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THE NEW ECONOMICS OF ACCELERATED DEPRECIATION

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ABSTRACT

The Economic Recovery Tax Act of 1981 included the largest business tax cut in U.S. history, embodied in the Accelerated Cost Recovery System. This paper describes in detail the provisions of the new treatment of depreciable property, and analyzes in a fairly nontechnical way its economic impact.

Particular attention is paid to a novel part of ACRS that creates a "safe harbor" for a wide range of sale-leaseback arrangements, effectively permitting the sale of depreciation deductions by investors without taxable income.

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The Economic Recovery Tax Act (hereafter ERTA) of 1981 included several significant changes in the tax law that together represent the most substantial cut in corporate and personal income taxes since their introduction in 1913. A particularly important and controversial element of ERTA is the radical change in business depreciation practice introduced by the Accelerated Cost Recovery System (hereafter ACRS). Under ACRS, tax lifetimes are, in general, substantially reduced; there are now only three distinct depreciation classes[1] where there previously were well over a hundred; the investment tax credit has been liberalized; and a "safe harbor" has been created for a broad class of leasing arrangements to permit firms without taxable income effectively to sell their depreciation allowances and investment credits to corporations with taxable income. These changes, to be fully phased in by the end of 1985, are expected ultimately to produce a large revenue loss to the Treasury, with estimates varying from 54.5 billion dollars[2] to 61.3 billion dollars[3] for fiscal year 1986. In comparison, the total collection of the corporate income tax amounted to 64.6 billion dollars in 1980.[4] Thus, it would appear that, as a source of revenue, the corporate tax has been eliminated to a great extent. However, while this may be true in the aggregate, some significant differences remain, and others have been introduced, in the tax treatment of different investments and different investors that would not have existed had the corporate tax simply been phased out.

This acceleration of depreciation allowances is likely to have important consequences for the mix and level of investment in the U.S. over the next several years. After reviewing the history of investment incentives in the U.S., we will examine the new tax law, as it relates to depreciation, and compare it

with alternatives that arose during the policy discussion leading up to the passage of the Economic Recovery Tax Act. In Section IV, we review the criteria economists use in evaluating changes in the tax treatment of investment. Section V presents an economic analysis of ACRS, and also touches on the relative merits of some of the other recent proposals alluded to above. Section VI reviews separately a particularly important part of ACRS, the liberalization of sale-leaseback arrangements, and the last section offers some concluding comments on the state of the corporate income tax.

I. A Brief History of Investment Incentives in the U.S.

The first major change in the tax law aimed specifically at encouraging business investment was the Revenue Act of 1954, which permitted purchasers of assets two forms of "accelerated" depreciation for tax purposes as alternatives to the normal practice of the time, straight-line depreciation. The two new methods, sum of the years digits and double declining balance, both permit a large fraction of an asset's depreciation deductions to be taken in the years shortly after its acquisition. This shifting of deductions toward earlier years is equivalent to an interest-free loan to the purchaser, since it allows a deferral of tax payments to later years with no increase in the amount due.

Other major changes in depreciation practice before 1981 occured in 1962 and 1971. The introduction of depreciation guidelines by the Treasury in 1962 permitted investors to write assets off over a shorter period than had been typically true before. The Revenue Act of 1971 created the Asset Depreciation Range (ADR) system, under which the purchaser of a qualifying asset was permitted to select a tax lifetime of between 80 and 120 percent of the 1962 guideline life established for the appropriate asset class. The ADR system applied to personal property (equipment), but not depreciable real property (structures). Moreover, its election made the tax accounting more complicated for the investor. Added complexity has been offered as one explanation for the fact that many smaller businesses had failed to adopt ADR, even several years after its introduction,[5] and also continued to use straight-line depreciation rather than one of the accelerated methods.[6]

The other major element of tax system with a direct and narrow effect on investment is the investment tax credit (ITC). Introduced in the Revenue Act

of 1962 at a rate of 7 percent on new investment, it was suspended for a brief period between 1966 and 1967, "permanently" removed in 1969, reintroduced in 1971, and increased to 10 percent in the Tax Reduction Act of 1975. Like the Asset Depreciation Range, the ITC did not (and still does not) apply to depreciable real property, and applied at reduced rates for short-lived equipment with tax lives of less than seven years. This last feature of the ITC constituted the main reason an investor would have for using ADR to elect a tax lifetime in excess of an asset's guideline life.

While not limited to income from investment, tax rate reductions, especially in the corporate sector, have been viewed as a way of stimulating investment activity. Except for a ten percent surcharge during the Viet Nam War, the corporate tax has drifted downward during the last two decades, with a reduction to 48 percent from 52 percent in 1964 and a further reduction to 46 percent in 1978.

Econometric evidence varies on the degree of stimulus provided by each of these changes in the tax law, though there is general agreement among economists that tax incentives do influence the scale and type of investment that occurs.[7] The formulation and adoption in 1981 of the Accelerated Cost Recovery System grew in part from a general perception that not enough investment in plant and equipment was taking place.

II. The Accelerated Cost Recovery System

The key aspect of ACRS is the shortening and simplification of depreciation schedules applicable to personal and real property. A number of its other provisions were necessitated by this acceleration of depreciation allowances.

Effective January 1, 1981, most new personal (section 1245) property qualifies for one of two depreciation classes. Autos, light-duty trucks, and other personal property with a midpoint life of four years or less under the old ADR system qualify for a three-year write-off. Most other equipment may be depreciated over five years. Important exceptions are long-lived public utility property. Such property with an ADR midpoint life of between eighteen and twenty-five years now may depreciated over ten years, while a fifteen-year write-off is permitted for public utility assets with an ADR midpoint life greater than twenty-five years. Real (section 1250) property is assigned to a fifteen-year recovery period. This system of few depreciation classes and fast write-off is essentially the Capital Cost Recovery Act, or the "ten-five-three" scheme originally propsed by Congressmen Conable and Jones in 1979, except that the recovery period for real property has been lengthened.

