

YIELD ANALYSIS FOR LESSORS: A PRIMER

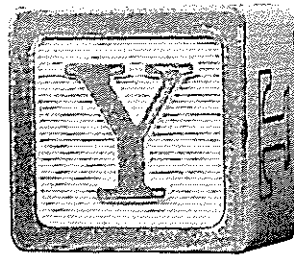
by James M. Johnson, Ph.D.

Introduction

The word "yield" may well be the most pervasive and the most convolutive term at work in the leasing community. The reason for its Loch Ness likeness, however, is not mysterious. Different uses merely have evolved to assist lessors in accomplishing their varied objectives. However, the myriad of yield definitions can be somewhat overwhelming. Accordingly, this article will explain the uses of yield information, describe the more frequently used types of yield, and illustrate how yields are calculated.

Yield Definition

The term "yield" is intended to convey a notion of return on investment. Yield allows dollar amounts of



investment cash inflows and outflows to be converted into a more useful form of information: A percentage return on funds invested. All yield measures—regardless of their specific form—are designed to serve this purpose.

Uses of Yield Information

There are three major uses of yield in the leasing industry. First, it is used to determine how earnings must be reported in compliance with the Financial Accounting Standards Board (FASB).¹ Second, it is employed to price leasing transactions in the marketplace (i.e., to determine the rent requirement). Third, it may be utilized to measure profitability. Since these purposes differ from one another—sometimes substantially—it becomes clearer why yield measures themselves

may produce significantly different results.

The FASB requires that earnings produced by leveraged leases be allocated to the various years the lease will be in existence, according to a multiple investment yield computation (to be discussed in more detail later). Basically, FASB 13² states that a leveraged lease may produce reportable earnings at a constant percentage rate (that rate being the multiple investment yield calculated) of unrecovered investment during those periods in which the lessor's investment is positive. Thus, lessors who attach great importance to near-term reportable earnings may attempt to structure a transaction to boost the multiple investment yield (since this will permit a higher percentage of unrecovered investment to be "booked" in the early years of the lease), or structure it to permit the first investment to be recovered more rapidly (which also allows earnings to be reported earlier in the lease). In sum, lessors concerned with the timing of reported earnings must deal with a yield concept known as the multiple investment yield.

Yield measures are used to price leasing transactions in the marketplace. Yields used in this context are methods of communication among various parties. An appropriate analogy might

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be the prime rate. Although several banks may charge the "same" prime rate, the real cost of a business loan may differ from bank to bank, depending upon fees, compensating balances and other factors. However, knowing the prime sends a reasonably clear message to all market participants concerning the cost of money at any point in time. Quoted lease yields work in a similar manner. To facilitate communication, most market participants talk about yields in terms of the single investor rate, and the multiple investment yield rate. Single investor indicates that there is only one investor at risk. Multiple investment indicates that the lease is leveraged as defined by FASB 13.

The yield measure most widely quoted in either case is a rate earned on the equity investor's "at risk" investment, after taxes, nominal per annum,³ with a zero interest rate sinking fund⁴ (whew!). In the case of a single investor lease, the yield quoted is the rate the lessor expects to earn on total capital invested, after taxes. It is based on total investment, since a single investor (lessor) by definition is risking all the capital in the financing. (The lessor may choose to borrow funds for part of the financing, but usually does so on a recourse basis.⁵) The rate quoted on a leveraged lease is based upon the multiple investment rate, computed on the lessor's at-risk investment. Here, however, the lessor's at-risk investment is not the total capital invested in the financing, but is total investment less funds borrowed from a lender on a nonrecourse basis. Thus, if a single investor lease is quoted as earning a 14% yield, for example, one should have a reasonably good idea how it was calculated, since the procedure for so doing is widely agreed upon within the profession.

Lease profitability measurement undoubtedly produces the widest possible range of meanings for yield. There are probably hundreds of yield profitability measures in use, each tailored to the way a particular lessor wishes to evaluate a lease. Although lease profitability analysis does in fact vary widely from lessor to lessor, one thing

is clear: Profitability drives the other two uses of yield. Yields quoted on leases are a by-product, or a function of the lessor's cost of doing business; as the lessor's cost of financing changes, for example, this is factored into a model to determine what quoted yield will be necessary to produce an acceptable level of profitability.

One yield profitability model, popular especially among subsidiary firms, is to price a lease at a fixed number of basis points above their cost of money in order to achieve a fixed "spread" of profit. Other lessors set a target return on actual equity invested in a lease, net of recourse borrowing they employ; this in turn allows them to determine what quoted yield rates will be necessary to insure their target rate of return. Other measures are all designed to accomplish the same objective—that of determining lease rate requirements adequate to achieve profitability goals.

