

Quantifying the Tax Effects of Leasing

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Equipment leasing is the service of providing assets to parties who need the use of assets, but who are not interested in owning them. The business of leasing also facilitates access to assets, by providing borrowers the financial resources to purchase the assets. Lessors and lenders have for many years debated the merits of their respective transactions. The complexity of the business and the variety of analytical methods, not to mention the diversity of organizational management preferences, have over time left many people confused and unsure of how to do this comparison. One important transaction difference is in their tax treatment, and over the years various approaches have been used to quantify the tax effects. This article will:

1. examine the tax characteristics of leases and loans (conditional sales) from the perspective of the lessor and lender;
2. examine various methods used for the analysis of the taxes; and
3. propose a few methodology guidelines.

The Importance of Methodology

A long-term trend in the leasing industry is the continuing refinement of analytical methods. This is due to competition, the proliferation of financing alternatives, better understanding of leasing by lessees, the availability of technology and advanced modeling techniques, and the drive by lessors to accurately measure and incorporate their costs of doing business in the bids. Taxes are a main ingredient in financial structuring. Establishing sound methods for valuing the tax effect is necessary to evaluate the success of completed transactions, to structure equitable compensation programs, to allocate limited investment resources most productively, and to plan future investments in a changing environment. Improving the methods used to gauge profitability will enhance the ability of a company to optimize its transaction mix.

Transaction Components

Let us first review the components of a tax-oriented lease and a loan. In general, an investment consists of a present-day outlay that produces future inflows whose sum is greater than the initial outflow. To be sure, both leases and loans fit this definition. The difficulties arise in assessing the components, timing, certainty, and magnitude of these future flows.

The **components** are of two types: **pre-tax cash flows** and **cash flows due to taxes**.

The pre-tax cash flows are the "cash-on-the-barrelhead" items in a transaction, including the equipment purchase, rent or debt service, residual income or balloon, fees, insurance, maintenance, among others. The purchase is a large up-front outflow, while the others are typically inflows occurring over the term of the transaction. The amounts and timing of these items are negotiated or estimated, but for analysis purposes let us consider them known.

The tax effects of a lease fall into two categories. First, the effect of each cash flow on taxable income must be determined. Revenues, such as rents or fees collected, increase taxable income. Expenses reduce taxable income, but not necessarily in the year of payment. Some expenses are amortized over the term of the transaction. Depreciation is governed by the MACRS (Modified Accelerated Cost Recovery System) provisions of the Internal Revenue Code (Section 168). The code specifies a schedule of percentages of the asset cost which the owner is entitled to recover (i.e., take as a deduction from taxable income) during the asset's life.

The second aspect of the tax effects is the computation of the amounts of tax to be paid and the timing of those payments. After a given year's taxable income has been calculated, the tax rate is applied to arrive at that year's tax liability. Such tax is usually paid in 4 equal installments, in months 4, 6, 9, and 12 of the year in question. Circumstances such as outstanding tax credits, Foreign Sales Corporation or Alternative Minimum Tax status, or net operating losses could affect both the amount and timing of tax payments, but for this analysis we will assume a normal situation.

The **magnitude** of the flows refers to the amount of the flows. The pre-tax flows are easily derived, once the components have been determined.

The **timing** of the flows involves determining the points in time when the flows will take place. Here again, the pre-tax cash flows are easily calculated, but the cash flows due to taxes may not be so simple, depending on the organization's tax practices. On this point, it is not just the actual payments to the IRS which are of question, but the timing of the payments or credits within the organization. A leasing entity will want to value the inflows and outflows when they occur from its own perspective, i.e., unaffected by transactions of other business lines within the corporation. The payments to the IRS will likely encompass the business activity of all business lines.

The **certainty** is a function of the risk that the cash flows will not occur as anticipated. The pre-tax flows are subject to risks related to credit, default, and market forces (such as floating rates), and the cash flows due to taxes are subject to tax law changes.

For simplicity's sake, most leasing organizations use the standard tax timing assumptions on a transaction-by-transaction basis, even though the actual payments to the IRS will likely be aggregated for the entire company. It is submitted that such an aggregation does not invalidate the methodology for computing the tax effect on a single transaction.

