

Identifying appropriate Project Required Return

Aditya Nimesh Raj

Symbiosis Centre for Management and Human Resource Development, SCMHRD, SIU, Symbiosis International (Deemed University), SIU, Hinjewadi, Pune, Maharashtra, India,
aditya_raj@scmhrd.edu

ABSTRACT

Most of the models for identifying required returns are based on the past performance of profitability, company share prices and market returns. The future expectations seldom get incorporated therein. Govt. expectations are based on different considerations altogether. Lenders also view this aspect differently. Infrastructure projects carried out with or without forming special purpose company pose another set of issues.

Practitioners follow different methods & considerations for identifying project required return. These are WACC, CAPM, Risk Adjusted Discount rate, Gordon model, Asset Beta, industry averages, opportunity costs, strategic considerations etc. For a given cost and future projections of project a small upward or downward change in the project required return can make the project financially unattractive or attractive. This is a very grey area of project appraisal.

The purpose of this article is to examine the spectrum of issues involved around deciding the hurdle 'project required return' and bring out comprehensive view on the same

Keywords

Project required return, discount rate, IRR, NPV.

Article Received: 10 August 2020, Revised: 25 October 2020, Accepted: 18 November 2020

Introduction

There are many ongoing projects in the world but which project is good and which project is bad for the purpose of investment solemnly depends on its return. This is because the sole motivation behind undertaking any project identification is to build up a fundamental proposition for the most suitable arrangement of intercessions and strategy, inside explicit time and spending outlines, to address a particular improvement objective in a specific area or setting. The sponsor of the project always analyzes the project, and the required funding is allocated to proceed with a feasibility study. It is up to the project sponsor to determine if the project is worth undertaking and whether the project will be profitable to the organization. The completion and approval of the feasibility study triggers the beginning of the planning phase. The feasibility study may also show that the project is not worth pursuing and the project is terminated; thus the next phase never begins. Investment decisions may rise from different areas and in different manner. It can start from an area's division plan, program or technique, as fate of a current undertaking or advancement of particular area or from needs distinguished in a multi-partner segment. Project recognition involves:

- Reviewing of alternative methods or techniques or choices for tending to a lot of improvement issues
- Identification of the serious issues that need be handled and the inquiries to be talked about prior to an undertaking can be implemented.

Adequate data on venture alternatives must be accumulated to empower the administration and financing offices to choose a priority task and agree among partners for arranging work, including setting up controlling sheets or national gatherings. The result of recognizable proof work should be summarized in a report which will depend on the organization's just as financing workplaces' necessities.

Practitioners follow different methods & considerations for identifying project required return. These are WACC, CAPM, Risk Adjusted Discount rate, Gordon model, Asset Beta, industry averages, opportunity costs, strategic considerations etc. For a given cost and future projections of project a small upward or downward change in the project required return can make the project financially unattractive or attractive. This is a very grey area of project appraisal.

Most of the models for identifying required returns are based on the past performance of profitability, company share prices and market returns. The future expectations seldom get incorporated therein. Govt. expectations are based on different considerations altogether. Lenders also view this aspect differently. Infrastructure projects carried out with or without forming special purpose company pose another set of issues.

The purpose of this article is to examine the spectrum of issues involved around deciding the hurdle 'project required return' and bring out comprehensive view on the same.

Literature Review

A. Investment decisions and sensitivity analysis

When we have lots of projects and we have to choose only those projects which are feasible or profit making, this comes under capital budgeting section of the finance. This section gives us various methods which can be used for evaluating the project. Some of these methods are NPV (Net Present Value), IRR (Internal Rate of Return), MIRR (Marginal Internal Rate of Return), Payback period etc. Among these NPV is considered as the most dependable tool but only academician use it and practically IRR or various other methods are used. Traditionally NPV is consistent if it is in coherence with IRR in signaling value creation. Since IRR doesn't give proper one return and it changes values very rapidly, AIRR is developed to remove

this inconsistency of IRR by considering the average of all the values of IRR. This AIRR is NPV consistent which shows that the decisions made by an investor based on NPV are same as those made by an investor who takes AIRR into consideration. While consistency with NPV is very important to take investment decisions, under unknown circumstances an NPV or IRR are not the only factors on which decisions can be made. Risk identification and their influence on the decision of investment are also important.

