The Tax Reform Act of 1986: Implications for the Cost of Capital

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By

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and

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Abstract

The Tax Reform Act of 1986 significantly changed the tax treatment of various types of capital assets. It is estimated that the Tax Reform Act of 1986 will increase the cost of capital for agricultural machinery and most types of farm buildings by over 12 percent when all the provisions of the Act are completely phased-in. The only farm asset which receives more favorable tax treatment under the Tax Reform Act is multipurpose farm structures. The Act directly affects the cost of capital through substantial reductions in marginal tax rates and by eliminating many of the exclusions, deductions, and credits allowed under prior law.

Keywords: Tax policy, cost of capital, Tax Reform Act of 1986.

Introduction

The Tax Reform Act of 1986 is the most comprehensive overhaul of the Federal income tax system in over 30 years. The Act substantially reduces marginal income tax rates and broadens the income tax base by eliminating many of the exclusions, deductions, and credits that existed under prior law. The Tax Reform Act could, therefore, significantly affect the cost of capital used in the agricultural sector. Tax induced changes to the cost of capital are important because the cost of capital it is an important determinant of both non farm [Hall and Jorgenson, 1967] and farm [LeBlanc and Hrubovcak, 1986; Halvorsen, 1987] investment. In all three studies the effects of tax policy on investment behavior enters an investment function through the cost or rental price of capital. Any change in tax policy changes the rental price of capital, causing a change in the desired level of capital stock. LeBlanc and Hrubovcak found that Federal income tax changes from 1956 through 1978 accounted for nearly 20 percent of net investment in agricultural equipment. Halvorsen found similar results for the farm sector when he estimated a dynamic interrelated input demand system.

The objective of this paper is to analyze the effects of the Tax Reform Act of 1986 on the cost of capital for farm equipment and buildings. We estimate and compare the cost of capital for farm tractors, long-lived farm equipment (e.g. combines, harvesters), crop storage structures (e.g. silos), unitary livestock facilities (e.g. milking parlors), and multipurpose farm structures (e.g. barns) under two scenarios. The first scenario maintains prior tax laws while the second scenario incorporates the changes introduced by the Tax Reform Act of 1986. In addition, the importance of debt financing on the cost of capital is discussed.

Overview of Prior Law and the Tax Reform Act of 1986

The Tax Reform Act of 1986 modified three major areas of prior law. The Tax Reform Act restructured income tax brackets changing marginal income tax rates, modified write-off periods and rates at which assets could be depreciated, and eliminated the investment tax credit.

Under prior law the tax system consisted of 14 tax brackets with marginal tax rates ranging from 11 to 50 percent. The personal exemption was $1,080 and the standard deduction was $3,760 on a joint return. Rate brackets, personal exemptions, and standard deductions were indexed for inflation. Prior to the enactment of the Tax Reform Act of 1986, the marginal tax rate for farm sole proprietorship was estimated to be about 22 percent.

The Tax Reform Act creates five tax rates for 1987: 11, 15, 28, 35, and 38.5 percent. Beginning in 1988 the new tax system will have only two brackets: 15 and 28 percent. The personal exemption is increased to $1,900 in 1987, $1,950 in 1988, and $2,000 in 1989. The standard deduction rises to $5,000 by 1988. Rate brackets, personal exemptions, and standard deductions continue to be indexed for inflation. Most farmers will fall in the 15 percent tax bracket.

Depreciation deductions under prior law were determined by the Accelerated Cost Recovery (ACR) system enacted in 1981. The ACR depreciation system allowed depreciable assets to be written of at accelerated rates over periods of 3 to 18 years, depending on the type of asset. Most farm assets except multipurpose farm structures could be written off over 5 years. Multipurpose farm structures could be depreciated over 19 years. Tax depreciation deductions were based on the historical cost of an asset and thus were not indexed for inflation.

Under the Tax Reform Act, the ACR depreciation system is retained with some modifications. Table 1 presents a comparison of the allowable tax lives and yearly tax depreciation allowances for most farm assets under prior law and the Tax Reform Act of 1986. In general, the Tax Reform Act increases write off periods by 2 years. Most farm equipment including tractors and both unitary livestock facilities and crop storage structures will be depreciated over 7 as opposed to 5 years under prior law. Multipurpose farm structures will be written off over 21 instead of 19 years. The allowable yearly deductions for most farm assets is computed using the 200 percent declining balance method except for multipurpose structures which can be written off using the 150 percent declining balance method. Depreciation deductions are not indexed for inflation.

