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THE IMPACT OF TAX REFORM ON IMPLICIT RENTAL
RATES FOR FARM CAPITAL

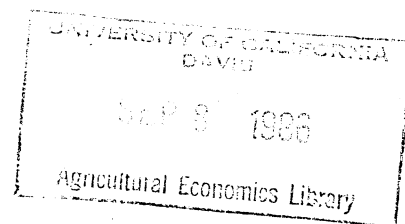
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The Impact of Tax Reform on Implicit Rental Rates for Farm Capital

In recent years the use of the tax system to implement certain economic and social policies has increased considerably. The current Federal income tax system contains more than 100 provisions that provide economic incentive or tax relief to particular groups or taxpayers. These preferential tax provisions distort the allocation of resources toward investments with lower rates of taxation rather than those that make the greatest contribution to real output. The economic loss from these distortions could be as high as \$100 billion each year [Hall and Rabushka].

Concerns regarding the fairness, complexity and inefficiencies of the current income tax system have led to a number of proposals for tax reform. Major proposals include the President's Tax Reform Plan, the Tax Reform Bill of 1985 (House Bill) and the Tax Reform Bill of 1986 (Senate Bill). While the specifics of these proposals differ, there is a common theme. Each would reduce marginal tax rates and broaden the income tax base by eliminating a number of the special exclusions, deductions and credits that now exist. Among the features of these proposals of significance to agriculture are individual tax rate reductions and modifications in investment tax credit and depreciation policies. These changes would alter incentives for investment in depreciable farm capital.

One way to analyze the effects of changes in tax laws on incentives to invest is to estimate implicit rental rates for various farm assets. This paper evaluates the impact of the President's, the House's and the Senate's tax reform proposals on the implicit rental rates of various types of farm capital. The first and second sections of this paper briefly describe the procedures and data used to develop the rental rate estimates. The third section describes current law and

proposed changes that would affect the rental rate of capital. Our estimates are presented in section four. The final section provides a brief summary of our analysis.

Estimation Procedures

The implicit rental price of a unit of capital service is the after-tax cost of the capital service that is internally supplied by the firm. The rental rate is a function of the price of the asset, the rate of capacity depreciation, the tax variables, the discount rate, and the rate of inflation. Tax-induced changes in rental rates affect the capital mix as lower-taxed capital inputs are substituted for higher-taxed inputs. Assuming perfectly competitive market conditions and cost-minimizing behavior, firms adjust their stocks of capital inputs until the ratio of the marginal products of any pair of inputs equals the ratio of their respective rental rates. To the degree that inputs are substitutable, a change in tax law that decreases the rental rate of one input relative to other inputs will increase the demand for the lower priced input until the cost-minimization conditions are satisfied.

A formula for implicit rental rates can be developed from the equality between the purchase price of an asset and the present value of the future rents generated by the asset [Jorgenson]. Assuming constant new asset price expectations and allowing for alternative depreciation patterns, the equality can be written as:

$$q_i = \sum_{t=1}^{L_i} u_1 a_1(t) / (1+r)^t \quad i = 1, 2, \dots, m \quad (1)$$

where q_i is the purchase price of the i th asset when new, L_i is the service

life of the asset, u_i is the rental rate for a new (undepreciated) unit of capital, $a_i(t)$ is the capacity of a unit of capital in year t of its service life, and r is the discount rate. The capacity of the asset is 1 in period 1 and declines over its service life as a function of the rate of capacity depreciation.

Equation (1) ignores all tax considerations. When capital income is subject to an income tax, the term on the right side of the equation (1) must be modified and expanded to include the effects of the tax. The expanded term includes expressions for the present value of the rents generated by the asset and the present value of the tax savings produced by the investment tax credit and tax depreciation deductions. Assuming the firm's marginal tax rate remains constant at T , equation (1) respecified to accommodate the tax system becomes:

$$q_i = (1 - T)u_i A_i + C_i q_i + T(1 - dc_i)B_i q_i \quad i = 1, 2, \dots, m \quad (2)$$

Where $(1-T)u_i A_i$ is the present value of the future rents, $C_i q_i$ is the present value of the investment tax credit, and $T(1-dc_i)B_i q_i$ is the present value of the future tax depreciation deductions.

With constant price expectations and a constant marginal tax rate, the rental rate remains constant over the life of the asset. The capacity of the asset, however, declines over the life of the asset so that:

$$A_i = \sum_{t=1}^{L_i} a_i(t)/(1+r)^t \quad i = 1, 2, \dots, m \quad (3)$$

where r is the discount rate which is the real after-tax rate of return required by the firm.