B. Why IRR is an inadequate indicator of costs and returns in relation to PFI schemes

The IRR is a very commonly used tool to check the performance of Private Finance Initiative (PFI), schemes but IRR is very misleading tool, unless the cash flows are linearly flat type. For those firms which have flat cash flows, IRR is a fantastic tool but on practical grounds it is not possible as PFI schemes have varied cash flows. UK Treasury has also given advice to public sector bodies which are commissioning PFI schemes is that while assessing the project cost and benefits they should rely only on NPV. But despite this advice from the Treasury on the use of IRR, IRR is the most commonly used tool mainly for the purpose of calculating projected profitability for shareholders. Several case studies are considered in this respect and it is found that IRR alone is very misleading and for any specific purpose, a detailed calculation with calculation of NPV at a right discount rate should be undertaken.

C. MIRR – A better measure

Its been years since NPV and IRR came into existence and they have now become overwhelming choices as a quantitative measurement to measure how attractive the business is. Despite being popular, neither NPV nor IRR are effective enough to handle vast amount of problems. NPV method says that the cash flows generated are reinvested at NPV discount rate while IRR method says that cash flows are reinvested at IRR rate. These assumptions are completely hypothetical and these both methods rank a project differently on the basis of its attractiveness. With the help of modified IRR or MIRR reinvestment rate and finance rate can be set at the point of calculation and can give far much correct value than IRR and NPV.

D. A resolution to NPV-IRR debate

The two main criteria which are considered to consider project attractiveness are NPV and IRR. Sometimes they provide rankings which are inconsistent in nature but in some cases they provide same ranking to the project. This inconsistency gave rise to debate about which tool or criteria is better. Till this day this debate has not resolved. One of the reasons for existence of this debate is that the financial practice has not come up with any theory. Market leaders use both tools but prefer IRR over NPV because it is easy to compare with cost of capital.

After thorough analysis it was found that an orthodox approach of IRR calculation uses only that part of information which is gleaned from TVM for an investment. It uses differences between interest rates, that is orthodox

IRR and the cost of capital. While, NPV uses all the differences between every possible IRR for a project and its cost of capital; therefore NPV is a richer concept than the orthodox IRR alone.

Research Methodology

To answer the research question of which is an appropriate project return, a combination of both qualitative and quantitative methods are used. By using two different methods the study turns out to be more diverse in nature and looks at various different angles of identifying appropriate project return. This study will help in better understanding about which is an appropriate project return at which any investor should look at. Various case studies and academic research paper were also acknowledged while deriving at the results of the study. Some data are created to explain how to derive at the objective question.

Qualitative research focuses on analytically disclosing certain practices or behaviors, and then showing how these behaviors or practices can be grouped or clustered to lead to observable outcomes. While quantitative research uses deductive reasoning and established theories as a foundation for the hypotheses that will be tested and explained.

Common ratios

A. Net Profit Value (NPV)

NPV is the contrast between the estimation of cash inflows and cash surges over a few extend of time, in other words Net Present Value is the sum of the present values of the cash inflows and outflows . In capital budgeting, NPV is used for speculation arranging to analyze the good thing about the expected hypothesis or task. An NPV which is positive denotes the foreseen benefit made by a task or a project beats the expected costs. It is acknowledged that theory with a NPV which is greater than zero will be beneficial, and a project with an NPV less than zero will realize an all-out setback. Typically the reason behind the NPV rule the show, which facilitates that lone project with positive Net Present Value characteristics ought to be thought of..

NPV is constrained by computing the costs i.e. cash flows which are less than zero and returns i.e. cash flows which are greater than zero for every season of a venture or task. After the cash flows for every time period is decided, the Present Value of each one is fulfilled by reducing its future cash streams at a rate of return. Net Present Value is the aggregate of every discounted upcoming cash flows. In view of its straightforwardness, NPV may be a critical device to choose if an undertaking or venture will bring around an add up to benefit or a add up to misfortune. A NPV, greater than zero or a positive Net Profit Value brings about benefits, while a negative Net Profit Value or a NPV which is less than zero brings about a misfortune. The Net Present Value estimates the overabundance or deficit of incomes, in present worth terms, over the expense of investment. In a speculative condition of endless capital budgeting, authorities should seek for each task whose NPV is positive. In any case, in down to earth terms, an affiliation's capital necessities limit sets out to experiences with the most raised

NPV whose cost pay rates or basic cash theory, don't beat the affiliation's capital. Net Present Value is the main tool in limited income or discounted cash flows (DCF) examination and is a general technique for utilizing the time estimation of cash to assess extended investments or ventures. Cash flows are discounted because of the following reasons:-

- As there is a risk involved in the project thus some adjustment need to be done.
- To account for TVM due to interest rates , inflation and opportunity cost, value of money today in hand has more value than the value of money which is coming tomorrow.