The use of January 1, 1981, as the effective date for the legislation was meant to fulfill the promise given during the legislative debate that all investment occuring then would qualify for the new liberalized tax treatment. Property purchased before 1981 does not qualify for ACRS, but used property purchased after January 1, 1981, does. That is, ACRS applies to all property purchased by the current owner after the effective date, regardless of when the asset was originally manufactured, sold and placed in service. This application

of ACRS to used property is limited to "real" transactions by a series of "anti-churning" rules. For transfers between related parties or sale-leaseback arrangements, the latter also receiving greatly liberalized treatment under ACRS (see below), the purchaser must continue previous depreciation practice.

The new legislation also specifies the pattern of depreciation allowances to be used for each of the recovery classes. For personal property placed in service between 1981 and 1984, the allowances mimic the use of 150 percent declining balance with a switch-over to straight-line in the second year and adoption of the half-year convention, under which all assets purchased in a given tax year are treated as if they were purchased six months into the year. For 1985, the schedule for new personal property approximates 175 percent declining balance with a second-year switchover to sum-of-the-years digits. For 1986 and after, the pattern of allowances follows 200 percent declining balance with a second-year switchover to sum-of-the-year's-digits. These recovery schedules are summarized in Table 1. It should be noted that the switchover to straight-line or sum-of-the-year's-digits in the second year does not necessarily maximize the value of switching over to the investor. For example, for 1981-1984, a switchover to straight-line in the third year would give a larger second year allowance for assets in the five-year class.

For real property in the fifteen-year recovery class, except low income rental housing, allowances are not specified in the law but are supposed to approximate the benefits of using 175 percent declining balance with an optimal

Table 1

Recovery Schedules under ACRS

Year of Purchase	Class					
	3 Year			5 Year		
% Allowance in Year	1981-4	1985	1986-	1981-4	1985	1986-
1	25%	29%	33%	15%	18%	20%
2	38	47	45	22	33	32
3	37	24	22	21	25	24
4				21	16	16
5				21	8	8

switchover to straight-line. Low income housing qualifies for 200 percent declining balance with a switchover to straight-line. Unlike the rules for personal property, no half-year convention is applied here.

In addition to the above depreciation schedules, investors may also elect to use straight-line over the entire recovery period, or to use straight-line over one of two "extended" recovery periods specified for each recovery class. For purposes of calculating earnings and profits to determine whether dividends are taxable or represent a return of capital, the shorter of the extended recovery periods and straight-line depreciation must be used, unless the longer extended recovery period is elected for tax purposes, in which case it must be used for calculating earnings and profits. This provision represents an attempt to prevent the "losses" at the corporate level generated by ACRS from spilling over into the personal tax treatment of corporate distributions. Under previous law, the same lifetime applied to the calculation of earnings and profits and the calculation of tax depreciation (although straight-line was always assumed for the former). The use of different lifetimes for the two calculations is consonant with the view that the recovery periods are no longer intended to bear any close relationship to the concept of an asset's "useful life".

As a result of the shortening of recovery periods for asset depreciation, a number of other issues had to be addressed as part of the same tax legislation. First of all, so that assets in the three-year recovery class would not be limited to an investment tax credit of 3-1/3 percent (whereas many such assets previously could qualify for the full 10 percent credit through the use of the ADR

Table 2

Extended Recovery Periods

Class (Years)	Extended Recovery Periods (Years)
3	5, 12
5	12, 25
10	25, 35
15	35,45

system), the credit for this class was set at 6 percent. Similarly, all other personal property, in the five, ten and fifteen year classes, receives the full 10 percent credit.

A second related issue is the recapture of accelerated depreciation upon the sale of an asset. The treatment of personal property remains the same: all sale proceeds representing prior depreciation are taxed at ordinary rather than term capital gains rates. For example, the sale of an asset purchased for 100 dollars, with a current basis of 20 dollars, will result in the ordinary taxation of the difference between the sale price and 20 dollars for any sale price up to 100 dollars and capital gains taxation of any amount by which sale price exceeds 100 dollars. The treatment of real property is exactly the same if straight-line is not used. If straight-line is used, then the previous method of recapture for real property applies: only the difference between straight-line basis and actual basis (in this case zero) is subject to ordinary income taxation. Thus, a disincentive has been introduced against the use of the full ACRS depreciation benefits for those purchasers of real estate who intend to sell after a reasonably short period.

The recapture of the investment credit is similar to previous law. It must be "given back" pro rata (though without interest) if the period the asset was held before resale was less than the mininum specified for full credit. Thus, an asset in the five year class sold after three years would have to pay back 40 percent of the credit originally received. The ERTA also increases, to 125 thousand dollars in 1981 and 150 thousand dollars in 1985 (from 100 thousand

dollars currently), the amount of newly purchased used property to which an investor can appy the investment tax credit. To the extent of this limitation, it is now possible to obtain the full ITC every five years on a qualifying asset through resale.

