

The Application of Cash Flow Analysis in Real Estate Investment Appraisal¹

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Abstract

The aim of this paper is to examine the application of cash flow analysis in real estate investment appraisal. In every appraisal exercise, there are cash outflows and cash inflows; and the appraiser may adopt the discounting or non-discounting methods. The non-discounting methods differ from the discounting methods mainly on the premise that they do not take into account the timings of the returns from various projects and the risk factor associated with these returns. The discounted cash flow techniques can be used to produce Gross Present Value (GPV), Net Present Value (NPV), Internal Rate of Return (IRR) and External Rate of Return (ERR); while the typical examples of non-discounting appraisal techniques are Rate of Return (RR) and the Payback Period (PP) models. Based on the computation carried out, this research has shown that cash flows analysis is the basic prerequisite to determine the attractiveness or otherwise of a contemplated project. It concluded that discounted cash flow techniques do not tell an investor which scheme to invest in, but rather provide very useful financial information on which investment decision is based.

Introduction

Real estate investment appraisal is critical in any project proposal and execution, though the process differs from one investment to another. Cash flow analysis is one of the techniques of pre-investment appraisal as the primary concern of any appraiser is on how to estimate the cash inflows and cash outflows in order to determine the attractiveness or otherwise of a contemplated project. The analysis of cash flow helps in determining whether development proposals meet project requirements, that is, whether the project attains a certain level of returns within the specific timeframe. This method of analysis requires the use of appropriate discount rate. The discount rate is the cost of capital adjusted to reflect the degree of risk inherent in the particular investment proposal. It involves the explicit tabulation of all incomes and outgoings, and appropriate made where necessary to arrive at reasonable values. The technique is time-adjusted in that the analysis takes into consideration the effect of time on the value of money.

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The aim of this paper is therefore to examine the application of cash flow analysis in real estate investment appraisal. The paper seeks to examine the various types of cash flows and their analytical techniques in real estate investment. A few case studies are employed to demonstrate their applicability.

Cash Flow Analysis

Cash flow is one of the appraisal techniques valuers usually used to advise prudent investors on the viability or otherwise of contemplated and/or ongoing real estate investment. Ogbuefi (2002) sees cash flows as analysis of cash outflow (expenditure) or cash inflow (income) as they pertain to a particular investment. Umeh (1977) sees cash flow in relation to time: one, as a technique that is not conscious of time; and two, as a technique that takes into account the effect of time. Geddes (2002) identifies four categories of cash flow to include capital investment, working capital, operational cash flow and taxation. Capital investment is the fund put into the project at the initial state to enable it to commence operation. Working capital is required to finance the initial stocks and debtors at the commencement of the project's operation. Operating cash flow is the income that accrues from the business of the project. It is from the income accruing from the project's operation that tax authority determines the tax to be imposed and collected on the project. The gross income less expenses incurred to run the business and tax forms the net income from the business. Geddes (2002) also listed four major elements that are relevant in investment appraisal as idea generation and investment proposals; evaluation of project proposal; application of acceptance or rejection criteria; and ongoing evaluation and monitoring. The analysis of cash flow helps in determining whether development proposals meet project requirements, that is, whether the project attains a certain level of returns within the specific timeframe. In using these methods of analysis, there is need to use an appropriate discount rate. The discount rate is the cost of capital adjusted to reflect the degree of risk inherent in the particular investment proposal. The costs of capital refer to the rate of interests at which funds are raised to effect an investment; this rate is the opportunity cost of utilizing the resources. In practice, it is the rate at which loanable funds are available for the particular class of investment.

As earlier mentioned, there are two main types of cash flows: cash outflows and cash inflows. Cash outflows include the initial capital outlay for the development or purchase; and interest payments on loans, tax, maintenance costs and other costs. Cash inflows for investment in real property normally refer to either sales proceeds or flows of rental income flowing in to the investor. The rental income could be treated as net of outgoings. The cash flows are incremental as they involve upward rent reviews. In every appraisal exercise, discount rates are applied to net cash flows in order to arrive at the viability of the investment project (Ogbuefi, 2002). In doing this, one may adopt the discounting or non-discounting methods.