Types of Yields

Most yield measures are developed upon three types of assumptions; in fact, it may be said that all yields are constructed as if these three assumptions had been addressed—whether or not that is the actual case. For convenience, these assumptions will be referred to as compounding, tax and cash utilization.

The compounding assumption refers to the frequency of cash flow compounding. Since most leases will generate cash flows much more frequently than once a year, it is necessary to decide what, if anything, intrayear cash flows will earn. Suppose, for example, that a single investor lease is priced to earn 1% per month on total invested capital. If the lessor wishes to assume that these cash flows can be reinvested between years but not within years, then the lessor will only focus upon what is called the nominal annual yield. If cash flows are assumed to be reinvested within each year, then the effective annual yield will be used. In the example, a lease earning 1% per month will have a nominal annual yield of 12%. In general, a nominal annual yield is

determined by multiplying the yield for the cash flow interval by the number of such periods in a year. Thus, the monthly yield of 1% translates into $1\% \times 12 = 12\%$ per year. Alternatively, an effective yield presumes that cash can be reinvested for all intrayear periods, earning the intrayear rate. An effective annual rate is calculated by adding 1 to the intrayear rate, raising the sum to a power equal to the number of periods in a year, and deducting 1 from the result: A straightforward compounding procedure. For the example, the effective rate is 12.68% ($[(1+.01)^{12} - 1] = 1.1268 - 1 = .1268 = 12.68\%$).⁶

The yield tax assumption refers to either pretax or after-tax yields, depending upon whichever holds more interest to the lessor. In most leasing software packages available, the after-tax return is solved first. Then, somewhat artificially, the after-tax return is "grossed up" by dividing it by the quantity one minus the tax rate assumed in the analysis. If a lease produced a 13% after-tax yield for a 46% tax-bracket lessor, this would be converted to a pretax equivalent by dividing 13% by .54, resulting in a pretax return of 24.07%. This pretaxing procedure is artificial primarily due to its failure to reflect the effect of taxes. If one were to literally measure the pretax return on a lease, pretending that taxes and tax credits were not cash flow components, the calculated yield would be considerably less than the after-tax grossed up number, because the pretax calculation cannot, by definition, reflect the value of investment tax credits or accelerated depreciation. However, the engineered pretax number can be quite useful in communicating with those who are used to thinking in pretax terms, and who are not well versed in tax-oriented investments.

The cash utilization assumption probably offers the most fertile ground for debate among these three yield measures. In a sense, it is a special case of the compounding assumption in that it deals with reinvestment. It focuses upon reinvestment as an issue only when a lease produces a secondary investment problem; i.e., the lease

requires an initial investment (negative cash flow), produces cash inflow (positive cash flow), and then produces subsequent negative cash flow (which may or may not be followed by more positive cash flow, usually in the form of a residual value). A lease which produces negative, positive, negative, (and perhaps then more positive) cash flow in series is treated differently by most lessors (and must be treated differently for reporting purposes, as mandated by the FASB in Statement 13) than a standard single investor lease which produces negative then positive cash flow.

The - + - + cash-flow-type lease is generally a leveraged lease and is variously referred to as a multiple investment, multiple phase, or separate phase lease. The FASB requires unique yield measurement procedures for multiple investment leveraged leases because of their objection to recording ("booking") income in periods during which the investor has no investment; the method required by FASB 13 overcomes this, and is known as the multiple investment yield or the FASB complying yield.

Members of the lessor community may wish to treat multiple investment leases differently for various reasons. First, a standard internal rate of return calculation may produce more than one "correct" answer: A lease may be found to have a return of 3% and also have a return of 43% (and perhaps even a negative return) due to the multiple sign changes in the cash flow sequence. Adjustment procedures employed may not solve this multiple return problem, but they do fix it. Second, a lessor may want to insure that a lease can produce sufficient cash flow to "fund" the secondary investment without requiring additional dollars to be injected from other sources at the disposal of the business (i.e. with dollars "outside the deal"). This issue is generally addressed by the use of a sinking fund concept. One sinking fund procedure uses the context of the FASB 13 multiple investment yield, but permits cash received in excess of 100% return of investment to earn interest (prohibited by FASB 13) as it awaits

use to finance the secondary investment. This may be referred to as the "multiple investment yield with sinking fund" method. Another sinking fund concept simply sets cash inflow aside, earning interest, in a quantity precisely necessary to fund subsequent cash outflows. This is commonly called the "standard sinking fund method."

The purpose of this section has been to develop a general understanding of the uses to which yields are put. In the sections that follow, examples will be used to demonstrate how the various measures are actually calculated, along with interpretation. Due to the wide diversity of profitability models, however, they will not be discussed here.

