LEASE EVALUATION
AND THE INVESTMENT TAX CREDIT:
A FRAMEWORK FOR ANALYSIS

R. CHARLES MOYER

Dr. Moyer is Associate Professor of Finance, University of Houston. He has authored articles in such journals as Accounting Review *and* Journal of Financial and Quantitative Analysis. *Dr. Moyer recently coauthored a book with Professor James McGuigan titled* Managerial Economics: Private and Public Sector Decision Analysis.

Few topics in financial management have been subjected to study as intense as has the lease-buy, or lease-borrow, decision [1, 2, 4, 6, 7, 8]. In the Winter 1973 issue of *Financial Management*, Bower [3] performed a valuable service by highlighting the major areas of agreement and disagreement among the various approaches. In spite of this extensive analysis and reevaluation, the treatment of the investment tax credit (ITC) in the decision-analysis framework has been consistently neglected. The purpose of this paper is to explicitly enumerate and evaluate the potential impacts of the investment tax credit on the lease-buy decision.

The Model

The impact of the ITC on the lease-buy decision is illustrated by using the Johnson and Lewellen (J and L) model [6]. The implications developed in the context of the J and L framework are generalizable to any of the alternative models reviewed by Bower [3]. For clarity, the J and L notation is used. The cash purchase price of the asset in question is A; the useful

economic life of the asset in years is n; anticipated book value of the asset at the end of its useful life is B; expected cash salvage value of the asset at the end of its life is S; the depreciation charge for year i if the asset is owned is D_i; the lease payment (before taxes) required in year i if the asset is leased is L_i; the corporate ordinary income tax rate is t; the tax rate applicable to gains and losses on the disposal of fixed assets is t_g; the total cash revenues expected from the use of the asset in year i are R_i; total pre-tax cash costs for labor, materials, etc. expected to be required to operate the asset in year i if it is purchased by the firm are C_i; pre-tax cash operating costs expected to be borne in year i by the firm if it *purchases* the asset, but not if it leases the asset, are O_i. Item O_i might include such costs as maintenance, insurance and property taxes depending upon the terms of the lease contract. Hence, the difference $C_i - O_i$ represents the year i total cash operating cost of leasing. The after-tax cost of capital for the firm is k, and r is the after tax borrowing rate for the firm. Finally, FMV is defined as the fair market value of the asset, and t_{ITC} is the investment tax credit rate.

A number of alternative circumstances may exist requiring differing analyses of the ITC impact on the lease-buy decision. The first and simplest case is that in which the ITC is assumed to be fully taken by the owner of the asset if it is purchased and by the lessee of the asset if it is leased. Thus, an additional term is required in the J and L Net Present Value (Purchase) and Net Present Value (Lease) equations. These are rewritten as follows:

$$NPV(P) = \sum_{i=1}^{n} \frac{(R_i-C_i) - t(R_i-C_i-D_i)}{(1+k)^i}$$

$$+ \frac{S-t_g(S-B)}{(1+k)^i} - A + \frac{t_{ITC}A}{(1+r)^1} \qquad (1)$$

The final term represents the investment tax credit received at the end of year 1. It is discounted by r, the firm's after-tax borrowing rate, because the ITC tax credit may be forecast with greater certainty than the normal operating cash flows. While this approach is favored by the author, some might argue for discounting the ITC tax credit at k (the firm's cost of capital) because of the uncertainty associated with having sufficient net income available to take advantage of the full amount of the ITC. Equation (2) shows that the ITC is computed on the basis of fair market value (FMV) in the case of a lessee.

$$NPV(L) = \sum_{i=1}^{n} \frac{[R_i-(C_i-O_i)](1-t)}{(1+k)^i}$$

$$- \sum_{i=1}^{n} \frac{L_i(1-t)}{(1+r)^i} + \frac{t_{ITC}FMV}{(1+r)^1} \qquad (2)$$

The resulting J and L decision equation (3) becomes:

$$\triangle NPV = NPV(P) - NPV(L)$$

$$= \sum_{i=1}^{n} \frac{tD_i - O_i(1-t)}{(1+k)^i} + \frac{S-t_g(S-B)}{(1+k)^n}$$

$$- A + \sum_{i=1}^{n} \frac{L_i(1-t)}{(1+r)^i} + \frac{t_{ITC}(A-FMV)}{(1+r)^1} \qquad (3)$$

As indicated above, in most cases, A, the cash purchase price, will equal FMV, the fair market value, and the last term in equation (3) will normally be eliminated. Thus, in this first case when the ITC is taken by the asset user, whether he purchases or leases the asset, the tax credit is likely to have little impact on the lease-buy decision. Only when the cash purchase price is not equal to the fair market value will the decision be materially altered.

At this point, a word of explanation should be offered regarding the choice of discount rates used in equations (1) and (2). As Johnson and Lewellen [6, p. 818] correctly point out, the use of the cost of capital, k, to discount revenues, costs and the salvage value terms in equations (1) and (2) and the borrowing rate, r, to discount obligations incurred under the lease contract, as well as the investment tax credit term in the same two equations, recognizes the distinct differences between the predictability of these two groups of cash flows. Using either k or r to discount all terms in both equations introduces unnecessary biases into the evaluation process. Regardless of which discount rate the reader prefers, the Gudikunst and Roberts [5] empirical research illustrates that the choice of a model and its assumption makes little difference in actual lease-buy decisions. Other factors, such as the treatment of the ITC or the firm's ability to take advantage of all available tax shields are more likely to be the most significant variables.

