Consumer choice

income changes preference

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What if consumer preference changes as income changes?

Yup, it’s safe to say it does in reality.

But how to represent it in economic model?

ChatGPT 4: Just add income as parameter to utility function

ChatGPT 4: use Cobb-Douglas form for the utility function

- `U(pizza, sushi, I) = pizza^α * sushi^β * I^γ`

Bard: income is also a good

- `U(x, y, I) = x^2 + y^2 + aI`

Weng Wei: income changes preference

- ```
  U(bread, steak, I) =
        bread^(1 - scale_income(I)) * steak^(scale_income(I))
  ```
- 0 < scale_income(I) < 1
  ```

No matter what I is, but if it's given as constant, it becomes a normal utility maximizing problem.

Or, can just treat I as a variable, in Econ 6022 Notes Chapter 1, we have:

- `max U(x, y, z) = x^2 * y^3 * z subject to x + y + y = 12`

It's similar to:

- `max U(bread, steak, I) = bread^(1 - scale_income(I)) * steak^(scale_income(I))`
- subject to `2 * bread + 20 * steak - I = 0`
    - Assume 0 < I < 200, scale_income(I) could just be `I / 200`

Mathematically, above should works.

But, does it has any implication on actual life?

After all, my question starts: In reality…

"The criterion of congruence with reality should have been sharpened - sharpened into the insistence that theories be examined for their implications for observable behavior. Not only where such implications not sought and tested, but there was a tendency, when there appeared to be a threat of an empirical test, to reformulate the theory to make the test ineffective. Economist did not anxiously seek the challenge of the facts." - Geoge. J. Stigler

Consumer choice by **Quota**

Consumer are subjected to two constrains

- Budget
- Quota

Categories

Both budget and quota are seperated into different categories, like:

- Food
  - Bread vs Steak
- Transport
  - Bus vs Taxi

Consumer Preference

- Budget distributions among categories
- Different consumer distribute budget differently
  - Tom treat food and transport as equal important
  - Jerry prefer spend more on food

Model Solution

- Maximizing budget usage within quota in each category

Model Setup

- Both Tom & Jerry has $200 total budget per week:
  - Tom: $100 on food and $100 on transport
  - Jerry: $175 on food and $25 on transport
- Same quota per week for food & transport:
  - Food: 14 units (2 meals per day)
  - Transport: 21 units (3 trips per day)
- Prices:
  - Food: Bread: $2 Steak: $20
  - Transport: Bus: $1 Taxi: $15

Tom's situation

- Weekly consumption:
  - Fbread unit of bread, Fsteak unit of steak
  - Tbus unit of bus, Ttaxi unit of taxi
- Food:
  - `Fbread + Fsteak = 14`
  - `Budget(Fbread, Fsteak) = 2 * Fbread + 20 * Fsteak <= 100`
- Transport:
  - `Tbus + Ttaxi <= 21`
  - `Budget(Tbus, Ttaxi) = 1 * Tbus + 15 * Ttaxi <= 100`
- Goal: maximize `Budget(Fbread, Fsteak)` & `Budget(Tbus, Ttaxi)`

Jerry's situation

- Food:
  - `Fbread + Fsteak = 14`
  - `Budget(Fbread, Fsteak) = 2 * Fbread + 20 * Fsteak <= 175`
- Transport:
  - `Tbus + Ttaxi = 21`
  - `Budget(Tbus, Ttaxi) = 1 * Tbus + 15 * Ttaxi <= 25`

By simple algebra

- Tom:
  - Fbread = 10, Fsteak = 4, Budget(Fbread, Fsteak) = 100
  - Tbus = 16, Ttaxi = 5, Budget(Tbus, Ttaxi) = 91 <= 100
- Jerry:
  - Fbread = 6, Fsteak = 8, Budget(Fbread, Fsteak) = 172 <= 175
  - Tbus = 21, Ttaxi = 0, Budget(Tbus, Ttaxi) = 21 <= 25

Implications from this model

- Let's just consider's Jerry's choice for food
  - Fbread = 6, Fsteak = 8, Budget(Fbread, Fsteak) = 172 <= 175
- What if steak's price drop to $15?
  - Fbread = 3, Fsteak = 11, Budget(Fbread, Fsteak) = 171 <= 175
- Price drop -> demand increase
  - law of demand proved ^_^

What if…

- There are 3rd option for food: lobster with unit price $40?
  - "Indifference curve" may comes in
- Jerry's budget increases to $1000?
  - More expensive goods will be consumed.
- Can it explain Lipstick effect?
  - Yes!
- How about Giffen good?
  - All goods exhibitions same behavior, no difference between Giffen or normal good
  - Law of demand always obeyed

Seek the challenge of the facts!

- Unlike “Utility”, quota & budget are something we could measure in real life
- Consumer choice by quota model would have predictions
  - It’s a refutable model
  - Can be tested with empirical result
- Hawker food’s price has been increasing, how will consumption in food court be affected?
- HDB price are raising, will it effect condo market?
- How would inflation affect our spending?

Thank You!