GEPM-375
Professional Practices and Construction Management

Cost Benefit Ratio (CBR)

CBR

What Is the Benefit-Cost Ratio (BCR)?

- Ratio used in a **cost-benefit analysis** to s**ummarize the overall relationship between the relative costs and benefits of a proposed project**.

- Can be expressed in **monetary or qualitative terms**.

- If a project has a **BCR greater than 1.0,** the project is expected to deliver a positive NPV to a firm and its investors.

CBR

What Is a Cost-Benefit Analysis?

- A cost-benefit analysis is a **systematic process** that businesses use **to analyze which decisions to make and which to forgo.**

- Cost-benefit **analyst sums the potential rewards** expected from a situation or action and then **subtracts the total costs** associated with taking that action.

- Some consultants or analyst also **build models to assign a dollar value on intangible items**, such as the benefits and costs associated with living in a certain town.

CBR

How the Benefit-Cost Ratio (BCR) Works

- Most often used in **capital budgeting** to **analyze the overall value for money** of undertaking a new project.

- However, **the cost-benefit analyses for large projects can be hard to get right**, because there are **so many assumptions and uncertainties** that are hard to quantify.

- This is why there is usually a **wide range of potential BCR outcomes**.

CBR

- BCR also **does not provide any sense of how much economic value will be created**, and so the BCR is usually **used to get a rough idea about the viability of a project** and **how much the internal rate of return (IRR)** exceeds the discount rate, which is the company's weighted average cost of capital (WACC) – the opportunity cost of that capital.

- BCR is calculated by **dividing the proposed total cash benefit** of a project by the **proposed total cash cost of the project.**

- Prior to dividing the numbers, the **NPV of the respective cash flows** over the proposed lifetime of the project – taking into account the **terminal values (TV)**, including **salvage/remediation costs** – are calculated.

CBR

What Is Capital Budgeting?

- **Process, a business undertakes to evaluate potential major projects** or investments.

- **Construction of a new plant or a big investment in an outside venture** are examples of projects that would require capital budgeting before they are approved or rejected.

- As part of capital budgeting, a company **might assess a prospective project's lifetime cash inflows and outflows to determine whether the potential returns** that would be generated meet a sufficient target benchmark.

- Capital budgeting process is also known as **investment appraisal**.

What Is Weighted Average Cost of Capital (WACC)?

- Represents a firm's average **after-tax cost of capital** from all sources, including common stock, preferred stock, bonds, and other forms of debt.

- WACC is the average rate that a company **expects to pay to finance** its assets.

What Is Terminal Value (TV)?

- Estimated value of an asset or business **beyond a specific forecast period**.

- It's also known as "**continuing value**" or "horizon value".

- Value of an asset, business, or project beyond the forecasted period when future cash flows can be estimated.

- Terminal value assumes a business will **grow at a set growth rate forever** after the forecast period.

- Terminal value often comprises a **large percentage of the total assessed value**.

CBR

What Does the BCR Tell You?

- If a project has a **BCR that is greater than 1.0,** the project is **expected to deliver a positive NPV** and **will have an IRR above the discount rate.**

- Suggests that the **NPV of the project's cash flows outweighs the NPV of the costs**, and the project should be considered.

- If the BCR is **equal to 1.0**, the ratio indicates that the NPV of expected **profits equals the costs.**

- If a project's **BCR is less than 1.0**, the project's **costs outweigh the benefits**, and it should not be considered.

CBR

Example of How to Use the BCR

- As an example, assume company ABC wishes to assess the profitability of a project that involves **renovating an apartment building** over the next year.

- Company decides to **lease the equipment needed** for the project for **$50,000** rather than purchasing it.

- **Inflation rate is 2%,** and the renovations are expected to increase the **company's annual profit by $100,000 for the next three years**.

CBR

Solution:

- **NPV of the total cost of the lease does not need to be discounted**, because the initial cost of $50,000 is paid up front.

- NPV of the projected benefits is **$378,901**, or ($100,000 / (1 + 0.02)^1) + ($100,000 / (1 + 0.02)^2) + ($100,00 / (1 + 0.02)^3).

- Consequently, the **BCR is 7.58**, or **$ 378,901 divided by $50,000.**

- In this example, our company has a BCR of **7.58**, which indicates that the **project's estimated benefits significantly outweigh its costs.**

- Moreover, company ABC could **expect $7.58 in benefits for each $1 of costs**.

CBR

Limitations of the BCR

- Primary limitation of the BCR is that **it reduces a project to a simple number** when the success or failure of an investment or expansion **relies on many factors** and can be undermined by unforeseen events.

- Simply following a rule that **above 1.0 means success** and below 1.0 spells failure is **misleading and can provide a false sense of comfort with a project**.

- BCR must be **used as a tool in conjunction with other types of analysis** to make a well-informed decision.

BCR

What Is the Benefit-Cost Ratio (BRC) Used for?

- BRC is used in cost-benefit analysis to **describe the connection between the costs and benefits of a potential project.**

How Do You Calculate the Benefit-Cost-Ratio?

- Benefit-Cost-Ratio is determined by **dividing the proposed total cash benefit of a project by the proposed total cash cost of the project**.

What Does a Benefit-Cost-Ratio Over 1.0 Suggest?

