Why Do Food and Other Agricultural Commodities Cost More?

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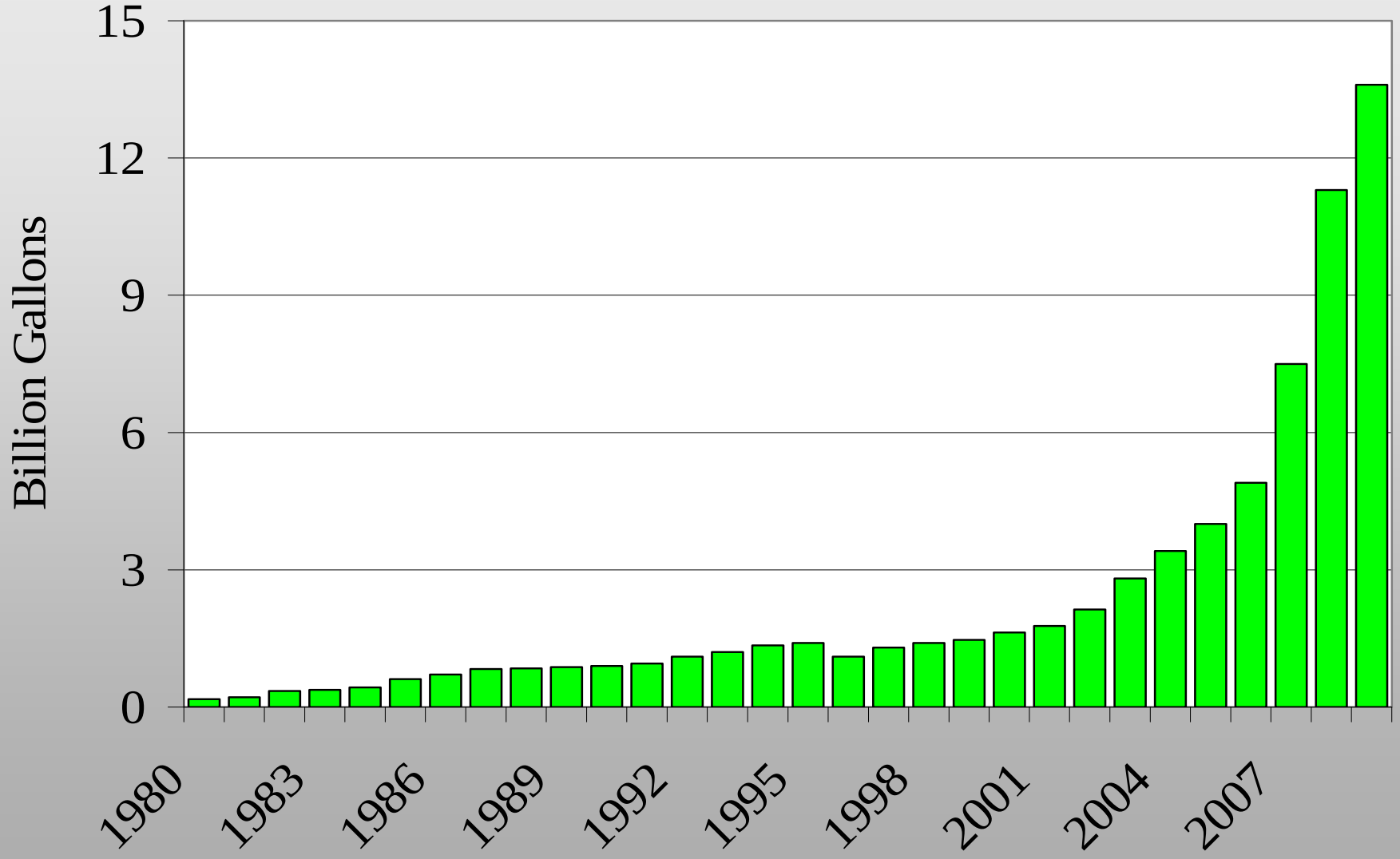
Higher energy prices on production agriculture

- Impact production costs
- Impact output prices and “energy” input costs for consumers
- How do producers adjust?
  - Crops
  - Livestock

