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48. See Kant, *The Metaphysical Elements of Justice* (New York: The Bobbs-Merril Comp, Inc., 1965), p. 24.
49. See A.G. Ramos, "A Substantive Approach to Organizations: Epistemological Grounds," Chapter IV of my forthcoming book, *The New Science of Organization.*
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52. See Peter F. Drucker, *The Age of Discontinuity.* (New York: Harper & Row, Publishers, 1969), p. 71.
53. See A.G. Ramos, "Models of Man and Administrative Theory," *PAR,* May/June, 1972.
54. See Theodore Caplow, *Principles of Organization* (New York: Harcourt, Brace & World, Inc., 1964), p. 234. The next item in this article is largely drawn from Caplow's book, same page above.

Leasing As A Municipal Finance Alternative*

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■ Due to prevailing capital formation problems and a scarcity of financial resources, many state and municipal governments have found it increasingly difficult to acquire funds to finance facilities and equipment. Such an environment has prompted public officials to seek alternatives to borrowing. This paper examines the institutional and managerial dimensions of one such alternative: the financial lease—which enables the municipality to indirectly employ private sector funds. The economics of lease rate setting are explored, wherein it is demonstrated how financial leases can provide net benefits to tax exempt institutions. A viable, yet simple, lease evaluation model is then presented, and extended to conditions of uncertainty. Finally, a new leasing concept is introduced in the form of a tax arbitrage lease—a financing procedure that addresses lease-or-buy (for cash) questions, rather than lease-or-borrow decisions. Throughout, the paper attempts to establish the economic vitality of municipal leasing.

In recent years, many state and municipal governments have found it difficult to acquire funds to finance facilities and equipment. Increased competition for the investor's dollar and changes in the perceived risk of most tax-exempt bond issues have caused interest rates in the municipal bond market to rise relative to prevailing rates in other sectors of the bond market. The shortage of public sector financing has been further exacerbated by private corporations issuing tax-exempt industrial development and pollution control bonds, thereby absorbing loanable funds traditionally reserved for municipal borrowers. Given this environment, alternatives to direct borrowing as a means of municipal financing should be explored. This paper examines one such alternative—the financial lease.

Leasing enables the municipality to employ the private sector indirectly as a source of funds, since the lessor provides the resources needed for the acquisition of the facilities. However, although considerable attention has been devoted to leasing in the private sector (see, for example, Van Horne [17] and the references he cites), there is scant literature pertaining to the economics of public sector leasing. For example, in their recent treatise on local government finance, Moak and Hillhouse [12] pay little attention to equipment leasing and leave the reader with the impression that leasing is almost invariably an undesirable course of action for a municipality.

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This treatment of municipal leasing apparently reflects the prevailing attitude of most municipal financial officers, who rarely consider leasing as a viable financing method. It is widely believed that leasing is inherently more expensive than other sources of financing (see Snyder [16]). In addition, many municipal financial officers seem to believe that financial leases are not widely available to municipalities. Neither of these beliefs is true. Actually, leasing may have much to offer the municipality that is in need of financing for equipment or facilities. For example, consider the following factors:

- Leasing may provide the municipality with the opportunity to raise needed capital in situations where local laws prevent direct bank borrowing (which is a comparable intermediate-term alternative);
- Leasing may provide municipalities which have little or no access to traditional capital markets with the means of obtaining financing for equipment and facilities (see Antieu [1] and Snyder [16]);
- Leasing is a convenient means of obtaining equipment which, because of size considerations, may be too small an expenditure to warrant a bond issue, yet too large to finance out of current revenues;
- Leasing may provide municipalities with a means of avoiding cumbersome and costly voter approval and other legal constraints on the capital raising function of municipalities, such as statutes that limit the levy on property (see Magnusson [9]);[1] and
- Leasing may allow the municipality to free up cash and debt capacity for other needs without deferring equipment acquisitions.[2]

In many situations, leasing may also be the least expensive means of equipment financing. In this paper, we focus on the quantitative aspects of municipal lease financing. The section that follows deals with the rate-setting decisions of the lessor and illustrates the economic and institutional factors that may render leasing a viable municipal financing procedure. We then examine leasing decisions by municipalities and present a relatively straightforward approach to lease evaluation by municipal financial managers. We then consider the possible risks (in financial terms) of leasing instead of borrowing and purchasing. Finally, we discuss the tax-arbitrage lease, which combines lease financing with direct investment by the municipality of those funds freed up through leasing. Because our attention throughout is directed toward leasing as a financing technique, we consider purely "financial," rather than "full-service," leases (i.e., leases that merely provide a means of financing as opposed to those that provide both financing and maintenance of the equipment being leased).

