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*Lease Evaluation and Dividend Imputation*

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**ABSTRACT**

The conventional approach to analysing lease versus buy decisions discounts differential after-tax cash flows at the after tax cost of debt. This involves the assumption that reductions in corporate tax create value for shareholders. Under a dividend imputation system such as has existed in Australia since 1987, this assumption can be questioned, and the standard approach to lease versus buy analysis warrants reexamination. This paper outlines how the traditional approach and an alternative pre-tax approach can be used to derive bounds for determining the NPV of leasing rather than buying. Since it is only the sign rather than the magnitude of the NPV which enters into the lease versus buy decision rule, situations in which both approaches generate a NPV of the same sign enable a straightforward decision to be made. However, there may be a significant number of situations in which conflicting results occur, and the financial manager will need to examine more closely the impact of leasing or buying upon dividend policy and consequent shareholder value.

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The conventional approach to lease evaluation is to compare the differential after-tax cash flows from leasing rather than buying, and discount these at the after tax cost of debt finance<sup>1</sup>. Two key assumptions underlie this approach. First, it is assumed that lease finance and debt finance are perfect substitutes. Second, it is assumed that reducing company tax cash outflows creates value for shareholders<sup>2</sup>.

While the first of these assumptions has been questioned by a number of authors<sup>3</sup>, it is the validity of the second assumption, under the current Australian tax system, which is the focus of this paper. Consequently, we adopt the assumption that debt and leases are perfect substitutes in order to direct attention to the appropriate treatment of tax cash flows in lease evaluation. Motivating our arguments is the existence of a dividend imputation tax system in Australia. In this environment, the value to shareholders of financial transactions which serve solely to reduce company tax payments can be questioned.

In the following section of the paper, we briefly review the sources of differential cash flows between leasing and buying which may generate a difference in the present value between these alternative funding methods, in order to demonstrate the significance of company tax cash flows. We then outline the conventional approach and explain why it can lead to errors under

the dividend imputation tax system. Section 3 of the paper then presents an alternative approach, which enables financial managers to better evaluate the lease alternative under the tax system currently prevailing in Australia.

### ***1. Sources of Cash Flow and Present Value Differentials.***

Smith and Wakeman (1985) have previously presented a comprehensive analysis of the potential sources of value arising from leasing rather than buying capital equipment. They divide the differential cash flows into "Nontax Cash Flows" and "Tax-Related Cash Flows".

In the former category are: (i) initial purchase costs, (ii) lease payments, (iii) differences in salvage value, (iv) differential maintenance expenses, (v) differences in operating cash flows and (vi) differences in out-of-pocket contracting costs. While the last four items in this list can be significant in specific cases, it simplifies our analysis to ignore them (as is typically done). This leaves the present value of lease payments relative to initial purchase price as the key item under nontax cash flows. The conventional discounted cash flow analysis of the lease versus borrow and buy decision incorporates these items - although the asset's purchase price is often replaced by its present value equivalent (ignoring tax cash flows) of interest and principal repayments on a loan of equivalent size.

Smith and Wakeman list under tax-related cash flows the following potential sources of difference between leasing and buying: (i) investment tax credits, (ii) depreciation tax shields, (iii) lease payment tax deductions, (iv) capital gains tax on asset disposal, (v) maintenance tax shields, (vi) tax on operating cash flow, (vii) debt interest tax shields. In order to simplify the

analysis, we ignore items (i), (iv), (v) and (vi) by assuming equal cash flows in both cases. The remaining cash flow differences relate to differences in company tax payments under the two financing alternatives, and these are incorporated into the traditional lease versus buy analysis<sup>4</sup>.

## **2. *Conventional Discounted Cash Flow Analysis***

The conventional lease versus buy analysis assumes that the investment-worthiness of the project has been evaluated separately from the specific method of financing to be employed. It is then necessary to consider solely the differential cash flows associated with the alternative financing techniques.

