

# Management Services: A Magazine of Planning, Systems, and Controls

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Volume 7 | Number 1

Article 1

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1-1970

## Letters

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## Recommended Citation

Moore, C. G.; Stephens, Matthew J.; Sorrell, C. Guy; Charrin, J. R.; and Navarette, Oscar (1970) "Letters," *Management Services: A Magazine of Planning, Systems, and Controls*: Vol. 7: No. 1, Article 1. Available at: <https://egrove.olemiss.edu/mgmtservices/vol7/iss1/1>

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### **Residual value**

Mr. Charrin's article in the September-October issue of *MANAGEMENT SERVICES* (p. 19), "A Lease-or-Purchase Decision Model for the XYZ Corporation," is accurately descriptive of results to a corporation balance sheet with regard to leasing techniques.

The only improvement I could suggest would be in the additional evaluation of the net effects on the final cost analysis if a purchase

option form of lease were employed, as is offered by most leasing companies. Generally, the residual values are less than the 20 per cent discussed; more often they are 10 per cent, 5 per cent, or 2 per cent, depending on other relationships in the contract.

*Charles G. Moore  
C. G. Moore & Co.*

*Palos Verdes Estates, California*

### **Caution**

Mr. Charrin makes the point that various general methods of analyzing financial leases are based upon assumptions that might not apply to particular situations. I agree, but I feel that one should proceed cautiously before casting aside general methods of analysis.

For example, most lease decision models proceed from an assumption that a long-term financial lease

represents a form of borrowing. Any working capital made available from leasing, therefore, can also be made available by borrowing to purchase the asset. Mr. Charrin's decision to lease is based upon an increase in working capital, and he mentions that XYZ has restricted borrowing power (p. 25). However, Table VI (p. 24) indicates the use of debt in purchasing the asset, and it is unclear how severely present borrowing restrictions preclude the use of debt.

Other questions might be raised about the analytical technique employed, but I want to comment specifically on the author's use of discounting. It seems quite possible that the article may lead to confusion concerning the use of discounting in decision making. Table II (p. 21) combines an attempt to cumulate forward to

terminal values (Column 6) with an attempt to discount backward to present value (Column 8), but the author seems to be confused about the relationship between the two procedures; this in turn leads to an incorrect decision (based on the author's facts) to lease. Table II is incorrect and/or misleading in several respects as listed [in the following paragraphs]:

1. The earnings (Column 4 minus Column 5) of Row 1 indi-

cate that the amount in Column 3 arose at the beginning of the year in order for returns to be earned during the year. The discount factor in Column 7, however, indicates that the amount in Column 6 (Column 3 plus the net of Columns 4 and 5) arose entirely at year end.

2. Only incremental cash flows, not total balances, should be discounted (Column 8). This column would then be additive.

3. The author specifies a 5 per cent after tax reinvestment rate (Columns 4 and 5). Since discounting involves the implicit reinvestment assumption that all cash flows before the terminal one can be reinvested at the rate involved in the discounting, discounting the figures in Column 6 at 10 per cent is inconsistent with specified conditions.

4. Column 3 for Years 4, 5, and 6 indicates an incremental return

TABLE II RESTATED\*

(Assumes Cash Out at Beginning of Period)

Year	(1) Purchase Net Cash Out (In)	(2) Lease Net Cash Out	(3) Freed Working Capital Plus Cumulative Lease Gain = (2) - (1)	(4) 5% Return on Col. 3 (10% Return-50% Tax)	(5) Cumulative Lease Gain = (3) + (4)	(6) 5% Present Value Factor	(7) Present Value of Incremental Working Capital (3 × 6)
1	\$191,915(A)	\$ 64,512	\$ 127,403	\$ 6,370	\$133,773	1.000(B)	\$127,403
2	183,750(A)	64,512	\$ 119,238 133,773			.952	113,515
			\$ 253,011	12,651	265,662		
3	191,917	64,512	\$ 127,405 265,662			.907	115,556
			\$ 393,067	19,653	412,720		
4	(49,584)	64,512	\$(114,096) 412,720			.864	(98,579)
			\$ 298,624	14,931	313,555		
5	(49,584)	64,512	\$(114,096) 313,555			.823	(93,901)
			\$ 199,459	9,973	209,432		
6	(49,584)	64,512	\$(114,096) 209,432			.784	(89,451)
			\$ 95,336	4,767	100,103		
Totals	\$418,830	\$387,072		\$68,345			\$ 74,543

The total of Column 1 minus the total of Column 2 plus the total of Column 4 equals \$100,103, the last figure of Column 5. This should be the case, since both sets describe the same thing.