Environment surrounding higher food prices

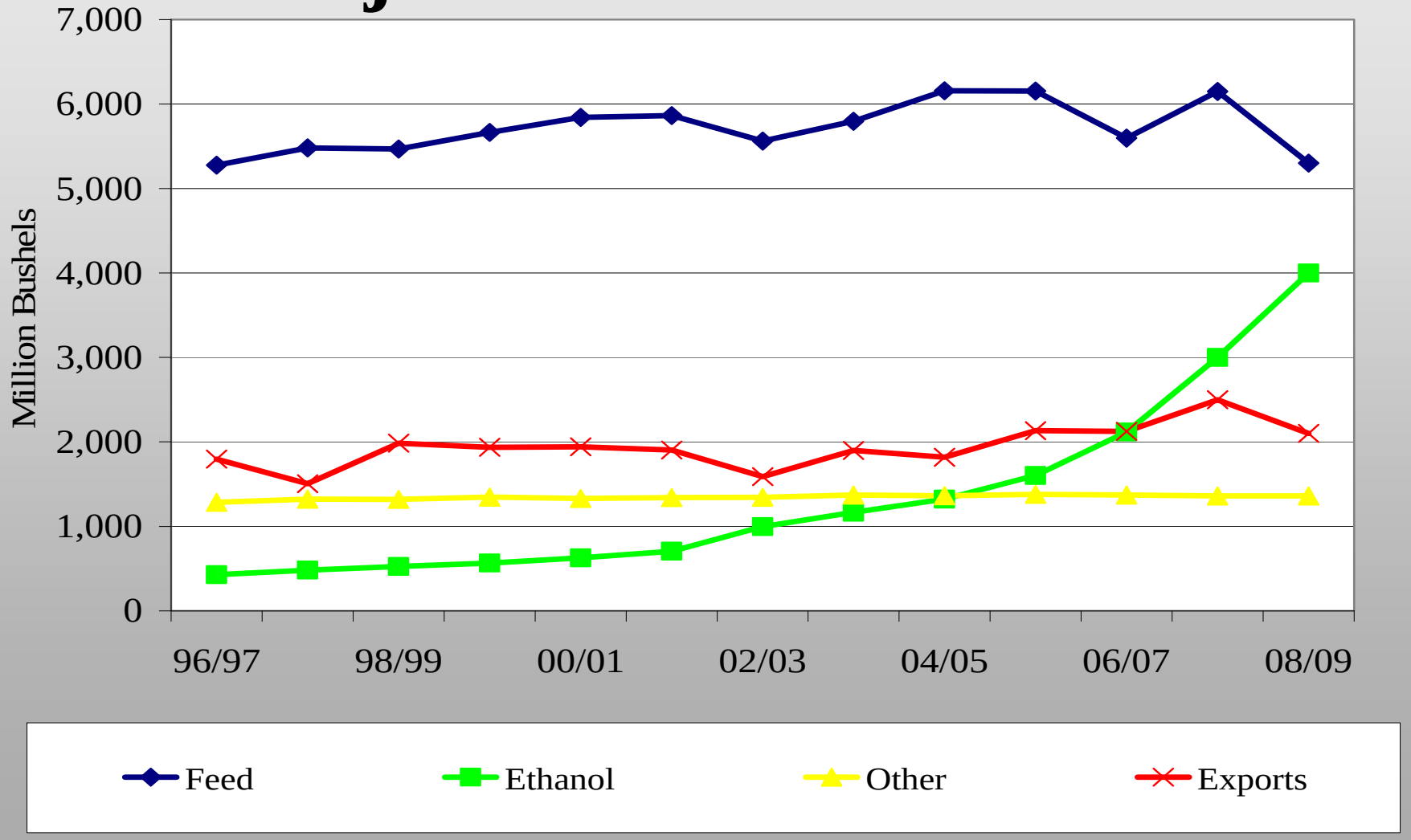
- Higher energy prices and transportation costs
- Growing global demand for oil and livestock
- Competition for scarce land base
  - Food
  - Feedstock
  - Land use and landscape issues
  - Sustainability concerns
  - Carbon implications

The Ethanol Explosion



Source: Renewable Fuels Association and preliminary CARD projections

Projected Corn Utilization



What is Driving the Price of Corn?