Advantages of NPV

- **Time Value of Money (TVM)**

The main reason of utilizing Net Present Value is that it considers the concept of the time value of money which means value of money which is present today is worth more than the value of money tomorrow attributable to its gaining limit. The calculation of NPV considers the investment based on discounted cash flows so as to decide its suitability. Let us take the accompanying model to analyse to what extent present value figures are relevant in capital budgeting. An organization is hoping to invest in a particular project. Let this amount be \$70,000. The necessary rate of return is 10%. If the TVM isn't thought of, the profit of the project would be the difference between the all-outflows and cash inflows and complete surges, as delineated in the following table underneath:-

Profit when TVM is not taken into consideration

Year	Project P	Project Q
1	10000	11000
2	12000	12000
3	15000	13000
4	17000	15000
5	28000	27000
6	40000	29000
Total cash inflow (X)	122000	107000
Total investment (Y)	70000	70000
Net cash inflow (X-Y)	52000	37000

According to these figures, Project P is considered to be more profitable than Project Q. In the same illustration, if the TVM is taken into consideration,

Profit when TVM is taken into consideration

Year	Project P	Project Q
1	9091	10000
2	9917	9917
3	11270	9767
4	11611	10245
5	17386	16765
6	22579	16370
Total cash inflow (X)	81854	73064

inflow (X)		
Total investment (Y)	70000	70000
Net cash inflow (X-Y)	11854	3064

It is clear that investing in Project P gives more profit with respect to the PV of future cash flows. Hence, it is vital to consider and determine the time value of money more accurately.

- **Decision Making**

Net Present Value strategy empowers the dynamic technique for associations. Notwithstanding the way that it evaluates projects of a comparative size, be that as it may, it is helpful in recognizing which particular venture is worth investing for and which venture can be neglected.

Let us take a model in which a company is planning to invest in a particular venture. The investment amount is \$7500 and the required rate of return is 10%. The estimated cash inflows of the project are as follows –

Year	Project inflow
1	-500
2	600
3	2400
4	2600
5	3100

NPV of the project = **\$(1954.8)**

In the above table it is clear that, the present worth of money outgoing is more than the present worth of money inflows. Therefore, it's not a project in which one should consider investing. NPV likewise assists with expanding the income of the financial specialist by putting resources into project which give the greatest returns.

NPV is a pointer of how much worth a venture or undertaking adds to the firm. With a specific task, if the net cash flows are a greater than zero, the undertaking will have of positive money inflow at the given time. If the net cash flows are a less than zero, the task will have discounted cash flow. Properly calculated investments whose NPV is greater than zero could be taken into consideration. This doesn't generally infer that they should be endeavored since NPV to the detriment of capital or at the expense of the capital may not represent opportunity cost, i.e., relationship with various other open endeavors. In budgetary theory, if one to select between two choices in a general sense random different project, the project which is yielding the higher Net Present Value should be picked. The NPV which is positive i.e. NPV whose value is greater than zero shows that the anticipated cash flows produced by a task or interest surpasses the foreseen costs. This idea is the reason for the Net Present Value guideline, which shows the path like

guiding light to which project the investments need to be made i.e. one with positive NPV.

A venture with a positive NPV is productive; however one with a negative NPV won't really bring about an overall loss: it is only that the inward pace of return of the undertaking falls underneath the necessary pace of return. An elective perspective on NPV is regardless of whether the undertaking can meet the expense of capital at the given rate of cost of capital.

For instance, lets assume the Net Present Value is -\$2500 for a given venture, it might imply that at the given WACC (Weighted Average Cost of Capital), the undertaking neglects to touch the desires for the providers of capital for the task. However, the Net Present Value of \$2500 will increase \$2500 to the surplus of the providers of assets far beyond their normal returns.

Condition	Meaning	Decision
NPV > 0	value to the project would increase if investment is done	The venture is of acceptable nature
NPV < 0	value to the project would decrease if investment is done	The project is likely to be revoked.
NPV = 0	the investment would have no loss no profit	One should think differently regarding this type of project. This project does not add profit or loss on the balance sheet. Criteria like, e.g., strategic positioning or different variables are required to make decision about this kind of project

Disadvantages of NPV

- **No guidelines for finding required rate of return**

The whole calculation of NPV lays on discounting the future cash flows to its current worth utilizing the necessary rate of return. Nonetheless, there are no rules with regard to the determination of this rate. This rate value is left to the prudence of organizations and there could be occasions wherein the NPV was incorrect because of a mistaken rate of profits. This can be understood by considering an example.

Let us take an undertaking which require \$100,000 as an investment with the specific inflows. The accompanying table portrays the progressions to the Net Profit Value when an organization chooses different rate of return.