Although the firm pays taxes on the rents generated by each asset, the firm is also allowed to deduct the decline in the value of the asset as an expense.

If $b_i(t)$ is the fraction of the price of the i th asset that is deducted from taxable income in year t of the asset's tax life (M_i), the present value of the tax savings from depreciation is TB_iq_i , where:

$$B_i = \sum_{t=1}^{M_i} b_i(t)/(1+r)^t(1+p)^t \quad i = 1, 2, \dots, m \quad (4)$$

and p is the rate of inflation. However, under current law the tax depreciation base may be reduced by half of the investment tax credit. Therefore, a more general expression for the present value of tax savings from depreciation deductions is $T(1 - dc_i)B_iq_i$, where d is the percentage of the credit, if any, which must be used to reduce the tax depreciation base.

In addition to the depreciation deductions, firms may also be eligible to claim an investment tax credit (c). If firms claim the credit at the end of the first year of the asset's service life, the present value of the credit is C_iq_i , where:

$$C_i = c_i/(1+r)^1(1+p)^1 \quad i = 1, 2, \dots, m \quad (5)$$

Given the market price of the asset, equation (2) can be rewritten as:

$$u_i = q_i[1 - C_i - T(1 - dc_i)B_i]/A_i(1 - T) \quad i = 1, 2, \dots, m \quad (6)$$

to solve for the implicit rental rate (u_i) that the firm must charge to earn the required real after-tax rate of return (r).^{1/}

Asset Characteristics, Inflation, and Discount Rates

We estimated rental rates for farm tractors, long-lived farm equipment, crop storage structures, multipurpose farm structures, and unitary livestock facil-

^{1/} The rental rate in equation (6) assumes the asset is completely depreciated and therefore could not be sold at the end of its service life. However, equation (6) could be generalized to consider any salvage value and the tax consequences of a sale.

ities for 1986. Asset price indexes for each of the farm machinery categories were based on the respective Bureau of Labor Statistics (BLS) price index for wheel-type farm tractors and agricultural machinery excluding farm tractors. A single price index series for all three structure categories was based on Bureau of Economic Analysis (BEA) data. Asset prices were then forecast based on changes in a nonresidential fixed investment deflator for equipment and structures provided by Wharton Econometrics.

The service lives for each equipment category are based on averages of Bulletin F depreciation lives. The service lives for tractors and other long-lived equipment are 9 and 13 years, respectively. Unitary livestock facilities and multipurpose agricultural structures have service lives of 50 years, and the service life of crop storage structures is 25 years.

The rate of economic depreciation for each category is approximated by the double-declining balance depreciation method where the capacity of the i th asset in year t of the assets service life (L_i) is represented as:

$$a_i(t) = [1 - (2/L_i)]^{t-1} \quad i = 1, 2, \dots, m \quad (7)$$

for $1 \leq t \leq L_i$, and $a_i(t) = 0$ for $t > L_i$.

In addition to the information regarding the economic characteristics of assets, it was necessary to estimate the inflation rate and the appropriate discount rate to calculate the present value of the rents, the investment tax credit, and the tax depreciation deductions. The inflation rate for 1986 is estimated at 1 percent. The discount rate used for equipment and structures is a weighted average of the longrun real after-tax interest rate (external financing) and the expected longrun real after-tax return to equity (internal financing).

Nominal interest charges are deductible from taxable income, and inflation reduces the real values of nominal interest and principal payments on debt. Taking these two factors into consideration, the real cost of external or debt financing (r_d) is:

$$r_d = [r_n(1 - T) - p]/(1 + p) \quad (8)$$

When equity and debt financing are combined, the real cost of capital or real discount rate is:

$$r = fr_d + (1 - f)r_e, \quad (9)$$

where f is the fraction of debt, r_d is the real after-tax cost of debt financing, and r_e is the real after-tax return to equity [Tideman and Tucker].

Data from the U.S. Department of Commerce indicate that the fraction of farm investment that is debt financed is about 50 percent. In keeping with the theory that the appropriate interest rate should be a longrun rate, base interest rates for external financing were set equal to rates charged by Federal Land Banks on new farm loans. The nominal interest rate for 1986 (10.8 percent) was based on the forecasted change in the interest rates on 3-month Treasury bills.