(a) Non-Discounting Cash Flow Technique

The non-discounting methods differ from the discounting methods mainly on the premises that they do not take into account the timings of the returns from various projects and the risk factor associated with these returns. Nevertheless, if well manipulated, they can be used in taking

simple decisions on investments. Rate of Return (RR) and the Payback Period are typical examples of non-discounting methods of appraisal.

i. The Rate of Return Method: This method measures the rate of profits from the project to the capital employed in the project. The net profit may be the average net profit over the life of the project or over a specific period. The rate of return is the ratio of the average annual profit after depreciations to the capital involved.

Table 1: Calculation of Rate of Return for two Different Properties

Years	0	1	2	3	4	5	Total profit	Average profit	Rate of Return
Project A	10,000	2,000	3,000	4,000	5,000	6,000	20,000	4,000	40%
Project B	10,000	6,000	5,000	3,000	3,000	2,000	19,000	3,800	38%

$$\text{Rate of Return} = \frac{\text{average receipt}}{\text{Initial capital}} \times 100$$

From the above table, the rate of return on Project A is 40% and that of Project B is 38%. Using the Average Profit criterion, Project A is preferred to Project B.

ii. The Payback Method: This method measures the time period within which the investment will payback or generate sufficient incremental cash flow to recoup the initial project cost. The Payback period is found by adding together all the incremental cash flows from an investment project and comparing it to the initial cost of the project. This criterion ignores the timing of the cash flows and so does not adequately account for the time value of the money. The method also ignores cash flows occurring after the payback period; since the primary aim of the method is to ensure that the project generates enough cash flow to meet the cost of capital before a certain time or by a certain time. Whatever occurs after this period is ignored. The payback criteria are primarily applicable to projects with short term horizon, where investors are mainly concerned with short term profitability.

Table 2: Calculation of Payback periods

Year	Capital Invested	Returns on Project A	Returns on Project B	Returns on Project C
1	₦1,000,000.00	₦200,000.00	₦800,000.00	₦1,300,000
2		₦300,000.00	₦900,000.00	
3		₦500,000.00	₦100,000.00	

4		₦800,000.00	₦80,000.00	
5		₦900,000.00	₦20,000.00	

Payback period for Project A = 3 years

Project B = 2 years

Project C = 1 year

From the analysis above, if the investor needs the quickest time to recover his invested capital, he should go for the Project C. If on the other hand, the investor is rooting for a maximum return irrespective of time factor, and he should go for Project A. The payback period acts as a screen against risky projects that is those projects subject to frequent changes. It selects the less risky projects at the expense of those that have longer gestation period and longer revenue stream. It is pertinent to mention that payback method should not be considered strictly as profitability test, particularly as the method is found more useful in evaluating projects that are subject to rapid changes, where the priority of the investor is the recovery of the investment.

(b) Discounted Cash Flow Technique

This is a technique used in investment and development appraisal whereby future inflows and outflows of cash associated with a particular project are expressed in present-day terms. It involves the explicit tabulation of all income and outgoings, and enables all assumptions about future costs and income to be illustrated. The technique is time-adjusted in that the analysis takes into consideration the effect of time on the value of money (Mun, 2002). The use of Discounted Cash Flow in investment appraisal further demonstrates the eclecticism of basic principles and theories in adopting and adapting the discounting principles and techniques used by accountants and financial analysts. In keeping with the overall objective of this research, we shall briefly touch on the technique of Discounted Cash Flow analysis.

Discounted cash flow requires discounting process at a given percentage which takes account of the passage of time. To the accountants, the technique is frequently used for financial analysis of proposed projects, thus providing a method of measuring the financial attractiveness of comparable investments by enabling an investment to be compared with another so that the investor could decide on the most attractive and profitable option. To the valuer, it provides an aid to the appraisal of any investment that produces income flows. In essence, the process of discounted cash flow involves:

- The preparation of a cash flow schedule showing year by year, the money which is likely to flow out in respect of a specific project or investment as a result of creating and maintaining the investment and also the money which is likely to flow in from the investment and from the ultimate disposal of the investment.
- Discounting the cash flow at a selected rate of interest so as to bring all monies flowing into or out of the project (no matter when payments or receipts occurred) to the same time frame, that is a common present value. All the cash out-flows and in-flows are reduced to their present values.