The cash flows which will occur if the asset is leased but not bought are: the annual lease rental payments ( $L$ ) from the end of year 0 till the end of year  $(n-1)$  for an  $n$  year lease (where lease payments are payable in advance), less the tax saving arising from the tax deductibility of lease payments. (For ease of exposition we assume constant lease payments, tax payments in the same year as expenses occur, and that no residual value payment is required at the end of the lease). If the asset is not leased but bought the cash flows have two main components. First, there is the cash flow which is the outlay equal to the purchase price of the machine ( $A_0$ ) at the end of year 0. (We assume the asset has no remaining value at date  $n$ ). Second, there are inflows equal to the tax savings arising from depreciation allowances ( $P_i$ ). With a company tax rate of  $T$ , the differential cash flows after company tax are set out in Table 1.

Table 1		
<u>End of Year</u>	<u>Lease</u>	<u>not Buy Cash Outflow</u>
0		$L(1-T) - A_0$
1		$L(1-T) + P_1T$
2		$L(1-T) + P_2T$
.		
.		
n-1		$L(1-T) + P_{n-1}T$
n		$P_nT$

A proposal to lease rather than buy is a **financing project** which may be evaluated by finding its net present value using an appropriate interest rate to discount the cash flows of this financing project. If complications associated with risk of financial distress and unprofitable operations (which would make future lease and tax cash flows uncertain) are ignored, the cash flows of a lease-financing project are very similar in their degree of certainty to cash flows under a borrowing contract with a fixed repayment schedule. The appropriate discount rate is then the borrowing rate at which the firm could raise an 'equivalent' loan<sup>5</sup> - a loan which gives rise to the same after-tax cash flows as the project. Since the cash flows have been assessed on an after-tax basis, the borrowing rate against which they are to be evaluated must also be an after-tax rate.

Under this approach, the Present value of Leasing rather than Buying is given by

$$NPV = A_0 - (1 - T)L - \frac{L(1 - T) + P_1T}{(1 + r(1 - T))} - \dots - \frac{L(1 - T) + P_{n-1}T}{(1 + r(1 - T))^{(n-1)}} - \frac{P_nT}{(1 + r(1 - T))^n} \quad (1)$$

Under the dividend imputation system of taxation, matters are however a little more complex. If we examine the cash flows in Equation (1), we can see that part of the differential cash flows reflect differences in the tax payments made by the company under the two alternatives. Since company tax payments can be regarded as prepayment of personal tax for shareholders under an imputation system this raises the question of whether, in fact, such differential cash flows add value for shareholders.

Two extreme cases can be identified. At one extreme, the dividend imputation tax system may operate as a fully integrated tax system, in which changes in company tax paid are offset one for one by opposite changes in personal tax payments of shareholders. That would, for example, occur if a company followed a policy of paying out all free cash flows as dividends, regardless of whether they could be franked or not. In such circumstances, a reduction in company tax paid (*ceteris paribus*) would enable a larger dividend payout (since cash flow after company tax will increase), but the franking percentage will decline. Provided shareholders are Australian taxpayers, their personal tax payments will correspondingly increase, leaving cash flows after all tax unchanged. In this scenario, it is inappropriate to regard reductions in company tax arising from leasing as a source of value to shareholders. In effect, the discount rate which shareholders will apply to the dividend cash flow will change in reflection of the change in the franking percentage.

The alternative extreme case is where the dividend imputation tax system fails to achieve any degree of integration between personal and company tax payments, or where corporate financial policy creates an equivalent effect. This could occur in several ways. One possibility is where shareholders are unable to utilise franking credits, so that an increase in dividends is

a source of value regardless of any changes in the degree of franking of those dividends. This could occur if shareholders were foreigners or tax-exempt residents. A second possibility arises if corporate financial policy can provide returns to Australian taxpaying shareholders in a form which avoids personal tax rather than paying unfranked dividends. If, for example, capital gains were untaxed, retention of cash flows which could only be otherwise distributed as unfranked dividends would avoid personal tax. In these circumstances, a reduction in company tax payments would add value to shareholders.