- **Processor's break-even price for corn:**

- $P_{Corn} = 2.80 \times (P_G * .667 + T_{Credit} + V_O + V_{DDG} - C_K - C_O)$

- **$60 per gallon price of crude oil translates into $2.07/gallon price of gasoline ($100 bbl oil is $3.45 P_G and $2.30 P_E)**

- **Sensitivity to current tax credit of $0.45/gallon ($1.25/bu)**

- **Long Run Breakeven Corn Price: $4.10/bu**

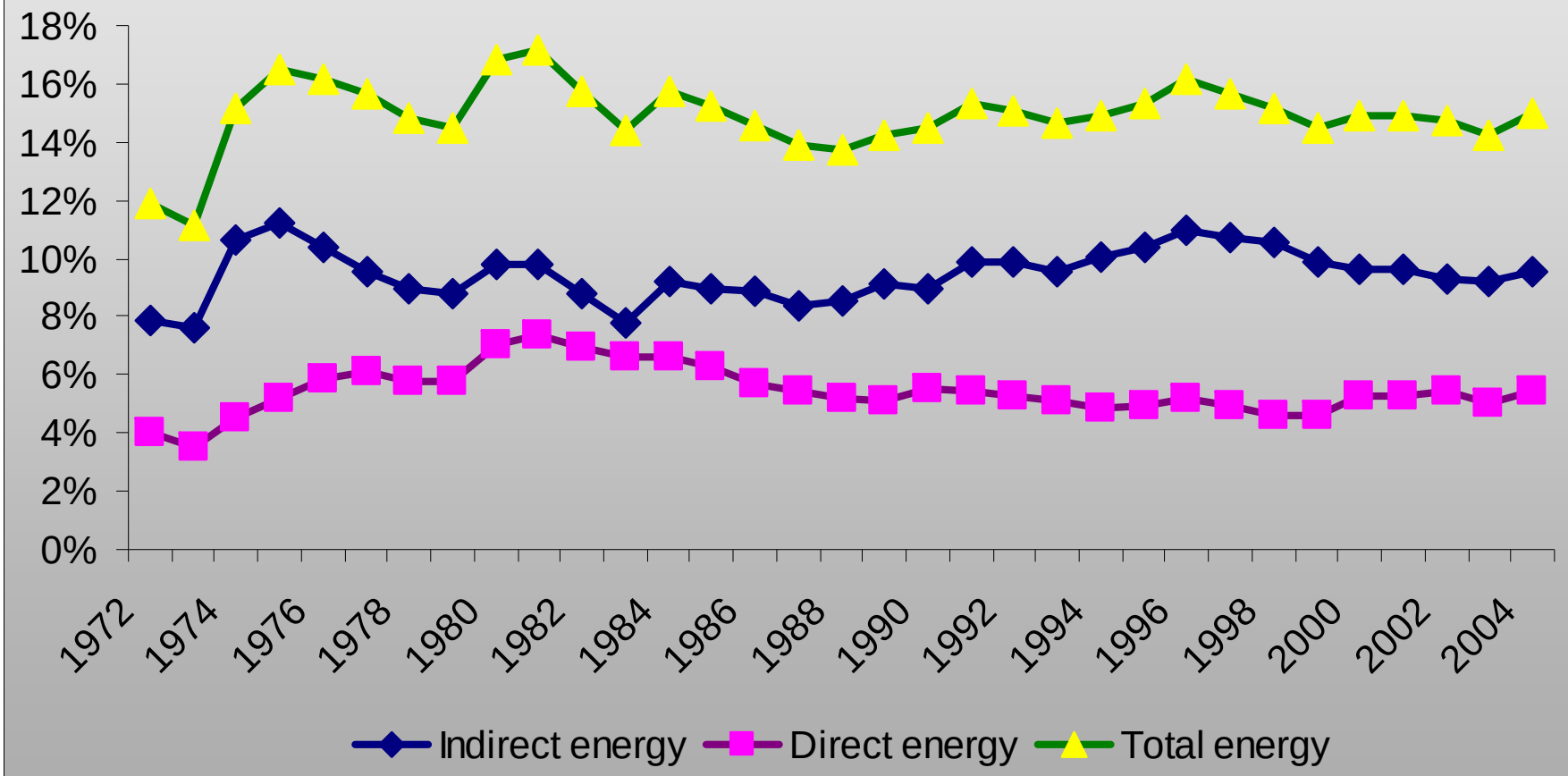
What are the implications for agricultural commodities?