Most depreciable farm property also qualified for a 6- or 10-percent investment tax credit.[1] If the full tax credit was claimed, however, the cost basis for depreciation was reduced by 50 percent of the investment tax credit. As an alternative to the basis adjustment the taxpayer could reduce the tax credit by 2 percentage points, resulting in either a 4- or 8-percent credit. In most cases, claiming the full tax credit resulted in the greatest tax savings. Under the Tax Reform Act the investment tax credit is repealed retroactively as of January 1, 1986, one year prior to the effective date for most of the changes the Tax Reform Act.

Cost of Capital

One way to measure the effects of the various changes introduced by the Tax Reform Act is through their impacts on the cost of capital. The cost of capital is developed from the equality between the purchase price of an asset and the present value of the future rents

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[1] Autos and light trucks were eligible for the 6 percent investment tax credit and tractors, long-lived farm equipment, crop storage structures, and unitary livestock facilities were eligible for the 10 percent investment tax credit.

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Table 1.—Depreciation Deductions per $1,000 of Investment in Various Farm Assets.

Year	Most Assets Except Multipurpose Structures		Multipurpose Structures	
	Prior Law	Tax Reform Act	Prior Law	Tax Reform Act
1	150	143	46	38
2	220	245	88	72
3	210	175	80	67
4	210	125	72	62
5	210	89	66	57
6		89	60	53
7		89	54	49
8		45	49	45
9			45	45
10–19			44	45
21				45

generated by the asset [Jorgenson, 1967]:

$$q_i = \int_0^{L_i} e^{-rt} u_i n_i(t) \, dt \qquad i = 1, 2, \ldots, m, \qquad (1)$$

where q_i is the purchase price of the ith asset when new, L_i is the service life of ith asset, u_i is the rental rate expressed in terms of an undepreciated unit of capital, $n_i(t)$ is the capacity of the asset available in year t of its service life, and r is the discount rate.

Equation (1) ignores all tax considerations. When capital income is subject to an income tax, the term on the right side of equation (1) is modified to include the effects of the tax. The modified term includes the present value of the after-tax rents generated by the asset, and the present value of the tax savings produced by the investment tax credit and the tax depreciation deductions. Assuming the firm's marginal tax rate (T) is expected to remain constant over the life of the asset, equation (1) respecified to accommodate the tax system is

$$q_i = (1 - T)u_i N_i + C_i q_i + T(1 - hc_i)Z_i q_i \qquad i = 1, 2, \ldots, m, \qquad (2)$$

where $(1 - T)u_i N_i$ is the expected present value of the future rents, $C_i q_i$ is the present value of the investment tax credit, and $T(1 - hc_i)Z_i q_i$ is the present value of the future tax depreciation deductions.[2]

If price expectations and the marginal tax rate are constant, the rental rate (u_i) is constant over the life of the asset (L_i). The productive capacity of the asset, however,

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[2] The term $(1 - hc_i)$ allows for the case if the tax depreciation base must be reduced when the investor claims the investment tax credit. The legislatively mandated percentage reduction in the depreciation base is represented as h and c_i the nominal value of the credit.

declines over the life of the asset so that

$$N_i = \int_0^{L_i} e^{-rt} n_i(t)\, dt \qquad i = 1, 2, \ldots, m, \tag{3}$$

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

Although the firm pays taxes on the rents generated by the asset, the firm can also deduct the decline in the value of the asset as an expense. Assuming there are no other distortions, if the present value of the depreciation deductions claimed for tax purposes is equal to the true decline in economic value of each asset, the tax system does not distort the asset mix.[3]

If $z_i(t)$ is the fraction of the price of the ith asset deducted from income in year t of the assets tax life (M_i), the present value of the tax depreciation deduction is TZ_iq_i, where

$$Z_i = \int_0^{M_i} e^{-(r+p)} z_i(t)\, dt \qquad i = 1, 2, \ldots, m, \tag{4}$$

and p is the rate of inflation. However, in years when the tax depreciation base is reduced by the amount of the investment tax credit, the real value of the tax depreciation deductions is $T(1 - hc_i)Z_iq_i$, where h is the percentage of the nominal tax credit (c_i) which reduces the depreciation base.