In practice, neither of these extreme cases seems applicable to Australian companies, but they do provide the bounds within which lease evaluation can be examined. This is considered in the following section.

### **3. Lease Evaluation under Dividend Imputation - A Suggested Approach**

In the preceding section we have indicated that differential cash flows involved in comparing the lease versus buy financing project, result partially from differential company tax cash flows and thus in differential tax credits available to shareholders. In principle, the evaluation of the lease versus buy decision should take into account the NPV of that change in the stream of tax credits available to shareholders. In practice, no hard and fast rules can be given for calculating that NPV. Ultimately, the franking effect will depend upon the dividend policy of the firm and the valuation of franking credits by shareholders.

Such a conclusion is somewhat unsatisfactory, although probably unavoidable. In such circumstances, alternative approaches designed to check the sensitivity of results to specific assumptions warrant consideration.

One alternative is to assume that the dividend imputation system involves complete integration and thus a complete "wash out" of company tax. Under this extreme assumption, it would be appropriate to examine the differential cash flows **before** company tax, and discount them at the before tax cost of debt. Because, in this case, changes in company tax are offset one for one by changes in shareholder personal tax, those cash flows should be ignored. Since pre tax cash flows are being compared, the pre tax cost of debt is the appropriate discount rate. If instead, company tax cash flows are included it will be necessary to also allow for the effect of a change in the rate of return required by shareholders as the dividend franking percentage changes. This involves some quite complicated adjustments.

This argument can be seen more clearly by reexamining equation (1) and dividing it into its constituent parts as:

$$\text{NPV}(\text{lease not buy}) = \text{Asset Cost} - \text{PV}(\text{Lease Payments}) + \text{PV}(\text{Differential company tax cash flows})$$

Under a fully integrated tax system, the present value of a change in company tax cash flows is zero, and the present value of the remaining terms needs to be calculated using a pre tax cost of borrowing.

An alternative extreme assumption is that franking credits are of zero value to shareholders, so that reductions in company tax are a source of value. Under this extreme assumption, it would be appropriate to examine the differential cash flows **after** company tax, and discount them at the after tax cost of debt as in the conventional approach.

Table 2 provides an illustration of the two approaches, for a project with:

- an eight year life
- purchase price of \$1
- lease payments in advance of \$0.20 p.a.
- five year straight line depreciation
- interest rate of 10% p.a.
- company tax rate of 0.33

Table 2

Year	Asset	Lease	Lease tax	Deprec-	Depn. tax	After tax	Pre-tax
	Price	Rental	Shield	iation	Shield	cash flow	cash flow
		(L)	Lt	(P)	P.t		
0	1	0.2	0.066			0.866	0.8
1		0.2	0.066	0.2	0.066	-0.2	-0.2
2		0.2	0.066	0.2	0.066	-0.2	-0.2
3		0.2	0.066	0.2	0.066	-0.2	-0.2
4		0.2	0.066	0.2	0.066	-0.2	-0.2
5		0.2	0.066	0.2	0.066	-0.2	-0.2
6		0.2	0.066			-0.134	-0.2
7		0.2	0.066			-0.134	-0.2
8							
					NPV	-\$0.402	-\$0.60

As can be seen from Table 2 the NPV of the differential after-tax cash flows (discounted at the after tax interest rate) is \$ -0.402, whereas that of the differential pre-tax cash flows (discounted at the pre tax interest rate) is \$ -0.60. Both approaches would indicate that leasing is not the preferred alternative.

These alternative approaches will typically generate different answers for the lease versus buy analysis. However, because they represent the polar extremes in terms of treatment of tax cash flows, they provide upper and lower bounds for the NPV of the differential cash flows. Moreover, the precise values of the NPV of the differential cash flows calculated on a pre tax versus after tax basis are of limited interest. The reason is that the lease versus buy decision rule relies only upon the sign of the NPV. If both answers yield the same sign for the NPV, we can be confident that dividend imputation tax credit considerations will not affect the appropriate decision. However where the two approaches lead to different conclusions (one positive, one negative), the specific impact of leasing versus buying on the shareholder clientele and dividend policy of the firm will need to be examined more carefully.

