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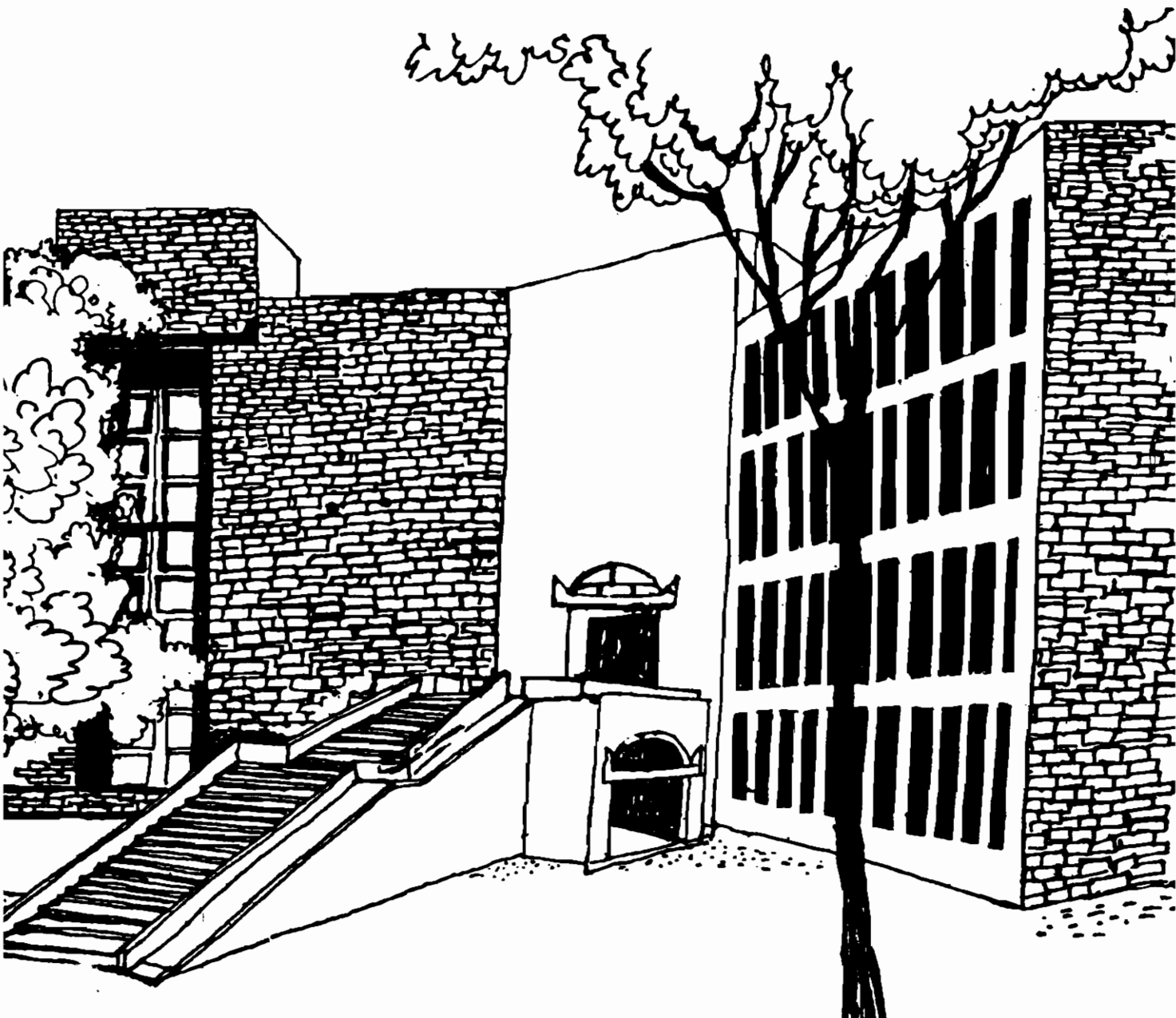
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Hire-purchase Instalments:
Are You Quoting Right?

