Class 2 Marketing Profitability Analysis

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October 2, 2024

Section 1

Overview

Learning Objectives

- How to conduct break-even analysis for a marketing proposal
- How to conduct net present value analysis for a marketing proposal
- Practice R basic calculations and vector operations in the case study

Section 2

Break-Even Analysis

Decisions for Marketing Managers

- The ultimate goal of marketing (and other business activities) is to create value and improve profitability for firms.
- As any marketing activity comes with a cost, data analysts need to correctly evaluate whether a campaign creates or destroys value to the company.
- Such analyses are called cost-benefit analyses, sometimes referred to as profitability analysis or break-even analysis in different contexts.

Break-Even Quantity

- We often use break-even analyses to evaluate the financial feasibility of a marketing campaign. In marketing, we often compute the **break-even quantity**.

Definition

The break-even quantity (BEQ) calculates the number of ***incremental*** units the firm needs to sell to cover the cost of the marketing campaign.

Compute BEQ

The difference between the **price per unit** and **variable costs per unit** is defined as the **contribution margin per unit**. That is,

Definition

Contribution Margin Per Unit = Price Per Unit - Variable Costs Per Unit

- **Price per unit**: retail price customers pay
- **Variable costs per unit:** Costs of goods sold (COGS)[1] + any other variable costs per unit

[1] Material and production labor costs for producing a unit of product, often represented in **percentage terms,** e.g., COGS of 60% means the costs are 60% of retail prices. An iPhone with a retail price of £1000 and COGS of 30% means the COGS is £300.

Compute BEQ: Formula

This gives the second formula for BEQ:

Definition

BEQ = Marketing Expenditure / Contribution Margin Per Unit

Break-Even Quantity: Steps and Decision Rule

- Steps to conduct break-even analysis
  - *Step 1*: Compute the BEQ based on the company's product demand and production cost structure. This is the minimum quantity the company needs to sell to cover the costs of the marketing campaign.
  - *Step 2*: Evaluate whether the campaign can generate an incremental quantity larger than BEQ
- The decision rule
  - if incremental quantity sales $>$ BEQ, the company makes money, so accept the campaign; otherwise, reject the campaign

Section 3

Case Study: Profitability Analysis for Apple Inc

Background

Tom, senior marketing manager of Apple UK, is looking to launch a series of marketing campaigns to promote the iPhone 16 series that are just released. Tom was a proud graduate from UCL MSc BA program in 2020. He remembered from the Marketing Analytics module that break-even analysis helps evaluate different types of marketing decisions.

Case objectives:

- Practice situation analysis and compare with Uber's case
- Practice how to conduct break-even analyses for a marketing compaign
- Practice R basic computations and vector operations

Apple Inc: Key Information

From the case: The marketing analytics team at Apple Inc had applied sales forecasting models on historical sales data and predicted that the sales this year will reach **10** million units at the retail price of **£799**, without any additional marketing activities. The team had also collected the information on the Cost of Goods Sold of Apple 16, which is **47%**. The Research and Development (R&D) costs for iPhone 16 is **100** million pounds.

- Open the .qmd answer sheet downloaded from Moodle Week 1. And let's solve this case using the R basics we learned!
- **Question 1:** Conduct a 5C analysis for Apple Inc, and compare with Uber's case.

Apple Inc: BEA Question 2

- **Question 2:** Compute the contribution margin
  - Do we need to consider R&D costs?

Sunk Costs and Sunk Costs Fallacy

- **Sunk costs** are costs that have already been incurred in the past and cannot be recovered. They should **not** be considered in decision-making.
- However, behavioral economics research shows that people often fall into the **sunk costs fallacy**, where they tend to consider sunk costs in decision-making instead of focusing on future costs and benefits.
- When making decisions, you should stand in the present and consider only future costs and benefits. In our case, the R&D costs are sunk costs and should not be considered in the break-even analysis.

Apple Inc: BEA Question 3

- **Question 3**: Based on the information at hand, should Tom approve the influencer marketing plan?

Section 4

Net Present Value

Definition of NPV

- When the effect of the marketing campaign is expected to have a long-term effect or **when time value of money is important** to the question at hand, we need to take the future into account.

Definition

Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time.

Formula of NPV

$$NPV = -I_0 + \frac{CF_1}{(1+k)} + \frac{CF_2}{(1+k)^2} + \cdots + \frac{CF_n}{(1+k)^n}$$

- I_0 is the initial marketing investment/expense
- CF_n is the **incremental** profits in period n: it must be the additional profits due to the marketing campaign
- k (sometimes r or i) is the discount rate: reflects the value of time: the same £1 today is worth $\pounds 1 * (1+k)$ in the next period.
- The decision rule
  - if NPV $>$ 0, then the marketing campaign can bring in more values to the company, so it should be accepted.
  - if NPV $<$ 0, then the marketing campaign will decrease the company's value, so it should be rejected.

Apple Inc: NPV Influencer Marketing I

Question 4: Based on the information at hand, should Tom approve the influencer marketing plan based on Net Present Value method?

1. Compute the sequence of monthly cash flows
    - Generate a sequence of incremental sales for 12 months (a vector with 12 elements)
        - Hint: use `rep()`, `c()`, and vector element-wise multiplication

The resulting monthly CFs are: 12.7041, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694, 8.4694

Apple Inc: NPV Influencer Marketing II

2. Compute the sequence of discount factors
    - Generate a sequence of WACC for 12 months (a vector with 12 elements)
    - Generate a sequence of discount rate for 12 months (a vector with 12 elements)
        - Hint: use `seq()` to generate geometric sequence with patterns

The resulting monthly discount factors are: 0.9917355, 0.9835394, 0.975411, 0.9673497, 0.9593551, 0.9514265, 0.9435635, 0.9357654, 0.9280319, 0.9203622, 0.9127559, 0.9052124

Apple Inc: NPV Influencer Marketing III

3. Compute the NPV
    - Generate a sequence of discounted CFs for 12 months
    - Sum up all discounted CFs across the 12 months using `sum()`
    - Subtract endorsement fee from the sum to get NPV

- The NPV is 0.5349641

After-class

- Review the coding practice from today's class and ensure you understand how to calculate NPV in R. Complete the R coding exercise for Week 1, and feel free to bring any questions to next week's class.