The final issue raised by the large acceleration of depreciation allowances is that many taxpayers will be thrown into the position of having a net operating loss, for tax purposes. Since the income tax is not refundable, this would impose a limitation on the extent to which the tax benefits of the new legislation could be obtained. One method of lessening this effect was the increase in carry over period for net operating losses and the investment tax credit to fifteen years from the previously permitted three year carry back and seven year carry forward. However, this extension of the carryover period only partially extends the range of firms capable of benefitting from ACRS. Firms with a record of losses or new firms without any record of profit or loss must still carry net operating losses forward, which involves a loss in interest on the delayed depreciation deductions as well as a cash flow constraint. To increase further the coverage of ACRS, the Economic Recovery Tax Act created a "safe harbor" for a broad range of sale-leaseback arrangements, the effect of which is to allow transactions which are very similar to the outright sale of depreciation deductions and investment tax credits. Basically, as long as the lessor is a corporation and has an "at risk" investment of at least 10 percent of the asset's adjusted basis throughout the lease, the transaction will be characterized as a lease. Among the things allowed within this "safe harbor"

are financing of the other 90 percent of the purchase price by the lessee; retention by the lessee of nominal ownership of the property for other legal purposes (e.g. title possession and payment of local property taxes, etc.) and resale arrangements whereby the lessor is obligated to sell the asset back to the lessee at the termination of the lease below fair market value. With these provisions, it is possible (see the example in Section VI) to structure a lease so that lessor and lessee need exchange money only at the commencement of the lease. Such an arrangement would appear to make the lease indistinguishable from the simple sale of depreciation allowances and investment credits. However, while there have been recent Treasury regulations on this issue, it is not yet entirely clear that lessors can fully escape all risks associated with the potential bankruptcy of lessees. Moreover, in the case of mass transportation equipment owned by state and local governments and financed by tax-exempt bonds, the current leasing arrangements allow the lessee to be a non-taxable entity. This makes it possible for such an government to "sell" credits and depreciation allowances for which it would never be eligible itself.

As always, the revenue cost of such a large tax reduction as ACRS is difficult to measure with any precision, because such a calculation requires estimates of how much investment (and other sources of revenue) will occur with ACRS as well as how much would have occurred without ACRS. While macroeconomic models exist and can be applied for such purposes, one can have confidence only in the rough magnitudes rather than the exact values of predictions. This is not a fault of the model-builders; there is simply too much uncertainty about the future to make precise forcasts. Nevertheless, it is interesting to examine the revenue costs that have been projected for ACRS.

Table 3 presents estimates by the Joint Committee on Taxation and the Office of Tax Analysis of the Treasury of the annual revenue loss that will occur because of the adoption of ACRS during the fiscal years 1981-1986. The estimates, which are quite similar, predict an annual loss which grows steadily throughout the period, and presumably, would continue to grow if calculations for later years were available. There are three reasons for this growth. First, as the nominal amount of investment grows (through real growth as well as inflation) so will the depreciation deductions and investment credits received. Moreover, only that fraction of capital purchased after 1981 will be receiving the new depreciation allowances. As the years pass, this will include a larger and larger fraction of the total capital stock. Finally, the phase-in provision, for personal property, of the degree of acceleration of deductions over the specified recovery period, must also contribute to a growth in revenue cost.

While these numbers are large by historical standards, they appear small relative to the revenue losses projected by OTA and JCT resulting from the personal tax cut. For example, JCF projects a loss of 196 billion dollars in 1986 alone from personal tax cuts,[8] while OTA estimates the loss to be 174 billion dollars.[9] However, these numbers are not really comparable to the estimates for ACRS since, even with a constant rate of inflation, "bracket creep" caused by the progressivity of the individual rate schedule would have caused the tax receipts to rise. No similar increase is built into the corporate tax, since the tax rate on virtually all income is the same. Thus, a large portion of the individual rate cut is not really a tax cut in the same sense that all of ACRS is.[10]

Table 3

Revenue Cost of ACRS
(Billions of Dollars)

Fiscal Year	OTA*	JCT**
1981	2.02	1.56
1982	8.98	10.66
1983	17.15	18.60
1984	28.05	28.28
1985	41.32	39.27
1986	61.35	54.47

* U.S. Department of the Treasury, Office of Tax Analysis, op. cit.

** U.S. Joint Committee on Taxation, op. cit.

III: Other Proposals

While effective opposition to ACRS never surfaced in Congress, there were a number of alternatives proposed by members of the House and Senate as well as the Carter Administration, beginning in 1980. One proposal, passed by the Senate Finance Committee in the summer of 1980, would have established four, rather than two recovery classes for personal property, excluding public utility property, with lengths of two, four, seven and ten years rather than three and five.[11] Under "2-4-7-10," assets in the two and four year classes were to receive an investment tax credit of 2.5 and 6 percent, respectively, with the other classes receiving the full credit. Public utility property was given a liberalized ADR variance of 30 percent, but otherwise unaffected. Investors in real property were allowed a twenty-year lifetime, with straight-line depreciation, and the option of using a fifteen-year straight-line write-off for low income rental housing and a fifteen-year, 150 percent declining balance write-off for owner-occupied non-residential structures. The bill also would have cut the top corporate tax rate to 44 percent.

The pattern of depreciation allowances to be applied to assets in the four personal property classes was somewhat novel. The investor would have been permitted to use 200 percent, 150 percent or 100 percent declining balance, but these percentages were to be applied to the total basis of all assets owned by the investor in the relevant recovery class, rather than separately to assets of different ages. Moreover, the percentage declining balance could be changed annually at the discretion of the investor. Finally, current recapture rules for personal property would have been replaced by the requirement that the sale

price of an asset of which an owner had disposed be deducted from the basis of all relevant recovery class accounts; assets sold were thus to be treated in a way symmetrical to assets purchased.

A main benefit of this system of aggregate personal property depreciation was its simplicity, replacing "vintage accounts" kept for assets by recovery class and year of purchase with "open-ended accounts" for all assets in each class. This type of simplification only could be possible in conjunction with the move to a constant rate declining balance formula, since the age structure of the assets being depreciated then would have no effect on the total amount of deductions; only the basis of each asset would be relevant, and these could be added together before, rather than after, the application of the percentage depreciation rate. Since ACRS uses combinations of depreciation methods, rather than a single declining balance formula for each recovery class, it requires continuance of the more complicated vintage account system.