Year	Inflow	Discounted to 10%	Discounted to 12%	Discounted to 14%
1	12000	10909	10714	10526
2	14000	11570	11161	10773
3	22000	16529	15659	14849
4	44000	30053	27963	26052

5	57000	35393	32343	29604
6	92000	51932	46610	41914
Total cash inflows (A)	241000	156385	144450	133718
Initial investment (B)	100000	100000	100000	100000
Net cash inflows (A-B)	141000	56385	44450	33718

As delineated in the above table, a change in the rate of return clearly changes the NPV figures.

Another detriment is that NPV doesn't consider any adjustments in the rate of profits. The rate of return is seen as consistent over the scope of an endeavor and any assortments in the rate of profit would require new NPV figuring.

- **Proove to be false while comparing project of varied sizes**

Other impediment of Net Profit Value is that it can be useless or wrong where tasks are of various sizes. Net Profit Value is not a rate but an absolute figure. Along these lines, bigger the project is, higher will be its Net Profit Value while a project of smaller size will have lesser NPV. There may be condition that the value of NPV is lower while the profit of smaller project seems to be higher. Let us comprehend this better with the accompanying model –

- i) Project X needs an investment of \$350,000 and has a Net Profit Value of \$207,000
- ii) Project Y needs an investment of \$30,000 and has a Net Profit Value of \$60,000.

Just by looking at the NPV values, project X seems as if it gives higher returns, whereas, when compared to project Y on the basis of investment, it has a higher return. Thus, comparing projects of unequal sizes just by looking at its NPV can be fatal.

B. Internal Rate of Return (IRR)

The IRR may be a extent of a venture's ordinary future rate of return. As the IRR could be a gage of a future annually rate of return, IRR should not to be mixed up for the genuine finished wander return of recorded hypothesis. The IRR for an undertaking is the "annualized compound return rate" or rate of return that sets the net display esteem of both positive and negative incomes from the speculation identical to zero. Indistinguishably, it is the markdown rate at which the NPV of future livelihoods is proportionate to the basic venture, and it in addition the rebate rate at which the display estimation of negative cash flows rises to the outright show esteem of the positive cash flows.

IRR is also contrasting the benefit of setting up new tasks with that of growing existing ones. For instance, an organization may utilize Internal Rate of Return in concluding whether to revamp and extend a formerly existing one or to open another subsidiary. While the two ventures are probably going to increase the value of the organization, almost certainly, one will be the more intelligent choice as recommended by IRR.

Advantages of IRR

• Time Value of Money

Internal rate of return is estimated by computing the financing cost at which the current estimation of future cash flow rises to the necessary capital speculation. The bit of leeway is that the planning of incomes in every future year are thought of and, accordingly, each cash flow is given equivalent load by utilizing the time estimation of cash.

• Simplistic approach

The IRR is a simple measure to ascertain and gives basic methods by which to think about the value of different ventures. The IRR furnishes any entrepreneur with a fast preview of what capital ventures would give the best potential income. It can likewise be utilized for planning purposes, for example, to give a snappy preview of the expected worth or reserve funds of buying new gear instead of fixing old hardware.

• No Hurdle rate required

While doing analysis in capital budgeting, the hurdle rate, or cost of capital, is the necessary rate of return at which theorists agree to put resources into an endeavor. It will in general be a passionate figure and usually ends up as an unsavory check. The IRR procedure doesn't require the hurdle rate, alleviating the peril of choosing a misguided rate. At the point when the IRR is resolved, exercises can be picked where the IRR outperforms the surveyed cost of capital.

• Easy comparative analysis

Internal Rate of Return is significantly more helpful when it is utilized to do a comparative analysis among projects or venture. The higher a task's Internal rate of return, the more alluring it is to embrace that venture as the best accessible speculation or investment choice. IRR is uniform for speculations of varied sorts and, in that capacity, IRR values are regularly used to rank different planned venture choices that a firm is thinking about on a similarly even premise. Expecting the measure of speculation is equivalent among the diverse accessible alternatives of the venture, the task with the most elevated IRR esteem is considered as the best and that specific choice may be (hypothetically) taken up first by a speculator.

The IRR of any undertaking is determined by remembering the accompanying three presumptions:

- i) The speculations caused will be held until their development dates.
- ii) The middle incomes will be reinvested in IRR itself.
- iii) All the incomes are intermittent in nature, or the delays between various incomes are equivalent.

The IRR furnishes the association with a rate of development that can be relied upon to be gotten by making an interest in the venture considered. While the real Internal Rate of Return got may shift from the hypothetical worth

that we have determined, the most noteworthy worth will unquestionably give the best development rate among all.

