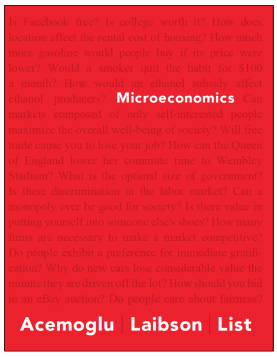


Chapter 3 Optimization: Doing the Best You Can

Modified by Joseph Tao-yi Wang

Chapter Outline

Key Ideas

1. When an economic agent chooses the best feasible option, she is optimizing.
2. Optimization in levels calculates the total net benefit of different alternatives and then chooses the best alternative.

Key Ideas

3. Optimization in differences calculates the change in net benefits when a person switches from one alternative to another, and then uses these marginal comparisons to choose the best alternative.
4. Optimization in levels and optimization in differences give identical answers.

Evidenced-Based Economics Example

How does location affect the rental cost of housing?

A Matter of Focus

- Do you always make the best choice?
- Why not?

A Matter of Focus

Sometimes it is difficult to make choices because:

- You have limited information
- Sorting through information can be complicated
- You are inexperienced in dealing with a given situation

A Matter of Focus

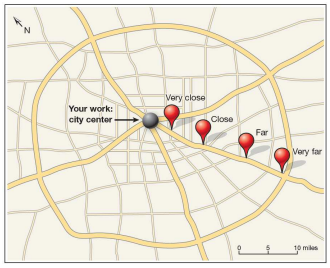
- How to choose?
  - How to evaluate trade-offs?
- Either
- Optimization in levels =
  - look at total benefit – total cost (net benefit)
- OR
- Optimization in differences =
  - look at the change in the net benefit of one option compared to another

A Matter of Focus

Demonstration:
What value do you place on this?

Optimization in Levels

Decision-making using totals:
Where should I live?



Trade-off:
Cost vs. Distance

Exhibit 3.1 Apartments on Your Short List, Which Differ Only on Commuting Time and Rent and Are Otherwise Identical

Optimization in Levels

Apartment Options

Apartment	Commuting Time (hours per month)	Rent ($ per month)
Very Close	5 hours	$1,180
Close	10 hours	$1,090
Far	15 hours	$1,030
Very Far	20 hours	$1,000

Exhibit 3.1 Apartments on Your Short List, Which Differ Only on Commuting Time and Rent and Are Otherwise Identical

Optimization in Levels

What does it cost to commute?

- Availability of public transportation
- Gasoline
- Parking
- Wear and tear on car/motorcycle
- Opportunity cost of time

Optimization in Levels

Apartment Options

Apartment	Commuting Time (hours per month)	Commuting Cost ($ per month)	Rent ($ per month)	Total Cost: Rent + Commuting ($ per month)
Very Close	5 hours	$50	$1,180	$1,230
Close	10 hours	$100	$1,090	$1,190
Far	**15 hours**	**$150**	**$1,030**	**$1,180**
Very Far	20 hours	$200	$1,000	$1,200

Exhibit 3.2 Commuting Cost and Rental Cost Expressed in Common Units, Assuming an Opportunity Cost of Time of $10/hour

Optimization in Levels

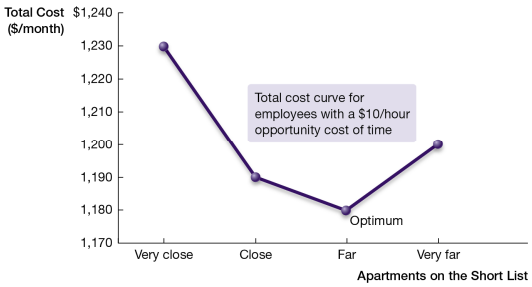


Exhibit 3.3 Total Cost Including Both Rent and Commuting Cost, Assuming an Opportunity Cost of Time of $10/hour

Optimization in Levels

Comparative Statics: What if the opportunity cost of commuting changes?

Optimization in Levels

Apartment Options

Apartment	Commuting Time (hours per month)	Commuting Cost ($ per month)	Rent ($ per month)	Total Cost: Rent + Commuting ($ per month)
Very Close	5 hours	$75	$1,180	$1,255
Close	**10 hours**	**$150**	**$1,090**	**$1,240**
Far	15 hours	$225	$1,030	$1,255
Very Far	20 hours	$300	$1,000	$1,300

Exhibit 3.4 Commuting Cost and Rental Cost Expressed in Common Units, Assuming an Opportunity Cost of Time of $15/hour

Optimization in Levels

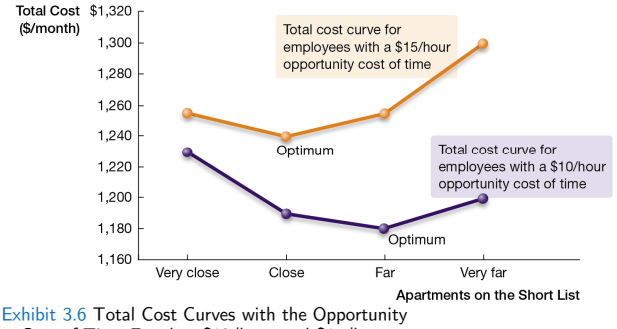


Exhibit 3.6 Total Cost Curves with the Opportunity Cost of Time Equal to $10/hour and $15/hour

Optimization in Levels

What's Missing?