MACRS vs. Loan-type Amortization

In true leases, the MACRS provisions allow 200% (double declining balance, switching to straight line, for most equipment) of the remaining basis of an asset to be written off over the depreciable life of the asset. The depreciable life is based on the equipment class of the asset, as defined in the Code. The sum of all years' depreciation deductions equals the equipment cost. (Table 1)

Table 1
Federal Depreciation

Period ending	Asset fundings	Depreciation	Cumulative Depreciation	Depreciation remaining	Depreciation as % of total assets
Dec-30-99	1,000,000.00	200,000.00	200,000.00	800,000.00	20.000000
Dec-30-00	0.00	320,000.00	520,000.00	480,000.00	32.000000
Dec-30-01	0.00	192,000.00	712,000.00	288,000.00	19.200000
Dec-30-02	0.00	115,200.00	827,200.00	172,800.00	11.520000
Dec-30-03	0.00	115,200.00	942,400.00	57,600.00	11.520000
Dec-30-04	0.00	57,600.00	1,000,000.00	0.00	5.760000
TOTAL	1,000,000.00	1,000,000.00			100.000000

In loans, a different pattern of taxable income is produced. Interest and principal components of the same pre-tax cash flows are determined, and the taxable income applies only to the interest component. Such an amortization is sometimes referred to as the principal method of amortization. The yield realized on a loan-type amortization will likely be lower than the corresponding yield on a lease, for a given borrower. (Table 2)

Table 2
Loan Amortization

Period ending	Starting balance	Takedowns	Debt service	Interest	Principal	Ending balance
Dec-30-99	0	1,000,000	91,177	47,132	44,045	955,955
Dec-30-00	955,955	0	121,569	59,496	62,074	893,881
Dec-30-01	893,881	0	121,569	55,441	66,128	827,753
Dec-30-02	827,753	0	121,569	51,123	70,447	757,307
Dec-30-03	757,307	0	121,569	46,522	75,048	682,259
Dec-30-04	682,259	0	121,569	41,620	79,949	602,310
Dec-30-05	602,310	0	121,569	36,399	85,170	517,140
Dec-30-06	517,140	0	121,569	30,836	90,733	426,407
Dec-30-07	426,407	0	121,569	24,911	96,659	329,748
Dec-30-08	329,748	0	121,569	18,598	102,971	226,777
Dec-30-09	226,777	0	230,392	3,615	226,777	0
TOTAL		1,000,000	1,415,693	415,693	1,000,000	

The Deferred Tax

The larger early tax deductions for the lease produce a delay in the realization of taxable income. The deferred tax balance is the cumulative accounting of the individual differences in taxes paid. The most direct benefit of this is in offsetting tax liabilities from other transactions within the company. This may in turn reduce the costs of matched funding, which is the technique of borrowing the exact amounts (and for the shortest time possible) to cover gaps in the positive after-tax cash flows in the transaction. Either a lowering of the average amount borrowed, or a shortening of the average life of the borrowing could enable the leasing company to borrow at a lower rate.

The benefit of tax deferral is the central inquiry. A number of methods have emerged to quantify this benefit. Before we examine any of these, it is interesting to remember that a surprisingly widespread method is to disregard the taxes, by simply pricing the effective cost of a lease at a certain spread over the cost of funds. For example, if the cost of funds is 6%, and the required spread is 100 bp, then the lease would be structured to achieve an effective cost of 7.0%. This ensures that the transaction will meet a profitability target exclusive of taxes. Any tax benefits realized would be a yield enhancement. The simplicity of this technique is certainly appealing. However, more and more companies are willing to forego simplicity in the drive for greater analytical accuracy. The taxes, a major transaction component, are one focus of such analysis, as the following methods will illustrate.

Sample Case

To help compare various methods, we will use the following sample case: \$1,000,000 equipment cost, 10-year term commencing July 1, 1999, 40 quarterly payments in arrears of \$30,392.32, 7-year MACRS life, residual/balloon of 20%, and a tax rate of 35%. In real-world lease structuring, some portion of the tax benefits is typically passed on to the lessee in the form of a lower lease rate. This will not be the case in our analysis; the pre-tax cash flows to the lessee/borrower remain constant. Modeled as a lease, these assumptions produce a

nominal annual pre-tax MISF yield of 8.00%. As a loan, these assumptions produce a 6.37% interest rate and yield.