The most well-known utilization of the Inward Pace of Return is seen when an association utilizes it to think about putting resources into another venture or to build an interest in a right now continuous undertaking. For instance, we can take the instance of a vitality organization that picks to begin another plant or to grow the working of a current working plant. The choice, for this situation, can be taken by ascertaining IRR and consequently discovering which of the choices will give a higher net benefit.

Disadvantages of IRR

• When reinvesting the positive earnings, it'll be at the cost of capital. Miscalculating utilizing IRR along these lines may provoke the conviction that an errand is more beneficial than it truly is. This, nearby the way that long investment with uneven cash flows may have various specific Internal Rate of Return values, has affected the utilization of another estimation called MIRR.

• A comparative issue develops when utilizing IRR to see at ventures of changed lengths. For example, an assignment of brief-term may have a high IRR, causing it to have all the earmarks of being an incredible venture, be that as it may moreover have a low NPV. At that point once more, a more expanded wander may have a low IRR, obtaining returns continuously and reliably, be that as it may, may increment the value of the organization after a while.

• While IRR is a greatly well-known estimation in looking over an undertaking's efficiency, it'll in common be deluding at anything point utilized alone. Unexpected on the covered up endeavor costs, an endeavor may have a high NPV and low IRR, deducing that the rate at which the affiliation sees returns on that assignment can be direct, the assignment may moreover be counting a part of by and huge motivating force to the organization.

C. Payback Period

One of the foremost critical thoughts each corporate cash related agent must learn is the way by which to measure different ventures or operational undertakings to choose the foremost beneficial task or venture to embrace. One way corporate financial specialists do this can be with the payback period. The payback time period is the cost of the speculation divided by the annually cash stream. The venture is more alluring if the payback period is shorter and if the payback period is greater or higher the project will be less alluring.. For instance, if cost of the plant is \$10,000 and the reserve funds are \$200 every month, it would take 4.2 years to arrive at the recompense time frame. Shorter payback time period means progressively alluring investments. Albeit figuring the payback time period is valuable in monetary and capital budgeting, this measurement has applications in different enterprises.

As it is simple to apply and direct for most individuals, they use it to identify the right project among various choices. Right when used carefully or to consider near endeavors, it will in general be exceptionally useful.

The Payback time outline could be a framework considered for looking at with genuine confinements and capacities for its use, since it doesn't consider time estimation of cash, risk, financing, or other critical examinations.

Whereas by using discounted WACC the time estimation of cash can be altered, it has for the most part concurred that this instrument for theory choices ought to not to be utilized in confinement. A specific doubt in the use of the compensation time frame is that benefits to the theory continue after the remuneration time period. The Payback time frame doesn't decide any vital relationship with various venture or even to not making a speculation.

Advantages of payback period approach

- **Easy and simple approach**

It is one of essential focal points of the payback time period. The technique needs small information and is simply more straightforward to figure than other techniques used in capital budgeting. The endeavor's yearly cash flows and underlying cost are only things needed for calculating payback. Notwithstanding the way that various methodologies furthermore use comparable wellsprings of data, they need more suspicions moreover.

- **Emphasis on liquidity**

The payback time outline is basic data that no other capital budgeting procedure uncovers. For the foremost portion, an undertaking with a shorter payback period moreover encompasses a lower plausibility of hazard. This kind of information is significant for small free endeavors with obliged assets. Private endeavors have to be rapidly recover their taken a toll to reinvest it in different conceivable outcomes.

- **Useful during uncertainty**

Projects which are dubious or witness fast creative changes, payback strategy procedure is incredibly significant in them. Such helplessness makes it difficult to broaden the future yearly money inflows. Along these lines, undertaking adventures whose compensation periods are less, this method helps in preventing losses.

Disadvantages of payback period approach

- **Only some cash flows are covered**

The restitution method takes cash flows into consideration simply till the time the basic venture is recuperated. In this method the cash flows that come in up and coming years are not taken into consideration. It is a compelled viewpoint on the income may head to ignore an errand that could make advantageous incomes in their years to come.

- **TVM is ignored**

It is among the vital drawback of it ignores the TVM which can be a noteworthy commerce concept. Concurring to the basics of the TVM, the value of money today is greater than

value of money tomorrow. The payback period methodology doesn't think approximately and this causes changes within the genuine esteem of cash streams.

- **Profitability is ignored**

There is no guarantee that if any project have shorter payback, it will a profitable project. Envision a situation where the earnings start decreasing after the payback period from the undertaking does not continue after the payback period. If any condition like these appear the project will become unaffordable after the payback finishes.