Salvage value of the asset after six years is estimated to be \$140,000 (p. 26 of article), or \$122,500 after 50% tax on the gain of \$35,000 (\$140,000-\$105,000 basis after six years). This is \$22,397 greater than the \$100,103 cumulative lease gain, thus indicating that the asset should be purchased. Alternatively, subtracting the \$74,543 total present value of incremental working capital from \$91,385 [\$122,500 net salvage × .746 (5%, 6th period)] equals \$16,842. Notice that \$22,397 × .746 = \$16,708, or \$16,842 except for rounding of present value factors.

(A) The author splits the cash flow from the investment credit between Years 1 and 2 (Column 4 of Table VI, p. 24). Presumably this is under the assumption that the tax liability limitations preclude taking the entire credit in Year 1.

(B) This assumes that cash flow (Column 3) takes place at the beginning of the period in order that interest may be earned upon it per the author's example. See Alternative Table II for receipt at end of period.

\*The column numbers in this table do not correspond to those in the original Table II because the original Column 5 has been omitted. (In essence, it has been incorporated into Column 4.)

**ALTERNATIVE TABLE II**  
(Assumes Cash Out at End of Period)

Year	(1) Purchase Net Cash Out (In)	(2) Lease Net Cash Out	(3) Freed Working Capital Plus Cumulated Earnings = (2) - (1)	(4) 5% (After Tax) Present Value Factor	(5) Present Value of Incremental Working Capital
1	\$191,915	\$64,512	\$ 127,403	.952	\$121,288
2	183,750	64,512	\$ 119,238	.907	108,149
			133,773(A)		
			\$ 253,011		
3	191,917	64,512	\$ 127,405	.864	110,078
			265,662(A)		
			\$ 393,067		
4	(49,584)	64,512	\$(114,096)(A)	.823	(93,901)
			412,720		
5	(49,584)	64,512	\$ 298,624		
			\$(114,096)(A)	.784	(89,451)
			313,555		
			\$ 199,459		
6	(49,584)	64,512	\$(114,096)(A)	.746	(85,116)
			209,432		
			\$ 95,336(B)		
				Total	\$ 71,047

(A) Previous year's total times 1.05

(B) Cumulative lease gain of \$95,336 compared to net salvage of \$122,500 shows that purchase is favored by \$27,164.

Alternatively, multiplying \$122,500 by .746 equals \$91,385, and subtracting \$71,047 equals \$20,338 present value in favor of purchasing. The \$20,338 is \$27,164  $\times$  .746 except for rounding of present value factors.

to purchasing of \$49,584. This should be \$114,096, the algebraic sum of Columns 1 and 2.

5. The difference between the totals of Columns 1 and 2 plus the total of Column 4 should equal the last figure in Column 6, since both sets are methods of arriving at the cumulative gain from leasing.

[I have prepared] two tables, Table II Restated [on page 2] and Alternative Table II [on this page]. Table II Restated assumes that the cash out for both lease and purchase occurs at the beginning of the year. This table follows Mr. Charrin's Table II, but I have attempted to clarify the points raised previously. Alternative Table II is

an identical type of analysis, but the cash out for both lease and purchase is assumed to take place at year end. As indicated in the notes to both tables, the assumptions made by Mr. Charrin would lead to a decision to purchase, rather than to lease as he concluded. Furthermore, these notes specify the relationship and basic symmetry between cumulating differential cash flows forward and discounting [them] backward.

In conclusion, it might be noted that leasing could still be favored if the \$140,000 salvage value were highly uncertain. Mr. Charrin, however, does not specify that this is the case.

*Matthew J. Stephens, CPA*  
*Assistant Professor of Accounting*  
*Wharton School of*  
*Finance and Commerce*  
*University of Pennsylvania*  
*Philadelphia, Pennsylvania*

#### **Freed working capital**

I have read with interest [the] article describing a lease-versus-purchase model and would appreciate clarification of [the] method of calculation of freed working capital in Column 3, Table 2, on page 21. It would seem that [the] logic has a flaw in Years 4 through 6 and that the amount of freed working capital should really be (\$114,096) each of these years.

This would reduce the total freed working capital to some \$100,000.