Yield Measurement

For ease of presentation, two leasing examples will be employed. A single

investor lease will be used to illustrate the concepts of pretax/after-tax, nominal/effective, and return on investment yields. A leveraged lease then will be used to illustrate the internal rate of return, standard sinking fund, and multiple investment yields (FASB complying, and FASB type with sinking fund).

The Single Investor Lease

The numbers which are used to calculate yield measures are net cash flows. Net cash flows are simply the after-tax cash inflows or outflows generated by an investment during each period of its anticipated life. Table 1 contains data for a sample single investor lease. The specifics are shown at the bottom of the table. The financing involves a piece of equipment which cost the lessor \$300,000. A residual value of \$60,000 is expected to

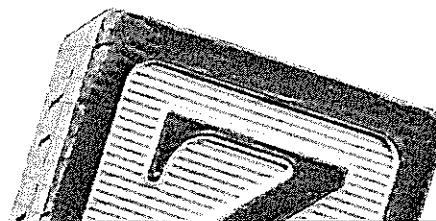


Table 1
SINGLE INVESTOR LEASE

COLUMN	- 1 -	- 2 -	- 3 - [1 - 2]	- 4 - ([3] × 46%)	- 5 - ITC	- 6 - Investment	- 7 - [1 - 4 - 5 - 6] Net Cash Flow
YEAR	Rent, Residual	Depreci- ation	Taxable Income	Taxes			
0		42750	- 42750	- 19665	- 30000	300000	- 250335
1	70512	62700	7812	3593	0	0	66918
2	70512	59850	10662	4904	0	0	65607
3	70512	59850	10662	4904	0	0	65607
4	70512	59850	10662	4904	0	0	65607
5	70512	0	70512	32435	0	0	38076
6	70512	0	70512	32435	0	0	38076
7	130512	0	130512	60035	0	0	70476

Rent required = \$ 70512
 Equipment cost = \$ 300000
 Residual = \$ 60000
 ITC = \$ 30000
 Depreciable basis = 95%
 Tax rate = 46%
 Price to earn = 15%

be realized at the end of the lease term, and the equipment permits the lessor to earn \$30,000 in investment tax credits (ITC). The asset is five-year property, and 95% of its basis (cost) will be depreciated over five tax years. (TEFRA requires five-year property to be 95% depreciated if 10% ITC is elected, or 100% depreciated if 8% ITC is elected; the former is preferable in this example. See Reference 1.) The lessor's tax rate is 46%, and the lease (for purposes of illustration) is priced to earn a return of 15% on total investment.⁷ Finally, the lease is executed and the equipment placed in service on December 10, all cash flows are assumed to occur at the end of each year, and the lease will have a term of seven years, calling for rents to be paid at the end of each year (i.e., in arrears).

Net cash flow for year zero (the commencement date) is the tax benefit of depreciation (depreciation deduction times the lessor's tax rate of 46%) plus ITC minus the cost of the asset. For years one through six, net cash flow equals rent income minus taxes paid on

taxable income. Net cash flow for year seven is the same as one through six, plus the anticipated residual income of \$60,000 (on which taxes are paid as if it were ordinary income). The drop in net cash flow from year four to year five is caused by the loss of further depreciation deductions.⁸

Table 2 explains the concept of return on investment (ROI), a standard form of yield. Recall that the lease was priced to earn a 15% after-tax ROI. Precisely what does that mean? It means that this lease is designed to provide the investor (lessor) with a return of 15% per year on the funds invested for each year. The concept is identical to that of a mortgage loan wherein interest paid each period is computed as a percentage of the amount owed at the beginning of that period; the portion of the mortgage payment left after interest is paid goes toward reducing the principal outstanding on the loan. The sole difference between a mortgage and a lease is that the lease is priced to develop an after-tax rate of return based upon after-tax

cash flows; mortgage amortization is computed on pretax values.

At the inception of the lease, the lessor pays \$300,000 for the equipment and receives the benefit of depreciation and ITC; thus unrecovered investment at commencement is \$250,335—the amount the lessor wishes to recover over the seven-year investment term. For year one, the lessor has a "beginning balance" of unrecovered investment of \$250,335 (column 1); i.e., he has an investment of \$250,335 for that year. Recalling that the lease was priced to produce a 15% ROI, the capital charge for year one is 15% of the capital employed for that year (column 2) or \$37,550 ($\$250,335 \times .15$). Since total cash inflow for year one (taken from Table 1) is \$66,918 (column 5), the \$29,368 of cash flow remaining after capital charges goes toward investment recovery (column 3); accordingly, the beginning unrecovered investment for year two is what it was at the beginning of the previous year minus the amount recovered at the end of the previous year, or \$220,967 ($\$250,335 - \$29,368$).