Taxes and the Economics of Leasing

Although the various qualitative factors delineated in the preceding section suggest a number of special situations where municipalities may find leasing an attractive financing alternative, a major move toward leasing by municipalities will result only if lessors are able to provide such financing on a basis that is price-competitive with the municipal bonds and other sources of municipal debt financing.

The primary economic reason for the existence of the financial lease is related to income taxes; in particular, to tax benefits accruing to the lessor. In the corporate sector, financial leases provide a means of transferring income tax deductions for depreciation and investment tax credits from lessee firms, which are unable to utilize these benefits fully, to lessor firms, which can use the tax deductions to the fullest (see Brigham [4] and [5]). Because municipalities are tax exempt entities and, therefore, have no use for depreciation tax deductions and investment tax credits, the potential for a similar transfer of tax benefits to lessor firms by public sector lessees clearly exists. Thus, leasing may enable municipalities to reduce their borrowing costs by transferring to the lessor tax benefits which were previously valueless to the municipality.

It is widely believed that leasing is inherently more expensive than other sources of financing . . . (and) that financial leases are not widely available to municipalities. Neither of these beliefs is true.

A brief discussion of the economics of lessor rate-setting will illustrate this point (see Dyl [7] for a more detailed analysis).[3] Assume that a potential lessor (e.g., a commercial bank, a leasing firm, a commercial finance company, or a private investor) requires a 12 per cent pre-tax return on investment and has a marginal income tax rate of 50 per cent, resulting in a 6 per cent after-tax required return. Under what terms will the lessor lease $200,000 worth of depreciable equipment (e.g., garbage trucks, police cars, a computer, or whatever) to a municipality?

Assume that: 1) the equipment may be depreciated over a 10-year life toward a 5 per cent salvage value using the sum-of-the-years digits method, 2) the market value of the equipment at the end of 10 years is expected to be $4,000, and 3) the equipment qualifies for an investment tax credit of 10 per cent. With this information, the proportion of the lessor's return that will take the form of ownership benefits (from depreciation, income taxes, and salvage value) can be determined. As we shall see, such benefits effectively reduce the amount that must be recovered from lease payments.

A procedure for computing the value of the ownership benefits realized by the lessor is illustrated in Table 1. The first columns shows the annual depreciation of the equipment, using a standard form of accelerated depreciation (i.e., the sum-of-the-years digits method), and the second lists the amount by which the lessor's income taxes will be reduced each year as a result of the tax deduction for depreciation (i.e., the amount of the deduction times the lessor's marginal income tax rate). This reduction in taxes is, of course, essentially a cash inflow to the lessor. The third column in Table 1 shows other cash flows resulting from the lessor's ownership of the equipment. These include the investment tax credit in the year of purchase ($20,000) and the proceeds from liquidating the asset at the

Table 1

OWNERSHIP BENEFITS TO LESSOR

Year	Depreciation	Value of Depreciation Tax Deduction	Other Ownership Benefits	Total Cash Flow	Present Value At 6%
1	$36,363.64	$18,181.82	$20,000.00	$38,181.82	$36,020.73
2	32,727.28	16,363.64	0	16,363.64	14,563.64
3	29,090.90	14,545.45	0	14,545.45	12,212.65
4	25,454.54	12,727.27	0	12,727.27	10,081.14
5	21,818.18	10,909.09	0	10,909.01	8,151.93
6	18,181.82	9,090.91	0	9,090.01	6,408.80
7	14,545.46	7,272.73	0	7,272.73	4,836.80
8	10,909.10	5,454.55	0	5,454.55	3,422.24
9	909.10	454.55	0	454.55	269.05
10	0	0	$7,000.00	7,000.00	3,908.73
					$99,875.64

end of the lease term ($7,000). The liquidating value in this case includes the $4,000 cash value of the asset and an income tax deduction of $6,000 for book loss on liquidating the equipment (i.e., the difference between the $10,000 book value in year 10 and the $4,000 sale value); the value of this income tax deduction is $3,000, resulting in a total cash flow of $7,000.