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Abstract

This paper is concerned with the practice in the financial sector to quote hire-purchase installments for 100% finance schemes and deposit linked hybrid finance schemes on the basis of equal IRRs. The paper shows the inherent problems in the methodology adopted by the industry and highlights the extent to which the industry may be under quoting in cases of its hybrid schemes and presents a more equitable approach to quotations for different schemes. the paper also presents a more acceptable approach to such quotations.

Hire-purchase Instalments: Are You Quoting Right?

By

V. Raghunathan & C. V. Rao[*]

Introduction

It is surprising that notwithstanding the basic simplicity of financial arithmetics, the finance companies continue to base their pricing decisions on erroneous grounds. In this very journal last year[1], we had focussed on how several leasing companies were quoting rentals based on pre-tax internal rate of returns (IRRs), even though leasing was nothing if not tax trading. That a company could at all ignore the tax implications in quoting its lease rentals was not merely naive, but amounted to committing financial harakiri. Even when the basis of such computations are absurd, unfortunately the mere fact of computing some IRRs on personal computers with outcomes on coloured screens and laser printers give these absurd results a scientific facade.

In this paper, we are concerned with yet another erroneous practice in the quotation of hire-purchase installments, prevalent even amongst the best of finance companies, which at the very least give a misleading picture to the investing public about their costs of capital and at worst threatens to gradually erode their profitability. In what follows, we highlight the problems in question and present the necessary resolution.

Description of Car Hire-purchase Financing Schemes

Most finance companies today have various schemes of financing[2], specifically for hire-purchase of cars, ranging from 100% financing to "deposit linked schemes". In a 100% Financing Scheme (100% F Scheme), a finance company finances 100% of the value of an asset for a client. In a deposit linked scheme, however, the company requires a client to deposit[3], say, 25 (25% deposit) and extends a credit of 100 to the same client (100% financing). This scheme may be referred to as a 25% DL Scheme (25% DL Scheme). Such a scheme is a hybrid, combining an investment and a financing alternative.

Table 1 and Table 2 provide the terms of 100% F Scheme and 25% DL Scheme for three year tenure for five well known finance companies respectively. The information has been sourced from their respective recent leaflets describing the schemes. The terms of the schemes are self-evident in the tables. Are these two schemes equivalent, in the sense that both the schemes imply the same return to the concerned finance company? Table 3 provides the annual IRR[4] for the two schemes for the

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[1]   Rao C.V. and Raghunathan V., "Lease Rentals Quotations: Pre-Tax or Post-Tax", Chartered Financial Analyst, June, 1993.

[2]   Though we shall continue to refer to "financing schemes", it should be remembered that the so called financing scheme is in fact an "investment" opportunity for a finance company. It is a financing option only for the borrower.

[3]   Note that the "deposit" represents a source of fund for the finance company, while its "investment" represents a use of funds.

[4]   The annual IRR is arrived at after computing the monthly IRR and equating the same to an equivalent annual IRR on a time adjusted basis, the formula for the adjustment being:
$[(1+r_m)^{12}]-1 = R_m$, where r_m and R_m are monthly and equivalent annual rates respectively.

five companies, calculated by simply generating the cash flows as shown in some of the latter tables (Table 4, 5 etc.). The computations assume that the management or processing fee for the deals is zero, since the common market practice is to pass on these fees to the brokers or dealers, so that no processing fee is actually received by the finance company. It is apparent that the IRRs under the two schemes are equal for every company (except 20TH CENTURY, in which case the IRR for the 25% DL Scheme is 2% lower than the IRR for the 100% F Scheme).

Are the Two Schemes Equivalent?

Does this imply that the return to these companies under the two schemes will be the same? At least these companies seem to believe so and so would perhaps most of us. But in fact are they? Let us take a close look through the hypothetical example depicted in Table 4.

Columns 2 and 3 of Table 4 depict the cash flows pertaining to a 100% F Scheme and 25% DL Scheme (the interest rate on the deposit being 15% p.a.) respectively of a hypothetical company. For the sake of simplicity, the example assumes that there are no advance instalment payments in either of the schemes. We observe in this table that as in the real life situation portrayed in Table 3, the annual IRRs under both the schemes are 34%. The question we wish to address is whether or not the two schemes can be considered equivalent in terms of returns to the hypothetical company offering these two schemes.