Firms may also be eligible to claim an investment tax credit. 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

$$C_i = \int_0^1 e^{-(r+p)} c_i \qquad i = 1, 2, \ldots, m. \tag{5}$$

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[3] The true decline in economic value is measured by any loss in efficiency over the life of the asset as well as the decrease in the remaining life of the asset.

A more realistic rendering of the discount rate shows it to be a weighted average of the longrun real after-tax interest rate (external financing) and the longrun real after-tax rate of return to equity (internal financing). Because nominal interest charges are deductible from taxable income, the real cost of external or debt financing (r_d) is

$$r_d = [r_n(1 - T) - p]/(1 + p) \qquad (6)$$

where r_n is the nominal interest rate. After the real costs of both equity and debt financing are combined, the real discount rate is

$$r = fr_d + (1 - f)r_e \qquad (7)$$

where f is the fraction debt financed, 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, 1976].

Given the market price of the asset, equation (2) is rewritten as

$$u_i = q_i[1 - C_i - T(1 - hc_i)Z_i]/N_i(1 - T) \qquad i = 1, 2, \ldots, m, \qquad (8)$$

which is the rental rate the firm must charge to earn the required real after-tax rate of return.

Asset Characteristics, Inflation, and Discount Rates

We estimate rental rates for farm tractors, long-lived farm equipment, crop storage structures, unitary livestock facilities, and multipurpose farm structures for 1986 and 1987

under both prior law and the Tax Reform Act.[4] 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 price were then forecast based on changes in a nonresidential

fixed investment deflator for equipment [Wharton, 1986].

The service lives for each equipment category are based on averages of Bulletin F

depreciation lives. The service lives for tractor 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

depreciation method where the capacity of the ith asset in year t of the assets service life

(L_i) is represented as

$$n_i(t) = [1 - (2/L_i)]^{t-1} \qquad i = 1, 2, \ldots, m \qquad (9)$$

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

The inflation rate for 1986 and 1987 is estimated at 1.6 and 3.0 percent, respectively.

The fraction of farm investment that is debt financed is 50 percent. Base interest rates for

external financing were set equal to rates changed by Federal Land Banks on new farm loans.

The nominal interest rate (10.8 and 10.9 percent for 1986 and 1987) was based on the

forecasted change in the interest rate 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

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4   Each category of farm assets is defined by the Federal income tax code. Examples of
long-lived farm equipment are combines, cultivators, and harvesters. Crop storage structures
include silos and unitary livestock facilities include milking parlors. Multipurpose farm
structures include barns.

regarding the appropriate longrun real after-tax return to equity, Melichar [1981] found that the total before-tax return to farm assets since 1950 has averaged about 8 percent. Also, Gertel [1982] found that the real before-tax return to cash rented farmland averaged 8.1 percent from 1940 to 1980. For this analysis, we decided to use a real after-tax return to equity of 6 percent.

Estimated Rental Rates

Table 2 presents our estimated rental rates for each of the five categories of farm assets under prior law and the Tax Reform Act for 1986 and 1987. The rental rates presented in table 2 represent the internal cost to the farmer for each dollar of investment in each type of asset category.[5] The only tax change which became effective in 1986 was the repeal of the investment tax credit. As a result of the repeal of the tax credit, rental rates for tractors, long-lived farm machinery, crop storage structures, and unitary livestock facilities increased significantly in 1986 (table 2). Increases for each of the those four categories of farm assets exceeded rental rates estimated under the assumption that prior tax law remained in effect by almost 10 percent. The only asset category which was not affected by the repeal of the tax credit was multipurpose farm structures.[6]

For 1987, when most of the provisions of the Tax Reform Act are phased-in, rental rates for each asset category except multipurpose farm structures are again significantly higher than if prior law had remained in effect. The results from table 2 indicate that for all assets except multipurpose structures the phase-in of the provisions of the Tax Reform Act cause an additional increase in rental rates.

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[5] For example, in 1986, if a farmer purchased a tractor for one dollar, the yearly cost of using that tractor increased from 29 to almost 32 cents under the Tax Reform Act of 1986.

[6] Multipurpose farm structures were not eligible to receive the investment tax credit under prior law.

Table 2—Normalized Rental Rates under Prior Law and the Tax Reform Act of 1986.

