Lecture 7.
Elasticity of Demand

The Midterm 1 Practice Exam will be posted on course website (Classes > Exams) on Wednesday evening. Practice Exam answers will be during the weekend.

The Midterm will be given during lecture time in your lecture auditorium (STO B50 or LAW Aud)

Clicker Question

If household incomes increase, then
So far we’ve seen that…

- On the demand curve, when the price rises, the quantity demanded falls.

- On the supply curve, when the price rises, the quantity supplied increases.

- But by how much will the quantity demanded fall?

- And by how much will the quantity supplied rise?

  (And who cares about the answer to this question 😁?)

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- Firms care:
  - “If we raise the price of gasoline by $0.80/gallon, will this bring down our profits, or will they go up?”

- Governments care:
  - In many countries: “If we want to cut teenage smoking by 50%, should cigarette taxes be increased by $0.80 a pack? by more? less? Will it work at all?”

  - In India: “If the government pays $1,000 to high-caste Indians who marry low-caste Indians, by how much will marriage across castes increase?”
Most important,

To answer these questions, we have to understand the concept of elasticity,…

…which measures the responsiveness of one variable to another as a ratio of percentages.

We begin with the price elasticity of demand.

- Sometimes we call it just the “elasticity of demand.”
- Or maybe “own-price elasticity of demand.”
Price Elasticity of Demand

- The elasticity of demand tells us how sensitive the quantity demanded is to the good’s price at a given point on a demand curve.

- The price elasticity of demand $\varepsilon$ is defined by:

$$\varepsilon = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

or equivalently by

$$\varepsilon = \frac{\% \Delta Q}{\% \Delta P}$$  \(\Delta\) means “change in”

- Note: Elasticity is always computed as a ratio of percentages, never as a ratio of amounts.

Example: Cigarettes

- Suppose that when the price of cigarettes rises by 10%,…

- the quantity of cigarettes demanded falls by 5%.

- Then the elasticity of demand for cigarettes is:

$$\varepsilon = \frac{-5\%}{?} = ?$$
Midpoint (Arc) Elasticities

- There are some things that are better NOT to know, like the midpoint elasticity formula.

\[ \varepsilon = \frac{(Q_2 - Q_1) / (\bar{Q} + \bar{Q}) / 2}{(P_2 - P_1) / (\bar{P} + \bar{P}) / 2} \]

- I want you to understand concepts.

- I don’t want you to memorize formulas,…

- …not even when the formula is in the textbook.

Example: Pork

- Suppose the price of pork falls by 2%, and the quantity demanded increases by 6% as a result.

- Then the price elasticity of demand for pork is…

\[ \varepsilon = \frac{?}{?} = ? \]

- The own-price elasticity of demand is generally negative (when price rises, quantity falls).

- Economists sometimes drop the minus sign, because we know that the elasticity is negative,…

- but I will keep the minus sign most of the time!
**Clicker Question**
Suppose the price of pork increases by 2%, and …

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**Why Percentages?**

- We use **percentage changes** to compute elasticities, *not* the amounts of the changes. Why?

- **Example:** Pork again.
  - When the price is $4.00 per kg, 500 grams are demanded.
  - But when the price changes to $3.92, then 530 grams are demanded.
  - What is the price elasticity of demand?
Solution with percentages \((\% \Delta Q / \% \Delta P)\):

- We have \(\Delta P = 3.92 - 4.00 = -.08\)
- so that \(\% \Delta P = -.08 / 4.00 = -.02 = -2\%\).
- Also \(\Delta Q = 530 - 500 = 30\)
- so that \(\% \Delta Q = 30 / 500 = 6\%\).
- and \(\varepsilon = 6\% / -2\% = -3\)

Without percentages \((\Delta Q / \Delta P)\):

- With prices in dollars: \(\Delta Q / \Delta P = 30 / -.08 = -375\)
- With prices in cents: \(\Delta Q / \Delta P = 30 / -8 = -3.75\)
- Different units \(\Rightarrow\) different results!

But percentages don’t have units—no problems.

Elasticity on a Graph

Suppose the price of milk goes from \$.40 to \$.60.

What is Emily’s elasticity of demand when the price is \$.40?

\[\% \Delta P = \frac{.20}{.40} = 50\%\]

\[\% \Delta Q = \frac{-20}{80} = -25\%\]

\[\varepsilon = \frac{\% \Delta Q}{\% \Delta P} = \frac{-25\%}{50\%} = -\frac{1}{2}\]
Interpreting Elasticity of Demand

Remember: \( \varepsilon = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}} \)

We see whether \( |\varepsilon| \) (the elasticity without the minus sign), is larger or smaller than 1.

- For \( |\varepsilon| > 1 \), we say that demand is elastic (quantity is quite sensitive to the price)
- For \( |\varepsilon| < 1 \), we say that demand is inelastic (quantity is not very sensitive to the price)
- For \( |\varepsilon| = 1 \), we say that demand is unit-elastic (price and quantity change by same percentage but in opposite directions)

Example: Ski Passes

What is the elasticity of demand for season ski-passes?