Rejects undertaking's entry on hypothesis – a couple of organizations require their capital ventures to win them an entry that's well over a particular rate of return. On the off chance the extend is rejected. Be that because it may, the payback strategy ignores the undertaking's rate of return.

D. Modified Internal Rate of Return(MIRR)

MIRR could be a budgetary extent of a venture's allure. It is utilized in capital budgeting to rank elective ventures of equivalent size. As the title proposes, MIRR may be a change of the IRR and as such plans to decide a number of issues with the IRR. When academicians are taken into consideration, IRR is never given such importance like NPV has got. It is because of the various issues that IRR have or associated with it. But when financial managers, authorities or investors are concerned they still favour IRR because of the simple fact that that it gives percentage value rather than absolute value. IRR also comes handy while negotiating with the investors.

The MIRR is utilized to rank investments or projects of inconsistent size. The computation is an answer to two significant issues that exist with the famous IRR figuring. The primary fundamental issue with IRR is that numerous arrangements can be found for a similar undertaking. The ensuing issue is that the positive cash flows are reinvested at the IRR and are seen as unreasonable for all intents and purposes. With the MIRR, simply just a single arrangement exists for a given endeavor, and the reinvestment rate of positive incomes is extensively progressively authentic. The MIRR grants authorities to change the expected rate of reinvested improvement from beginning to the end in an undertaking.

Because of need to access reinvestment rates, MIRR calculation is done. There are three stages of MIRR computation:

- i) Calculate the PV of the amount to be invested to the project. It will in identifying the risk involved investment,
- ii) compound the free cash flows (excluding investments) forward to a time horizon at a chosen reinvestment rate that represents expected future opportunities with risks equal to the investment risk, and
- iii) Computes the Internal Rate of Return.

The adjusted IRR or MIRR will be the discount rate that makes the hypothesis proportionate to the future estimation of the incomes from the venture. NPV will move toward zero. The time ranges between the basic venture and the future worth are topped off with zeros.

Likewise with unmodified IRR, a task is monetarily appealing when MIRR surpasses the venture's obstacle rate.

When contrasting speculations of equivalent size, the higher the Modified Internal Rate of Return, the more appealing the venture. While differentiating theories of comparable size, the higher the MIRR, the all the more charming the hypothesis. In like manner, when in any event two endeavors are incorporated, the time horizon should be as long as or longer than the elective covering the best number of time spans.

Advantages of MIRR

- With the help of MIRR, investors successfully remove the limitations related with IRR. For instance, multiple IRR outcomes bring confusion when cash flows are uneven.
- Unlike IRR, the MIRR helps investors to calculate project sensitivity as it measures the variation between the cost of capital and financing cost.

comparative study

Apart from above mentioned techniques to identify the project return, there are lots of other ways to identify the project returns but those methods are not generally used during the process of making investment decisions. It is because of various demerits and less merits associated with those methods. Among the above mentioned techniques which give an investor an appropriate project return is very difficult task. This article compares above mentioned techniques which gives a clear picture of which technique should be adopted and which should not.

A. IRR vs MIRR

In spite of the way that the internal rate of return is notable among business speculators, it will by and large overstate the advantage of an extend and can provoke capital budgeting bungles reliant on an unreasonably hopeful gauge. The adjusted inward pace of return compensates for this deformity and gives executives greater authority over the acknowledged reinvestment rate from future incomes. An IRR figuring carries on like an upset intensifying development rate; it needs to constrain the ascent from the fundamental starting speculation despite reinvested incomes. Regardless, the IRR doesn't represent how incomes are truly reinvested into future exercises.

Cashflows are regularly reinvested at the expense of capital, not a similar rate at which they were produced. IRR expect that the growth rate stays consistent from task to task. It is extremely simple to exaggerate expected future incentive with essential IRR figures.

Another significant issue with IRR happens when a venture has various times of positive and negative incomes. In these cases, the IRR creates more than one number, creating vulnerability and turmoil. MIRR settles this issue also.

B. IRR vs NPV

For this let's take a venture that has the accompanying yearly incomes:

- Year 1 = - \$100,000 (starting capital expense)
- Year 2 = \$120,000 return

Year 3 = - \$56,000 in contingencies to update the task. A single IRR can't be utilized for this situation. IRR is the discount rate or the premium required for the undertaking to recover back the initial investment. In the event that economic situations change throughout the years, this undertaking can have various IRRs. At the end of the day, long tasks with fluctuating incomes and extra investment of capital may have numerous IRR values.