The annual cash flows to the lessor from tax benefits and other ownership benefits are shown in the fourth column of Table 1, and the last column shows the present value of these cash flows given in the lessor's required 6 per cent after-tax return. The total present value of $99,875 is the portion of the lessor's original investment recovered from ownership benefits (and, of course, includes a 6 per cent after-tax return). Note that this is before considering any lease payments. Thus, the lessor need only recover $100,125 (i.e., $200,000 minus $99,875), from payments to be made by the lessee. It is interesting to note that, in this case, *half* of the lessor's required return has been generated by income tax and depreciation benefits that are of no real value to the municipal lessee.

The annual after-tax lease proceeds required to recover the balance of the lessor's investment and desired profit can be computed from the following equation:

$$(1) \quad L_{at} = NC \Big/ \sum_{t=0}^{n-1} (1 + R)^{-t}$$

where L_{at} denotes the required after-tax proceeds, NC is the remaining net cost to be recouped (in this case, $100,125), n is the life of the lease (which for a financial lease, will generally be equivalent to the depreciable life of the equipment being leased—in this case, ten years), and R is the lessor's required after-tax rate of return (i.e., 6 per cent in our example). Note that this equation assumes level lease payments made in advance (i.e., at the beginning of the year), which is the usual practice in the equipment leasing industry.

By using equation (1) we can see that the proceeds required by the lessor in our examples are

$$L_{at} = \$100,125 / 7.8017 = \$12,834$$

However, because the annual lease payments from the lessee will be taxed at the lessor's marginal tax rate, to determine the actual lease payment (i.e., before-tax) required by the lessee, L_{at} must be adjusted as follows:

$$(2) \quad L = L_{at} / (1\text{-}T)$$

where L is the annual lease payment and T is the lessor's marginal tax rate. Thus, the resulting lease payment for our illustration will be

$$L = \$12,834 / .5 = \$25,668$$

What does a lease payment of $25,668 suggest about the viability of leasing as a municipal financing alternative? A detailed discussion of lease evaluation is provided in the following section, but at this point it is sufficient to note that the lessee is receiving net benefits of $174,332 (i.e., the $200,000 worth of equipment less the initial lease payment of $25,668) in exchange for nine future annual payments of $25,668. Thus, the effective rate of interest on this lease is essentially 6 per cent, even though the lessor is earning the equivalent of 12 per cent, pre-tax return. As a result of the transfer of tax and other ownership benefits from the municipal lessee to the lessor, financial leases will clearly be competitive with many alternative sources of municipal borrowing. Indeed, recent studies of the municipal bond market suggest that a corporate lessor with a tax rate of 50 per cent could easily offer a finance rate more attractive than the rate available to the municipality by issuing tax-exempt bonds (e.g., see Rosenbloom [6]).

The Lease Evaluation Decision

The preceding discussion has shown a potential economic rationale for municipal leasing. Such insight is, of course, useful to the lessee, if for no other reason than to provide a basis for knowledgeable bargaining in lease negotiations. At the same time, municipal financial officers must have a procedure for assessing the economic desirability of a financial lease. This section of the paper develops a municipal lease decision model and illustrates its application.

The municipal lease evaluation model is similar to widely used corporate procedures. Due to the absence of income tax considerations, however, the technique is considerably less complex. In particular, items such as "lost" depreciation and "lost" investment tax credit can be ignored because they are of no consequence to a tax-exempt lessee. Municipal lease evaluation basically encompasses three items: the annual lease payments to be made by the municipality over the term of the lease (L); the estimated salvage value of the equipment to be realized at the end of the life of the lease (SV_n); and the invoice and installation costs of the equipment to be leased (C).

