)	.00009 (.0003)	-.04* (.011)	.038 (.0296)	.410 (.260)	-.388 (.44)	.114 (.241)	-.80* (.432)	-.50* (.194)
log (P_5/P_3)	4.52 (.693)	-.092* (.0268)	.0007 (.0003)	-.034* (.01)	.021 (.027)	-.057 (.262)	-.825* (.439)	.896* (.251)	.452 (.428)	-.44* (.195)
log (P_5/P_4)	.744 (.692)	-.037 (.026)	-.00002 (.00031)	.006 (.01)	-.017 (.027)	.467* (.260)	-.437 (.44)	.782* (.246)	1.25* (.425)	.06 (.189)

*Significant at the 10 percent level.

Table 4. Estimated coefficients and standard error of Alabama and Iowa farmer attitude on lower tax rates with fewer provisions being fairer.

	Constant	Education	Acres	Age	Years in farming	Current Expense Levels C1	Current Expense Levels C2	State
log (P_2/P_1)	-4.391	.191*	-.0007	.0005	-.0118	.978	1.29	1.41*
	(2.43)	(.099)	(.0008)	(.04)	(.035)	(.795)	(.957)	(.594)
log(P_3/P_1)	-2.27	.120	-.0014	-.001	-.04	1.59	.971*	1.30*
	(2.28)	(.098)	(.001)	(.038)	(.034)	(.758)	(.982)	(.577)
log(P_4/P_1)	-.692	.036	0.0002	.003	-.014	.611	.407	.728
	(1.93)	(.084)	(.0007)	(.034)	(.029)	(.731)	(.915)	(.501)
log$(P_5/P_1$	-.284	.060	-.0006	0.008	.005	.965	.270	.359
	(1.95)	(.084)	(.0008)	(.035)	(.029)	(.732)	(.966)	(.515)
log (P_3/P_2)	-2.12	-.071	-.0007	-.0015	-.028	.612	-.319	-.11
	(1.71)	(.077)	(.0007)	(.030)	(.026)	(.660)	(.822)	(.440)
log (P_4/P_2)	3.699*	-.155*	-.0005	.0025	-.002	0.367	0.883	-.682
	(1.64)	(.070)	(.00063)	(.03)	(.025)	(.657	(.821)	(.438)
log (P_5/P_2)	4.107*	-.131*	.0001	-.0085	.0168	-.013	-1.02	-1.051*
	(1.62)	(.071)	(.0006)	(.029)	(.0248)	(.651)	(.810)	(.428)
log (P_4P_3)	1.578	-.084	.0005	.004	.026	-.979	-.564	-.243
	(1.64)	(.071)	(.00061)	(.030)	(.0256)	(.661)	(.825)	(.440)
log (P_5/P_3)	1.986	-.06	.0008	0.007	.045*	-.0625	-.701	-.612
	(1.62)	(.07)	(.0007)	(.029)	(.024)	(.654)	(.814)	(.433)
log (P_5/P_4)	.408	.024	.0004	-.011	.019	.345	-.137	-.369
	(1.6)	(.069)	(.0006)	(.029)	(.024)	(.652)	(.811)	(.430)

*Significant at the 10 percent level.

Table 5--Probabilities of farmer response to farm tax issues based on average levels of education, acres, farmer age, years in farming, current expenses, and farm sales

Item	Units	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
Flat-rate tax preferred to progressive	Alabama	.085	.061	.239	.329	.284
	Iowa	.068	.13	.381	.226	.193
Prefer lower tax rates with fewer provisions	Alabama	.098	.094	.024	.232	.549
	Iowa	.02	.018	.073	.324	.567
Attitudes on fairness of lower tax rates and fewer provisions	Alabama	.105	.086	.175	.233	.398
	Iowa	.049	.163	.298	.224	.265

Mean of variable	Alabama	Iowa	Average
Education 1/ (years)	12.06	12.07	12.07
Acres (per farm)	185.7	315.7	253.7
Age (years)	55.48	51.4	53.4
Years in farming(years)	30.8	26.9	28.7
Current expense(dollars)	40,000-100,000		--
Farm sales (dollars)	40,000-100,000		--

--Not applicable.