Another circumstance that messes up individuals who favor the IRR strategy occur when there is no knowledge about the discount rate. IRR method is correctly applied when discount rate is known. If IRR is over the discount rate, the undertaking is achievable, else the task is considered not possible. The IRR is of limited use if discount rate isn't known. If such conditions are there then NPV method can become handy. On the off chance that a task's NPV is greater than zero, at that point it's viewed as monetarily beneficial.

C. Irr vs MIRR vs NPV

MIRR manages most issues of IRR and NPV. The accompanying issues with IRR and NPV have been distinguished up until this point:

- i) IRR and NPV are two period measures that can't represent free incomes between the periods. IRR is directed by the timing and size of cash flows, not the reinvestment potential the cost of capital.
- ii) On the off chance that a discount rate is utilized to represent venture market or cost sparing danger, the discount rate will not mirror the hazard related to the investment funds of the organization overall, since it is cut off from the association's cost of capital. Accordingly, executives are secured in the supposition that it not just can, yet in addition will make future ventures of a similar size at the discount rate chance level. IRR and NPV concentrate the board consideration on the danger of the interest being referred to, however not on what's to come reinvestment ramifications of their choice.
- iii) IRR and NPV may rank fundamentally unrelated tasks contrastingly when timing, or size are included. This issue gets significant when subsidizing is restricted or extends are commonly elite.
- iv) IRR may display various paces of bring when back incomes go from negative to positive more than once.

The following illustration shows how to use MIRR and how it solves project ranking problem. In the given example the cost of capital is 12% and the rate of reinvestment is 12%.

Machine and its substitutes: MIRR vs NPV vs IRR

	Year 0	Year 1	Year 2	Year 3
Machine	(12000000)	600000	650000	650000
NPV @12%	316547			
IRR	27%			
MIRR	21%			

New Part	(12000000)	1300000	200000	40000
NPV @12%	148624			
IRR	24%			
MIRR	16%			
New Equipment	(12000000)	60000	400000	1400000
NPV @12%	168941			
IRR	18%			
MIRR	17%			

For each situation MIRR reliably positions the options in a similar way as Net Present Value; bigger the Net Present Value, the bigger the Modified Internal Rate of Return will be. This remains constant till the rate of reinvestment rises to the discount rate or cost of capital. For each situation, Modified Internal Rate of Return is not exactly Internal Rate of Return on the grounds that the former indicates a rate of reinvestment at the moderate 12% cost of capital, while Internal Rate of Return infers reinvestment is done at IRR rate which is now greater.

Machine and its substitutes: MIRR vs NPV vs IRR

	Year 0	Year 1	Year 2	Year 3
Machine	(12000000)	600000	650000	650000
NPV @12%	316547			
IRR	27%			
MIRR	21%			
New Part	(12000000)	100000	1200000	600000
NPV @12%	272987			
IRR	23%			
MIRR	20%			
New Equipment	(12000000)	1300000	120000	0
NPV @12%	56378			
IRR	17%			
MIRR	14%			

Above table shows that exactly when the earnings are one of a kind in time, MIRR positions expand a comparative path as Net Profit Value when the reinvestment rate and cost of capital are proportionate to each other. It limits negative incomes from venture to the present and blends negative and positive cash flows from activities to future terminal worth. Cash flows which are negative are normally neutralized by the cash flows which are positive, so only one critical changed to positive which was negative before.

Right when the reinvestment and investment rates are proportionate to the Net Profit Value discount rate, Modified Internal Rate of Return is the thing that may be contrasted with the NPV in rate terms. Right when they are one of a kind, MIRR will be the better measure since it honestly speaks to the cash flows when reinvested at the differing rate. "Both NPV and MIRR can be utilized to assess ventures, however the MIRR, when deciphered as the loan cost paid by an undertaking or option, gives a sign of task proficiency which is not given by NPV."

conclusion

Presently, NPV and IRR are the very much favoured proportions of investment attractiveness. NPV is utilized regularly by professionals, despite the fact that administrators have confirmed an instinctive inclination for Internal Rate of Return. There are three important things to be taken from this article:

i) Both IRR and NPV have noteworthy demerits. Precautions should to be taken in deciphering what the measures are suggesting. The disadvantages incorporate

- Authorities have made sure regarding speculations about how reinvest the future cash flows, along these lines giving an outlandish point of view on a investment's authentic potential
- problems of timing, size, and situating make correlations among decisions inconvenient when spending plans are obliged or extends are fundamentally unrelated; and
- Internal Rate of Return when unchanged experiences the extraordinary issue of various IRRs.

ii) MIRR oversees such issues by unequivocally seeing that incomes made by a venture can be reinvested. Be that as it may,

- Authorities must show a return on investment that evaluates investment threats,
- Authorities ought to exhibit a rate of reinvestment given the hazards related to the future speculation of incomes

NPV, IRR and MIRR can't bargain with the issue of estimating differential among choices without steady examination.