The common method of appraising investment opportunities is through the use of discounted cash flow techniques which can be used to produce Gross Present Value (GPV), Net Present Value (NPV), Internal Rate of Return (IRR) and External Rate of Return (ERR).

i. Gross Present Value (GPV): This is seen as the discounted or present value of a series of future cash flows where the initial outlay is not included as an outflow. It is the worth of the cash flow at the investor's target rate of return. It is the money the investor would have to set aside today to cover all the expenditure involved in creating and maintaining that investment. It may also be seen as the value to the investor of the right to receive the income from the investment throughout the life of the investment. Most investors borrow part or the whole of the investment sum. If the investment is created with borrowed money, the rate of interest which will have to be paid on the borrowed money is the most preferred discount rate (Cox, Ingersoll and Ross, 1985). This gives the investor a glance as to whether or not the investment will make reasonable profit after paying the borrowed money. Where the investor uses equity capital to create investment, discount rate is equal to the interest that could be earned if the money were to be invested elsewhere. The larger the rate of interest at which the cash flow is discounted, the smaller the present value of the cash inflow and vice versa. With any successful investment, cash will flow in two directions: capital spent in order to create the investment (cash outflow); and when the investment begins to pay and yield income (cash inflow). In property investment, the capital outlay (cash outflow) like in any other investments would cover gross figure including working capital and capital expenditure on the property including cost of acquisition and money spent on adaptations or improvements but will not include depreciation allowances. The cash inflow is generally the net income (rent) after deduction of normal out-goings.

ii. Net Present Value (NPV): Here, we consider the conventional method of capitalizing future income/benefits to determine present value, otherwise referred to as discounting. The process involves the assumption of a continuous income flow capitalized with an overall or all risks rate, usually derived from the analysis of comprehensive sales on similar terms and conditions. The Net Present Value is therefore the surplus or deficit present valued of monetary sum above or below the initial outlay (purchase price). This technique requires the discounting of all future incomes and expenditures of an investment at a target rate of interest. It is the surplus or deficit that accrues when the immediate and discounted future expenditure is set against the discounted future incomes. The discounting is done by the use of the present value of ₦1.00. In every investment cash flows in two ways: money flows outward when investment is created and inward when the investment begins to generate income ((Umeh, 2009; Ogbuefi 2002; and Udo, 2003). Financial success of any investment can therefore be measured by comparing the total outflows of money with total inflows of money. How much an investor/developer can invest for the right to receive a certain amount of money in the future is a function of the period the investor has to wait for the invested and the rate of interest used. The present value of the right to receive a certain amount of cash inflow is therefore the relationship between time and money. Applying the present value of ₦1.00 for each year offsets cash inflow against cash outflow so that the balance can be known.

In the Net Present Value method, a discount rate sometimes called the budget rate or target rate of interest, which is considered suitable from the investor's point of view, is adopted. This rate is then used to discount, that is, find present value of all monies flowing out, and all monies

flowing in, as a result of the investment. The difference between the present value of monies flowing out (cash outflow) and the present value of monies flowing in (cash inflow) is the net present value (NPV). The discounting will produce three possible outcomes for the NPV, which may be positive, negative or zero.

(i) A positive NPV indicates that present value of cash inflow is more than the present value of the cash outflows. Since the cash flows are discounted at an adopted rate of interest, a positive NPV implies that the investment is yielding a rate of return greater than the adopted rate of interest, which is the target rate. If the net present value of the investment is positive, it indicates that the investment will show a profit.

(ii) A negative NPV shows that the present value of cash out-flow is greater than that of the cash in-flow. A negative NPV implies that the yield on the investment is at a rate of return lower than the target rate. The target rate is the minimum rate of return which an investor requires in order to make the investment worthwhile taking into account the risk and all other relevant factors involved. The target rate will be decided by the investor's cost of capital.

(iii) A zero NPV means both outflow and inflow is equal. If the net present value is zero, the investment will neither show a profit nor a loss, which is another way of saying that the investment will break even. If the net present value is zero, the investment will neither show a profit nor a loss. In such a situation, it follows that:

- If all the money needed to create and maintain the investment has to be borrowed at the same rate as the target rate, then there must be other reasons apart from the profit motive for the investment. An organization may for various reasons be prepared to undertake a scheme provided it does not actually incur a loss. Schemes for the benefit of the staff, or the community, such as housing scheme r projects which are good for public relations, may fall under this heading.
- If, on the other hand, the investor is to provide the money for the investment from his own resources and if he is satisfied with receiving a rate of return on his monies equal to the discount rate, then the investor may proceed with the scheme even though, it does not show a profit as such.