It will be noted from Table 2 that the ending recovered investment for year seven is zero. This is as it should be, since the lease was designed to produce an ROI of 15%. The 15% ROI for this example means that the lease will produce a 100% return of capital over its seven-year life, and a constant 15% after-tax return on (declining capital) investment during each year of its life. At the end of the lease term, the lessor will have fully recovered its investment, and will have been earning 15% after tax on funds employed each year. Stated yet another way, if all net cash flows from the lease were discounted at a 15% rate for the appropriate number of years, the net present value of the lease would be exactly zero—which is why the unrecovered investment balance at the end of the lease term must be zero; the lease was priced to earn 15% and therefore must produce a zero net present value when cash is discounted at 15%.

This ROI is also identical to the internal rate of return (IRR) measure. IRR is defined as that rate which will

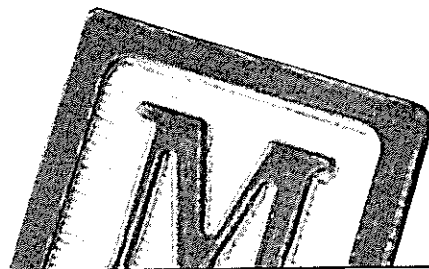
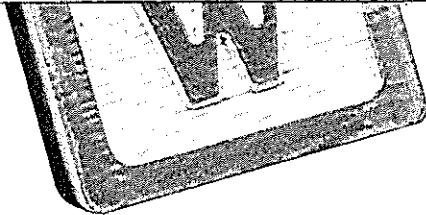


Table 2
RECONCILIATION OF SINGLE INVESTOR YIELD

COLUMN YEAR	Cash Flow Allocation to:						
	-1- Beginning Unrecovered Investment	-2- 15% Capital Charge	-3- Investment Recovery	-4- (1-3) Ending Unrecovered Investment	-5- Net Cash Flow	-2- 15% Capital Charge	-3- Investment Recovery
0	0	0	-250335	250335	-250335	0	-250335
1	250335	37550	29368	220967	66918	37550	29368
2	220967	33145	32462	188504	65607	33145	32462
3	188504	28276	37332	151173	65607	28276	37332
4	151173	22676	42932	108241	65607	22676	42932
5	108241	16236	21840	86401	38076	16236	21840
6	86401	12960	25116	61284	38076	12960	25116
7	61284	9192	61284	0	70476	9192	61284

LEVERAGED LEASE YIELD MEASURES: A QUICK FIX

Yield Method	Purpose of Adjustments to Cash Flow	Sinking Fund Earnings Assumption
FASB 13 complying	Create separate and distinct investment phases, each with the same yield	No interest earned on funds allocated to sinking fund
FASB with sinking fund	Create separate and distinct investment phases, each with the same yield	Conservative interest rate earned
Internal rate of return (IRR)	Create separate and distinct investment phases, each with the same yield	Internal rate of return interest rate earned
Standard sinking fund	Create one investment phase by applying early year cash to (any) subsequent investment(s)	Conservative interest rate earned



cause an investment to have a net present value of exactly zero.

Since this lease example uses annual cash flows, its nominal and effective yields are the same; only when cash flow intervals are terms other than years will there be a difference between the two. However, suppose one wished to know the nominal and effective monthly yields for this lease. The nominal monthly yield would be the annual yield divided by 12, or 1.25%. The effective monthly yield is computed by adding one to the annual decimal equivalent yield, raising the sum to the 1/12th power (.083 power), and deducting one from the result; i.e., $([1+.15] \exp [1/12] - 1)$, or 1.17%. Suppose for a moment that the Table 1 lease generated quarterly cash flows, and nominal and effective annual yields were desired. Suppose further that the lease was priced to earn a 4.0% after-tax quarterly ROI. The nominal annual yield of the lease would be 16% (4x4%), and the effective annual yield would be 16.986% $([1+.04] \exp 4 - 1 = 1.16986 - 1 = .16986 = 16.986\%)$.

The single investor lease in Table 1

was designed to produce an after-tax return. To convert the 15% after-tax yield to a pretax equivalent, the after-tax rate is divided by the quantity one minus the lessor's assumed tax rate of 46%, or $15\% / (1 - .46) = 27.78\%$.

To summarize, the 15% ROI earned on the single investor lease is the yield measure generally referred to in the marketplace. It is an after-tax yield earned on total capital employed. It generates a pretax ROI of 27.78%, which is the after-tax return solved for, "grossed up" by dividing the after-tax yield by one minus the lessor's tax rate. Since the lease uses annual cash flows, the nominal and effective yields are identical. Had the lease employed shorter time intervals between cash flows, the nominal and effective annual yields would have differed. The nominal annual yield would be the per-period yield solved for, multiplied by the number of time intervals in a year. The effective annual yield would be calculated by adding one to the decimal equivalent of the per-period yield, raising the sum to the number of time intervals in a year, and deducting one from the result.