[The] comment on page 25 relative to the effect on the income statement caused me, as an accountant, to raise a brow, to say the least. [Mr. Charrin] stated that if the lease period is too short,

operating expenses will be overstated and if the lease period is too long, they will be understated. I disagree wholeheartedly that operating expenses will be overstated or understated under either method. They will simply be different.

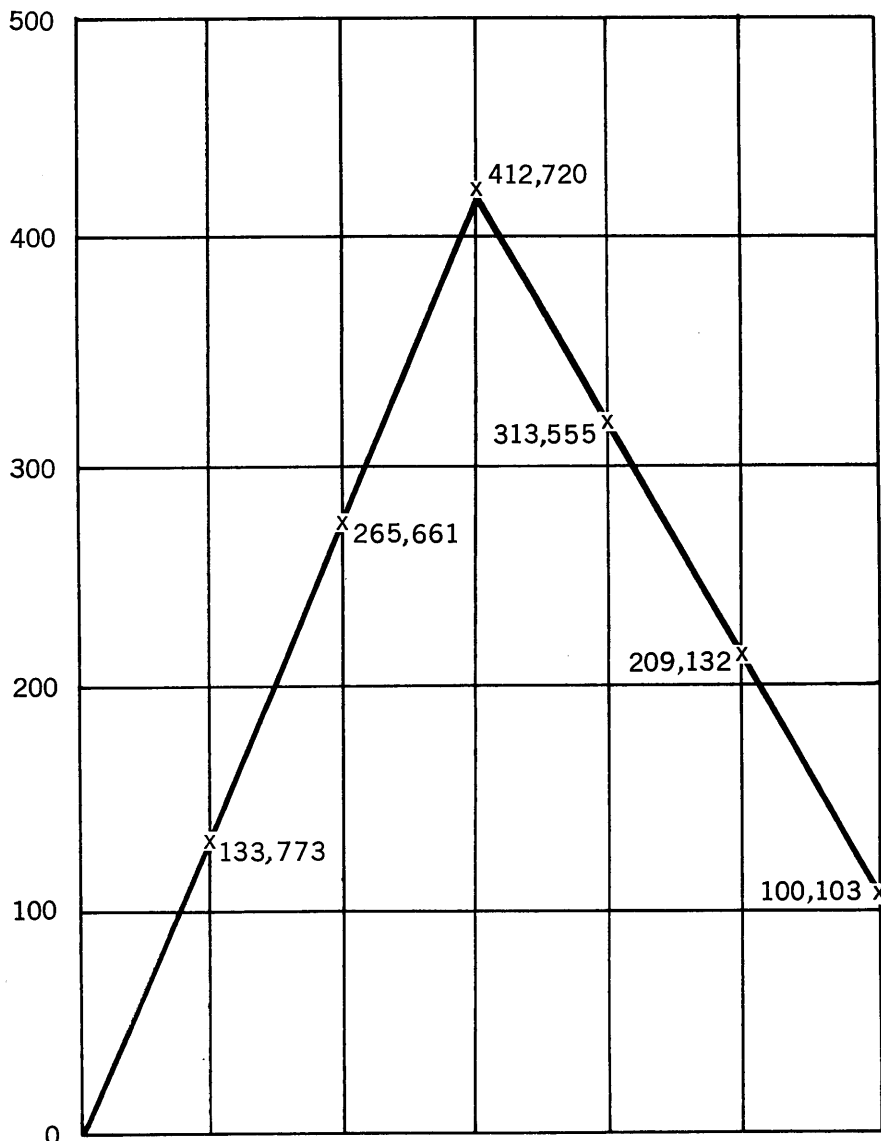
I would concur with [Mr. Char-rin's] observation that a comparison of equivalent periods in which the lease period would be identical to the useful life would be the most meaningful. It would be foolhardy to attempt to compare unlike periods, but comparison of like periods could be effected by recognition of a fair market value in the purchase flows at the end of a lease period in instances where the lease is non-renewable and does not contain a purchase clause.

We have considered [Mr. Char-rin's] model to be applicable to our operations in real estate development, and we have made some slight modifications in the model and added a computerized version to our existing bag of tools.

*G. Guy Sorrell,  
Assistant Controller  
Cousins Properties, Inc.  
Atlanta, Georgia*

### Working Capital Movement Over Six-Year Period

(Based on Data from Column 6, Table II)



### In reply

[Professor Stephens'] comments relative to the discounting method used are well taken. I agree with [his] Table II Restated and have made the suggested changes as outlined in his Points 1 through 5. A mathematical error was made in Columns 1 and 2 for Periods 4, 5, and 6.