An investment may require the initial outlay of a large capital sum and investors will often be forced to borrow money in order to accumulate that sum. The interest to be paid on that loan will be that investor's cost of capital at that time. It is clear that the rate of return from an investment where the initial capital has been borrowed would be, at least, equal to the cost of capital, otherwise a loss will result. An alternative way of looking at this is that the investor will always have other avenues to invest the capital. The return from such investment should therefore compare favourably with the opportunity cost of the funds employed and this will usually be related to the cost of capital.

For these reasons, the target rate should compare well with the cost of capital. From this basis, a positive or negative NPV will be the result of the analysis and upon this result the investment decision may be made. When the net present value method is used to compare a number of

different investments, then it will be the one which has the highest net present value that will make the biggest profit in cash terms but not necessarily the biggest percentage return on the capital invested.

Let us consider an example.

Case Study 1:

A concrete prefabricating industry is to be set up on land purchased at ₦10,000.00. Building and structures are expected to cost ₦5,000.00. Plant, machinery and other equipment were purchased including installation at ₦25,000.00. The anticipated net revenue from the sale of products for the first five years are – ₦16,000.00, ₦20,000.00, ₦25,000.00, ₦30,000.00, ₦30,000.00. The machines will have to be overhauled in the third year without loss to production, at total cost of ₦8,000.00. The target rate based on cost of capital is 25%.

Solution

The Cash Flow of the investment can be set out as follows:

Year	Details	Cash outflow ₦	Cash inflow ₦	Net Cash ₦	P.V @ 25%	Discounted @ 25% NPV	
						Outflow	Inflow
0	Acquisition of land construction of building purchase & installation of machines	50,000	-	-50,000	1.00	-50,000	-
1	Net Income (Profit from sale of products)	-	16,000	+16,000	0.80	-	+12,800
2	“	-	20,000	+20,000	0.64	-	+12,800
3.	Over-hauling of plants & machinery	8,000	-	-	-	-	-
4.	Profit from products	-	25,000	+17,000	0.512	-	+8,704
5.	“	-	30,000	+30,000	0.409	-	+12,298
6.	“	-	30,000	+30,000	0.327	-	+9,831
						-50,000	+56,432

The project shows a positive NPV of ₦6,432.00 after the five years which makes it profitable on the face of that period. This shows that the investor will realize a percentage return over the target rate within this time frame.

The investor in *Case Study 1* has an option of another project (B) for rock crushing at total initial out-lay of ₦64,000. For this new project, the following returns and expenditure are anticipated:

Year 1 Profit	...	...	...	...	...	₦25,000.00
Year 2 Profit	...	...	...	...	...	₦30,000.00
Year 3 Overhauling of machine	...	...	...	...	...	₦35,000.00
Profit	...	...	...	...	...	₦30,000.00
Year 4 Profit	...	...	...	...	...	₦45,000.00
Year 5 Profit	...	...	...	...	...	₦50,000.00

Assume that the investor’s target rate for both investments is 25%.

Solution

Let us compare project “A” with project “B” using the NPV.

Project ‘A’ Concrete Industry (Net Present Value).

Year	Net cash flow i.e. Balance of cash out-flow & in-flow (₦)	P.V of ₦1 @ 25%	Discounted @ 25%	
			Out-flow (₦)	In-flow (₦)
0	- 50,000	1.0	50,000	-
1	+ 16,000	0.80	-	12,000
2	+ 20,000	0.64	-	12,800
3	+ 17,000	0.512		8,704
4	+ 30,000	0.4096		12,288
5	+ 30,000	0.3277		9,841
			50,000	56,433
				50,000
Net present Value				₦6,433

Year	Net cash flow i.e. Balance of cash out-flow & in-flow ₦	P.V of ₦1 @ 25%	Discounted @ 25%	
			Out-flow ₦	In-flow ₦
0	- 64,000	1.0	64,000	-

1	+ 25,000	0.80	-	20,000
2	+ 30,000	0.64	-	19,200
3	- 5,000	0.512	2,560	-
4	+ 45,000	0.4096	-	18,432
5	+ 50,000	0.3277	-	16,385
			66,560	74,017
				66,560
Net present Value				₦7,457

The discounted cash flow tables for both projects indicate that the projects will earn the 25% target rate and cash surplus of ₦6,433 for project A and ₦7,457 for B based on the above analyses, Project B should be chosen on the basis of surplus NPV. Each investment gives a return of 25% plus a positive NPV, Project ‘B’ produces the great NPV, and on the face of that, appears more attractive.