The Leveraged Lease

The most prevalent yield measures for leveraged leases will be discussed in this section. These measures include the FASB-complying multiple investment yield (FASB-complying), the FASB-styled multiple investment yield which includes a sinking fund (FASB with sinking fund), internal rate of return (IRR), and the standard sinking fund method. The basic structural difference among these four methods has to do with the cash flow numbers used to compute yield. With the exception of IRR, none of the methods utilize actual cash flows expected to emanate from a lease, but rather adjust them in various ways to overcome conceptual objections to IRR.

To focus attention upon the common characteristics of these yield measures, as well as to crystallize their differences, one sample lease will be used for all cases—the leveraged lease provided in the FASB 13 document itself—and all measures will be presented in the same analysis structure. In Tables 3 through 6, it will be noted that the beginning unrecovered investment value for year one is \$400,000, and all cash flow numbers are identical; this is as it should be since the same lease is being analyzed in all cases. \$400,000 is the lessor's equity investment in the lease at inception, and thus represents the amount to be recovered over the lease term.

Table 3 exhibits the analysis which produces the FASB-complying yield—that yield used by lessors to book income. Income under FASB 13 may be booked at the multiple investment rate (a constant) times the unrecovered investment for each year. The multiple investment yield is that rate which, when applied to unrecovered investment during those years in which the investment is positive, will exactly recover the lessor's investment by the end of the term. In the case of the sample lease, the multiple investment rate (FASB-complying

rate) is 8.6469%. There is no exact procedure which permits the FASB yield to be calculated directly; rather, computer routines are generally employed which determine the rate through an iterative (trial and error) process.

Note that the FASB rate is multiplied by the unrecovered investment for each year to produce reportable earnings (column 3). Earnings for year four are thus \$92,945 times .086469, or \$8,037. For each year, the amount of cash flow which remains, after earnings have been deducted, goes toward investment recovery until all

capital has been recovered; this is the case for years one through four. In years five and six, the positive net cash flow produced goes into a sinking fund (parking lot)—none of the cash flow is permitted to be booked as earnings since there is no investment, and none is ascribed as investment recovery since all investment has been recovered. The cash flow allocated to the sinking fund does not earn interest, since FASB 13 does not permit it.

For years seven through fifteen, the sample lease produces negative cash flow each year, which is indicative of a second or secondary investment. However, unrecovered investment (column 1) does not become positive during this secondary term until year eleven. The reason why unrecovered investment remains zero for four years of negative cash flow (years seven through ten) is due to the sinking fund. Since funds were placed in the sinking fund—funds generated by this lease during years five and six—it is FASB's opinion that unrecovered investment cannot become positive until the sinking fund is depleted. In year ten, the sinking fund is insufficient to offset negative cash flow for that year, and the amount by which cash flow exceeds sinking funds becomes the unrecovered investment at the beginning of year eleven; further, since there is now again an investment, earnings are recorded as before (even though cash flow is negative). When earnings are booked during negative cash flow years (years eleven through fifteen), investment recovery will be negative by the amount of net cash flow minus booked earnings (e.g., year fourteen investment recovery, column 4, equals $-\$23,856 - \$6,232$ or $-\$30,088$). In year sixteen, the beginning unrecovered investment is exactly offset by investment recovery for the year— $\$137,694$; this is also reflected in the total of column 4, which adds all positive and negative investment recovery numbers for all sixteen years.

Perhaps the easiest way to reconcile the meaning of the FASB 13 yield is to examine column 8. Here, all values—positive and negative—for both earnings and recovery (columns 3 and 4)

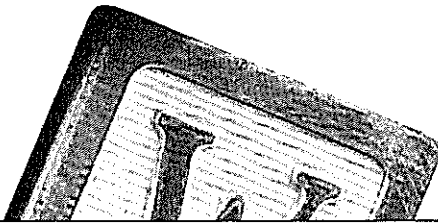


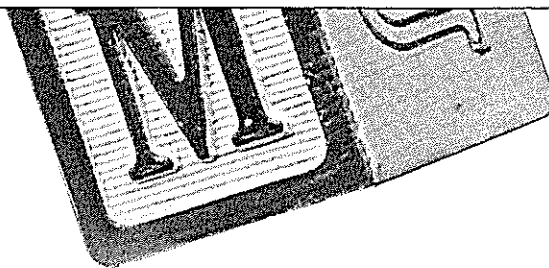
Table 3
LEVERAGED LEASE
(FASB 13 COMPLYING)