Optimization in Levels

- Optimization in Levels
  1. Express all costs and benefits in the same unit (like $)
  2. Calculate total net benefit (benefits – costs) for each option
  3. Choose the option with the highest net benefit

Optimization in Differences: Marginal Analysis

Decision-Making Using Marginal Analysis:
What's the net benefit of one more?

How many servings do you want?

Optimization in Differences: Marginal Analysis

Apartment Options

Apartment	Commuting Cost	Marginal Commuting Cost	Rent Cost	Marginal Rent Cost	Total Cost	Marginal Total Cost
Very Close	$50		$1,180		$1,230	
		$50		−$90		−$40
Close	$100		$1,090		$1,190	
		$50		−$60		−$10
Far	$150		$1,030		$1,180	
		$50		−$30		$20
Very Far	$200		$1,000		$1,200	

Exhibit 3.7 Relationship Between Levels and Differences (Margins), Assuming a $10/hour Opportunity Cost of Time

Optimization in Differences: Marginal Analysis

Principle of Optimization at the Margin

If an option is the best choice, you will be made better off as you move toward it, and worse off as you move away from it.

Optimization in Differences: Marginal Analysis

- Optimizing in Differences:
  1. Express all costs and benefits in the same unit
  2. Calculate how the costs and benefits change as you move from one option to another
  3. Apply the Principle of Optimization at the Margin—choose the option that makes you better off by moving toward it, and worse off by moving away from it.

Optimization in Differences: Marginal Analysis

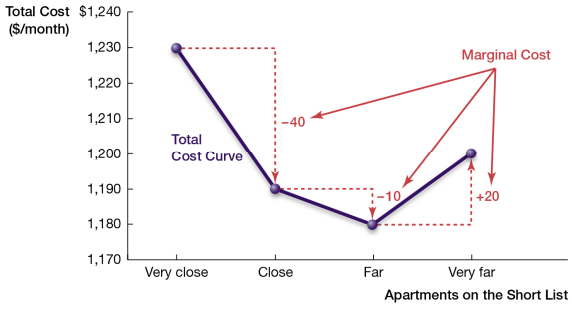


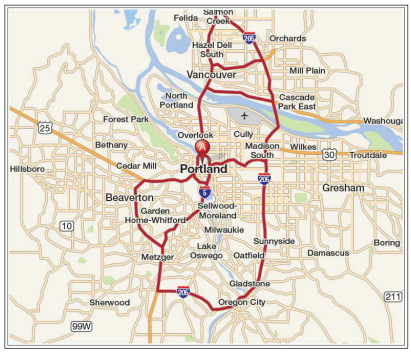
Exhibit 3.8 Total Cost of Each Apartment and the Marginal Cost of Moving Between Apartments, Assuming an Opportunity Cost of $10/hour

Evidenced-Based Economics Example

How does location affect the rental cost of housing?

Evidenced-Based Economics Example

How does location affect the rental cost of housing?



Optimization in Differences: Marginal Analysis

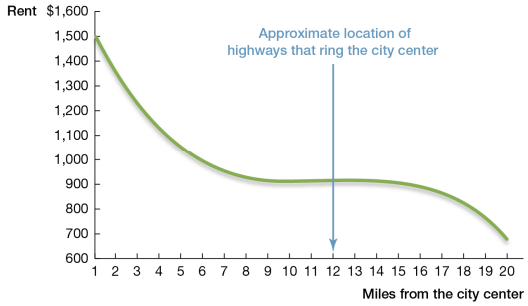


Exhibit 3.9 Apartment Rent in Portland, Oregon, Depends on Distance from the City Center

Homework For ALL Chapter 3

- ALL Chap.3, Problem 4, 7, 8
- Bonus Question (See next slide)
- Challenge Questions (from Past Midterms)
  - N/A

Bonus Question (ALL 3-1)

- Suppose the government in a certain country wants to reduce urban sprawl.
- What measures could it take to ensure that people choose to live closer to the central business district?
  - Urban sprawl refers to the development of residential and commercial areas in the suburbs around the periphery of a city.
  - One of the main problems with urban sprawl is that it leads to increased traffic congestion and air pollution as commuters travel to the city every day.