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old</td>
<td>$400</td>
<td>10,000</td>
</tr>
<tr>
<td>New</td>
<td>$380</td>
<td>12,000</td>
</tr>
</tbody>
</table>

\[
\begin{align*}
\%\Delta P &= \frac{(380 - 400)}{400} = \ ? \\
\%\Delta Q &= \frac{(12000 - 10000)}{10000} = \ ? \\
\varepsilon &= \ ? = \ ?
\end{align*}
\]

So demand for ski passes at $400 is _____.

Clicker Question

No calculators, please!

Demand for electric guitars:

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<table>
<thead>
<tr>
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<tr>
<td>Price</td>
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<tr>
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<tr>
<td>New</td>
<td>$380</td>
</tr>
</tbody>
</table>

What Determines Demand Elasticity?

- Why is the demand for peas...

- ...so much more elastic than the demand for coffee?

  - Availability of Substitutes: “Few things can give you such a good jolt as a shot of coffee” – but you can substitute other vegetables for peas.

  - The demand for Colombian coffee is more elastic than the demand for coffee in general, ...

  - because it’s easier to substitute between different types of coffee than to substitute something else for coffee.

  - The demand for the product of a single firm is more elastic than that for the whole industry—for the same reason.
Why is the demand for housing...

...so much more elastic than the demand for coffee?

- **Budget Share:** Housing is expensive, and a large share of the budget,...
- so if the price is too high, many people simply cannot afford to rent (or buy) too much housing space.

But the demand for edible salt is much less elastic than the demand for coffee, exactly because the budget share of salt is so small.

- People aren’t sensitive to the price of salt, because they spend so little on it.

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**Example:** Demand for Eggs and Demand for Gala Apples

<table>
<thead>
<tr>
<th>Price</th>
<th>Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>400</td>
</tr>
</tbody>
</table>

**Demand for Eggs**

- **Very Inelastic**
- It’s hard to find good substitutes for eggs,...

**Demand for Gala Apples**

- **Very Elastic**
- ...but other kinds of apples are good substitutes for Gala Apples
**Example: Elasticity of Demand for Rice**

- An Indian economics professor who lives and teaches in Canada, visited villages in India to conduct research.

- Many people asked him the same question…
  - “How many hours do you have to work in Canada to earn enough to buy a kilogram of rice.”
  - The professor was very embarrassed, because he had no idea of what the answer was.

- The professor eats lots of rice, but he doesn’t even know the price of rice in his local Canadian supermarket.
  - Why doesn’t he know its price?
  - Do you think that most Indians know the price of rice in their shops?

- Whose demand for rice is more elastic?
  - the professor’s?
  - the Indian villager’s?

- If the price of rice in India jumps up, what do you think would happen?
**Clicker Question**

The demand for rice is most elastic in which of the following countries?

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**Example: Mosquito Nets for Malaria Prevention***

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*According to WHO, malaria killed an estimated 584,000 people in 2013 (down by 47 percent since the year 2000).*

- Malaria is spread by mosquitoes.
- Insecticide-impregnated nets protect against malaria.

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- Malaria is spread by mosquitoes.
- Insecticide-impregnated nets protect against malaria.

*A 2010 study** finds that the elasticity of demand for the nets is very large!*

- People are far more likely to accept and use the nets if they get them free, than if they have to buy them…
- even when the price is very low.
- What are the policy implications of the study?*

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**Cohen and Dupas, QJE, 2010, included in course website: CLASSES > Readings.**

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Measured Elasticities of Demand

* Broiler Chickens
  −0.5 to −0.6

* Petroleum (World)
  −0.4

* Car fuel
  −0.25 (Short run)
  −0.64 (Long run)

* Medicine (US)
  −0.31 (Insurance)
  −0.03 to −0.06 (Pediatric Visits)

* Soft drinks
  −0.8 to −1.0 (general)
  −3.8 (Coca Cola)
  −4.4 (Mountain Dew)

* Steel
  −0.2 to −0.3

* Eggs
  −0.1 (US)
  −0.35 (Canada)
  −0.55 (South Africa)

* Cigarettes (US)
  −0.3 to −0.6 (General)
  −0.6 to −0.7 (Youth)

* Alcoholic beverages (US)
  −0.3 (Beer)
  −1.0 (Wine)
  −1.5 (Spirits)

* Rice
  −0.47 (Austria)
  −0.80 (Bangladesh)
  −0.80 (China)
  −0.25 (Japan)
  −0.55 (US)

* Airline travel (US)
  −0.3 (First Class)
  −0.9 (Discount)
  −1.5 (for Pleasure)

* Cinema visits (US)
  −0.87

* Transport
  −0.20 (Bus travel US)
  −2.80 (Ford)

https://en.wikipedia.org/wiki/Pricing elasticity of demand
Clicker Question

Which of the following products or product groups has the most elastic demand?

A study has shown that the elasticity of demand for insecticide-impregnated mosquito nets is…
End of File