The annual lease payments (L), which typically commence at $t=0$, are generally quoted by the lessor. Normally, the lease payments are an annuity, as in the rate-setting example presented above. In some cases, however, a lessor might wish to establish an uneven lease payment pattern; this would have no effect on the lease evaluation procedure described below. The salvage value (SV_n) represents the estimated market value of the equipment at the end of the life of the lease and is an opportunity cost to the lessee. The potential variability of this "cost" is discussed in the following section. Finally, of course, the cost of the equipment, C, is included in the evaluation model as a measure of the gross benefits from leasing.

Municipal leases can be evaluated either by comparing the effective interest rate on the lease to the cost of alternative financing, or by comparing the present value of the lease costs to the benefits resulting from the lease (see Van Horne [17]). We personally prefer the cost-benefit analysis approach, both because of its computational simplicity and because it provides a tangible measure of the (present) dollar benefits of leasing. In addition, while either approach will result in the same accept/reject decision for a given lease, the present value procedure has the added attribute of allowing the decision maker to evaluate competitive lease proposals more accurately.

In the present value procedure for lease evaluation, the various real and opportunity costs of leasing are discounted to determine their present value, and this result is compared to the benefits from the lease. In particular, the present value cost (PVC) of a lease option may be specified as:

$$(3) \qquad PVC = L \sum_{t=0}^{n-1} (1 + i)^{-t} + SV_n (1 + i)^{-n}$$

where i equals the discount rate and the other terms are defined above. The appropriate decision rule is for the municipality to employ the financial lease in lieu of an alternative financing technique whenever PVC<C (i.e., when leasing is less costly than purchasing the equipment).

Before applying equation (3) we should address the question of the appropriate discount rate, i. The time value of money in the public sector is generally thought of in terms of the so-called social rate of discount. A popular definition of the social discount rate is as follows: given that some unidentified alternative use of the resources in question can be expected to produce a rate of return equal to i, the resources should be utilized in the public sector only if they yield a return equal to or greater than i (see Baumol [2] and Marglin [10] for further discussion). The social discount rate, however, is irrelevant in the present case since it is not the alternative uses of public funds that are of concern, but rather alternative financing techniques. Thus, because in evaluating leases the municipality is narrowly concerned with evaluating a specific debt management alternative, we aver that the municipality's borrowing rate is the appropriate definition of the alternative cost of acquiring resources in this case; thus, it is the proper discount rate.

To illustrate briefly the application of the proposed lease evaluation procedure, consider the example developed earlier in connection with the lessor's rate-setting decision. Recall from that example that the municipality in question was considering a ten year lease to acquire the services of a piece of $200,000 equipment with an estimated salvage value (SV_n) of $4,000 at $t = 10$, and an annual lease payment (L), as proposed by the lessor, of $25,668, to be paid annually from t_0 to t_9. The only other item needed to evaluate this lease is the municipality's current borrowing rate, which we posit to be approximately 7 per cent (true annual interest cost). Using equation (3) it can be seen that

$$PVC = \$25,668 + \$25,668\ (6.5152) + \$4,000\ (.50835) = \$194,926$$

Since the value of PVC is $5,074 *less* than C, it follows that there is considerable economic justification for undertaking the proposed lease in lieu of the borrow-and-purchase alternative. In effect, the municipality is obtaining the services of a $200,000 piece of equipment (C) for a present value cost of $194,926—thereby generating a (present value) savings of $5,074 over what it would cost to purchase and finance the equipment at a 7 per cent borrowing rate. Such savings, of course, occur because of the municipality's ability to transfer ownership benefits to the lessor, which in turn leads to a difference in the effective costs of borrowing vs. leasing (i.e., 7 per cent for the former as opposed to approximately 6-¼ per cent for the leasing alternative).