Before we answer this question, consider the 25% DL Scheme in Table 4 once again (Column 3). In this scheme, our hypothetical company accepts a deposit of 25,000 while it finances an asset worth 1,00,000, so that the net outflow to the finance company in period zero is only 75,000. The monthly instalments in arrears are 3836 till the 36th period. The outflow of 34,186 (shown with a negative sign) in fact includes a receipt of 3836, coupled with an outflow of 38022 (so that the net outflow is 38022 - 3836 = 34186).

Column 4 and 5 represent the splitting of Column 3 into the 100% financing and 25% deposit linked cash flows. Thus, Column 4 is synonymous with 100% F Scheme of a 100,000 asset (Column 2), while Column 5 represents cash flows pertaining acceptance of deposit of 25,000 at 15% per annum. In other words, the stream of 3,836 in Column 4 represents the annuity against the financing of 1,00,000, while the outflow of 38022 in the 36th period of Column 5 represents the repayment with interest (@ 15% per annum) against the deposit of 25,000.

We observe that the IRRs for Columns 4 and 5 are about 25% and 15% respectively. We now have a rather interesting situation in terms of what our hypothetical company believes is happening, what is actually happening and what perhaps ought to be happening if the company's quotations were to be in line with its belief.

Our hypothetical company believes (based on Column 3, Table 4) that in its 25% DL Scheme, it is receiving an annual return of 34% on its financing component (of 100,000) and paying an annual interest of 15% on its deposit of 25,000. This, in fact, is not the reality.

What is in fact happening is that the company is earning an annual return of only 25% on its financing component of 100,000 (Column 4), while it is paying an annual interest of 15% on its deposit component of 25,000 (Column 5). On the other hand, if the company believes that it is earning a return of 34% on its financing component of 1,00,000 in a 25% DL Scheme, then it also amounts to saying that the company is in fact paying an annual interest of 34% on its deposit component of 25,000. This is because, an IRR is also the implicit reinvestment rate in any investment scheme. Thus, 34% IRR of a 25% DL Scheme implies that for both the investment as well as the financing cash flows inherent in the Scheme, the reinvestment rate is 34%.

If the companies are aware that they are de facto paying an interest of 34% interest on the deposits, then it would appear that they have hit upon a "smart" way of circumventing the interest rate ceiling on fixed deposits, merely by labeling the deposits as "security deposits" rather than fixed deposits. But if this were the case, their claim in their leaflets that they pay an interest of 14% or 15% per annum (Table 2) is misleading and goes against the interest of the shareholders of these companies, who are given to understand that the company is paying a smaller interest to the deposit holders, when the actual interest paid is much higher.

It appears that the instal ments which our company ought to have quoted on the 25% DL Scheme should have been as shown in Column 6 of Table 4. These instal ments are nothing but the sum of Columns 2 and 5; Column 2 showing the financing of 1,00,000 at 34% and Column 5 showing the acceptance of 25,000 deposit at 15%. We observe that Column 6 shows an IRR of about 51% instead of 34%! By charging instal ments as per Column 3, the company is in fact charging 389 less every month (4225-3836) in terms of monthly installments.

The Reasons for the Confusion

Why does our hypothetical company make the above mistake of apparent under quotation? The reasons aren't far to seek. Our finance company erroneously thinks that its 25% DL Scheme (financing 100,000 against a deposit of 25,000) is equivalent to outright financing of 75,000 as in a 100% Financing Scheme, just because the two schemes yield the same IRR (as can be seen by comparing Columns 2 and 3 of Table 5. It may be noted that even for a 25% DL Scheme where the company actually pays an interest of 34% per annum on the deposit, the IRR of the scheme remains 34% (see Column 4 of Table 5). How the cash flows in Column 4 of Table 5 have been arrived at is shown in Table 6.

Table 5 puts the confusion in sharper focus. Column 2 is the 25% DL Scheme of our hypothetical company which pays 15% interest on the deposit. Column 3 shows the annuity payments for a 100% Financing Scheme for a 75,000 asset (note that the annuity of 3169 is 75% of 4225, which in turn is the annuity of 100% F Scheme for a 100,000 asset). Column 4 represents a 25% DL Scheme in which the interest rate on the deposit is 34%.

