


User Manual: Investment Metrics Explained

Net Present Value (NPV)

 Think of NPV as: “How much is this stream of future profits worth today?”


When:


- $NPV > 0 \rightarrow$ the investment is profitable
- $NPV = 0 \rightarrow$ the IRR is the return rate
- $NPV < 0 \rightarrow$ you’re losing money

 Formula:

$$NPV = \sum CF_t / (1 + r)^t - \text{Initial Investment}$$

Internal Rate of Return (IRR)

 Definition: Annualized return rate where $NPV = 0$


 Formula:

Use numpy or a financial calculator:

`np.irr([-Initial Investment, CF1, CF2, ...])`

Return on Investment (ROI)

 Definition: Total return relative to initial capital.


 Formula:

$$ROI = (\text{Total Return} / \text{Initial Investment}) \times 100$$

ROI becomes more meaningful over time as it includes:


- Appreciation
- Mortgage principal paydown
- Net profit at sale

Cash-on-Cash Return (CoC)

 Definition: Measures the annual pre-tax cash flow relative to the initial cash invested.

 Formula:


$$CoC = (\text{Annual Pre-Tax Cash Flow} / \text{Initial Cash Invested}) \times 100$$

 Example:

You put \$40,000 down on a rental property and receive \$3,600 in annual cash flow:

$$CoC \text{ Return} = (\$3,600 / \$40,000) \times 100 = 9\%$$

Multi-Year Cash Flow & ROI

 Cash Flow = Annual Rent – (Operating Expenses + Mortgage Payments)
ROI = (Total Return / Initial Investment) × 100

What Counts as Cash Flow for CoC and ROI?


Cash-on-Cash Return uses Net Pre-Tax Cash Flow — not total rent.

 Formula:

Cash Flow = Annual Rent – (Operating Expenses + Mortgage Payments)

In many cases, Operating Expenses (property taxes, insurance, repairs, etc.) are estimated or entered manually in the app.

If you only know mortgage and rent, use a placeholder for expenses, e.g., 25% of rent.

 Tip: If you're unsure of the exact monthly expenses, a common rule of thumb is to estimate them as 25% of monthly rent.

This includes typical operating costs like:

- Property taxes
- Insurance
- Repairs & maintenance
- Vacancy buffer
- HOA fees or other recurring expenses

When CoC = ROI (Year 1)

If there is no appreciation, mortgage paydown, or sale value yet, ROI = CoC.

But ROI becomes more powerful long-term, factoring in gains like:

- Equity from price appreciation
- Mortgage principal reduction
- Sale value of property

■ Long-Term Metrics

■ IRR (%) – Internal Rate of Return

Definition Recap: The IRR is the annualized rate at which the net present value (NPV) of all cash flows (including purchase, rent, expenses, sale) becomes zero.

■ Example:

You buy a rental property with a \$40,000 down payment.

Each year you receive \$3,600 in cash flow.

After 5 years, you sell the property and receive \$60,000 net profit.

■ Python Code:

```
import numpy as np
irr = np.irr([-40000, 3600, 3600, 3600, 3600, 3600 + 60000])
print(f"IRR: {irr:.2%}") # Result: ~17.7%
```

■ IRR \approx 17.7%

■ Equity Multiple

Definition: How many times your original investment has grown.

■ Formula:

Equity Multiple = Total Cash Inflows / Total Cash Invested

■ Example:

You invest \$40,000 and receive back a total of \$78,000 (from rent and final sale).

■ Equity Multiple = $78,000 / 40,000 = 1.95\times$

■ This means your investment nearly doubled.