The capital outlay on each of the investment is however different and the use of the straight difference in NPV, in such circumstances, may not reveal the true relative merits of the two projects. A possible approach to avoid this shortcoming would be to express the NPV, as a percentage known as the profitability index, of the respective outlays. The Profitability Index is expressed as NPV/capital outlay for the investments. In the two examples, the profitability indexes will be.

$$\text{Project 'A'} = \frac{6433}{50,000} \times \frac{100}{1} = 12.866\%$$

$$\text{Project 'B'} = \frac{7457}{64,000} \times \frac{100}{1} = 11.652\%$$

On this basis ‘A’ and not ‘B’ shows a better performance and should be chosen.

The major short-coming of NPV method of presenting the cash flow is that the return on an investment is, at the same time, expressed in two different ways. Firstly, a rate of return in percentage, that is the target rate and secondly, cash sum which represents an extra return. This use of two differing units, at the same time, in expressing the performance of investments makes comparison of some investments difficult.

(iii) The Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) for an investment is the percentage rate earned on each Naira invested for each period it is invested. It measures the return on the outstanding internal investment amount remaining in an investment for each period it is invested. This gives an investor the means to compare alternative investments based on their yield. Its application can be a very helpful decision indicator for selecting an investment. One very important point that must be made about Internal Rate Return is that, it does not always equal the annual compound rate of

return on an initial investment. Thus, the outstanding internal investment can increase or decrease over the holding period.

The internal rate of return avoids the shortcoming of the NPV method by using only the rate of interest as the means of measurement. This method involves finding the one rate of interest at which the present value of the expenditure equals the present value of the benefits or receipts (that is, the rate at which net present value = zero). The rate of interest at which this happens is known as the internal rate of return (also called the DCF Rate). For most investment, if the rate of interest used to discount the cash flow is very high, then the net present value of the outflow will exceed the net present value of the inflow. On the other hand, if the rate of interest used to discount the cash is very low, then the present value of the in-flow exceeds the present value of the outflow. The equilibrium point between the net present value of the outflow and that of the inflow obviously lies somewhere between a very high rate of interest and a very low rate of interest. The exact rate of interest at which this happens is the discount rate which equates the discounted flow of future benefits with the initial outlay. This may be found by trial and error, that is, through the use of various trial discount rates until the IRR is arrived at. It needs to be pointed out that IRR does not always measure the return on the initial investment, neither does it says anything about what happens to capital taken out of the investment.

Mathematically, the IRR can be found by setting the Net Present Value (NPV) equation to be equal to zero (0). In determining the rate of return (IRR), the following equation is given:

$$0 = \sum_{t=0}^N \frac{CF_t}{(1 + IRR)^t}$$

Given the following data gotten from a study on a proposed fish pond project, the Internal Rate of Return can be calculated as follows:

Year	Cash flow	PV @ 8%	Discounted Cash flow	PV @ 25%	Discounted Cash flow
0	7,500,000	-	7,500,000	-	7,500,000
1	1,602,605	0.9254	1,483,852	0.8000	1,282,084
2	3,731,087	0.8573	3,198,661	0.6400	2,047,143
3	3,731,087	0.7938	2,961,737	0.5120	1,910,316
4	3,731,087	0.6805	2,539,005	0.4096	1,528,253
Net Present Value			₦2,683,255		₦2,014,288

$$IRR = A_0 + \frac{A}{[A] - [-B]} \times [B_0] - [A_0]$$

$$\begin{aligned}
 \text{IRR} &= 8 + \frac{2,633,255}{4,697,543} \times [17] \\
 &= 8 + (0.5712 \times 17) \\
 &= 8 + 9.7
 \end{aligned}$$

Therefore, Internal Rate of Return = 17.7%

Case Study 4

Find the IRR of the following investment.

Outlay ₦60,000:	Returns	Year 1	₦10,226
		2	₦40,000
		3	₦30,000

Solution

Trying 10%

Year	Net income	PV ₦1 @10%	NPV
1	₦10,226	0.9091	₦9,296
2	₦40,000	0.8264	₦33,056
3	₦30,000	0.7513	₦22,539
			₦64,891.00
	Outlay	-	₦60,000.00
	NPV		₦4,891.00

As an NPV of zero is the desired result, a positive NPV of ₦4892 is too high and indicates that the trial rate of 10% is too low.