It can be seen that all the three schemes have the same IRR, that is, 34%. Are the three schemes equivalent then? Obviously not, as is evident from the description of the schemes. Clearly then, even when IRRs of different schemes are equal, the schemes themselves may not be equivalent.

The whole confusion arises because our company has been mixing up its investment and financing cash flows. The credit of 100,000 that it extends to the borrower in financing his asset is in fact the company's investment, that is, use of finance, while inviting a deposit of 25,000 amounts to financing its capital, which is a source of finance. In principle, a company must segregate its sources and uses of finance. Conceptually, this also implies that a company must be indifferent as to who brings in the capital (or deposit). The fact that the deposit is brought in by a client cannot be regarded any different from the deposit being brought by a non-client[5]. In either case, given the company's debt capacity, its overall cost of the deposit must remain the same. Also, it is intuitively appealing that the company's cost of capital (in this case deposit) should be less than the return the company expects to earn on its investments (as implied by financing of the clients), so that the IRRs of the investment and financing options are different. However, when a company nets out its investment and financing cash flows and computes a single IRR, it *de facto* assumes that its cost of funds is the same as the return that it expects to earn on its investments (being 34% in the example above). This is clearly erroneous.

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5   The exception to this statement being that when a client brings in the deposit, the net risk exposure to the finance company with respect to that client is lower. for example, in a 25% DL Scheme, the net risk exposure of the finance company is limited to 75,000. This aspect is dealt with later in the paper.

Thus it is clear that by mixing up the investment and financing cash flows, the finance companies are erring on their instalment quotes on deposit linked schemes. In fact, the case of 20TH CENTURY is worse, since its IRR on the 25% DL Scheme is lower than its IRR on the 100% Scheme (Table 3), whereas it should be the other way round (Column 6 of Table 4).

Of course, our hypothetical finance company may argue that a deposit scheme is merely one of its sources of funds and that it can afford to reduce its effective IRR on the deposit linked scheme, even as manufacturing companies give price discounts in some cases. Such a stand is perfectly acceptable, so long as this company is clear that it is in fact paying an interest of 34% and not 15% on its deposit and conveys the same to its stakeholders. But if our company is prepared to pay an interest of 34% per annum on its deposits, has it explored alternative sources such as commercial papers, inter-corporate deposits etc. which are much cheaper than 34%?

The NPV Decision Criterion

The above analysis has already shown the weakness of the IRR as a valid decision criterion. The classic debate of IRR versus NPV (Net Present Value) indicates that since the reinvestment rate has no reason to coincide with the IRR, the NPV criterion is generally superior to the IRR criterion[6]. This is because, the discount rate under the NPV criterion captures the market expectation of the investors, while the IRR is a mere arithmetic computation. It should be noted that under the NPV framework, the financing decisions of a firm are captured as the cost of capital and used to discount the operating cash flows of an investment decisions[7].

Further, the IRR decision rule also suffers from another well known problem concerning the mathematical character of IRR. Theoretically, every hybrid scheme with a large payoff against the maturity of the deposit (for example see Column 3 of Table 4) can have two IRRs, since there are two sign changes involved in the cash flows; from negative to positive in the first period and from positive to negative in the last period[8].

The NPV decision rule, however, skirts around all these problems. Thus, the earlier analysis can be revised using the NPV decision criterion in place of the IRR criterion. Reasonably enough, the results under the two scenarios are likely to be quite different.

For the purpose of following analysis we assume that our hypothetical finance company has no capital constraint[9]. We further assume that the company's cost of equity (post tax) is 24%, the cost of debt is 16%, the debt to equity ratio is about 6:1 and the marginal tax rate is 46%.

Since the cash flows to be discounted are gross pre-tax cash flows, the discount rate employed is the pre-tax cost of capital, which works out to around 20%, arrived at as follows:

$$\text{Weighted Average Pre-tax Cost of Capital} = \frac{24}{(1 - 0.46)} \cdot \frac{1}{7} + 16 \cdot \frac{6}{7} = 20\%$$

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6   For a detailed discussion on this issue, the readers are requested to refer to any standard text book on Corporate Finance.