Net Interest Margin

One method of quantifying the benefit of tax deferral is to compute the margin between the interest rate for the loan and lease scenarios. The interest on the loan is known; for the lease, an implicit interest stream is calculated. This is done by assuming that the equity in the lease consists entirely of borrowed funds. The principal balance on this "loan" is adjusted by the deferred tax balance. Then, using a market interest rate, the interest associated with that loan is computed, and the difference between that and the book income in the lease is computed for each year. In absolute terms, this margin increases in proportion to the deferred tax balance. Expressing it as a ratio to the outstanding balance makes it more meaningful, as it is then tied to the transaction size. That ratio will typically grow from the start of the transaction for approximately 2/3 of the term, then decline as the deferred tax balance approaches 0.

In the example case, the net interest margin benefit shows a total of \$246,567 overall. The interest margin as a percentage of outstanding balance per year is 4.15% (45.67% divided by 11 years) (Table 3). This means that on average the lease produces a benefit over a loan in the amount of 4.15% of the outstanding investment, because the deferral of taxes lowered the average amount "borrowed."

One potential conceptual difficulty with this method is that both actual cash flows and accounting cash flows are used.

Table 3
Net Interest Margin

Period ending	IRR balance 6.343315%	Average net outstanding	Book income %	Average deferred tax interest	Average amount borrowed	Interest expense	Interest margin	Interest margin divided by outstanding balance
Dec-30-99	966,088	984,835	57,265	50,462	856,509	64,238	-6,973	-0.71
Dec-30-00	903,357	927,552	58,838	238,152	689,399	51,705	7,133	0.77
Dec-30-01	836,528	862,964	54,741	459,160	403,803	30,285	24,455	2.83
Dec-30-02	765,334	794,157	50,376	560,407	233,750	17,531	32,845	4.14
Dec-30-03	689,491	720,857	45,726	604,885	115,972	8,698	37,028	5.14
Dec-30-04	608,695	642,770	40,773	622,948	19,822	1,487	39,286	6.11
Dec-30-05	522,622	559,582	35,496	575,209	-15,627	-1,172	36,668	6.55
Dec-30-06	430,927	470,962	29,875	482,742	-11,780	-883	30,758	6.53
Dec-30-07	333,244	376,554	23,886	384,236	-7,681	-576	24,462	6.50
Dec-30-08	229,181	275,980	17,506	279,296	-3,315	-249	17,755	6.43
Dec-30-09	229,181	229,181	1,211	539,214	-25,836	-1,938	3,149	1.37
TOTAL			415,693			169,126	246,567	45.67

Present Value

Present valuing can be a helpful technique for determining the benefit of the tax deferral. With this technique, the differences between the tax payments from the lease and those from the loan are determined. These differences will be initially positive (i.e., favorable for the lease), and later negative. (The sum of the differences will be "0".) The present-value of all of these differences is a gauge for the overall benefit.

The present valuing technique is conceptually straightforward and analogous to many other techniques in financial analysis; however, since the differences actually occur over time, the analysis has limitations. Furthermore, the analysis requires the selection of a discount rate—a highly subjective but nevertheless critical piece of the formula. Selecting an inappropriate discount rate could affect the decision significantly. Depending on perspective, interested parties may argue that the discount rate should approximate the like-term commercial paper, the T-bill rate corresponding to the average life of the investment, the weighted average cost of capital, the incremental borrowing rate, or any of a number of other quantities. Others may wish to incorporate a component of risk by using a higher discount rate. Finally, the discount rate itself technically should be converted from pre-tax to after-tax (multiplied by 1 - composite tax rate) because it is being applied to after-tax cash flows, but even this point can be debated, in particular in multiple tax rate situations. Potentially, the calculation can become overburdened with complexity.

One way to separate this calculation from subjective preferences is to use a value inherent in the transaction for the discount rate, such as the IRR of the pre-tax cash flows. The logic here is that the discount rate should generally reflect the time value of money or prevailing transaction economics.