1/ Although the overall education level of farmers in Alabama was lower than in Iowa, this analysis was conducted for the subset of farmers who filled out all three tax policy questions which resulted in a similar mean education level in both States.

could be generated for farms of different sizes, sales, and demographic characteristics of operator.

Summary and Conclusions

Farmer attitudes toward three tax reform proposals were investigated using a multi-chotomous logit model. Years in farming was found to be inversely related to agreement with these tax changes and value of farm sales was found to be generally insignificant. Education and size of farm measured in acres and expense levels were found not to be significant. While these were not particularly strong results, they do suggest that the high level of support observed for these three tax reform proposals (table 1) is broadly based among farmers of different sizes and educational backgrounds. The multi-chotomous logit model provided a useful framework for analyzing survey data involving categorical attitude variables and for testing the hypothesized relationship among the various tax and demographic variables. These procedures provide a method of predicting level of support based upon the characteristics of individual or groups of farmers.

Further research efforts testing whether other demographic or farm characteristic variables influence farmer preferences toward tax change proposals may be useful. Additional ranges of values of farm and personal characteristics can be evaluated to estimate the probability of response levels for different farm groups.

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Appendix: The Logit Model

The multi-chotomous logit model is an extention of the binary logit model to cases of three or more alternatives. This alternative approach is needed since the use of OLS for parameter estimation for the dichotomous or N-chotomous case violates the desirable assumptions of constant variance and zero mean of the error team.

The probit and logit models were developed to circumvent these statistical problems of the linear probability model. In the logit model, the probability that a decisionmaker chooses a nonzero versus a zero or no response is translated from an index value (Z_i) which is estimated as a linear function of regressions:

$$(Z_i) = X_i'B$$

The classification of y as 0 or 1 can be represented as follows:

$$Y_i = \begin{cases} 1 \text{ if } Z_i \geq Z_i^* \\ 0 \text{ if } Z_i < Z_i^* \end{cases}$$

where Y_i is the dichotomous choice of the ith decisionmaker and Z* is a critical or threshold value of the index Z. In this process, each y_i is thus a function of the individual characteristics (X_s) by way Z_i and Z_i^*. The index Z_i, which can have values ranging from minus to plus infinity is translated to a unit interval range by use of the cumulative distribution function ($F(Z_i)$).

The logit probability model is associated with the logistic cumulative distribution function $F(Z_i) = e^{Z_i}/(1+e^{Z_i})$.

In the binary logit model, the analysis estimates the probability (P_i) that the ith decisionmaker selects the first decision is given by:

$$P_i = F(Z_i) = e^{Zi}/(1+e^{Zi}), \quad -\infty < Z_i < \infty,$$

where $F(Z_i)$ is the logistic cumulative distribution function.
In the zero-one-case, this expression can also be written as:

$$Z_i = \log (P_i/(1-P_i)) = X'B.$$

The ratio $P_i/(1-P_i)$ represents the odds in favor of selecting the first alternative by the ith decisionmaker.

The multiresponse logit model is similar to the binary choice case:

$$P(y_i = j) = F_{ij}(XB),$$

where i = 1,2,3,...t for the ith individual, j = 2,3,...N for the jth alternative, and where X represents the vector of independent variables and B represents the vector of unknown parameters. In this model, the explanatory factors include the attributes of the tax preference alternatives as well as the characteristics of the decisionmakers.

For estimation purposes, the N-chotomous model can be written as:

$$\log \left[\frac{P_{ij}}{P_{ij}}\right] = XB.$$

The log-likelihood function for this model is:

$$\log L = \sum_{i=1}^{T} \sum_{j=1}^{N} f_{ij} \log (P_{ij}),$$

where P_{ij} is the expression for the multinominal logit model:

$$P_{ij} = \frac{e^{X_{ij}'B}}{\sum_{j=1}^{N} e^{x_{ij}B}}.$$

Consequently, the log-likelihood fuction for this model is:

$$\log L = \sum_{i=1}^{T} \sum_{j=1}^{N} f_{ij} \log \left(\frac{e^{X'_{ij}B}}{\sum_{j=1}^{N} e^{X'_{ij}B}}\right).$$

Maximum-likelihood techniques are used to find estimates of the parameters (B) from this expression.