7   Conceptually, the cost of capital of a firm is nothing but the IRR of its financing cashflows. Thus, as the financing cashflows are accounted for in arriving at the cost of capital, the only cashflows to be discounted are the operating or investment cashflows.

8   Most standard text books on corporate finance will provide greater insight into this problem.

9   If there is capital constraint at a given interest rate, it is merely assumed that a company can always raise finances at a higher interest rate.

Table 7 presents the NPVs (at 20%) for several alternative set of cash flows. Note that under the NPV criterion, we are concerned only with the pure investment cash flows, since the financing cash flows enter into the computation of the cost of capital or the discount rate. Thus, NPVs of mixed schemes (like deposit linked schemes) are conceptually problematic.

From this table it is obvious that the investment cash flows implied in our company's 25% DL Scheme have the least NPV at 5562 (Column 3). The NPV for a 100% F Scheme for financing a 100,000 asset is 16266 (Column 2). Similarly, the NPV for a 25% DL Scheme for financing a 100,000 asset is 12207 (Column 4).

Thus, we can say that a hybrid scheme of the company may be considered equivalent to the 100% F Scheme, if the investment component of the scheme yields the same NPV as that of the 100% F Scheme, provided the credit risk exposures are equivalent in the two cases.

In order to clarify the above stand, let us assume that our company is designing two hybrid schemes for financing a 100,000 asset:

1)   25% DL Scheme giving 15% interest on deposit, and
2)   25% DL Scheme giving no interest on deposit.

In this situation, the company must ensure that its resulting NPV for the investment component in both the cases will remain 12207 (at 20%), since in both these cases the company's net credit risk exposure is limited to 75000. Column 7 depicts the recommended cash flows for Scheme 1 above. Note that under this scheme, the credit risk exposure of our company is limited to 75,000 and the NPV of the investment component of the scheme is 12207 (Column 5 of Table 7). Column 6 merely represents the deposit linked cash flows of the scheme, so that the Column 7 is nothing but the net cash flow for the 25% DL Scheme. If on the other hand, we wanted to design Scheme 2 above, which also has a net credit risk exposure of only 75,000 for our company, we shall merely have to recognize that the cash outflow shown in period 36 in column 6 of Table 7, will remain 25,000 (being repayment of the principal, there being no interest to be paid). However, the investment component of this scheme will be the same as shown in Column 5 of Table 7. The quoted instal ments for the scheme will merely be an annuity of 4077 for the first 35 periods, followed by an outflow of 20923 (being 25000 - 4077) in the 36th period.

Our company may also wish to devise a scheme for financing a 125,000 asset with a deposit component of 25,000. For such a scheme, the net credit risk exposure of the company will be 100,000, so that on the investment component of the scheme, our company must require an NPV of 16266.

Conclusion

What we have attempted to underscore in the paper is that mixing up investment and financing cash flows presents several conceptual problems in the process of arriving at the HP instal ments. Moreover, IRR decision rule suffers with several inherent problems such that different schemes having the same IRR cannot be viewed as equivalent in terms of adding the same value to the shareholders. The objective of equivalence of schemes can be achieved only through the NPV decision rule. In other words, two schemes are equivalent if they yield the same NPV, when capital is not a constraint, and risk exposures are alike. In sum, a scheme which mixes up the investment and financing cash flows and computes the combined IRR of the cash flows is usually sub-optimal, implying that such strategies must reduce the overall value of the firm. Put differently, a company will be able to take best decisions only when it views its investment and financing decisions separately and maximizes the NPV of its investments.