In the example, the PV of tax effects is \$48,821. To illustrate the effect of varying discount rates, 3%, 7%, and 10% produce PVs of \$37,563, \$71,059, and \$87,321, respectively. (Table 4)

Table 4
Present Value of Tax Differences

Period ending	After-tax cash flow from lease	After-tax cash flow from loan	After-tax cash flow difference	Present value factor 4.1450%	Present value of difference
Dec-30-99	-881,372	-930,653	49,281	0.961314	48,075
Dec-30-00	191,020	101,092	89,928	0.922426	84,179
Dec-30-01	146,220	102,534	43,686	0.885111	39,239
Dec-30-02	119,340	104,069	15,271	0.849305	13,161
Dec-30-03	119,340	105,705	13,635	0.814948	11,276
Dec-30-04	99,180	107,448	-8,268	0.781980	-6,561
Dec-30-05	79,020	109,305	-30,285	0.750347	-23,060
Dec-30-06	79,020	111,283	-32,263	0.719993	-23,573
Dec-30-07	79,020	113,390	-34,370	0.690866	-24,096
Dec-30-08	79,020	115,635	-36,615	0.662919	-24,631
Dec-30-09	160,392	230,392	-70,000	0.636132	-45,187
TOTAL	270,200	270,200	0		48,821

Adjusted Return on Investment

Another approach is a customized return on net investment. Return on investment is in general the ratio of net income to average investment. In this customization, the denominator is adjusted by subtracting the average deferred liability tax balance from the average investment balance (or, if there is an average deferred tax asset balance, adding it). The deferred tax balance is the difference between the financial reporting investment balance and the net tax basis multiplied by the company's effective tax rate. This technique can be used on a transaction or a portfolio basis.

This method is clean and logical; moreover, it does not need a discount rate, thus eliminating a source of subjectivity in some other methods. The monthly investment is simply adjusted by the deferred tax balance. Also, a return on investment measure fits well into many companies' financial measurement and management methods due to general familiarity and wide acceptance.

In the example case, the nominal annual after-tax adjusted return on investment is 22.6% (Table 5). Excluding the adjustment for deferral of taxes, it is 19.5%. (Table 6)

Table 5
ROI with Deferral Adjustment

Period ending	Net income	Investment balance 6.34331%	Deferred Tax	Tax adjustment investment balance	Cumulative annual		Accounting return on investment
					Tax adjustment investment balance	Net income	
Dec-30-99	40,542	966,088	49,281	11,477,798	11,750,907	40,542	25.47
Dec-30-00	38,029	903,357	139,209	9,890,749	22,808,090	78,571	25.43
Dec-30-01	35,352	836,528	182,895	8,332,941	33,057,074	113,922	25.44
Dec-30-02	32,500	765,334	198,166	7,163,270	42,577,104	146,422	25.38
Dec-30-03	29,461	689,491	211,800	6,106,302	51,451,811	175,884	25.23
Dec-30-04	26,225	608,695	203,532	5,032,064	59,714,812	202,108	24.98
Dec-30-05	22,777	522,622	173,247	4,381,630	67,429,637	224,885	24.62
Dec-30-06	19,103	430,927	140,984	3,688,715	74,652,752	243,989	24.12
Dec-30-07	15,190	333,244	106,615	2,950,547	81,415,506	259,179	23.50
Dec-30-08	11,022	229,181	70,000	2,164,168	87,734,422	270,200	22.73
Dec-30-09	0	0	0	0	88,240,109	270,200	22.60
TOTAL	270,200						

Table 6
ROI with No Deferral Adjustment

Period ending	Net income	Investment balance 6.34331%	Cumulative annual		
			Tax adjusted investment balance	Net income	Accounting return on investment
Dec-30-99	40,542	966,088	11,936,821	40,542	25.07
Dec-30-00	38,029	903,357	23,534,640	78,571	24.64
Dec-30-01	35,352	836,528	34,760,134	113,922	24.19
Dec-30-02	32,500	765,334	45,595,823	146,422	23.70
Dec-30-03	29,461	689,491	56,024,207	175,884	23.17
Dec-30-04	26,225	608,695	66,027,138	202,108	22.59
Dec-30-05	22,777	522,622	75,585,657	224,885	21.96
Dec-30-06	19,103	430,927	84,679,902	243,989	21.27
Dec-30-07	15,190	333,244	93,289,047	259,179	20.51
Dec-30-08	11,022	229,181	101,391,242	270,200	19.67
Dec-30-09	0	0	102,041,150	270,200	19.54
TOTAL	270,200				

Many companies have developed customized return on equity or MISF measures that incorporate the tax effects of depreciation and additional costs for funding, credit, sales, risk, overhead, or others. The difference between that and the effective cost of the lease is also an indication of the value of tax benefits, or indeed of overall economic value.