INCOME TAX REFORM AND AGRICULTURE: DISCUSSION

B.R. Eddleman*

In line with the plan of the symposium on Income Tax Reform and Agriculture, the papers were at hand before we met and fell into three groups: the interrelations among Federal income tax provisions, farm commodity policy, and economic change in agriculture; farmers' attitudes toward income tax reform; and a set of economic considerations that may prove useful in choosing an optimal income tax policy for agriculture. Judging from the discussion the papers generated, we should give a high mark to the plan for the symposium. I shall comment on some parts of the papers presented at the symposium, raising questions about the analyses and the implications for tax and farm price/income-support policy.

Optimal Income Tax Policy for Agriculture

Breimyer's paper reflects his usual incisiveness into the economic issues and eloquence in expressing his insights. My assessment of Breimyer's optimal income tax policy for agriculture would be a set of tax provisions that:

(1) do not provide for tax sheltered investments (deductions) in agriculture,
(2) do not allow depreciable investments to be used as current operating expense to reduce taxable income,
(3) do not allow capital gains to be taxed at rates different than earned income, and
(4) require use of accrual accounting by farmers for tax purposes.

My personal biases are in line with Breimyer's and to attempt to expand on his recommendations would be futile. I also believe that tax shelters erode the progressive feature of the income tax; set into motion a whole set of legal maneuverings and countervailing powers to tailor provisions to certain interest groups; interfere with prices and the market system in determining resource allocations and product distributions; and generally contribute to over-valuation of resources, enlarged investment, and over-capacity in agriculture. Current tax deduction or shelter schemes that abound in our Federal income tax laws appear to have modified the longstanding credence of American democracy, "From each according to his ability and to each according to his need" to more or less one of "to each according to his ability (to manipulate or evade) and from each according to our (the Federal Government's) need." There is probably no American institution in greater need of reform than the Federal income tax policy.

Some have proposed levying an *ad valorem* tax or a user fee on all farm commodities paid by the first-purchaser as an alternative for or a supplement to current income tax policy. Others have proposed a value-added tax scheme at all levels in the economic production, fabrication, and distribution process. Such tax provisions would generally result in the tax burden being passed on to the ultimate consumer through increased retail prices. As such their impacts in agriculture would not be unlike the State or local sales tax on food purchases in that they place the heaviest relative tax burden on those with the least ability to pay.

*B.R. Eddleman is professor of economics, Dept. of Agr. Econ., Mississippi State University. Several of the concerns of Dr. Eddleman regarding the papers presented in the symposium have been addressed in full or in part during the revision process.

Income Tax, Farm Commodity Policy, and Economic Change

The two papers devoted to this topic give a rich account of past, current, and proposed tax laws. The paper by Nixon and Richardson provides a succinct review of the important provisions impacting on agriculture of the Tax Reform Act of 1984 (TRA), the Department of Treasury's proposed Tax Reform for Fairness, Simplicity, and Economic Growth Act (Treasury I), and President Reagan's proposed tax reforms (Treasury II). The authors then proceed with a rather extensive discussion of their Firm Level Income Tax and Farm Policy Simulation Model (FLIPSIM V).

The simulation model was used to estimate the impacts of current TRA and proposed Treasury I tax provisions on moderate-size and very large crop farms in Texas, Mississippi, and Illinois. The simulation model provides options for allowing or not allowing growth of the farm firm over time through purchases and/or leasing of additional cropland and acquisition of additional machinery and equipment required for expanded operation. The authors do not indicate whether the farms were allowed to grow and, if so, whether they actually grew in total acres operated in comparing the impacts of the two sets of tax provisions. If the farms do not grow, then differences in average ending net worth, annual net farm income, and annual income tax payments are direct effects of differences between the two tax policies. However, if one or more of the farms increased its acreage operated then a portion of the differences in these economic measures results from second-order structural changes in the firm in response to differences in the tax incentives. Since all farmers are not motivated to increase the size of their farming operations, it would have been insightful if the authors had differentiated these types of impacts. As a side note, the data presented in table 2 of the Nixon and Richardson paper reports "acres leased" as "acres owned" and this gives some widely divergent per-acre values for owned cropland. The correct entries should be as follows:

	Texas cotton farms		Mississippi crop farms		Illinois grain farms	
Acres owned	381	3,453	533	3,064	260	458

As a second general comment, comparison of the tax provision impacts resulted in substantial differences in tax payment per dollar of annual net farm income for the Illinois grain farms relative to the Texas cotton and Mississippi crop farms.