#### **4. Estimating the NPV differential**

To assess the empirical significance of dividend imputation considerations in the lease versus buy analysis, a comparison is given below using hypothetical values. Examining equation (1) it is apparent that six parameters enter into the valuation equation. They are:

- Asset price (A) - assumed \$100
- Asset life (n) - assumed 4 years
- Company tax rate (T) - equals 0.33
- Interest rate [r] - values of 0.06,0.08,0.10,0.12 used

- Depreciation ( $P_i$ ) - tax schedule values of \$60,\$24,\$9.6,\$6.4 used<sup>6</sup>
- Lease payments (L) - alternative values calculated as described below, assuming annual payments in advance.

To calculate lease payments, alternative scenarios were constructed by assuming that the present value of pre tax lease payments at the various interest rates were respectively 1.05, 0.95, and 0.90 of the asset purchase price. Thus, for example, in Table 3, the entry of (\$28.59) in row [ $PV(L;r)A=1.05$ ] and column [Interest rate = 0.06] indicates that constant annual lease payments (in advance) of \$28.59 for four years have a present value of \$105 at an interest rate of 6%. If the lease versus buy calculation were undertaken on a pre tax basis in this scenario, the lease alternative would be rejected.

Table 3  
Lease Payments (\$100 asset purchase price, 4 year life)

PV(L;r)/ A	Interest Rate			
	0.06	0.08	0.10	0.12
1.05	(\$28.59)	(\$29.35)	(\$30.11)	(\$30.87)
0.95	(\$25.86)	(\$26.56)	(\$27.25)	(\$27.93)
0.9	(\$24.50)	(\$25.16)	(\$25.81)	(\$26.46)

Using the lease payment scenarios from Table 3, and the tax and depreciation values outlined above, Table 4 shows the NPV of leasing rather than buying using after-tax cash flows as outlined in equation (1). The first column of the table shows the NPV of leasing rather than buying using pre tax cash flows. (For example, the value of -5 corresponds to the  $PV(L;r)/A$  value of 1.05 in Table 3 - if the present value of lease cash flows is 1.05 times the asset cost of \$100, the NPV of leasing is -\$5)

Table 4  
 NPV(lease not buy) - after tax cash flow analysis  
 (Asset cost = \$100)

NPV (lease not buy) - pre tax cash flows	Interest Rate			
	0.06	0.08	0.10	0.12
-5	-8.219	-7.92834	-7.64657	-7.37259
+5	-1.33472	-0.98881	-0.65466	-0.33106
+10	2.10742	2.480957	2.841288	3.189704

The results in Table 4 suggest that an analysis using after tax cash flows is less likely to favour leasing than an analysis using pre tax cash flows, and may sometimes generate a different decision. For example, when the lease payments equate to a NPV advantage of \$5 (i.e. 5% of the asset purchase price) using pre tax cash flows, the after tax cash flow approach would reject leasing in favour of purchasing.

Underpinning this result is the accelerated depreciation taxation arrangements introduced in February 1992 which mean that an asset (such as the one used in this example) with a four year life has 60% of its value written off in the first year. This leads to a substantial front end loading of company tax savings from purchasing relative to leasing. Because the after-tax cash flow approach attributes value to reductions in company tax, the present value effect of the differential time pattern of company tax will create a bias towards purchase.

While both approaches appear to generate the same decision in situations where there is a significant advantage to leasing, it is clear that there is a range of outcomes where conflicting results could occur. Since a difference in the NPV advantage of 5-6% is economically significant, it is advisable that results be checked using the alternative approach when the initially preferred approach generates a NPV differential of (say) less than 10 % of the asset

purchase price. To the extent that conflicting recommendations arise from the alternative approaches, it will be necessary to examine the impact of the lease versus buy decision in more detail by incorporating implications for future company dividend policy.