COLUMN	Cash Flow Allocation to:							
	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -	- 7 -	- 8 -
YEAR	Beginning Unrecovered Investment	Net Cash Flow	Earnings 8.6469000	Investment Recovery	To/from Sinking Fund	Sinking Fund Earnings 0.0000000	Sinking Fund Balance	Earnings and Recovery
1	400000	169421	34588	134833	0	0	0	169421
2	265167	119923	22929	96994	0	0	0	119923
3	168172	89769	14542	75227	0	0	0	89769
4	92945	71525	8037	63488	0	0	0	71525
5	29457	53182	2547	29457	21178	0	21178	32004
6	0	18616	0	0	18616	0	39794	0
7	0	-9553	0	0	-9553	0	30241	0
8	0	-11108	0	0	-11108	0	19133	0
9	0	-12803	0	0	-12803	0	6330	0
10	0	-14649	0	-8319	-6330	0	0	-8319
11	8319	-16663	719	-17382	0	0	0	-16663
12	25701	-18857	2222	-21079	0	0	0	-18857
13	46781	-21248	4045	-25293	0	0	0	-21248
14	72074	-23856	6232	-30088	0	0	0	-23856
15	102162	-26698	8834	-35532	0	0	0	-26698
16	137694	149600	11906	137694	0	0	0	149600
TOTALS		516601	116601	400000	0	0		516601

Table 4
LEVERAGED LEASE
 (FASB WITH SINKING FUND)

Cash Flow Allocation to:

COLUMN	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -	- 7 -	- 8 -
YEAR	Beginning Unrecovered Investment	Net Cash Flow	Earnings 8.9372700	Investment Recovery	To/from Sinking Fund	Sinking Fund Earnings 4.0000000	Sinking Fund Balance	Earnings and Recovery
1	400000	169421	35749	133672	0	0	0	169421
2	266328	119923	23802	96121	0	0	0	119923
3	170208	89769	15212	74557	0	0	0	89769
4	95650	71525	8549	62976	0	0	0	71525
5	32674	53182	2920	32674	17588	0	17588	35594
6	0	18616	0	0	18616	704	36907	0
7	0	-9553	0	0	-9553	1476	28831	0
8	0	-11108	0	0	-11108	1153	18876	0
9	0	-12803	0	0	-12803	755	6828	0
10	0	-14649	0	-7544	-7105	273	0	-7548
11	7548	-16663	675	-17338	0	0	0	-16663
12	24886	-18857	2224	-21081	0	0	0	-18857
13	45967	-21248	4108	-25356	0	0	0	-21248
14	71323	-23856	6374	-30230	0	0	0	-23856
15	101553	-26698	9076	-35774	0	0	0	-26698
16	137327	149600	12273	137327	0	0	0	149600
TOTALS		516601	120963	400000	-4361	4361		520962



have been totalled by year. First, it may be noted that the total of column 8 is exactly equal to the sum of the totals for columns 3 and 4. Second, it is apparent that the investment has been separated into two distinct phases; Phase I requires a cash outlay of \$400,000 in year zero, and produces earnings and recovery in years one through five (in the amounts shown in column 8). Phase II requires investment in years ten through fifteen, and realizes earnings and recovery in year sixteen only.

It is instructive to compute the IRR

for each of these two investment phases—IRR being calculated by finding that rate which causes net present value to equal zero. What is the IRR for an investment requiring an outlay of \$400,000 in year zero, and producing the benefits shown in years one through five in column 8? Second, what is the IRR with the investment requirements shown in years ten through fifteen of column 8, followed by the singular \$149,600 benefit in year sixteen? The IRR of the Phase I investment is found to be 8.6469%. The IRR of the Phase II investment will also be

8.6469%. Finally, if the cash flows in column 8 are all treated as one investment (with a dormant period in years six through nine), it will also produce an IRR of exactly 8.6469%. This equality of yield for the various phases of a leveraged lease will always be identical under FASB 13—by design.

Table 4 shows the results of the FASB yield, but with an interest-producing sinking fund added. This yield is not FASB-complying, but is felt to be more realistic by most members of the lessor community for the simple reason that few lessors are likely to invest a temporary surplus of cash in a noninterest-bearing vehicle. Here, the structure and mechanics of determining yield are identical to Table 3 except that sinking fund contributions are permitted to earn interest. The interest rate assumed is 4% in the example, after-tax; most lessors use a rate between 3.5% and 4%, since the fund's purpose is to simulate short-term investment (the rate on Treasury bills). Not surprisingly, the yield calculated under this method is higher than the FASB rate, since fewer sinking fund contributions are required (sinking fund earnings total \$4,361).