The longrun real after-tax rate of return to equity was assumed constant for each asset. Although there are few data regarding the appropriate long-run real after-tax return to equity, Melichar found that the real total before-tax return to farm assets since 1950 has averaged about 8 percent. Also, Gertel found that the real before-tax return to cash rented farmland averaged 8.1 percent from 1940 to 1980. Therefore, for this analysis we decided to use a real after-tax return to equity of 6 percent.

Current Tax Law and Reform Proposals

In each of the tax reform plans, the three most significant changes regarding the tax treatment of capital assets are the proposed reductions in marginal tax rates, the elimination of the investment tax credit, and the modification of depreciation allowances. The current tax system contains 14 brackets with tax rates ranging from 11 to 50 percent. Under the President's proposal, the tax system would have only three tax brackets: 15, 25, and 35 percent. The House Bill would provide for tax rates of 15, 25, 35, and 38 percent. The Senate Bill contains rates of 15 and 27 percent. On average, the marginal tax rate for farm sole proprietorships under each of the reform proposals would fall from 22 to 15 percent.

The Accelerated Cost Recovery System (ACRS), enacted in 1981, allows depreciable assets to be written-off at accelerated rates over periods of 3 to 19 years, depending upon asset type. Most farm assets can be written off over 5 years. This includes all asset types examined in this report except for multipurpose farm structures which must be written off over a 19 year period. Under current law, tax depreciation deductions are based on the historical cost of assets and thus are not indexed for inflation. Each taxpayer may immediately deduct up to \$5,000 of investment each year. This is scheduled to increase to \$10,000 by 1990.

The President's proposal would replace ACRS with the Capital Cost Recovery System (CCRS). CCRS would divide all assets into six classes representing varying rates of economic depreciation. Tax depreciation deductions, computed under the declining-balance method, would be indexed for inflation. Since the value of depreciation deductions would no longer be affected by inflation, equation (4) must be recast as:

$$B_i = \sum_{t=1}^{M_i} b_i(t)/(1+r)^t \quad i = 1, 2, \dots, m \quad (10)$$

Tax depreciation rates under CCRS would range from 55 percent per year for Class 1 property to 4 percent per year for Class 6 property. The write-off periods for farm tractors and long-lived farm equipment would be increased from 5 years to 7 and 8 years, respectively under the President's tax plan. The tax lives for crop storage structures, unitary livestock facilities, and multipurpose agricultural structures would increase from 5, 5, and 19 years to 8, 8, and 29 years, respectively. The current option to expense up to \$5,000 would be retained but the scheduled increase to \$10,000 would be repealed.

The House Bill would replace ACRS with a system containing 10 recovery periods ranging from 3 to 30 years. Deductions would be computed using a 200-percent declining-balance method. Most farm assets including farm tractors, long-lived machinery, and crop storage structures would be written off over a 10-year period. Unitary livestock facilities would be written off over 13 years while multipurpose agricultural structures would be written off over a 25-year period. An option to expense up to \$10,000 of investment per year would be available to businesses which invest less than \$200,000 per year. Depreciation deductions would be indexed for half of the excess of inflation above 5 percent. As a result, if the inflation rate exceeds 5 percent, equation (4) would be recast as:

$$B_i = \sum_{t=1}^{M_i} b_i(t) / [(1+r)^t + [1+p-0.5(p-0.05)]^t] \quad i = 1, 2, \dots, m \quad (11)$$

The Senate Bill would retain a modified ACRS system with write-off periods ranging from 3 to 31.5 years. Deductions would be computed using a 200-percent declining balance method. Most farm assets including farm tractors, long-lived equipment and crop storage structures would be written off over a 5-year period. Unitary livestock facilities would be written off over a 10-year period. Multi-

purpose agricultural structures would be written off over 31.5 years. An option to expense up to \$10,000 of investment per year would be available to businesses which invest less than \$200,000 per year. Depreciation deductions would not be indexed for inflation.

Most depreciable farm property currently qualifies for the 6- or 10 percent investment tax credit. Qualifying farm property includes machinery, equipment, and livestock purchased for dairy, draft, breeding, or sporting purposes, and crop storage and unitary livestock facilities. Currently, if the full tax credit is claimed, the basis for depreciation (cost of the asset) must be reduced by 50 percent of the investment tax credit. Alternatively, the taxpayer may reduce the tax credit 2 percentage points, resulting in either a 4- or 8-percent credit. For example, the purchaser of a farm tractor may claim the full 10-percent tax credit and depreciate only 95 percent of the tractor's cost, or take an 8-percent tax credit and depreciate its full cost. Each of the tax reform proposals would eliminate the investment tax credit.