## **5. Conclusion**

This paper has argued the traditional approach of including company tax cash flows into a lease versus buy analysis can be questioned under a dividend imputation tax system such as exists in Australia. Underpinning that argument is the fact that changes in company tax payments alter the ability of the company to pay franked dividends, and thus have implications for personal tax positions of shareholders. In an extreme case, company taxes “wash out” so that changes in company tax cash flows have no effect on shareholder value. The conventional approach assumes instead the polar extreme case where each dollar change in company tax paid affects shareholder value by the same amount.

The approach suggested in this paper is for financial managers to perform lease versus buy analysis on both a pre and post tax basis. The results generated by these two approaches will provide the bounds within which the true NPV will lie. Since it is only the sign, and not the magnitude, of the NPV calculation which is relevant for the lease versus buy decision, situations in which both approaches give NPV answers of the same sign provide clear guidance for the financial manager. In situations where conflicting results eventuate, it will be necessary for the financial manager to investigate further the implications of changes in company tax payments upon shareholder value for their specific circumstances.

## REFERENCES

Ang, James and Pamela P. Peterson. "The Leasing Puzzle," Journal of Finance, 1984, v39(4), 1055-1065.

Bayless, Mark E. and J. David Diltz. "An Empirical Study Of The Debt Displacement Effects Of Leasing," Financial Management, 1986, 5(4), 53-60.

Burrows G H "Evolution of a Lease Solution" ABACUS, 24, September 1988, 107-119.

Franks J and S Hodges `Valuation of Financial Lease Contracts: A Note' Journal of Finance, 33, May 1978, 657-69.

Lewis C and J Schallheim "Are Debt and Leases Substitutes?" Journal of Financial and Quantitative Analysis, 27, 4, December 1992, 497-511.

Marston F and R S Harris "Substitutability of Leases and Debt in Corporate Capital Structures" Journal of Accounting, Auditing and Finance, 3,2, 1988, pp147-170.

Mukherjee T "A Survey of Corporate Leasing Analysis" Financial Management, 10, Autumn 1991, 96-107.

Myers S, Dill D, and A Bautista `Valuation of Financial Lease Contracts' Journal of Finance, 31, June 1976, 799-820.

Smith C W Jr. and L Wakeman 'Determinants of Corporate Leasing Policy' Journal of Finance, XL, 3, July 1985, 895-908.

## ENDNOTES

<sup>1</sup>For a simple exposition of this approach (originally due to Myers, Dill and Bautista (1976) see Franks and Hodges (1978). Burrows (1988) provides an historical overview of the development of analytical approaches to lease evaluation. Mukherjee (1991) provides survey evidence on the approaches adopted by U.S. financial managers which indicates that two thirds of participants use a lease versus buy approach (many in conjunction with an internal rate of return comparison), and that the majority of users of the lease versus buy approach use an after tax borrowing rate as the discount rate.

<sup>2</sup>Myers, Dill and Bautista (1976) demonstrate that the approach also assumes that "1. ...the only advantage of debt financing is the tax savings generated by the deductibility of interest... 2. ... dividend policy is irrelevant...3. ..."value additivity principle holds". The validity of the first two of these assumptions under an imputation tax system is considered subsequently.

<sup>3</sup>See, for example, Ang and Peterson (1984), Bayliss and Diltz (1986) and Marston and Harris (1988) for empirical evidence, and Lewis and Schallheim (1992) for a theoretical analysis of why debt and leases may not be perfect substitutes.

<sup>4</sup>Myers, Dill and Bautista (1976) demonstrate how interest tax shields are implicitly incorporated into the valuation formula through the use of an after-tax discount rate, rather than through inclusion of interest-related tax cash flows.

<sup>5</sup>The concept of 'equivalent loan' and the lease versus buy method of analysis was introduced by Stewart C. Myers, David A. Dill, and Alberto J. Bautista, 'Valuation of Financial Lease Contracts', Journal of Finance, 31 (June 1976), 787-98.

<sup>6</sup>These values are successive annual depreciation allowances for an asset costing \$100 and with a four year life which is written off in year four, calculated using the depreciation schedules introduced in February 1992.