Trying 16%

Year	Net income	PV ₦1 @16%	NPV
1	₦10,226	0.8621	₦8,816
2	₦40,000	0.7432	₦29,728
3	₦30,000	0.6407	₦19,221
			₦57,765.00
	Outlay	-	₦60,000.00
	NPV		- ₦2,235.00

This time the receipts have been discounted at higher rate. A negative NPV of ₦2,235 is the result, so the trial rate is too high. The IRR must be between 10% and 16%.

Trying 14%

Year	Net income	PV N1 @14%	NPV
1	₦10,226	0.8772	₦8,970
2	₦40,000	0.7695	₦30,780
3	₦30,000	0.6750	₦20,250
			N60,000.00
	Outlay	-	N60,000.00

An NPV of zero results: therefore, the IRR is 14%

Calculation of the Internal Rate of Return by the use of trial rates appears difficult when the Internal Rate of Return does not arrive at a round figure. The internal rate of return is a very convenient way of measuring the financial attractiveness of an investment. Thus:

- the internal rate of return of one investment can be readily compared with the rate of return of other investments such as government stock, building society deposits, bank deposit accounts and other more traditional forms of investment.
- The internal rate of return can also be compared with the cost of borrowing money. It is usual practice for accountants and financial analysts to consider income flows after deduction of tax, and the deduction of tax is simple in preparing the Cash Flow. If when preparing the cash flow, tax was deducted, then the internal rate of return will be net, that is the rate of interest earned free of tax. If on the other hand, tax was not deducted when the cash flow was prepared, then the internal rate of return will be gross that is the rate of interest earned before tax is paid.

(iv) External Rate of Returns (ERR)

On the other hand, the computation of external rate of return involves the use of a discount factor which an investor expects from a particular investment or assumption of a discount factor based on the market survey and analysis of similar investments in the same investment environment. In this manner, the rate chosen is assumed to be the external rate of return and should take into account risk elements associated with such investment. The ERR is applied in discounting of both the cash inflows and cash outflows. During computation, where the discounted cash inflows equals the discounted cash outflows, the investment is at a breakeven point; but where the discounted cash inflows equals the capital invested in the business, that is the payback point. It also infers that where the total discounted cash inflows are greater than the total cash outflow, then there is a net positive present value (NPPV) and vice versa. According

to Ogbuefi (2002), the ERR is used to establish the investment trend and performance rather than the present value of the cash flows over the entire life of the project.

Mutually Exclusive Projects

In our analysis so far, we have assumed that projects to be evaluated have identical capital outlay and identical lifespan. Where a firm has two possible ways of producing the same type of output, each with a different level of capital outlays, we resort to incremental analysis.

For example, taking borrowing rate at 15%

Year	0	1	2	3	NPV @ 15%	IRR
Project X	1000	475	475	475	181	20%
Project Y	500	256	256	256	137	25%
Project X-Y	500	219	219	219	44	15%

When we are faced with the problem of choosing between two mutually exclusive projects with different capital outlay, the Internal Rate of Return approach gives a conflicting result with the Net Present Value (NPV) or gives a wrong result. Using the table above, project X produced a higher NPV and yet on the IRR approach appears worse than project Y. Project X makes a bigger absolute contribution to profit (N44.00 more than could be obtained by investing at the firm's marginal rate, as shown by the NPV) but has a lower IRR than project Y. the problem with IRR is that it tells an investor to prefer 25% return on N500.00 to 20% return on N1,000.00

The question an investor should ask is whether it is better to invest to invest N1000 in project X at 20% rather than to divide up into N500 in project Y at 25% and an investment of N500.00 at the marginal rate. The easiest method to assess this is to formulate a hypothetical project by deducting project Y's cash flow from. Project X's and see what IRR is being made on the surplus invested in project X. if this is greater than the firm's marginal rate, then more is made by choosing project X than choosing project Y and investing the balance at say 15%. Since the IRR of the hypothetical project X-Y of 15% is greater than the firm's marginal rate, project X is better than project Y. this follows from the fact that project X offers everything that project Y offers plus a 15% rate of return on an extra investment of N500.00.

The decision rule, thus, is that if the incremental IRR is greater than the firm's marginal investment rate, an investor should be advised to choose the larger of the two projects.