The scheme put forward by the Carter Administration in 1980, referred to as "constant-rate depreciation", was similar to 2-4-7-10 in that it called for a reduction in the number of capital recovery classes (to 30) and the application of a constant-rate declining balance formula to open-ended recovery accounts. Neither 2-4-7-10 nor constant-rate depreciation would have provided tax reductions as large as those given by ACRS. This can be seen clearly from Table 4, which compares the revenue costs of the forerunner to ACRS, 10-5-3, with those of 2-4-7-10 and CRD. (The 74.5 billion dollar loss in 1986 under 10-5-3 exceeds those for ACRS cited above because of changes such as the lengthening of the real property recovery period.) Two other proposed changes in depreciation

Table 4

Revenue Cost Estimates of 10-5-3 and Two Alternatives*

(Billions of Dollars)

Fiscal Year	10-5-3	2-4-7-10	CRD
1981	2.9	4.3	2.9
1982	10.8	13.7	9.0
1983	22.1	18.6	14.2
1984	37.8	19.0	18.4
1985	56.3	19.7	22.2
1986	74.5	21.0	25.4

* Assumes a January 1, 1981 effective date.

Source: Congressional Budget Office, op. cit.

practice would have replaced the stream of depreciation deductions reeceived by an asset over its tax lifetime, or recovery period, with a single deduction in the year of purchase. Under the First Year Capital Recovery System (FYCRS), originally formulated by Alan Auerbach and Dale Jorgenson[12], each asset would have been assigned a capital recovery deduction in the year of purchase equal to a certain fraction of full purchase price, with the exact value of this fraction varying across classes of assets according to durability. Very short-lived assets would have received nearly a dollar in allowances for each dollar spent, while very long-lived assets would have been given less than half of the purchase price as a deduction.

The method of calculating such first-year allowances was to estimate the fraction of its value an asset would lose during each year of its productive life, and take the present value of such annual measures of "economic depreciation" using a discount rate of 4 percent. For example, an asset purchased for 100 dollars new, and expected to lose one-tenth of its value every year, would receive a deduction of $71.43, or about 71-1/2 cents for each dollar of capital purchased[13]. Like 2-4-7-10, FYCRS would have introduced symmetric treatment to the disposal of assets, with sellers including in income the same amount that purchasers could deduct, the sale price multiplied by the first-year allowance. It would also have been very simple, for assets would always have a basis of zero, eliminating the need for record-keepping. Some versions of the first year system also called for a repeal of the investment tax credit.

A related, but simpler and considerably more generous proposal, was made by Democrats in the House shortly before the adoption of ACRS in 1981. This would have permitted a full, rather than fractional, write-off of personal property in the first-year of acquisition, repealed the investment tax credit, and gradually brought the corporate rate down to 34 percent. The revenue loss for this plan was thought to be similar to ACRS.

All proposals, both ACRS and various others, stressed simplicity, and most would have lowered to some extent the tax burden on capital investment. However, they differed in a number of respects important from an economic perspective, including

(1) the overall tax burden on investment;

(2) the distribution of this tax burden across different assets;

(3) the sensitivity of this burden to inflation;

(4) the revenue loss per dollar of investment; and

(5) the distribution of incentives between the investments of taxable and non-taxable investors.

IV. Evaluation Criteria

To explore these differences and their importance, it is necessary to discuss first the economic criteria that are involved. First of all, it has long been recognized that virtually all taxes distort economic behavior[14]. This reduction in economic efficiency is referred to as the "deadweight loss" or "excess burden" of the tax system. While it may be inevitable that some efficiency be sacrificed in order to raise revenue, not all taxes impose the same excess burden per dollar of revenue raised. Some tax structures are more efficient than others, and the area of study called "optimal tax theory" seeks to characterize tax systems that are relatively efficient. While the results of such work are fairly complicated, certain basic rules do come out. First, it is usually more efficient to tax activities (e.g. types of income or purchases) that are relatively unresponsive to price changes. For example, how high the overall tax burden on savings and investment ought to be, from an efficiency perspective, would depend on how responsive savings is to changes in the after-tax rate of return[15]. A second general rule is that it is relatively inefficient to raise revenue through a distortion of production activity. Such a distortion would arise in the allocation of capital, for example, if different types of investment were taxed at different rates. Such differential taxation would cause a shift of investment into the more lightly taxed types of asset. The term "neutrality" is often used to describe a tax sytem that does not distort production efficiency. Of course, full neutrality with respect to the allocation of capital would call for comparable treatment of nonbusiness capital and business capital. The former consists mostly of owner-occupied housing,

which currently receives very favorable treatment under the tax law. To the extent that taxes on capital are higher in the business sector, any proposal which lowers them, by effecting a shift of capital from residential to non-residential uses, would increase allocative efficiency.

A related issue is how the tax treatment of assets is influenced by changes in the inflation rate. Under any capital recovery system where depreciation allowances are based on original cost, the effect of inflation is to lower the real value of future depreciation allowances. Their dollar value is unaffected, but they are worth less in terms of purchasing power. This effect of inflation may reduce economic efficiency for two reasons. First, in raising the overall tax burden on investment income to what might be an inefficiently high level and, second, in its differential impact across different investments, leading to production distortions.

How much "bang per buck" a tax reduction has, i.e., how much new investment will be generated by reductions in tax revenue, depends on at least three factors. First, how effective is the tax reduction at focusing on the behavior it seeks to encourage? In the current context, this depends on the treatment of old versus new assets. Plans that reduce the tax burden on income from existing assets are more costly because only part of the tax reduction goes toward encouraging new investment[16]. Second, how is the plan phased in over time? It is possible to encourage or discourage investment today through the changes in tax structure that are scheduled to occur in the near future. An example of this is the phasing in under ACRS of the full depreciation deductions for personal property investments between 1981 and 1986. Third, how responsive is

investment to tax incentives? This depends on a number of factors, including the responsiveness of businesses to changes in the tax treatment of investment income as well as the responsiveness of savers to the net rate of return. The latter matters because if a tax cut does stimulate investment, businesses will seek more funds in the capital market. As they do so, the price of funds, the interest rate, will be bid up. How high it must go depends on how responsive savers are to its increase. Empirical evidence on this savings responsiveness is weak. Evidence on the responsiveness of business to tax incentives suggests that previous changes in depreciation schedules and the investment tax credit have led to increased investment, although different views exist about the magnitudes involved[17].

