IMPERIAL

Finance & Pricing Strategy

2. Project evaluation - Tutorial

Emilio Luis Sáenz Guillén
23/09/2024

Introduction

Pre-prepared activities

Q & A

Introduction
About myself

- Welcome everyone! My name is Emilio Luis Sáenz Guillén, I'll be your Teaching Assistant for the Finance & Pricing Strategy module.
- Doctoral Researcher in Actuarial Science at Bayes Business School, City St George's, University of London.
- Email: `esaenzgu@ic.ac.uk`, though better if you use Ed Discussion!
- Personal Website: `https://emilioluissaenzguillen.github.io/`

Tutorials & Office Hours

- **5 Tutorials**
  - Monday 23/09; Tuesday 01/10; Thursday 10/10; Monday 04/11; Monday 18/11.
  - At 10:00-11:00 and at 18:00-19:00 (London time).
- **Weekly Office Hours**
  - Odd weeks: Fridays at 10:00-11:00.
  - Even weeks: Thursdays at 17:00-18:00.

Tutorials & Office Hours Structure

1. Review/summary of <u>some</u> of the week's contents.
2. Pre-prepared activities.
3. Q & A?
   - Questions previously received on Ed Discussion forum or via email.
   - Questions you want to make in situ.

Note:
→ Each week we'll review each week's corresponding contents.
→ ICL policy: turn on your cameras ! ☺

Introduction

Pre-prepared activities

Q & A

2. Project Evaluation

"That the sun will not rise tomorrow is no less intelligible a proposition, and implies no more contradiction, than the affirmation, that it will rise."
David Hume (1748). An Enquiry Concerning Human Understanding. London: A. Millar

➜ How do we evaluate Risk & Uncertainty in the framework Finance & Pricing Strategy?

2.2. Net Present Value (NPV)

Current value of the projected future stream of payments from a company, project, or investment. Tool to analyse a project's projected profitability.

$$NPV = \sum_{t=0}^{T} PV(t) = \sum_{t=0}^{T} CF(t) \times \text{Disc. factor}(t) = \sum_{t=0}^{T} CF(t) \times \frac{1}{(1+R)^t}$$

- $CF(t)$: net cash inflow/outflow at period t;
- R: discount rate, captures the opportunity cost of capital, i.e., the rate of return an investor can get if investing in another project of similar risk (the riskier, the higher it should be);
- T: terminal period.

How to obtain NPV?

1. Step by step, computing the present value of each cash flow and then summing them up.
2. Excel function: =NPV(rate, value1, [value2], ...). 🗎
3. In the case of constant (or constantly increasing/decreasing) CF, we can come up with an explicit formula by leveraging geometric series:

$$\sum_{t=0}^{T} \left(\frac{1}{1+R} \right)^t = \frac{1 - \left(\frac{1}{1+R} \right)^{T+1}}{1 - \frac{1}{1+R}}$$

2.2. Internal Rate of Return (IRR)

Actual return provided by the project's cash-flows; if:

- IRR > Your company's hurdle rate[1]: invest ✔
- IRR < Your company's hurdle rate: don't invest ✖

$$\sum_{t=0}^{T} CF(t) \times \frac{1}{(1 + IRR)^t} = 0$$

How to obtain IRR?

1. Wolfram|Alpha: computational intelligence
2. Step by step, and using Excel add-in `Solver` to solve the above equation numerically. 🗎
3. Excel function: =IRR(values, [guess]). 🗎

---

[1]Minimum acceptable rate of return

Exercise

Company ABC is considering opening a new store:

- It is estimated that an investment of £150,000 will be needed to get the store up and running
- In the first year of operation, ABC expects to receive £27,000 in net income
- Net income is projected to increase by 4% annually over the next five years.

Compute the NPV of opening a store using an interest rate of 7% and answer the following question, along with a justification.

Sensitivity and Scenario analysis

More shophisticated tools to analyse the different sources of risk:

- **Sensitivity analysis**: "ceteris paribus" analysis, i.e., how would the NPV be affected by changing a single factor, while keeping everything else constant?
- **Scenario analysis**: different combinations of variables changing together to explore possible outcomes.
- **Probability analysis**: include subjective probabilities on each possible scenario.

Introduction
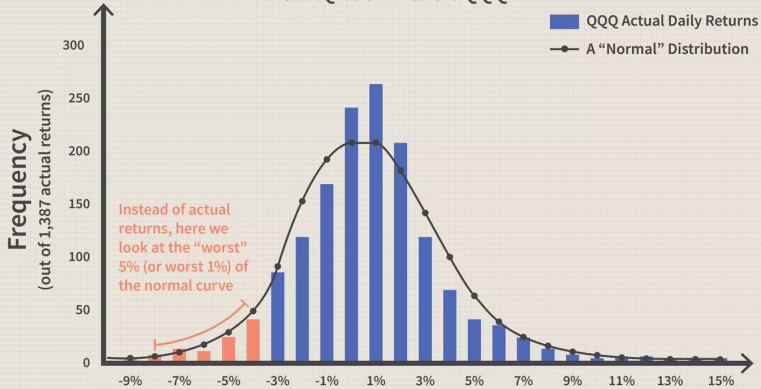
Pre-prepared activities

Q & A

Q & A

1. Probability analysis will enhance precision but it also requires analytical **capabilities that not all companies possess**.
   - Data Collection and Management
   - Probabilistic model: choosing the correct model (e.g., logistic regression, machine learning models, etc.)
     $\longrightarrow$ Software management & expertise
   - Integration with Business Knowledge: effective communication and ability to convince stakeholders
2. Conduct sensitivity analysis to see how sensitive your qualitative conclusions (e.g. accept or reject a project) are against the quantitative assumptions in your model.
   - Which are the unknowns in your sensitivity analysis? And how to they actually move...
   - Averages are limited, ideally one should look at the entire distribution of the unknown.

Distribution of Daily Returns
NASDAQ 100 - Ticker: QQQ

Instead of actual returns, here we look at the "worst" 5% (or worst 1%) of the normal curve

IMPERIAL

Thank you.
Questions?