Tax payments per dollar of annual net farm income were 34 percent less for the moderate-size Illinois farm than for the moderate-size Texas and Mississippi farms under TRA, and 22 to 32 percent less under Treasury I, even though average annual net farm income was of the same general magnitude on each type of farm. Similar tax payment differences per dollar of net farm income of 39 to 46 percent less under TRA and 37 to 51 percent less under Treasury I resulted for the very large Illinois farm compared with the very large Texas and Mississippi farms.

However, the very large Illinois farm had an annual net farm income considerably less than the net farm income on the very large Texas and Mississippi farms. Personal exemptions, standard deductions, family withdrawals claimed as personal exemptions, and net-farm-operating losses carried forward from previous years were unlikely to account for these differences. Thus, differences in the age structure of the machinery complement, the timing of replacement machinery, and the investment tax credits applicable to the farms probably accounted for these differences among Illinois farms versus Texas and Mississippi farms.

A final comment on the Nixon and Richardson paper concerns their conclusion that the Federal income tax provisions of TRA and Treasury I are relatively neutral with respect to structure within a given farm type. This conclusion stems from their observation that the tax burden (dollar taxes/dollar receipts) was about the same for moderate-size and very large farms of a given type. It is income after taxes that really matters with regard to internal capital accumulation on farms and, hence, the ability to invest in additional farm assets. Treasury I provisions would result in substantial net gains in after-tax income relative to TRA provisions, and for very large farms relative to moderate-size farms. For example, after-tax income would be $136,800 higher over the 6-year period on the very large Texas farm under Treasury I compared with TRA. On the moderate-size Texas farm the after-tax income advantage of Treasury I is $35,400. Similarly, for the very large and moderate-size Mississippi farms, the after-tax income advantage of Treasury I relative to TRA is $144,600 and $44,400, respectively, over the 6-year period. The estimates of the advantages of Treasury I for the Illinois farms are $61,800 and $31,200 for the very large and moderate-size farms, respectively. Thus, the net gains in after-tax income under Treasury I provisions relative to TRA provisions are two to four times greater for the very large farms than for the moderate-size farms.

The paper by Baum and others is difficult to assess, partly because the various sections deal with seemingly unrelated material. The paper reads as if each of the four authors wrote a section and then loosely hung them together. The introductory section of the paper raises a number of important questions concerning the distribution of tax policy benefits: prescription of tax and commodity policies for the farm sector; control of farm resources and decisionmaking; and monitoring and forecasting productive capacity, efficiency, resource use, financial stability, etc., of the farm sector. Yet, one does not find a meaningful treatment of these questions in the paper.

The section on economic methodology appears most unrelated to the other sections of the paper. The farm decision framework is posed as an optimizing process whereby total realized and unrealized financial gain is a function of total before-tax net revenue above variable costs, plus government payments and nominal capital gains on land holdings, less payments for leased land and capital items and less investment costs on current and new capital items (including investment tax credits). This function would be maximized for an individual farm firm subject to constraints on total acreage operated, resources or technology capacity, and available investment capital. The model is presented with no empirical analysis to show that it may be useful. I take a critical view of such a paper. I hold the view that no paper should be published unless the authors have used their model in empirical analysis. Our agricultural economics literature is plagued with an abundance of unused models.

The remaining sections of the paper include a history of agricultural price support and adjustment programs and a discussion of current and proposed Federal income tax provisions as they affect the farm sector. I find this latter section to be the most informative with respect to the authors' interpretations of the potential impacts on agriculture. In their summary of the tax research literature regarding impacts of tax policy and price/income-support policies on the farm sector, it might be well to add that in recent years the $50,000 payment limitation on deficiency and diversion payments may have encouraged family farms to incorporate to as large extent as the estate and income tax laws. Reports abound of schemes by tax avoidance limited partnerships whereby farmers cleverly divide their operations into several "payee units."