Finally an issue relevant to the current discussion is the treatment of similar assets purchased by different investors, particularly those with and without taxable income. Because investment incentives are often considered when at least some sectors of the economy are in recession, the need to have taxable income to offset increased deductions or credits may restrict the ability of many firms to take advantage of the tax cut. Whether this is economically desirable is open to question. On one side is the argument that full coverage (via refundability, for example) encourages poorly managed companies to continue operation. On the other hand, profits as measured for tax purposes only vaguely resemble real economic earnings, and the "bad management" argument can not be fairly applied to new firms without any earnings history. Indeed, the indirectness and complication of the new "safe harbor" leasing included in ACRS seems to have been aimed in part at satisfying proponents on each side of this argument.

V. The Economics of ACRS

The design of ACRS limits the ability of investors to get any additional tax benefits for assets first put in service before January 1, 1981. In this sense, it should have a large "bang per buck" relative to other proposals that included a reduction in corporate taxes, since the latter would have reduced taxes even for those making no new investments. As indicated above, the anti-churning rules prevent a taxpayer from obtaining ACRS benefits on property the taxpayer put in service prior to 1981. And, while it is possible under the statute to obtain ACRS on used property through a transfer of ownership, the full tax benefits might be negative. This is because the prospective increase in depreciation allowances would be accompanied by an immediate recapture of earlier deductions. For example, suppose a piece of equipment was purchased for 100 dollars, received the investment tax credit, now has a basis of zero and a potential sale price of 40 dollars. If a sale occurred, the seller would pay taxes immediately on 40 dollars of income, while the purchaser could take deductions equal to 40 dollars over five years. If they were in the same tax bracket, the taxes paid by the seller would exceed, in present value, the taxes avoided by the purchaser. Only to the limited extent that the investment tax credit could be taken again might this transaction be worthwhile. For structures, the tax on recapture would be lower because of the capital gains treatment of the gain over straight-line basis. However, the present value of prospective deductions under ACRS also would be smaller, for the deductions must be taken over a period of fifteen rather than five years. While particular cases in which a sale would generate tax benefits are possible, this does not appear to be a large problem, particularly because this type of sale cannot be done in conjunction with a sale-leaseback arrangement.

The other part of the "bang per buck" question concerns the phase-in of ACRS for personal property. Because investments made in 1986 (and 1985, to a lesser extent) will receive more favorable treatment than assets purchased in 1981 through 1984, some investors who possess a degree of flexibility in the timing of their purchases may wait until 1986 to invest. This will lessen the expansionary effect of ACRS in the next four years. Whether this is good or bad from a macroeconomic perspective largely depends on the severity of the current recession and how expansionary the rest of the federal government's tax-expenditure program ultimately turns out to be.

In order to evaluate the burden imposed on different investments under ACRS, we calculate and display in Table 5 values, discounted at an after-tax rate of 12 percent, of depreciation allowances received by typical investments in the three, five and fifteen years classes. For the three and five year classes, the deduction equivalent to the investment credit (for a corporation in the top bracket), labelled "A", is also calculated to obtain the combined effect of investment related credits and deductions. These values rise over time for the personal property classes because of the phase-in, but exceed one even in 1981. This means that the combination of depreciation deductions and the investment credit offers a greater tax shield than immediate expensing without the ITC, the alternative proposed by House Democrats in 1981. This is not the case for most structures, which receive the equivalent of about fifty-five cents in deductions per dollar invested.

A useful way of understanding these numbers is to ask what reduction in tax rate the investor would require in exchange for giving up the credits and deduc-

Table 5

Present Value of Depreciation Allowances under ACRS

(per dollar invested)

Discount Rate = 12%

	Year of Purchase		
Asset Class	1981-1984	1985	1986
3 year*			
PV of Deductions	.8842	.9010	.9072
ITC /.46	.1304	.1304	.1304
Total (A)	1.0147	1.0314	1.0376
5 year*			
PV of Deductions	.7968	.8387	.8418
ITC/.46	.2174	.2174	.2174
Total (A)	1.0142	1.0561	1.0592
15 year**			
PV of Deductions	.5515	.5515	.5515
ITC/.46	0	0	0
Total (A)	.5515	.5515	.5515

* Based on the schedules reported in Table 1.

** Based on 175 percent declining balance with a switchover to straight-line in year 8 and purchase 6 months into the tax year.

tions of ACRS for those consistent with economic depreciation; that is, what effective tax rate on true economic income is imposed by the combination of a statutory tax rate of 46 percent on investment tax credit and a rapid write-off. To derive this effective tax rate, we must know what the economic depreciation of assets actually is, and must make assumptions about the inflation rate and the real after-tax rate of return earned by corporations on their investments. Table 6 presents effective tax rate calculations for five representative types of investment in the three main recovery classes. For a real discount rate, we use 4 percent[18]. Estimates of declining-balance rates of economic depreciation are obtained from a recent U.S. Treasury study.[19] Effective tax rates for each asset are computed for inflation rates of 6 percent and 8 percent.