Asset Type:	1986		1987	
	Prior Law	Tax Reform Act	Prior Law	Tax Reform Act
Tractors	0.2911	0.3198	0.2888	0.3216
Long-Lived Farm Equipment	.2190	.2406	.2162	.2416
Crop Storage Structures	.1395	.1533	.1369	.1513
Unitary Livestock Facilities	.0985	.1083	.0946	.1058
Multipurpose Structures	.1153	.1153	.1108	.1107

Rental rates are expected to be 10.5 to almost 12 percent higher in 1987 for most farm assets except multipurpose structures as compared to only about a 10 percent increase in 1986. The difference between the percentage increases in 1986 and 1987 are a result of the phase-in of the modified ACR depreciation system and the lower marginal tax rates in the Tax Reform Act. Two results are evident when comparing the respective 1986 and 1987 increases in rental rates. First, the repeal of the investment tax credit is the main cause in any change in rental rates from prior law. The phase-in of the modified ACR depreciation system and the lower tax rates account for only an additional 2 percent increase in rental rates for most farm assets. Second, under our assumption of 50 percent debt and 50 percent equity financing, the phase-in of the modified ACR depreciation system and lower marginal tax rates increase rental rates for all farm assets except multipurpose structures. Our debt/equity financing assumption is critical because the lower marginal tax rates under the Tax Reform Act cause an increase in the after-tax cost of debt financing if before-tax interest rates are assumed not to be affected by the Tax Reform Act. For example, assuming the nominal before tax interest rate remains constant at 10 percent, the nominal after-tax interest rate increases from 7.8 percent under the 22 percent marginal tax rate for prior law to 8.5 percent under the 15 percent marginal tax rates for the Tax Reform Act. The increase in after-tax interest expenses causes the rental rate to increase because the required after-tax rate of return is higher.

Table 3 presents rental rates for 1986 and 1987 assuming complete equity financing. With complete equity financing, the estimated rental rates will not be affected any increase in the after-tax cost of debt financing. As depicted in table 3, rental rates remain significantly higher under the Tax Reform Act, but the percentage increase in 1987 is slightly less than the increase in 1986. The smaller increase in 1987 suggests that the phase-in of the ACR depreciation system and lower marginal tax rates could have a moderating influence on rental rates if an investor is less reliant on the use of debt financing.

Table 3—Normalized Rental Rates under Prior Law and the Tax Reform Act of 1986 Assuming Complete Equity Financing.