MIRR is a progressively precise proportion of the engaging quality of venture elective, since engaging quality depends not just on the ROI itself, but additionally on the returns anticipated on cash flows it creates. According to the concept used in IRR and NPV the cash flows which are generated by the project are reinvested back into the same project. But this does not happen always. Practically the cash flows which are generated from the project are often in some other project within the same firm and to say that it will generate or capable of generating decent IRR will be

very vague. Here again MIRR comes as a saviour to the investors. It is comparatively faster technique gives only one value not multiple.

Through this study we have found that neither of the tools gives as appropriate answer like MIRR because those tools or techniques have various other demerits which can prove to be fatal if an investor fails to recognise them. Through this research paper MIRR has evolved out to be the winner among the race of many tools and techniques.

Although this research gives the holistic approach to identifying the appropriate project returns and has analysed the comparison between various tools, finding an appropriate project return and implementing that to identify which project is more attractive based on its returns and profit, all this depends on the fine judgment of the investor.

Acknowledgment

The author wish to acknowledge Symbiosis Centre for Management and Human Resource Development for providing this opportunity.

Conflict of Interest

There is no conflict of Interest.

Funding

Self funded

References

- [1] <https://www.investopedia.com/terms/i/irr.asp>
- [2] <https://www.investopedia.com/terms/n/npv.asp>
- [3] https://en.wikipedia.org/wiki/Net_present_value#cite_note-3
- [4] <https://efinancemanagement.com/investment-decisions/advantages-and-disadvantages-of-npv>
- [5] <https://www.wallstreetmojo.com/advantages-and-disadvantages-of-npv/>
- [6] <http://www.fao.org/investment-learning-platform/themes-and-tasks/project-identification/en/>
- [7] Hartman, J. C., and Schafrick, I. C., "The relevant internal rate of return," *The Engineering Economist* 49(2), 2004, 139–158.
- [8] Keane, S.M., "The internal rate of return and the reinvestment fallacy." *Abacus* 15(1), 1979, 48–55
- [9] Rich, S.P., and J.T. Rose, "Re-examining an Old Question: Does the IRR Method Implicitly Assume a Reinvestment Rate?" *Journal of Financial Education* 10(1), 2014, 105-116.
- [10] <https://smallbusiness.chron.com/advantages-disadvantages-internal-rate-return-method-60935.html>
- [11] <https://www.accountingtools.com/articles/2017/5/13/internal-rate-of-return-irr>
- [12] <https://www.wallstreetmojo.com/internal-rate-of-return-irr/>
- [13] Hartman, J. C., and Schafrick, I. C., "The relevant internal rate of return," *The Engineering Economist* 49(2), 2004, 139–158
- [14] Dudley, C.L., "A note on reinvestment assumptions in choosing between net present value and internal rate of return." *Journal of Finance* 27(4), 1972
- [15] <https://www.bdc.ca/en/articles-tools/money-finance/manage-finances/pages/financial-analysis.aspx>
- [16] <https://www.investopedia.com/terms/p/paybackperiod.asp>.
- [17] Advantages & Disadvantages of Payback Capital Budgeting Method. *Chron*.
- [18] Advantages and Disadvantages of Payback Period Method. *ConnectUS*.
- [19] Pay-Back Method: Merits and Demerits | Capital Budgeting. *Economics Discussion*.
- [20] Lin, S. A. Y., "The modified internal rate of return and investment criterion," *The Engineering Economist* 21(4), 1976, 237–247
- [21] Kharabe, P., & Rimbach, A. (1989). MRR, IRR, and NPV as project ranking measures. *Real Estate Review*, 19(2), 74.
- [22] Andrea Marchioni and Carlo Alberto Magni, "Investment decisions and sensitivity analysis: NPV-consistency of rates of return", *European Journal of Operational Research* Volume 268, Issue 1, 1 July 2018, Pages 361-372
- [23] J.R.Cuthbert and M.Cuthbert, "Why IRR is an inadequate indicator of costs and

returns in relation to PFI schemes”,
Critical Perspectives on Accounting
Volume 23, Issue 6, September 2012,
Pages 420-433

[24] Michael J. Osborne, “A resolution to the
NPV–IRR debate?”, The Quarterly
Review of Economics and Finance
Volume 50, Issue 2, May 2010, Pages 234-
239

[25] Herbert Kierulff, “MIRR: A better
measure”, Business Horizons Volume 51,
Issue 4, July–August 2008, Pages 321-329