I also find interesting the notion that tax depreciation and tax credit policies may have reduced the productive efficiency of the farm capital stock. Some of the real costs to society of high real interest rates over the past few years may not have been realized yet because accelerated tax depreciation methods mask the magnitude of real declines in the farm capital stock. Hughes and Penson in a recent paper have estimated that continued low investment could result in a decline in the stock of total depreciable assets in farming by one-fifth through 1995. They translate this decline in assets into a 4-percent decline in aggregate farm output, a subsequent 12- to 27-percent increase in farm level prices, and as much as a 7-percent increase in consumer food prices by 1995.

The authors' review of current tax law and proposed tax reforms under Treasury I is good. It would have been desirable had the Nixon and Richardson paper discussed and contrasted the actual outcomes of their simulations of the representative crop farms with the potential impacts identified by Baum and others. For example, what were the direction and dollar magnitudes of changes in investment tax credits, depreciation allowances, capital gains, and interest income and expenses under Treasury I versus TRA for each representative farm. The output of FLIPSIM V is capable of providing this type of information.

Farmers' Attitudes Toward Income Tax Reform

The paper by Otto and Hanson caused me considerably more difficulty in attempting to decipher what was learned from the research than any of the other papers in the symposium. This was partly due to my own shortcomings in not having mastered multi-chotomous logit analysis techniques, and also due to my bias that an estimated coefficient for an independent variable requires an explanation of its meaning. Throughout the paper reference is made to "estimated coefficients and their estimated asymptotic standard errors" without specific interpretation of any of the coefficients. For example, I am not sure whether the coefficient, -.143, for the education variable in the first equation of table 3 is an elasticity coefficient or whether it is to be interpreted as the change in the probability of choosing the second-level response (disagree) instead of the first-level response (strongly disagree) associated with a 1-year change in farmers' education level.1/ Having expressed my general lack of understanding about these estimated functions, it would probably be wise to end this discussion; but fools do often rush in! There are a number of points where clarification is needed.

The authors refer to sample sizes of 251 farmers in Iowa and 255 farmers in Alabama as comprising the pooled sample. Yet, the results in table 1 are based on 252 Alabama and 260 Iowa farmers in each sample. Similarly, I find it surprising in table 5 that the mean value of the education variable is 12.07 for both Alabama farmers and Iowa farmers! I find no explanation as to why the farm sales variables were dropped from their equations shown in table 4 estimating farmers' attitudes about the fairness of lower tax rates with fewer special provisions. Also, I do not find any coefficients reported in tables 2 to 4 for the value of current assets variables even though the authors indicate that these variables were included in the analysis.

1/ This and several other clarification and presentation issues have now been addressed by the authors.

The authors conclude that years of farming was inversely related to agreement with the three tax reform proposals. My examination of tables 2 to 4 did not reveal the basis for their conclusion. With regard to the first proposal of a flat-rate tax being preferred to progressive tax structures, none of the coefficients were statistically significant and, in general, the absolute value of the asymptotic standard errors were double (or more) their estimated coefficient. With this kind of statistical results, I am not sure one can say anything about the relationship. Three of the estimated coefficients for the years-in-farming variable were statistically significant in the equations for the second proposal of lower tax rates with fewer special provisions being preferred. The signs of the coefficients were positive and pertained to the probability of choosing a no-opinion, agree, or strongly agree response relative to a disagree response. I would interpret this result to mean that for this second tax reform proposal, the number of years in farming was positively related to agreement with the reform. I would place a similar interpretation on the statistically significant positive coefficient for log (P_5/P_3) in table 4 dealing with farmers' attitudes about fairness of lower tax rates with fewer provisions.

I would have to agree with the authors that a good deal more testing will have to be carried out before much can be said about the personal characteristics of farmers and the economic characteristics of farms that influence farmers' preferences toward specific proposals for tax reform.

Summary

This symposium considered a number of interrelated tax reform and farm commodity policy issues. These included the relationship between tax policy and farm price/income-support program incentives on farm firm decisionmaking, farmers' perspectives on tax reform, and elements of an optimal income tax for agriculture. The farm firm growth model used to analyze current (TRA) and proposed (Treasury I) tax provisions explored a number of production and financial implications of key tax provisions at the firm level. But there is more to be said on the interactions between farm price/income-support policy and income tax policy. We still have little understanding of the linkages between farm commodity policy and income tax policy as it affects structural changes in farming. The farm firm agricultural modeling research being conducted by ERS, USDA, and the State experiment stations should add to our general store of knowledge about these relationships in the coming years.