Results

Table 1 presents our estimates of implicit rental rates under current law, the President's proposal and the Senate and House bills. At the forecasted 1 percent inflation rate, rental rates would increase an average of 10 percent under the President's proposal and the Senate bill and 12 percent under the House bill. Considering the ability to currently expense some capital expenditures, the increase in rental rates would be about 9 percent under both the President's proposal and the Senate bill and about 10 percent under the House bill. At higher levels of inflation (7 percent) the indexing of depreciation deductions under the President's proposal and the House bill would lessen the impact of the repeal of the investment tax credit and the lengthening of

write-off periods. At the higher rate of inflation, rental rates on average would increase by only about 6 percent under the President's proposal, 8 percent under the Senate bill and by about 9 percent under the House bill.

As would be expected assets which receive the most favorable treatment under current law would experience the largest rental rate increase under proposed law. For example, rental rates for unitary livestock facilities would increase about 14 percent under the President's proposal, 15 percent under the Senate bill and as much as 16 percent under the House bill. Rental rates for most farm machinery and equipment would increase about 10 percent under the Senate bill, 11 percent under the President's proposal and about 12 percent under the House bill. Rental rates for multipurpose agricultural structures would, however, remain about the same. At higher levels of inflation, rates would even decline slightly under each of the reform proposals.

Conclusions

Changes in tax laws may alter relative rental rates for various asset types increasing demand for assets which receive more favorable tax treatment and decreasing demand for assets which receive less favorable tax treatment. In the absence of other distortions, the resulting shift in investment decreases economic efficiency because the shift is a response to change in tax laws rather than a response to market changes. The development of implicit rental rates for capital inputs is an important concept for evaluating the impact of tax induced changes in agricultural investment.

One of the primary goals of reform is to improve efficiency by reducing the role of the tax system in determining the make up of the capital stock and to allow the market to determine the appropriate level of investment. Under current law, the investment tax credit and tax depreciation system

TABLE 1--USER COSTS FOR FARM ASSETS

ASSET TYPE	CURRENT LAW		PRESIDENT'S PLAN			HOUSE BILL			SENATE BILL		
	BASE	HIGH 1/ INFLATION	BASE	EXPENSING 2/	HIGH 1/ INFLATION	BASE	EXPENSING 2/	HIGH 1/ INFLATION	BASE	EXPENSING 2/	HIGH 1/ INFLATION
FARM TRACTORS	0.293	0.304	0.321	0.319	0.321	0.327	0.321	0.333	0.321	0.318	0.327
LONG-LIVED EQUIPMENT	0.221	0.230	0.245	0.244	0.245	0.248	0.244	0.252	0.243	0.241	0.248
CROP STORAGE STRUCTURES	0.143	0.149	0.160	0.159	0.160	0.162	0.159	0.165	0.159	0.158	0.162
UNITARY LIVESTOCK FACILITIES	0.102	0.106	0.116	0.115	0.116	0.118	0.115	0.120	0.117	0.115	0.120
MULTIPURPOSE STRUCTURES	0.122	0.126	0.122	0.122 3/	0.122	0.121	0.121 3/	0.123	0.124	0.124 3/	0.126
ALL ASSETS 4/	0.218	0.226	0.240	0.238	0.240	0.243	0.239	0.247	0.239	0.237	0.244

1/ INFLATION RATE ASSUMED TO BE 7 PERCENT.

2/ BASED ON \$20,000 ANNUAL LEVEL OF INVESTMENT. THIS ALLOWS 25 PERCENT OF INVESTMENT TO BE EXPENSED UNDER THE PRESIDENT'S PROPOSAL AND 50 PERCENT UNDER THE SENATE AND HOUSE BILLS.

3/ MULTI-PURPOSE STRUCTURES CANNOT BE EXPENDED UNDER ANY PLAN.

4/ INDEX BASED ON COMPOSITION OF CAPITAL STOCK.

based on historical rather than the real cost of assets has biased investment decisions. The proposed elimination of the investment tax credit and the indexation of depreciation deductions would reduce these tax induced inefficiencies. However, the longrun efficiency gains would come at a cost since the implicit rental rates of most farm capital inputs would rise under each of the tax reform measures.

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