A second possibility is that the lessor will elect not to pass the ITC along to the lessee. Although this election is at the option of the lessor, in practice it is a matter subject to mutual negotiation. The most prevalent example of the lessor retaining the ITC is the case of the leveraged lease arrangement under which it is imperative that the lessor retain the ITC for himself in order for the arrangement to be effective. Under this second possibility, the ITC benefit would be directly received by the asset user in the purchase case, but only indirectly reflected in potentially lower lease payments in the lease case. Thus, the decision equation would be modified to:

$$\triangle NPV = NPV(P) - NPV(L)$$

$$= \sum_{i=1}^{n} \frac{tD_i-O_i(1-t)}{(1+k)^i} + \frac{S-t_g(S-B)}{(1+k)^n}$$

$$- A + \sum_{i=1}^{n} \frac{L_{i(1-t)}}{(1+r)^i} + \frac{t_{ITC}A}{(1+r)^1} \qquad (4)$$

In this case, it is apparent that the decision to lease or buy may be materially affected by the treatment of the ITC. This will occur whenever the present value of the ITC to the purchaser varies from that of the reduced lease payments, assuming all or some portion of the ITC is passed from the lessor to the lessee in this manner.

For example, assume a piece of equipment with a ten-year useful life is to be acquired. The equipment

costs $1 million and is eligible for a 7% ITC of $70,000 at the end of year 1. The lessor is assumed to require a 10% return on his investment (before considering the ITC). Thus, annual lease payments will be $162,744. If, instead of leasing the asset, the user chooses to purchase it, he will receive the full value of the ITC. The cost of capital, k, for the owner is 12% and r is 6%.

The present value of the ITC to the lessor, should he receive it, is:

$$PV_{ITC} = \frac{\$70,000}{(1+.10)^1} = \$63,637$$

If he chooses to fully amortize the present value of the ITC, i.e., pass it fully along to the lessee, over the ten-year lease payments, it will equal:

$$\text{Reduction in annual lease payment} = \frac{\$63,637}{6.1446}$$
$$= \$10,356$$

(using a 10 percent lessor required return).

If the owner/lessee (the asset user) uses his borrowing rate, r = 6%, or any rate different from that of the lessor to evaluate the ITC benefit and any lease payments, it is immediately seen that what happens to the ITC will have a significant impact on the lease-buy decision. At 6%, the present value of the ITC to the asset user would be:

$$PV_{ITC} = \frac{\$70,000}{(1+.06)^1} = \$66,010$$

In order to be indifferent between owning the asset and taking the ITC directly and leasing the asset and receiving the ITC in the form of reduced lease payments, the present value of the reduction in lease payments must equal $66,010. This is unlikely to be the case since the lessor and the lessee will normally evaluate the cash flows at different discount rates.

Thus, it can be seen that the impact of the ITC on the lease-buy decision is critically influenced by (1) the portion of the ITC which the lessor passes along to the lessee in the form of lower lease payments; (2) the cost of capital, k, at which the lessor and asset user initially evaluate the ITC; and (3) the discount rate used by the lessee to evaluate lease payments.

A third instance in which the treatment of the ITC may have a substantial impact on the lease-buy decision is the case of a new or existing firm with insuffi-cient taxable income (or with a tax loss carry-forward) to take full advantage of the ITC at the time of asset acquisition. In such cases it may be several years before the firm has sufficient taxable income to make use of the ITC. Furthermore, the risk associated with making full use of the ITC is higher than normal, and the present value of the ITC will be lower the longer it takes the firm to be able to make use of it.

Under these conditions, the asset user may be strongly predisposed to the lease alternative because of the certainty of savings resulting from reduced lease payments (as a result of full or partial ITC pass-along), in contrast to the risk of owning the asset and attempting to take the ITC directly. The analysis of the lease-buy decision in this case will be a function of (1) the expected present value of the ITC to the asset user, based upon the timing when he expects to be able to take advantage of the tax credit; (2) the subjective risk premium applied by the asset-user to his ability to generate future incomes sufficient to cover the ITC (i.e., the higher the risk premium, the lower will be the expected present value in (1) above); and (3) the three factors shown to influence the analysis in case 2 above.

In the third case, the best that can be said is that these five pieces of information will help determine the boundaries for negotiation with respect to the amount of the ITC taken by each party (the lessor and lessee) and the proportion, if any, that will be passed back to the lessee (asset user) in the form of lower lease payments. Since the bargaining position of the lessee is likely to be weak (because asset ownership may not be a viable alternative), it is unlikely that the lessor will pass along all of the ITC to which he is entitled to the lessee in the form of lower lease payments.

Concluding Comments

In this note it has been shown that the models for making the lease-buy decision advanced thus far are incomplete because of their failure to explicitly consider the varied impact of the investment tax credit on the lease-buy decision. On the basis of the three cases examined, it should be clear that the treatment of the investment tax credit is likely to have a material impact on the lease-buy decision of a firm. Unfortunately, ITC analysis opens new doors of controversy with respect to the use of appropriate discount rates in evaluation.

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