Logit analysis revealed that farmers' perspectives on tax reform issues are indeed complex and difficult to explain. Further analysis will be required before much can be said about individual personal and farm firm economic characteristics influencing farmers' attitudes and preferences toward tax reform.

Optimal income tax reform would have the characteristics of maintaining progressiveness in taxation according to ability to pay; reducing the maldistribution of economic power generated by tax shelters, depreciation, capital gains taxing rates, etc.; and minimizing interference with prices and the market system in affecting resource allocation and product distribution.

With the many off-setting provisions and the wide variability in net income among farm producing units, the net effect of proposed tax reform on the agricultural sector is difficult to assess. Individual farmers with high net farm incomes might pay less as reduced tax rates would offset the loss of tax incentives such as the investment credit. Similarly, farmers with low net farm income would probably pay less tax or no tax at all. But for a vast number of farmers between

these two extremes, the net effect of proposed tax reform would depend on the amount of net income, the type of enterprises produced, the make-up of deductions and exemptions, the amount of investment in capital assets, and many other factors.

The proposed tax reform should, if enacted, reduce the incentive for investors to use farming as a tax shelter for other income and hence, reduce the amount of "tax-loss" farming that plagues agriculture. But, underlying all proposed tax reforms is the need to examine carefully the beliefs and value systems that influence the political adjustments necessary to change current tax policy.

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EFFECTS OF INCOME TAX REFORM ON AGRICULTURE: REVIEW AND NEW EVIDENCE

Sermin D. Hardesty and Hoy F. Carman*

Introduction

The papers presented in this symposium examine various aspects of income tax reform in the agricultural sector. Nixon and Richardson compare the simulated effects of the Treasury's original proposal and current tax law on the financial performance of six commercial farms in Texas, Mississippi, and Illinois. Otto and Hanson examine the attitudes of Iowa and Alabama farmers regarding income tax reform. Breimyer discusses the need for tax reform, arguing that the popularity of tax-sheltered investments in agriculture has produced harmful effects on the agricultural economy. In this review, we evaluate the findings presented in the symposium within the context of our research regarding agricultural investment response to changing income tax laws.

It is generally acknowledged that income tax laws play an important role in U.S. agriculture. Most research has focused on the effects of special income tax rules applicable to agriculture, such as the use of cash accounting, the deductibility of some expenses of a capital nature, and capital gains treatment for income from assets whose costs may have been deducted as a current expense. However, there is evidence that the longrun impacts of other income tax provisions applicable to all enterprises also have important implications for agricultural investments and the longrun structure of agriculture. Income tax provisions may be as important to the growth and survival of many farm firms as are agricultural commodity programs.

Special Agricultural Tax Rules

Income tax rules influence investment activity through their effect on after-tax rates of return. Breimyer notes that, because of special tax provisions, "[a]griculture is a favorite sector for tax shelters...[which] reduce prices and set in motion a transfer of asset ownership to sheltered investors." Tax shelters involving livestock and citrus and almond groves proliferated during the late 1960's. The Tax Reform Act of 1969 increased the holding period for livestock to qualify for capital gains treatment and required the recapture of depreciation. These changes removed most of the opportunities to convert ordinary income to capital gains through development of breeding livestock or dairy herds purely as a tax-shelter investment (Carman, 1972). The current tax rules, however, continue to provide significant incentives for investment in livestock production. The Tax Reform Act of 1969 also required the capitalization of citrus grove planting and development expenses during the first 4 tax years after planting; this provision was extended to almonds 1 year later. These changes terminated most of the tax advantages of developing citrus and almond groves.

Carman (1981) used a supply response model to examine the long-term impacts on other perennial crops of cost capitalization provisions which are applicable only

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to citrus and almonds. Model results indicate that by 1978 California citrus and almond acreage decreased an estimated 46,241 acres due to cost capitalization provisions first effective in 1970 and 1971. At the same time, California walnut and grape acreage increased an estimated 99,163 acres in response to these same capitalization provisions. Similar projections for 1985 have citrus and almonds decreasing by 54,254 acres with grapes and walnuts increasing by 91,552 acres. This estimated increase was due only to the tax law change and did not include the already increased level of investment due to favorable tax rules for development of these perennial crops. Acreage of crops not included in the analysis, such as pistachios and kiwi fruit, also expanded as investors took advantage of the favorable tax treatment available for these crops.