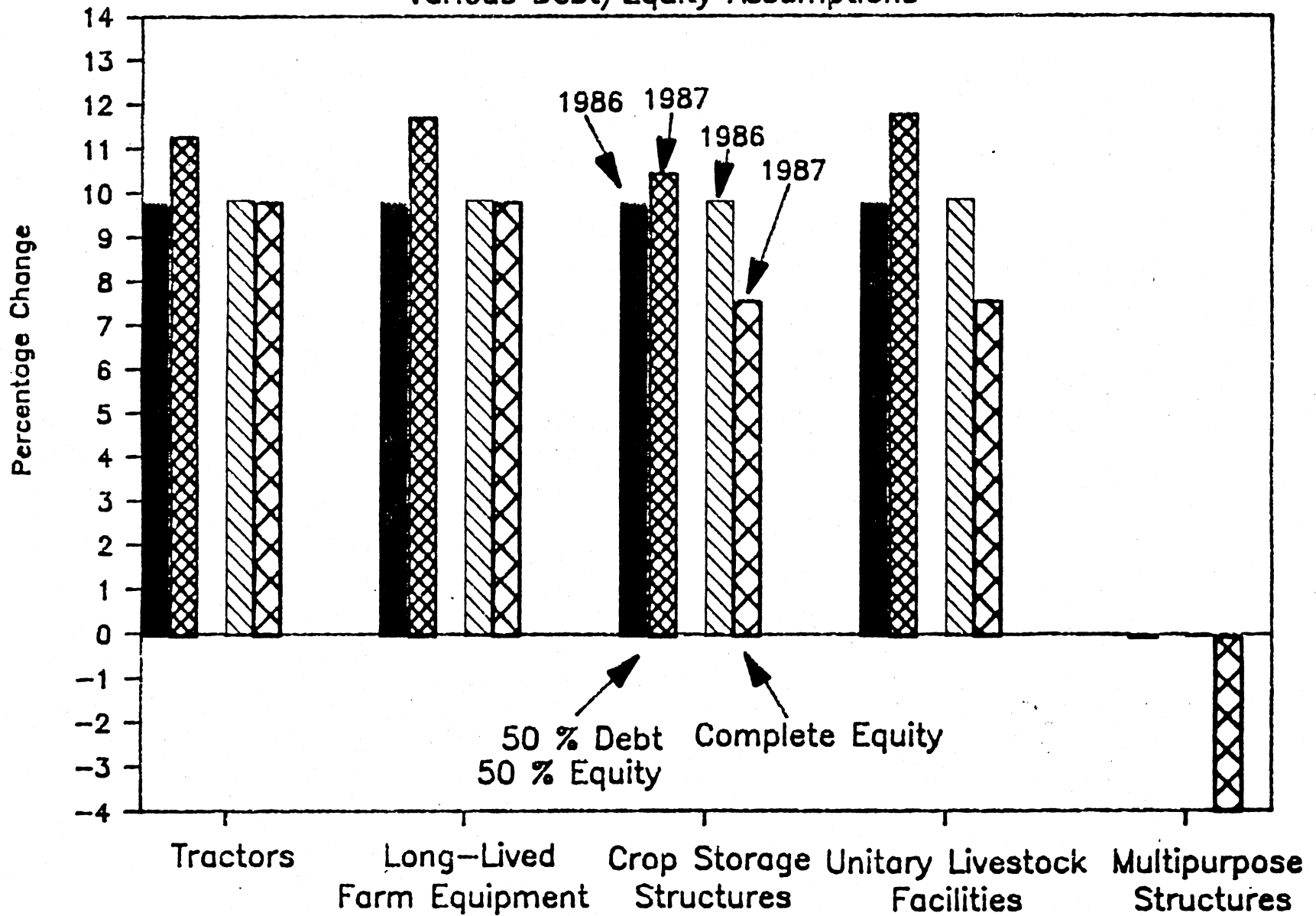| Asset Type:	1986		1987	
	Prior Law	Tax Reform Act	Prior Law	Tax Reform Act
Tractors	0.2892	0.3179	0.2923	0.3211
Long-Lived Farm Equipment	.2173	.2388	.2196	.2412
Crop Storage Structures	.1379	.1515	.1401	.1508
Unitary Livestock Facilities	.0969	.1065	.0979	.1053
Multipurpose Structures	.1133	.1133	.1147	.1102

Figure 1 depicts the percentage change in rental rates resulting from Tax Reform assuming 50 percent debt and 50 percent equity financing and complete equity financing. For 1986, there is almost no difference in the respective percentage changes in rental rates under either assumption because the only change to prior tax law was the repeal of the tax credit. In 1987, the percentage changes in rental rates are sensitive to the debt/equity assumption because of the lower tax rates under the Tax Reform Act. Assuming 50 percent debt and 50 percent equity financing, rental rates for most assets except multipurpose structures are expected to increase by 10.5 to 11.9 percent with the complete phase-in of Tax Reform. Assuming complete equity financing, rental rates for assets other than multipurpose structures increase by only 7.5 to 9.8 percent with the complete phase-in of the Tax Reform Act.

Conclusions

The provisions contained in the Tax Reform Act of 1986 will cause the rental rate for most types of farm machinery and structures to increase. The only asset category which receives more favorable treatment under the Tax Reform Act is multipurpose structures. The primary cause of the increase in rental rates is the elimination of the investment tax credit. The elimination of the tax credit causes rental rates for assets which under prior law were eligible to receive the credit to increase by almost 10 percent. The combined effect of the reducing marginal income tax rates and the modified ACR depreciation system is a function of the amount of debt financing employed by farmers. If a farmer relies less on debt financing, the lower tax rates and modified ACR depreciation system will moderate the increases in rental rates caused by the elimination of the investment tax credit. If a farmer relies more on debt financing, the lower tax rates and modified ACR depreciation system will augment the increases in rental rates caused by the repeal of the investment tax credit. Even if a farmer uses no debt financing, however, rental rates will still increase for most types of farm assets.

Percentage Change in Rental Rates Over Prior Law
Various Debt/Equity Assumptions

Bar chart showing Percentage Change (y-axis, ranging from -4 to 14) across categories: Tractors, Long-Lived Farm Equipment, Crop Storage Structures, Unitary Livestock Facilities, Multipurpose Structures.

Legend annotations: 1986 and 1987 labels for "50 % Debt 50 % Equity" and "Complete Equity" assumptions.

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