The IRR measure of yield is shown in Table 5. The conventional calculation of IRR, as stated previously, is to find that rate which will cause the net present value of an investment to equal zero; the rate which achieves this is, by definition, the IRR. For unconventional investments like leveraged leases, however, there may be more than one IRR due to the multiple sign changes in the cash flow sequence. (For the sample lease, only one IRR is obtained.)

Calculation of the IRR for the example using conventional means is accomplished by setting the initial investment of \$400,000 in year zero equal to the present value of all future cash flows shown in column 2 and solving for the yield that accomplishes this strict equality; the rate is found to be 9.25753%. The implicit theory behind IRR is that all cash flows—positive or negative—should be discounted at the same rate, and on an “as is/where is” basis (without adjustments). To further explore the significance of this assump-

tion, the IRR may be viewed in a different fashion.

If IRR is shown in a different context, it will be clear that it differs from the FASB complying rate in only one respect, and is identical in structure to the FASB with sinking fund yield measure. To see this, compare the columns in Tables 3 and 5. Note that in each case unrecovered investment falls to zero, and becomes positive in later years. Note that earnings are computed only for those years in which the net investment is positive. Further note that investment recovery (column 4) ceases when all investment has been recovered, and surplus cash flow goes

into the sinking fund. It is clear that the two tables are identical in all but one respect: The IRR allows sinking funds to earn interest. Now compare Tables 4 and 5. Here, both yield measures permit interest to be earned on sinking funds. *In fact, the results produced in Tables 4 and 5 are exactly the same in structure and content, with the sole exception of the rate earned on sinking funds!* The sinking fund rate used in the IRR yield is the IRR itself; the rate used in the FASB with sinking fund yield is designed to reflect the after-tax return on short-term (money market) investments.

The decision of which rate is

preferable to use depends upon the individual lessor. Those lessors who feel that a conservative sinking fund earnings rate should be employed would probably argue that this is proper due to the short period of time during which the sinking funds are available for investment. A perusal of column 5 in Tables 4 and 5 will reveal that contributions to either sinking fund are made for only two years, followed by withdrawals thereafter; thus, it would seem unrealistic to ascribe a long-term earnings rate to funds available for such a short time. Those who would accept the IRR sinking fund rate as more appropriate would argue that sinking funds are not real—they are merely conceptual tools—and, in any case, they are not interested in whether one investment can generate enough cash by itself to finance a secondary one. IRR proponents probably feel that if one adopts a portfolio approach, it is then easy to assume that cash from one investment will be available for reinvestment in others, and will not be placed in money market securities.

Table 6 illustrates the yield calculation for a leveraged lease using what is usually termed the standard sinking fund method. This is probably the least frequently utilized yield measure for leveraged leases. Of the four leveraged lease yield measures presented, the standard sinking fund method is the most unique, due to its objective. The three previous methods all allocate net cash flow—positive and negative—to earnings, recovery, and a sinking fund, and all allocate cash flow to earnings during only those years in which the net investment is positive. Once total investment is recovered, all surplus cash flow is allocated to a sinking fund. The standard sinking fund method is more cash-flow oriented, in that it allocates cash flow to a sinking fund in such a way that the secondary investment is completely eliminated. To see this, compare the earnings and recovery columns (column 8) for Tables 3 through 6. It is seen that only the standard sinking fund method eliminates the negative values. Mechanically, this method allocates cash inflows on an LIFO basis (last in,

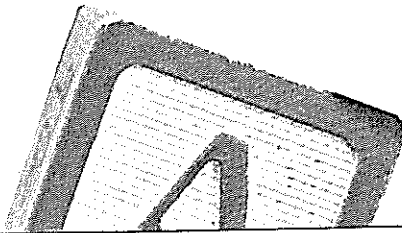


Table 5
LEVERAGED LEASE
(IRR)

Cash Flow Allocation to:

COLUMN	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -	- 7 -	- 8 -
YEAR	Beginning Unrecovered Investment	Net Cash Flow	Earnings 9.2575300	Investment Recovery	To/from Sinking Fund	Sinking Fund Earnings 9.2575300	Sinking Fund Balance	Earnings and Recovery
1	400000	169421	37030	132391	0	0	0	169421
2	267609	119923	24774	95149	0	0	0	119923
3	172460	89769	15966	73803	0	0	0	89769
4	98657	71525	9133	62392	0	0	0	71525
5	36265	53182	3357	36265	13560	0	13560	39622
6	0	18616	0	0	18616	1255	33431	0
7	0	-9553	0	0	-9553	3095	26973	0
8	0	-11108	0	0	-11108	2497	18362	0
9	0	-12803	0	0	-12803	1700	7259	0
10	0	-14649	0	-6718	-7931	672	0	-6718
11	6718	-16663	622	-17285	0	0	0	-16663
12	24003	-18857	2222	-21079	0	0	0	-18857
13	45082	-21248	4173	-25421	0	0	0	-21248
14	70503	-23856	6527	-30383	0	0	0	-23856
15	100886	-26698	9340	-36038	0	0	0	-26698
16	136924	149600	12676	136924	0	0	0	149600
TOTALS		516601	125820	400000	-9219	9219		525820

first out) just sufficient to completely "fund" the secondary investment, given a specified earnings rate on the sinking fund.