Perhaps the most startling result in Table 6 is that most of the tax rates are negative: investors would prefer ACRS to the abolition of corporate taxation, for assets in the three-year and five-year recovery classes. This outcome is perfectly possible, and consistent with the results in Table 5, where such assets were found to have equivalent deductions and credits in excess of immediate write-off. In fact, these conditions are the same. As others have pointed out in the past, immediate write-off converts the corporate tax to a "partnership" where government bears an equal percentage of costs and receipts, with each "partner" earning the before-tax rate of return on investment. Hence, a system more generous than immediate write-off is equivalent to government bearing a greater fraction of the initial cost than it receives of the future flows: it is <u>subsidizing</u> the project. Furthermore, these calculations assume no debt is used to finance the project. Since interest payments are tax

Table 6

Effective Tax Rates under ACRS*

Asset Class	Recovery Period (years)	Economic Depreciation Rate**	ETR for Inflation Rate = 6%	8%
Trucks, buses and trailers	3	.254		
1981-1984			-24.7%	-10.1%
1985			-40.5	-24.5
1986			-47.3	-30.8
Construction machinery	5	.172		
1981-1984			-17.0	-5.2
1985			-37.4	-24.0
1986			-39.1	-25.0
General Industrial Equipment	5	.122		
1981-1984			-23.5	-6.9
1985			-55.3	-33.9
1986			-58.2	-36.5
Industrial Buildings	15	.036	39.4	42.1
Commercial Buildings	15	.025	35.8	38.3

* Derived according to formula $t = \tau/[1+(\frac{1-\tau}{1-A})(A-\frac{\delta}{r+\delta})]$ where $\tau = .46$, $r = .04$, A is as defined in Table 5 and δ is the economic depreciation rate. Further details provided by the auther upon request.

** Estimated rate of declining-balance economic depreciation; see text.

deductible, these additional tax savings would make the effective tax rates more negative for projects financed in part by borrowing.

These negative tax rates differ across types of personal property, but the key difference is between personal property and real property. At an inflation rate of 6 percent, the effective tax rates on industrial buildings and general industrial equipment would differ by almost 98 percentage points after 1985. This poses an enormous distortion in the allocation of industrial capital.

Aside from differing by asset class, the effective tax rates also depend on the inflation rate that prevails. This is because, depreciation allowances received in future years are eroded to the extent that prices rise between the date of purchase and the date of the allowance. These rates rise more for the personal property classes, though they are still negative at an inflation rate of 8 percent. In fact, it would take a long-run inflation rate of 14 percent to bring the post-1985 effective tax rate out of the negative range.

These effective tax rates, especially those for equipment, are substantially lower than those that would have applied had any of the alternative to ACRS discussed above been enacted. For example, under "2-4-7-10", the effective tax rates at 8 percent inflation would have been -0.50 percent for trucks, buses and trailers, +0.65 percent for construction machinery and +0.85 percent for general industrial equipment[20] -- virtually the same as in the House expensing proposal. The Carter Administration proposal specifically precluded the total tax benefits for any asset from exceeding those of expensing. Under the First-Year System with no investment tax credit, the effective tax rate would have been 46 percent for all assets.

The effective tax rates under ACRS are also more sensitive to inflation than would have been true under either the expensing or First Year proposals. Since each of the latter two plans offered a deduction only in the year of purchase, the value of such deductions would not have been influenced by fluctuations in the rate of inflation.

Aside from the distortion caused by such large differences in tax rates among investments competing for the same funds, it is not necessarily efficient to tax corporate capital income at a rate near or below zero, in the aggregate.[21] However, given that such rates were being set, a serious problem of coverage would have arisen had not something like the safe-harbor for leasing been created at the same time. Indeed, this problem would have become more acute over the years, as greater fractions of the assets owned by companies fell under ACRS. The tax losses generated by even profitable investments would, for a number of companies, outweigh taxable income generated by real property, pre-1981 depreciable assets and non-depreciable assets. Indeed, the revenue cost estimates of ACRS cited in the introduction are so large a part of total corporate tax collections that this problem is obvious without detailed calculations.

VI. Leasing

The new safe-harbor leasing rules make it possible to structure a transaction so that "lessor" makes a single, initial payment to "lessee", obtains in return the investment tax credit and depreciation deductions on the designated property, and all contact between the two parties may then cease. However, the exact details of the agreement will determine how much the lessor is willing to pay for the credits and deductions. One purpose of the analysis that follows is to show this and to give a numerical example of one such hypothetical transaction.

Another issue that arises in the discussion of leasing is the question of whether it should be available to all firms with tax losses. Imagine two types of firms with current net operating losses and without the availability of a carry back against previous taxable income. Type I, the "high growth" firm, has "losses" primarily because of the amount of investment it is undertaking. It will have profits in future years. The Type II firm, of which Chrysler might be an example, already has lots of tax losses to carry forward. Even if its current investments generate a taxable profit, this company will be able to offset such profit using its net operating loss carry forwards. For the forseeable future, it is essentially non-taxable. Without leasing, both would have to carry forward those tax benefits associated with the ITC and depreciation deductions. Even with taxable income in the future to offset by these losses, the companies would receive a lower present discounted value from these tax shields. In the case of Type I firms, this would put them at a competitive disadvantage

with firms having taxable income: they would have to pay taxes on their gross income when earned, but carry forward their deductions at the beginning. Leasing would put them on a par with taxable firms. However, since Type II firms expect to pay no tax on their earnings, should they, too, be allowed the full value of their deductions? The apparent answer is no, that this would give them a tax advantage over the other types of firm. However, as we discuss below, the problem is really more complicated because of the presence of interest deductibility.