- A reading **over 1.0** suggests that on a broad level, **a project should be financially successful**; a **reading of 1.0** suggests that the **benefits equal the costs**; and a reading **below 1.0** suggests that the **costs trump the benefits**.

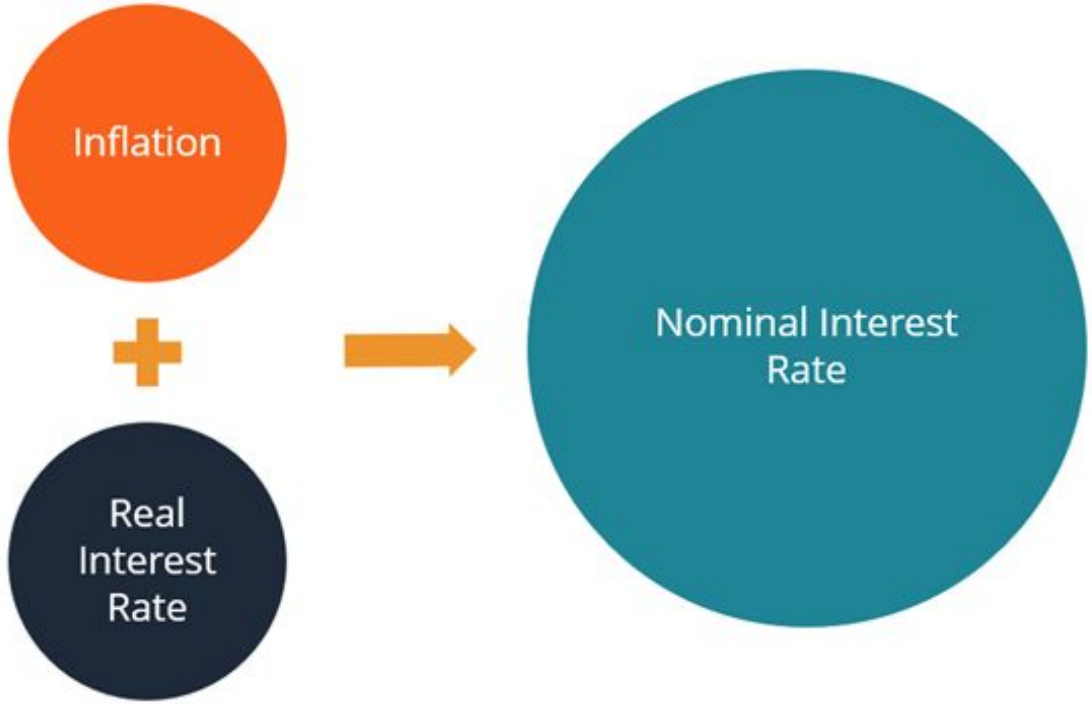
Fisher Rate Equation

What is the Fisher Equation?

•Fisher equation is a concept in economics that **describes the relationship between nominal and real interest rates** under the effect of inflation.

•Equation states that the **nominal interest rate is equal to the sum of the real interest rate plus inflation**.

•Fisher equation is often used in situations where **investors or lenders ask for an additional reward to compensate for losses** in purchasing power due to high inflation.



Concept of Fisher Equation

- Concept is widely used in the **fields of finance and economics.**
- Frequently used in **calculating return on investment** or in **predicting the behavior** of nominal and real interest rates.

Example: When an investor wants to **determine the actual (real) interest rate earned on an investment after accounting for the effect of inflation**.

Fisher equation is **related to monetary policy**.

- Equation reveals that monetary policy moves inflation and the nominal interest rate together in the same direction.
- Whereas, monetary policy generally does not affect the real interest rate.

American economist **Irving Fisher** proposed the equation.

Fisher Equation Formula

- Fisher equation is expressed through the following formula:

  $$(1 + i) = (1 + r)(1 + \pi)$$

  Where:

  i – the nominal interest rate

  r – the real interest rate

  π – the inflation rate

- However, one can also use the approximate version of the previous formula:

$$i \approx r + \pi$$

Fisher Equation Example

Suppose Sam owns an investment portfolio. Last year, the portfolio earned a **return of 3.25%.** However, last year's inflation rate was around **2%**. Sam wants to determine the real return he earned from his portfolio.

Solution:

In order to find the real rate of return, we use the Fisher equation. The equation states that:

$$(1 + i) = (1 + r)(1 + \pi)$$

We can rearrange the equation to find the **real interest rate**:

$$r = \frac{(1 + i)}{(1 + \pi)} - 1$$

Therefore, the real interest rate, or actual return on investment, of the portfolio equals:

$$r = \frac{1+3.25}{1+2} = 1.42\%$$

Real interest that Sam's investment portfolio earned last year, after accounting for inflation, is **1.42%**.

Inflation: Overall increase of prices or cost of living in a country.

Nominal Interest Rate: Interest on investment before taking inflation into account

Real Interest rate: Interest that has been adjusted to inflation.

Causes of Inflation:

- **Cost push inflation**: Production cost increases, Producer raises prices to cover cost.
- **Inflation Expectation**: Expect rise prices and wages also rises.
- **Creeping Inflation**: When supply of money or income increases, prices may rise.
- **Money Supply**: Grows faster than economic growth.
- **Rising wages**: Workers paid more, cost of product increases, passed to consumers.
- **Demand pull Inflation**: Demand increases faster, than economic growth.

Thanks