Table 1 : 100% Finance Scheme (100% F Scheme)					
Company's Name	20th Century	Essanda	GLFL	Kotak	Lloyds
Amount of Finance	100000	100000	100000	100000	100000
Term (in Months)	36	36	36	36	36
No. of Instalments in Advance	5	3	1	5	6
No. of Instalments in Arrears	31	33	35	31	30
Instalment Amount	3730	3830	4020	3819	3695

Table 2 : 25% Deposit Linked Scheme (25% DL Scheme)*					
Company's Name	20th Century	Essanda	GLFL	Kotak	Lloyds
Amount Financed	100000	100000	100000	100000	100000
Deposit (25% of Amount financed)	25000	25000	25000	25000	25000
Annual Interest Rate on Deposit	14.00%	14.00%	25.00%	14.00%	15.00%
Freqency of Compounding	Qtly	Qtly	Annual	Qtly	Qtly
Maturity Value of Deposit	37777	37777	48828	37777	38886
Term (in Months)	36	36	36	36	36
No. of Instalments in Advance	1	1	1	1	1
No. of Instalments in Arrears	35	35	35	35	35
Instalment Amount	3665	3680	3880	3775	3749

*Under this Scheme, the asset is financed to the tune of 100%, while 25% of the amount financed is taken as deposit.

Table 3: IRRs for 100% F & 25% DL Schemes		
	IRRs for	
Name of the Company	100% F Scheme	25% DL Scheme
20th Century	32%	30%
Essanda	31%	31%
GLFL	31%	31%
Kotak	36%	36%
Lloyds	34%	34%

			Table 4 : Hypothetical Case		
Period	100% F Scheme	25% DL Scheme	Investment Component of Col (3) Cashflows	Deposit Component of Col (3) Cashflows	Net Quote for 25% DL Scheme (2) + (5)
(1)	(2)	(3)	(4)	(5)	(6)
0	-100000	-75000	-100000	25000	-75000
1	4225	3836	3836	0	4225
2	4225	3836	3836	0	4225
3	4225	3836	3836	0	4225
:	:	:	:	0	:
:	:	:	:	0	:
:	:	:	:	0	:
35	4225	3836	3836	0	4225
36	4225	-34186	3836	-38022	-33797
IRR	34%	34%	25%	15%	51%

* 100% Financing (for 100,000) less 25% Deposit (of 25,000)
** 34186 = Maturity Value of Deposit (of 25000) which is 38022 less last instalment of 3836
Notes:
a. Amount Financed : 100000
b. Instalments payable monthly in arrears.
c. Term is 36 Months
d. Interest on Deposit of 25000 is payable at 15% p.a compounded annually
e. Both the Schemes are designed to yield an IRR of 34%

	Table 5 : Are the Three Schemes Equivalent?		
Period	25% DL Scheme at 15% p.a	100% F Scheme for a 75000 Asset	25% DL Scheme at 34% p.a
(1)	(2)	(3)	(4)
0	-75000	-75000	-75000
1	3836	3169	4225
2	3836	3169	4225
3	3836	3169	4225
:	:	:	:
:	:	:	:
:	:	:	:
35	3836	3169	4225
36	-34186	3169	-55925
IRR	34%	34%	34%

Table 6 : Investment & Financing at 34% IRR			
Period	100% F Scheme	25% Deposit at 34% p.a	Hybrid Scheme (2) + (3)
(1)	(2)	(3)	(4)
0	-100000	+25000	-75000
1	4225	0	4225
2	4225	0	4225
3	4225	0	4225
:	:	:	:
:	:	:	:
:	:	:	:
35	4225	0	4225
36	4225	-60150	-55925
IRR	34%	34%	34%

Note: The hybrid scheme, as can be seen, is a combination of investment and financing alternatives of the finance company. Thus, all DL schemes are hybrid schemes.

Table 7 : NPVs for the Hypothetical Company's Schemes						
Period	100% F Scheme	Investment Component of 25% DL Scheme	100% F Scheme for a 75000 Asset	Recommended Investment component of 25% DL Scheme	25% Deposit at 15% p.a.	Net cashflows for 25% DL Scheme (5) + (6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0	-100000	-100000	-75000	-100000	25000	-75000
1	4225	3836	3169	4077	0	4077
2	4225	3836	3169	4077	0	4077
3	4225	3836	3169	4077	0	4077
:	:	:	:	:	:	:
:	:	:	:	:	:	:
:	:	:	:	:	:	:
35	4225	3836	3169	4077	0	4077
36	4225	3836	3169	4077	-38022	-33945

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