Advantages of the Discounted Cash Flow Method

The advantage of the Net Present Value method over the one-stage Years' Purchase model is in its ability to calculate the Present Value of Cash flows that do not conform to either constant annuity or arithmetic and geometric growth or decline (Udo, 2003). The other advantages of discounted cash flow techniques as given by Ifediora (1989) are:

- i. The timing of receipts and payments is fully taken into account.
- ii. The fact that receipts and expenditure may vary widely over the life of the project is also taken into account.
- iii. The full life of the investment is assessed.
- iv. Depreciation can be fully and accurately taken into account by including the sale value (if any) of the investment, at the end of its life.
- v. The effect of taxes, reliefs and grants can be taken into account by including them in the cash flow.
- vi. Effect of inflation can be built into the model.
- vii. Risk can be allowed for.

Limitation of Cash Flow Technique

Discounted cash flow is not an end in itself; it is only a means to an end. Discounted cash flow will not tell an investor which scheme to invest in, but it will provide him with very useful information (of a financial nature) on which to base his decision. It is not possible to express all considerations that may motivate an investor in terms of money and the investor may have to make the final decision on the basis of other non-financial considerations.

Like in the traditional capitalization of income method the Discounted Cash flow technique is only as good as the information on which it is based. If the estimates on which the discounted cash flow is based prove to be wrong, the discounted cash flow technique will not save the investor from making an error. Discounted cash flow is not a substitute for sound judgment but a valuable tool in the hands of the decision maker.

Conclusion

The importance of project appraisal prior to project execution cannot be overemphasized. It helps to guide the investors in taking decisions, whether to embark on the project or not. It gives the prospective investors the chances to choose between two or more projects and plays a vital role in diversification of investments. The appraisal methods given in this paper help in determining the worthwhileness of a project. The accuracy of any projections of appraisal report depends on the competence of the appraisers, the comprehensiveness of the report and the ability to gather appropriate data for the study. Inaccurate reports of any study would misguide the investor and may result in project failure and loss of resources.

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End Notes

Where the present value of the right to receive the cash inflows from the investment is greater than the present value of the cash outflow which is to be spent in creating and maintaining the investment, the investment will show a profit; but where the present value of the cash outflow is greater than the present value of the cash inflow, the investment shows a loss. Real estate investment is capital intensive.

According to Ogbuefi (2011), Cash flow appraisal is the *pari-pasu* analysis of costs or cost outflows and benefits or cash inflows as they pertain to a particular investment.

Discounted Cash Flow provides many of the relevant performance indicators required by many decision-makers in order to establish whether or not a project or scheme will be viable (Baum and Crosby, 1988). It gives the projected pre-production financial landscape of the gestation

period. Discounted cash flow shows a series of expected returns as they may be at each point in time over the life of the development and enables an investor/developer to know the minimum, normal and maximum returns expected from the project, providing a clearer picture on which a decision-maker should base decision as to the problem of uncertainty.

Real Estate Investment Appraisal

The paper seeks to explore the origin of Cash flow, types of cash flows, Cash flow analysis techniques and to demonstrate the application of cash flow appraisal techniques in real estate investment. A few case studies are employed to demonstrate its applicability.

Origin of Cash flow

Several professions lay claims to the origin of investment cash flow. The accountants are interested in historic cash flow which excludes a number of legitimate items in the computation of cash flow analysis. Historic cash flow is based on records of a firm's previous activities over the years past and therefore applicable to that specific point of time which may not have anything to do with the present. Discounted cash flow analysis is widely used in investment finance, real estate development and corporate financial management, among others. It was used in industry as early as the 1700s or 1800s, widely discussed in financial economics in the 1960s, and became widely used in U.S. Courts in the 1980s and 1990s.

Discounted cash flow calculations have been used in some form since money was first lent at interest in ancient times. Studies of ancient Egyptian and Babylonian mathematics suggest that they used techniques similar to discounting of the future cash flows. This method of asset valuation differentiated between the accounting book value, which is based on the amount paid for the asset.

Following the stock market crash of 1929, discounted cash flow analysis gained popularity as a valuation method for stocks. Irving Fisher in his 1930 book *The Theory of Interest* and John Burr Williams's 1938 text – *The Theory of Investment Value* first formally expressed the DCF method in modern economic terms.

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