To determine how much cash inflow is necessary to fund the secondary investment, the cash outflows are discounted back in time and deducted from the cash inflows (beginning with the last inflow in year six) until the cumulative present value of all outflows has been driven to zero. The results of this procedure are shown in Table 6. All the cash flow from years five and six, plus \$46,569 of the cash flow from year four is sufficient to fund the outflows in years seven through fifteen, assuming that the sinking fund will earn a 4% after-tax rate.

To summarize, it has been shown that three of the four leveraged lease yields are extremely similar; in fact, they differ only in the earnings rate assumed for the sinking fund (zero, a money rate or an investment rate). The fourth measure—the standard sinking fund method—was found to be the most unique, since it is the only measure which has the objective of eliminating the secondary investment.

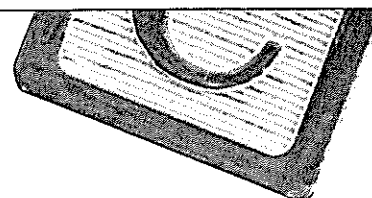
Footnotes

1. The FASB is a body which establishes accounting rules and procedures governing how companies must report financial information.
2. FASB 13 is the statement which deals with the financial reporting of lease transactions.
3. See the first part of the types of yield section for an explanation of nominal yields.
4. Refer to the leveraged lease section for an explanation of sinking funds and interest rates earned thereon.
5. Recourse borrowing means the borrower is obligated to repay the lender under any and all circumstances. This is distinguished from nonrecourse borrowing, which is typical in leveraged leases. In the latter case, a borrower (the lessor) may be required to repay the lender only to the extent that rents are paid by the lessee. Should the lessee be faulted on rent, the lender has recourse only to the lessee.
6. $(1 + .01)^{12} - 1$ means raise the quantity 1.01 to the twelfth power and deduct 1.0 from the result.

Table 6
LEVERAGED LEASE
(STANDARD SINKING FUND [4%])

Cash Flow Allocation to:

COLUMN	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -	- 6 -	- 7 -	- 8 -
YEAR	Beginning Unrecovered Investment	Net Cash Flow	Earnings 7.4508700	Investment Recovery	To/from Sinking Fund	Sinking Fund Earnings 4.0000000	Sinking Fund Balance	Earnings and Recovery
1	400000	169421	29803	139618	0	0	0	169421
2	260382	119923	19401	100522	0	0	0	119923
3	159860	89769	11911	77858	0	0	0	89769
4	82002	71525	6110	18847	46569	0	46569	24956
5	63156	53182	4706	-4706	0	1863	101613	0
6	67861	18616	5056	-5056	18616	4065	124294	0
7	72918	-9553	5433	-5433	-9553	4972	119713	0
8	78351	-11108	5838	-5838	-11108	4789	113393	0
9	84188	-12803	6273	-6273	-12803	4536	105126	0
10	90461	-14649	6740	-6740	-14649	4205	94682	0
11	97201	-16663	7242	-7242	-16663	3787	81806	0
12	104444	-18857	7782	-7782	-18857	3272	66221	0
13	112226	-21248	8362	-8362	-21248	2649	47622	0
14	120587	-23856	8985	-8985	-23856	1905	25671	0
15	129572	-26698	9654	-9654	-26698	1027	0	0
16	139226	149600	10374	139226	0	0	0	149600
TOTALS		516601	153669	400000	-37068	37068		553669



7. It is important to note here that the 15% after-tax rate assumed is for demonstration purposes only, and is substantially higher than prevailing rates at the time of this writing. However, the specific yield assumption used in this example in no way compromises the principles being developed.
8. It may sound counterintuitive to say that property being depreciated over five years will run out of deductions by the end of year four. However, this is correct within the context of the example presented. The example presumes that commencement occurs in early December, which means that ITC and first year depreciation tax benefits will be earned within a few days after the lessor's investment is made. Thus, "year one" tax benefits are included in "year zero," "year two" benefits included in "year one," etc.

References

1. Johnson, James M. "The Impact of TEFRA on Leasing Transactions." *The Journal of Equipment Lease Financing*, vol. 1, no. 1, 1983, pp. 4-10.