The estimated percentage impact of cost capitalization provisions on individual crops is shown in table 1. The projected 1985 grape acreage increased by some 14 percent over what it would have been without the citrus and almond capitalization provisions. The California grape industry currently faces severe economic problems as a result of high production and prices which are low relative to costs of production. In addition, the switch of developer and investor interest to walnuts and grapes appears to have added to the cyclical instability of production and prices for these two crops. These findings indicate that allowing the immediate deduction of capital asset development expenses combined with capital gains treatment upon sale of the asset distorts resource allocation in agriculture.

Economic Recovery Tax Act of 1981

The income tax system has a progressive rate structure; however, the degree of progressivity has been eroded by the ability of high-income taxpayers to utilize tax shelters to generate deductions which reduce taxable income. Breimyer asserts that the Economic Recovery Tax Act of 1981 (ERTA) further jeopardized the progressivity of the rate structure by adding to the retinue of deductions previously in place. However, Hardesty's findings indicate that by lowering tax rates ERTA reduced the incentive for row-crop farms to seek tax-reducing deductions.

Hardesty used a dynamic optimization model to examine the effects of tax law changes on representative small, medium, and large California row-crop farms. These three farms made annual decisions on investment in land and machinery, savings, debt, land leasing, total acreage planted, and crop mix over an 8-year period with the objective of maximizing the firm's net worth. Three income tax alternatives (no income taxes, pre-ERTA rules, and post-ERTA rules) were considered for each model farm. The farms had the same beginning position for each set of tax rules; each faced the same input and output prices and were subject to the same constraints. Only the income tax rules differed in the three tax scenarios for each farm size.

The present value of machinery purchases for each farm size and scenario is shown in table 2. Purchases were highest for the pre-ETRA scenario and lowest for the situation with no taxes. While changes in investment tax credit and depreciation rules in ERTA encourage increased machinery investment, this positive impact was offset by reduced tax rates. The reduced tax rates decrease the present value of tax savings from interest and depreciation deductions and increase the desirability of repairing machinery relative to replacing it. For each farm size, the machine stock was smallest in the no-tax scenario and highest in the pre-ERTA scenario. Machinery requirements varied minimally because cropping patterns were identical under pre- and post-ERTA rules and these patterns differed only slightly from the no-tax scenario. By reducing tax rates, ERTA decreased the level of excess machinery capacity which the firms maintained to generate deductions.

Table 1--Projected 1985 total acreage response to the tax reform act of 1969

Crop	Percentage response
	Percent
Navel oranges	-7.5
Valencia oranges	-19.0
Lemons	-21.0
Almonds	-2.1
Walnuts	+2.0
Avocados	+0.1
Grapes	+14.3

Source: Carman (1981).

Table 2--The present value of machinery purchases by farm size and income tax scenario

Farm size	Present value of machinery purchases by tax rule		
	No tax	Pre-ERTA	Post-ERTA
		Dollars	
Small	54,123	101,932	81,864
Medium	108,738	254,999	199,742
Large	209,785	744,513	575,471

Source: Hardesty.

Land purchases were found to be highly sensitive to tax provisions. In the no-tax scenario the farms expanded their acreage solely through leasing. Total acreage purchased in the post-ERTA scenarios was 15 to 40 percent less than that purchased in the pre-ERTA scenarios. ERTA reduced the tax savings generated from interest deductions. Nevertheless, the progressive rate structure continues to provide an incentive for high-income farm firms to seek greater taxable income reducing deductions than low-income farm firms. Only a flat-tax rate structure would eliminate this distortion.

Treasury's Tax Reform Proposal

Numerous tax reform proposals have been introduced recently which promote movement toward a flat-tax rate and the elimination or modification of special farm tax

provisions. In Otto and Hanson's study 69 percent of the surveyed farmers favored lower tax rates with fewer special provisions. This support for tax reform appears to be broadly based among farmers of different size operations and educational backgrounds.

