INELASTICITY IN AGRICULTURE

AAE 320
Paul D. Mitchell
Agricultural & Applied Economics
Learning Goal

- Become aware that ag supply and food demand are relatively inelastic compared to many other types of supply and demand.
- Understand the impacts of this inelasticity on ag prices, farm income and consumer spending on food.
  - Means large price swings for small supply/demand quantity changes and small supply/demand quantity changes for large price swings.
  - Means large swings in farm income and consumer spending on food.
Elasticity

• Economists use the term “elasticity” to talk about the “responsiveness” between factors that are connected
• How responsive one factor is to changes in another factor
• Own price elasticity, income elasticity, cross price elasticity

• Own Price Elasticity:
  • How price responds to changes in quantity of supply (or demand)
  • Percentage change in price divided by percentage change in quantity
  • How much price changes in % if have a sudden supply or demand “shock”
  • **Own Price Elasticity = \( \frac{\% \Delta P}{\% \Delta Q} \)**
• Like a slope, but normalized by using percentage changes so does not depend on units of measure used
Why is food demand relatively inelastic?

- Biological: There are no substitutes for food, we have to eat, but we can only eat so much
- Social/Cultural: Many foods and diets are culturally set, slow to change, even with large price swings

Why is agricultural product supply relatively inelastic?

- Biological: Long crop and livestock life cycles: once the crop is planted or the cow is pregnant, supply “locked in” and can’t change quickly in response to price changes
- Social/Cultural: Few uses for land other than agriculture and farmers tied emotionally to agriculture
Agricultural supply and food demand curves are relatively inelastic in quantity, So What!

Both curves are steep in quantity, flat in price

Both curves are flat in quantity steep in price
**Inelastic** Supply and Demand

**Elastic** Supply and Demand

**Same-sized supply shift**

Large Price Change

Small Price Change
**Inelastic** Supply and Demand

Price | Quantity
--- | ---

**Elastic** Supply and Demand

Price | Quantity
--- | ---

**Same-sized demand shift**

Large Price Change

Small Price Change
Implications of Inelastic Supply & Demand for Food/Ag Products

• Large price changes for small quantity changes
• Small quantity changes for large price changes
  • Tariffs cause milk prices to drop, but farmers still milk cows every day and don’t start selling cows
  • Quinoa prices skyrocket as farmers race to keep up with demand, then prices drop fast once market supplied
  • Same thing for sweet cherries, peaches, new potatoes, … when they first come in
  • People keep buying milk in store even if prices go up
  • If beef prices plummet, people don’t start eating beef for breakfast, lunch and dinner
• Ag/food supplies and demands often vary due to weather, disruptions, food fads/scares – so prices vary greatly
CBOT Weekly Average Price for December 2018 Corn

18.5% decrease from $4.05 to $3.40 (May 20 to July 8)
Dec 2020 Corn Futures Price

- Approximately $4.03 in January 2020 to a low of about $3.23 in June, then recovered
- 20% drop and then a full recovery
  - Pandemic
  - Weather
  - Trade
Income effects of highly variable prices

- Farmers bear the costs of price variability because they are inelastic.
- Do not or cannot respond to crop and livestock price changes
- Lose money when prices are low and make money when prices are high
Summary

- Agricultural supply and food demand are relatively inelastic: Non-responsive to price changes
  - Biological and cultural reasons for these
- Large price swings for small supply/demand quantity changes
- Small supply/demand quantity changes for large price swings
- Large swings in farm income and consumer spending on food as weather, policy and other factors shock the system
- The effects of this inelasticity on farm income and consumer spending are important factors driving ag and food policy in many nations