Under a typical leasing arrangement, the lessee purchases (or already has purchased) the property in question. The lessor "purchases" it, using up to 90% borrowed money, which we shall assume is lent by the lessee. Over the period of the lease, the lessor gets the opportunity to take the applicable investment tax credit and depreciation deductions. The lessor makes payments of principal and interest to the lessee on the outstanding loan, while the lessee makes payments on the lease. At the end of the term of the lease, the lessor pays off the balance of the loan and the lessee "repurchases" the equipment at a price specified in the lease. By arranging for principal and interest payments to equal lease payments, and for the repurchase price to equal the terminal loan balance, the parties to the lease need exchange money only upon the initial purchase. Moreover, to avoid recapture, they can arrange for the repurchase price to be nearly zero.

Under such an agreement, the lessor would have to pay taxes over the course of the lease on the difference between lease payments made by the lessee and interest payments made to the lessee. Similarly, the lessee, if taxable in future years, would get the benefit of tax deductions of equal size. Thus, the

initial amount transferred from lessor to lessee constitutes only part of the "payment" the lessor makes to buy the lessee's depreciation deductions and tax credit.

For a lease of length T, with matching level annual payments, a zero repurchase price and a loan interest rate of i, the initial payment that would yield a zero present value for the lessor over the entire transaction is:

$$x = \tau A - B(1-\tau A)$$

where A is the combined present value (in terms of equivalent deductions) of the asset's investment credit and recovery allowances, as defined in Table 5, τ is the lessor's marginal tax rate (normally 46 percent since lessors must be corporations) and B is defined by the formula

$$B = \begin{cases} \dfrac{1}{\frac{(i-\rho)}{\tau i}\left(\frac{(1+i)^T-1}{(1+\rho)^T-1}\right) - 1} & \text{, if } p \neq i \\ \dfrac{\tau i T}{(1+i)^{T+1}-(1+i)-\tau i T} & \text{, if } p = i \end{cases}$$

where ρ is the discount rate used. The corresponding annual lease payments would be

$$P = \frac{(1-x)i(1+i)^T}{(1+i)^T - 1}$$

Various values for the initial payment, x, and the annual lease payments, P, for hypothetical leases involving the three personal property examples used in

Tables 5 and 6 are presented in Table 7. The main result in Table 7 is that though the initial payment, x, is far less than the value of credits and deductions to the lessor, τA, it is not very sensitive to the discount rate used. For example, a lessor with a discount rate of 12 percent would pay 21.2 cents for a five-year lease per dollar of assets in the five-year recovery class; this figure would be 20.5 cents if the lessor had a discount rate of 6.48 percent.[22]

A fully worked out example of one of these transactions appears in Table 8, for a five-year lease of a five-year asset and a 12 percent discount rate.[23]

Table 7

Lease Characteristics

(interest rate = 12%; asset price = 1 dollar)

Recovery Class	Discount Rate (ρ)	Lease Term	Value of Deductions plus Credit (τA)	Initial Payment (x)	Lease Payments (P)
3 years	12%	3	.467	.160	.349
	10	3	.475	.154	.352
	6.48	3	.489	.142	.357
	12	5	.467	.212	.218
	10	5	.475	.202	.221
	6.48	5	.489	.180	.227
5 years	12	5	.467	.212	.218
	10	5	.479	.209	.219
	6.48	5	.504	.205	.220
	12	10	.467	.303	.123
	10	10	.479	.297	.124
	6.48	10	.504	.279	.128

Table 8

A Sample Leasing Transaction

Year	1982	1983	1984	1985	1986	1987
1. Purchase	100.00	0	0	0	0	0
2. Loan	78.85	0	0	0	0	0
3. Loan Repayments	0	12.42	13.90	15.57	17.43	19.53
4. Loan Balance	78.85	66.43	52.53	36.96	19.53	0
5. Interest Payments	0	9.45	7.97	6.30	4.44	2.34
6. Lease Receipts	0	21.87	21.87	21.87	21.87	21.87
7. Depreciation Allowances	15	22	21	21	21	0
8. Investment Credit	10	0	0	0	0	0
9. Tax*	-16.90	-4.41	-3.27	-2.50	-1.64	8.98
10. Cash Flow**	-4.25	4.41	3.27	2.50	1.64	-8.98

Present Value (discounted at 12 percent) = .02 dollars

* Tax = .46 x (6-5-7) - 8

** Cash Flow = (2-1) + (6-4-5) - 9 = 2-1-9

We next consider the relative position of different types of firms, with the availability of safe harbor leasing. If a fully-taxable firm sells and then leases an asset from one in similar circumstances, the tax effects should cancel, with respect to bot the ITC and depreciation deductions and the taxes on lease payments net of interest payments. Should the lessee be a Type I firm with no taxable income in the year of the lease but taxable income thereafter, the lease will allow the full tax benefits of ACRS to be obtained, but the taxes on lease payments net of interest payments will still cancel. Thus, the lessee has been enabled to gain a position similar to the fully-taxable firm. Finally, however, consider the non-taxable Type II firm as lessee. It gets the full value of the asset's depreciation deductions, but it pays no taxes on the income the asset generates. This appears to place it in a favored position relative to the other firms. However, there are two extenuating factors here. First, the non-taxable lessee cannot take advantage of the deductions of lease payments made net of interest received from the lessor, while the lessor must include the difference in income. Naturally, two firms in this situation could lengthen the term of the lease substantially, and in so doing make the loan repayments smaller, although the term of a lease cannot exceed the greater of 150 percent of the asset's ADR midpoint life and 90 percent of its "useful life" as defined under section 167 of the Internal Revenue Code. In addition, to the extent that the Type II firm finances its investment with borrowing of its own, it cannot deduct the interest payments, while a firm with taxable profits can. Together, these two factors will probably not give the advantage to the taxable firm, but they will lessen the disadvantage from which it suffers relative to the non-taxable firm.

Of course, what makes a sale-leaseback agreement really different from the sale of credits and deductions is the risk undertaken by the lessor that the lessee will enter bankruptcy. What the position of the lessor would be in such a case is a legal issue that can not be judged here.