Lowering tax rates and eliminating special farm tax provisions could have a substantial impact on farm firms. Nixon and Richardson examined the impact of the Treasury's original proposal (Treasury I) on commercial farms in Texas, Mississippi, and Illinois. They found that "the reduction in marginal Federal income tax rates under Treasury I had a greater impact on the representative farm's income tax payments than the change in depreciation allowances [and the elimination of the investment tax credit]." The increase in average annual net farm income for their six farms ranged from 2.3 to 6.2 percent.

A study by Hardesty and Carman of Treasury I utilizing a dynamic optimination model indicated that Treasury I would also have a positive financial impact on California row-crop farms. They examined the individual and combined effects of Treasury I's major provisions: elimination of the investment credit, extended depreciation schedule, and collapsed rate structure. In the model the firm makes production, investment, and financing decisions and controls its income tax liability as part of its overall optimization problem. The tax changes affected both the firm's ability and incentive to invest in land and machinery. The results for the five scenarios are summarized in table 3.

Under the Treasury I tax rules the firm's net worth was 3.1 percent higher and its total tax liabilities were 7.4 percent lower than under the current tax rules. There were substantial differences in machinery investment decisions caused by changes in the major provisions individually. In each case machinery purchases were lower than under the current tax rules. When all the changes were considered collectively, the interactions between provisions caused optimal machinery purchases to decrease by 68 percent from those under the current tax rules. Land purchases decreased when the changes were examined individually. When the Treasury I revisions were considered collectively, land purchases were 47 percent higher than under the current tax rules. Treasury I causes the attractiveness of land investment relative to machinery investment to increase significantly.

Summary and Concluding Comments

Numerous studies concerning the effects of income taxation on agriculture suggest that tax policy may be working against agricultural policy goals related to farm structure and rates of return to agricultural enterprises. Special farm tax rules have encouraged tax shelter investment activity in various commodities. The progressive rate structure has provided farmers with incentives to expand by seeking deduction-generating investment. Because of inelastic product demand, the tax incentives which provide a short-term benefit to individual operators may produce a deterioration of longrun returns resulting from increased total production.

Research regarding income taxation and agriculture has evolved substantially since initial studies utilizing budgeting examples. However, efforts have been hampered by the lack of data and analytical limitations. It is virtually impossible to obtain information concerning farm firm tax liabilities and the utilization of specific tax provisions. Income tax laws affect the relative prices of input factors, including capital assets. Analysis of the long-term effects of such changes requires an intertemporal framework with theoretical justification.

3--Financial conditions and decisions of representative farm by tax rule

Measure*	Initial period	Scenarios** 1	2	3	4	
			Dollars			
net worth	2,559,336	1,994,192	1,974,246	1,978,905	2,084,196	2,
value	2,688,000	2,313,878	2,286,566	2,254,385	2,047,030	2,
land purchases	--	286,492	257,404	223,410	0	
nery value	217,667	121,423	96,382	72,256	100,739	
machinery purchases	--	255,438	209,897	176,946	215,990	
gs	19,000	81,816	73,806	95,437	266,618	
debt	365,331	385,136	346,356	308,913	207,076	
asset (ratio)	.12	.16	.14	.13	.09	
e tax liabilities	--	273,352	321,328	291,910	242,660	
acreage planted during planning iod (acres)	--	8,000	8,000	8,000	8,000	

e: Hardesty and Carman.
dollar values for Scenarios 1 through 5 pertain to the terminal period or the entire planning horizon a
ssed in present value terms. Net worth is measured by the market value of assets less liabilities. Us
ry is valued according to resale price relationships published in the Agricultural Engineer's Yearbook.
nario 1 is based on the Federal income tax rules in effect as of Januray 1, 1985.
nario 2 is based on the same Federal income tax rules as in Scenario 1, except that the investment tax
limited.
nario 3 is based on the same Federal income tax rules as in Scenario 1, except that ACRS is replaced by
ended depreciation schedule as proposed by the Treasury.
nario 4 is based on the same Federal income tax rules as in Scenario 1, except that the tax rates are
ed into three brackets as proposed by the Treasury.
nario 5 is based on the same Federal income tax rules as in Scenario 1, except that all of the changes
narios 2, 3, and 4 are incorporated.

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Substantial additional research on the impacts of income tax laws on agriculture is warranted given its significant policy implications. Studies of both firm level and aggregate responses are valuable. The application of recently developed dynamic analysis methods to examine long-range impacts merits special attention.

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