Evaluating Risk

Our evaluation of a municipal lease has thus far proceeded on the premise that the decision is free of any risk to the lessee. While we have noted some of the uncertainties that the lessor must consider in the rate setting process, it should be clear that the lessee, likewise, must evaluate the risk in undertaking the lease. The municipal lessee, of course, is subject to the usual operating risks to which any entity would be exposed when making investment decisions—such as the continued economic justification for the asset, the possiblity of obsolescence, the ability to generate sufficient cash flow to service debt requirements. However, these risks are not unique to lease evaluations. In the context of this article, the primary concern is with the risk exposure of the municipality when it undertakes a lease in lieu of purchase of the asset. Such risk exposure

basically eminates from a single variable—the salvage value of the asset.

Variability in the salvage value can affect the decision in one of two ways: 1) if the lease is acceptable, then the risk to the municipality is that the realized salvage value may turn out to be greater than the expected amount used in the lease evaluation; or, 2) if the lease is deemed unacceptable, the risk is that the cash proceeds from the salvage value at a time of liquidation will fall short of the estimated amount. In either case, changes in salvage value may be sufficient to reverse the decision to undertake (or reject) the lease alternative. Very simply, the lessee can assess the extent of salvage value risk exposure by determining the SV_n necessary to reverse the decision. That is, the lessee computes how large the salvage value must be before leasing is no longer attractive (i.e., where PVC becomes greater than C). The municipality can then estimate the probability of the revised salvage value actually occuring.

The adjusted salvage value required to reverse the decision (which we will denote as SV^*_n) can be defined as:

$$(4) \qquad SV^*_n = [C - 1 \sum_{t=0}^{n-1} (1 + i)^{-t}] (1 + i)^n$$

where all the terms are as defined above. In any condition where $SV^*_n \geq 0$, the probability of such a salvage value occurring must be determined. Assuming a normal distribution of possible salvage values, the standard normal deviate (Z) necessary to bring about the indicated change can be computed. Once this Z-value has been determined, the probability of occurrence can be measured by consulting a table of areas under the normal curve. The standard normal deviate (Z) is defined as:

$$(5) \qquad Z = \frac{SV^*_n - SV_n}{\sigma_n}$$

where σ_n is the standard deviation of the expected SV_n and the other terms are as defined above.

To apply this risk evaluation procedure, the only additional piece of information required is the standard deviation of the estimated salvage value. Assume that, in our example, the estimated standard deviation is $3500. Using equation (4), we can determine the adjusted salvage value (SV^*_n) required to reverse the decision (made in equation (3)) to proceed with the lease. For our illustration, SV^*_n would equal:

$$SV^*_n = [\$200,000 - (\$25,668 + 25,668\ (6.5152))]\ (1.9672) = \$13,967$$

Thus, if the salvage value were greater than $13,967, the municipality would be better advised to forego the lease.

Of course, after this revised salvage has been computed, the probability that the actual salvage value will be $\geq SV^*_n$ must be determined. To do this, the Z-value is computed according to equation (5); for our illustration

$$Z = \$13,967 - \$4,000/\$3,500 = 2.85$$

Given a Z-value of 2.85, the probability of actually realizing the adjusted salvage value can be found by referring to a table of areas under the normal curve. In this example $P(Z > 2.85) = .0022$; in other words, there is a less than 1 per cent chance that the salvage value will be great enough to reverse the decision to lease. In this case, the risk analysis merely reaffirms the decision indicated by the PVC analysis—i.e., there is better than a 99 per cent chance that leasing is superior to the purchase alternative.

The Tax Arbitrage Lease

Thus far, only leasing as an alternative to other forms of *external* financing has been considered. However, due to the tax exempt status of municipalities, lease financing may also be beneficial to municipalities as an alternative to *internal* financing (i.e., paying cash for equipment). In particular, the use of lease financing may permit the municipality to arbitrage between the taxable and tax-exempt sectors of the capital markets. The municipality may acquire low-cost lease financing by passing on tax benefits to the lessor while, in turn, investing the freed-up cash (i.e., funds not expended on the leased asset) in high-yield, fully taxable instruments—e.g., term certificates of deposit or Treasury securities. This "leasing instead of spending" procedure may be referred to as tax arbitrage leasing. In effect, the municipality may wish to use a lease as a financing vehicle, not because it lacks the funds to finance the acquisition from its general fund, but, rather, because the municipality may be better off by using its available cash in some investment outlet other than ownership of its own facilities and equipment. Although there are a number of restrictions upon a municipality's issuing tax exempt bonds and investing the proceeds in taxable obligations (see Ritter [13] and [14]), the alternative of "leasing instead of spending" to accomplish the objective remains available.