As a result, the graph that appeared on page 22 [of the original article] should be corrected to appear as shown at the left. Furthermore, the second paragraph on page 26 should now read as follows:

"From Table IV, Column 8, XYZ Corporation would pay \$74,144 in finance charges through leasing. Added to this figure is the estimated equipment residual value which XYZ gives up. The residual value of the type of equipment in-

volved is difficult to estimate because of its specialized nature and limited marketability. However, an approximate value at the end of the six-year lease would be 20 per cent, or \$140,000. The total dollar leasing cost is estimated at \$214,144 (\$140,000 + \$74,144), compared to \$98,000 in interest charges for purchasing (Table VI, Column 2). However, this \$116,144 higher leasing cost difference is offset by the earnings on freed working capital totaling \$136,690 (Table II, Column 4). While the figures are estimates, they are realistic enough to support the comparative analysis. The above figures are before tax and are non-discounted."

[As for Professor Stephens' other comments:]

Working capital is gained by either leasing or purchasing; only the amounts differ. In my article, the working capital gained through leasing was greater than through purchasing primarily due to the difference in terms. Leasing was for six years, and purchasing was for three years. Both terms were actual proposals by the two institutions involved.

XYZ was restricted on assuming more debt under the existing debt structure. The decision model was developed to show XYZ the effects leasing would have as compared to purchase through debt. In other words, XYZ could only lease under its existing debt restrictions. There was a possibility of obtaining lenders' permission to assume the additional \$700,000 if XYZ decided to use debt. As it finally turned out, XYZ was merged into another company shortly after the study and obtained internal funds for the equipment needed.

The residual value is highly uncertain since [the] equipment in-

volved is subject to technological obsolescence. The residual value of \$140,000 (20 per cent) could be high. As [Mr. Moore] pointed out, this [value could be reduced to] 5 per cent [or] 10 per cent rather than 20 per cent.

[Professor Stephens'] comment that purchase would be indicated based on residual value (\$140,000) being greater than cumulative lease gain (\$100,103) does not consider the tax effect on sale of asset for residual value. Assuming a \$140,000 residual value sale at end of period, XYZ would pay taxes at 50 per cent rate on sale proceeds. Cumulative lease gain of \$100,103 is greater than after-tax residual value sale of \$70,000.

Considering the tax effects on leasing cost difference shown on page 26, again assuming \$140,000 residual, [that] plus \$74,144 lease charges less \$98,000 purchase cost equals \$116,144 before tax and \$58,072 after tax (non-discounted). The after-tax working capital gain of \$100,103 can then be compared to after-tax lease cost difference of \$58,072.

I might add that my approach to lease-versus-purchase [analysis] is one of several approaches. The approach is another tool of analysis a company should consider in making the decision.

[Mr. Sorrell's] comment relative to the income statement effects of leasing is a difference in terminology used. If a lease period involving equipment (not real estate) is not tied reasonably close to useful life, then income is affected. A purchase would not affect income nearly as much as a lease since interest only is deductible under a purchase and (the) entire lease payment is deductible under a lease.

[Here is] a further analysis of net leasing cost effects if a purchase option (residual value) is included in the lease. Assuming 20 per cent or \$140,000 residual value, the cost analysis [is as follows:]

\$140,000	residual value
74,144	lease finance charges
<u>\$214,144</u>	
98,000	less purchase interest charges
<u>\$116,144</u>	net cost difference of lease before tax
58,072	tax at 50%
<u>\$ 58,072</u>	net after tax cost

This can be compared to cumulative lease gain of \$100,103 (Column 6, Table II).

I am pleased [that Mr. Sorrell] found the model applicable to [his] real estate development and found it worthwhile to adapt it to a computerized version.

*J. R. Charrin*  
Assistant Division Treasury  
Manager  
Continental Oil Company  
Salt Lake City, Utah

**Appreciation**

I am a new subscriber. I thought you might be interested in knowing that 51 per cent of my reason for subscribing (and for three years at that) is out of appreciation for the section, "What People Are Writing About." That alone tipped the scales in favor of my becoming a subscriber.

Since you started your section, "Management Services Forum," I . . . have additional reasons for remaining a subscriber. Keep up the good work!

*Oscar Navarette*  
Manager, Accounting Department,  
Aerospace Controls Corporation  
Los Angeles, California