VII. Conclusions

The Accelerated Cost Recovery System included in the Economic Recovery Tax Act of 1981 reduced greatly the tax burden on nonresidential and non-owner-occupied residential investment in the U.S. undertaken after January 1, 1981, to the extent that it will largely offset the corporation income tax in future years. However, its effects are quite different from the simple abolition of the corporate tax. The effective corporate tax rate is not zero, but varies widely across assets and is negative for many. The opportunity to deduct interest payments makes the effective tax rates on debt-financed investments still lower. What will keep corporate tax collections positive is many firms continuing at least for a time to derive a large portion of their income from sources other than depreciable personal property purchased after January 1, 1981. Those firms not in this category will be able to sell part of their losses to those that are through safe-harbor leases. Thus, the smallness of corporate tax collections will mask what is happening: some investments, being taxed effectively at substantially negative rates being used to shelter others that face positive tax rates.

Regardless of whether reductions in capital income taxes were in general a good idea, ACRS appears to have accomplished this objective in a rather complicated and distortionary way.

Footnotes

* Assistant Professor of Economics, Harvard University; Research Associate, National Bureau for Economic Research; A.B. Yale University 1974; Ph.D. Harvard University 1978. I am grateful to Alvin C. Warren for helpful comments.

1 There are two additional classes for longer-lived public utility property. See the discussion below.

2 U.S. Joint Committee on Taxation, Summary of H.R. 4242, the Economic Recovery Tax Act of 1981, August 5, 1981.

3 U.S. Department of the Treasury, Office of Tax Analysis, Change in Fiscal Year Receipts Resulting from the Conference Agreement on H.R. 4242, the Economic Recovery Act of 1981, August 3, 1981.

4 U.S. Council of Economic Advisors, Economic Report of the President, 1981; Table B-70.

5 Evidence of this behavior is reported in T. Vasquez, "The Effects of the Asset Depreciation Range System on Depreciation Practice," U.S. Department of the Treasury, Office of Tax Analysis Paper No. 1, May, 1974.

6 An alternative agreement is that such businesses, less closely scrutinized by the Internal Revenue Service, simply chose tax lifetimes sufficiently short that ADR could be of no further assistance.

7 This is discussed in greater detail in Section IV.

8 U.S. Joint Committee on Taxation, op. cit.

9 U.S. Department of the Treasury, Office of Tax Analysis, op. cit.

10 A January, 1981, study by the Congressional Budget Office suggested that indexing the tax system as of January 1, 1981, to avoid bracket creep would have resulted in a revenue loss of $182.1 billion dollars by FY1985. Shifting this number back to 1986 to allow for the later passage of the ERTA suggests that the personal tax cut exceeds indexing by very little in the aggregate. See Congressional Budget Office, An Analysis of President Carter's Budgetary Proposals for Fiscal Year 1982, January, 1981.

11 For further details of this proposal, U.S. Joint Committee on Taxation, Summary of the Tax Cut Provisions of H.R. 5829, August 25, 1980.

12 A.J. Auerbach and D.W. Jorgenson, "The First-Year Capital Recovery System," Harvard Institute of Economic Research Working Paper No. 740, February, 1980. Reprinted in Tax Notes, April 14, 1980; see also A.J. Auerbach and D.W. Jorgenson, "Inflation-Proof Depreciation of Assets," Harvard Business Review, September-October 1980.

13 This comes from discounting the economic depreciation of .1, .1 x (1-.1), .1 x $(1-.1)^2$,... at a rate of .04.

14 The only exceptions are "lump-sum" taxes, such as head taxes, because they are levied on individuals without regard to any aspect of economic activity. Since the individual can do nothing to lessen the tax, he will not be induced to distort his behavior. Unfortunately, this "strength" is also what makes lump-sum taxes impractical.

15 The issue of how responsive savings is and how heavily it should be taxed is at present a hotly debated one in the area of Public Finance. Many have argued in favor of a cash-flow or "consumption" tax that would allow individuals a deduction from the income tax base for net saving. Such a tax change would also involve either elimination of the corporate tax or an alternative adjustment that would effectively eliminate the tax for income from new investments. However, there are other arguments in favor of a consumption tax aside from those relating to efficiency. See the discussion in J. Pechman, editor, What Should Be Taxed: Income or Expenditure? (Washington: Brookings 1980).

16 Indeed, it would be cheaper still to offer incentives only to that new investment that would not otherwise have occured, but this would be impossible to implement. A more sensible approach that has come up over the years is to apply the incentives only to the increment in investment over the average of investment in previous years. This is precisely the way in which the new tax credit for research and development has been structured.

17 For a recent analysis, see R.S. Chirinko and R. Eisner, "The Effects of Tax Parameters on the Investment Equations in Macroeconometric Models," U.S. Department of the Treasury, Office of Tax Analysis Paper No. 47, January, 1981.

18 The use of this rate follows Auerbach and Jorgenson, "Inflation-Proof Depreciation of Assets," op. cit.

19 Charles Hulten and Frank Wykoff, "Tax and Economic Depreciation of Machinary and Equipment: A Theoretical and Empirical Analysis," U.S. Department of the Treasury, Office of Tax Analysis, 1979.

20 Calculations assume the first asset class will receive a 2.5 percent tax credit and use 200 percent (double) declining balance over 2 years, while the other two receive a 6 percent credit and use 200 percent declining balance over 4 years.

21 Naturally, important distributional issues are involved in such a large cut in capital income taxes. However, since the main focus here is on ACRS as a reduction in capital income taxes, such questions are being left aside.

22 The value 6.48 percent is chosen for the example because it would be the after-tax discount rate for a firm borrowing at 12 percent.

23 For other examples, see S.M. Sheffrin, "The Simple Economics of the Liberalized Leasing Provisions," University of California - Davis, October, 1981.