The evaluation of a tax arbitrage lease is essentially identical to the evaluation of a general municipal lease, except that the relevant discount rate is the investment rate that can be earned on the investment of excess funds by the municipality instead of the alternative finance rate. For example, in our illustration, assume that the municipality now has the $200,000 in cash required to purchase the equipment, and that it can invest its cash at an annual return of 9 per cent. The municipality is now considering leasing the equipment for cash (i.e., a tax arbitrage lease). Given a level lease payment, the PVC of such a tax arbitrage lease can be computed as follows:

$$(6) \qquad PVC = L \sum_{t=0}^{n-1} (1 + i^*)^{-t} + SV_n (1 + i^*)^{-n}$$

where i^* is the investment rate and the other terms are as defined above. Thus, using a 9 per cent rate, the PVC for this lease is

$$PVC = \$25,668 + \$25,668\ (5.9952) + \$4,000\ (.46043) = \$180,981$$

If the municipality leases the equipment and invests the funds thus freed up at a 9 per cent rate, the present value of

the savings from leasing instead of purchasing the asset will be $19,019 (i.e., $200,000 minus $180,981). The source of these savings is, of course, the combination of a relatively favorable lease payment (due to the tax benefits passed on to the taxable lessor) and the relatively high, and taxless, investment by the municipality.

. . . the municipality may wish to use a lease as a financing vehicle, not because it lacks the funds to finance the acquisition from its general fund, but, rather, because the municipality may be better off by using its available cash in some investment outlet other than ownership of its own facilities and equipment.

The fact that the savings on the tax arbitrage lease amounts to $19,019, versus only $5,074 when the lease was compared to the traditional debt financing alternative, results from the difference between the municipality's investment rate (assumed to be 9 per cent and its borrowing rate (assumed to be 7 per cent). Because investment rates are usually greater than borrowing rates, tax arbitrage leases will frequently be desirable even in situations where equipment leasing would not otherwise be a viable *financing* alternative (presuming, of course, that the municipality has the available cash to begin with). To date, neither lessors nor municipalities have shown any inclination to avail themselves of the benefits of tax arbitrage leasing on a large scale. However, doubtless this situation will change as the mutual benefits of this unregulated tax artifice become apparent.

Conclusion

This paper has examined the viability of leasing as a municipal finance alternative. The discussion of the economics of leasing demonstrates that tax benefits that are normally valueless to a municipality will, in effect, reduce the payments required by lessors. Thus, a financial lease may often be competitive with a municipality's other (and tax-exempt) financing alternatives. We then presented a lease evaluation procedure for municipal financial managers to use in comparing leasing with other sources of financing. It is evident that the present value approach is a simple algorithm, which requires little sophistication on the part of the user. Even the evaluation of the "risk" of foregoing substantial salvage values on leased assets is relatively straightforward. Finally, we noted the possibility of tax arbitrage leasing, where the financing lease is an alternative to spending cash rather than to borrowing. The tax arbitrage lease is perhaps the most intriguing aspect of our discussion in that it permits municipalities to exploit their tax exempt status to reduce their operating costs.

Notes

1. Of course, municipal managers may also have ulterior or, at least questionable motives for avoiding citizen scrutiny of capital expenditures.
2. However, the effect of leasing on residual debt capacity is probably modest. See Miller and Upton [11] and Lewellen, et. al., [8].
3. In the interest of simplicity, we ignore the possibility of the lessor's using leverage to finance the purchase of the asset. Leverage leasing provides additional income tax benefits to the lessor, because his interest payments are tax deductible, but the analysis of leveraged leases is computationally complex (see Bierman [3], Childs and Gridley [6] and Wiar [18].

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