One pitfall in comparing the effective cost to the after-tax MISF yield is that the IRR is strictly a pre-tax quantity, whereas the MISF is an after-tax quantity and incorporates the timing of taxes. A yield that assumes quarterly tax payments will generally be higher than if taxes are paid when due. Some articles in industry PUBLICATIONS have exaggerated the significance of this factor. For example, in the case at hand, the pre-tax MISF (which is the grossed-up after-tax yield on the after-tax cash flows) is less than 1 bp higher than the pre-tax interest rate, with either monthly or daily yield calculations.

Also, the MISF assumes that the tax credits can be immediately applied as a reduction to the lessor's taxes. This is probably valid in large companies with a volume of ongoing business, but in a small organization it might not be a sound assumption. Because of that, some organizations assume that such credits are carried forward and applied against subsequent liabilities in the same transaction, rather than applied immediately.

Economic Structuring

Most leases are structured on an after-tax, or economic, basis. This means that the tax effects are not separately quantified, but instead are structured into a bid by using software that produces a yield based on after-tax cash flows.

Any of a variety of yields can be used --- multiple investment sinking fund, return on assets, return on equity --- depending on the organization's practices. A discussion of yields falls outside the scope of this article, but suffice it to say that once a suitable yield has been selected, the pre-tax cash flows can, within certain limitations, be manipulated to achieve the desired yield. The software calculates the tax effects of the revised structure and computes the new yield. Through iterations, the desired structure is found. The tax effects are not explicitly quantified, but are implicit in the yield calculation, as it is based on after-tax cash flows.

Loans are typically structured on a pre-tax basis. Because of this, analysts often consider loans only in terms of the interest rate, rather than the after-tax yield. We recommend that transactions done in a taxed (in contrast to a tax-exempt) environment be analyzed on an after-tax basis to be consistent. As mentioned earlier, the difference between the pre-tax interest rate and the pre-tax equivalent of the after-tax yield of a loan will usually be minimal, but extenuating tax factors such as delays or changing rates could increase this difference.

Accounting-Based Structuring

In contrast to economic-based structuring, some companies prefer an accounting-based yield as a lease-pricing measure. Instead of using the actual after-tax cash flows as a basis for the economic yield, an artificial stream of cash flows is built which corresponds to the book yield. Some argue that an accounting-based approach does not model reality as closely as an economic-based one. This is because the restructured cash flows omit the effect of the deferred tax. This could understate the transaction economics and perhaps hurt the marketplace competitiveness of a bid. Further, the operating lease-capital lease distinction made by accounting (but not for taxes) can cause a transaction with a PV of minimum lease payments of 89.99% to be measured much differently from one whose PV is 90.01%, in spite of the actual cash flows being almost identical.

On the other hand, accounting statements are the basis for many payments in corporations---commissions, dividends, incentives, income recognition, performance measurement, interest charges---and therefore reflect a certain reality. As such, they may be more valuable than economic measures. Also, some companies see a benefit in the consistency of the accounting-based yield with varying months of commencement. (An economic yield, other factors held constant, is higher, the later within the year the commencement takes place.)

Organizational Factors

A general impression gathered in preparing this material is that most banks, which are likely to be active in both leasing and lending, attempt to quantify the tax effects of leasing, although a variety of techniques is used. In general, these efforts include federal taxes and a composite state tax rate, without attempting to model specific state rates. In companies with both leasing and non-leasing business groups, many leasing people stated that educating their non-leasing brethren about the nuances of leasing is an ongoing and sometimes challenging process. Some factors contributing to this difficulty are turnover and mergers, as well as the complexity of leasing and the continuing evolution of structures and techniques.

It appears that the trend toward more accurate and thorough analysis of lease transaction components, both profits and costs, will continue. Taxes, as one such main component, warrant close attention because of their absolute numbers and the significance of deferrals.

A number of techniques are available to perform this analysis. A present value method may be conceptually clear and understandable, but requires a discount rate. A return-on-investment measure adjusted for the deferred tax balance handles the effect by adjusting the denominator, avoiding the discount rate problem, and it may mesh well with existing financial measures. The net interest margin can be useful, but it is complex and requires a money cost. The method most appropriate will depend on transaction type, economic factors, organizational policies or preferences, and the applicable tax situation.