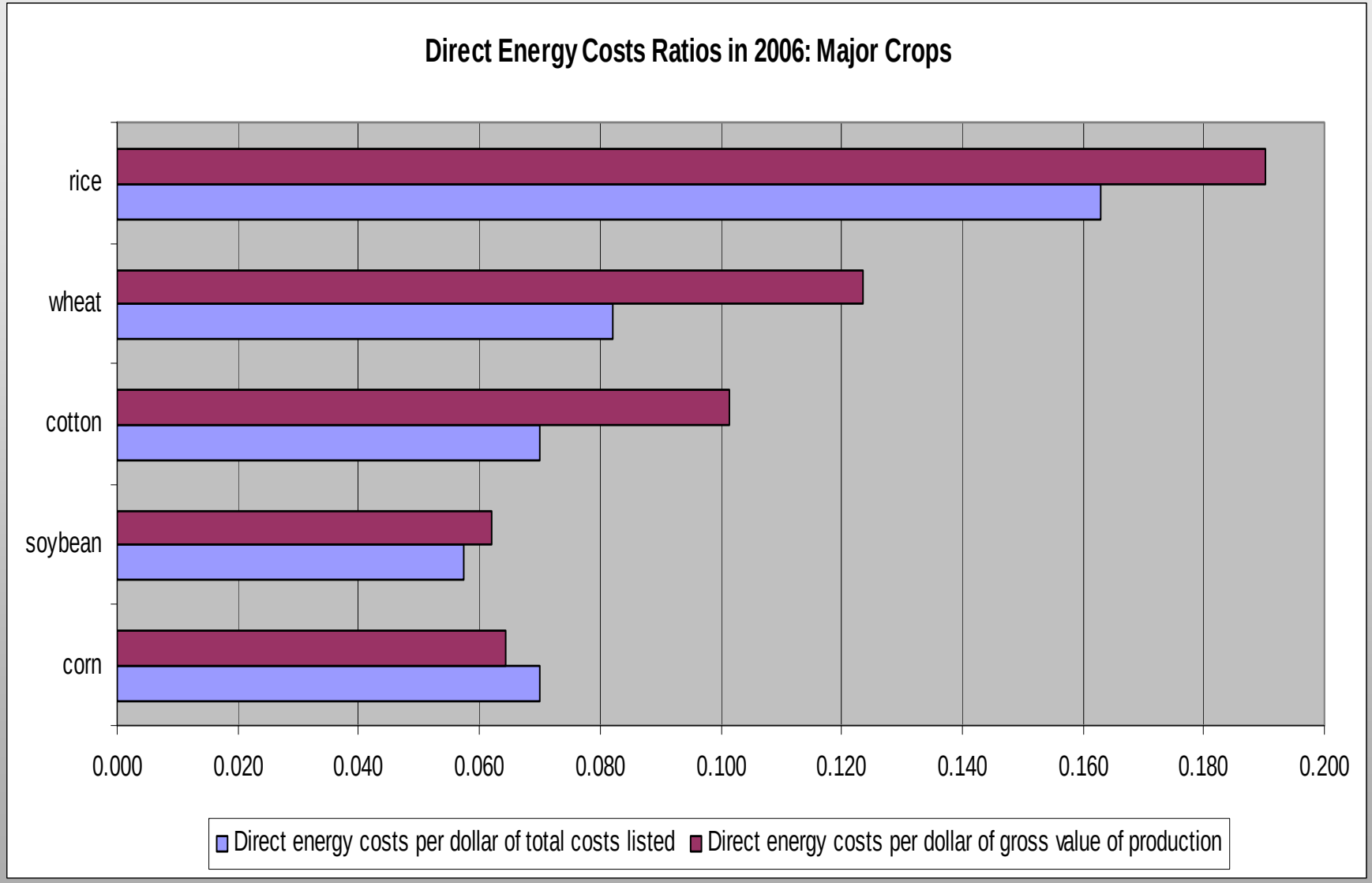
- Corn price driven by ethanol price driven by oil price; transportation and other costs are oil driven as well
- Growing global demand for crude oil and livestock products (FAPRI Study – 15B and 29B gal corn ethanol)
- Crop and livestock products competing for same domestic and global cropland base – all prices increase
- Growing opportunity cost of cropland and biomass fuels, both domestically and globally
- Need to differentiate between SR shocks and LR natural resource trends

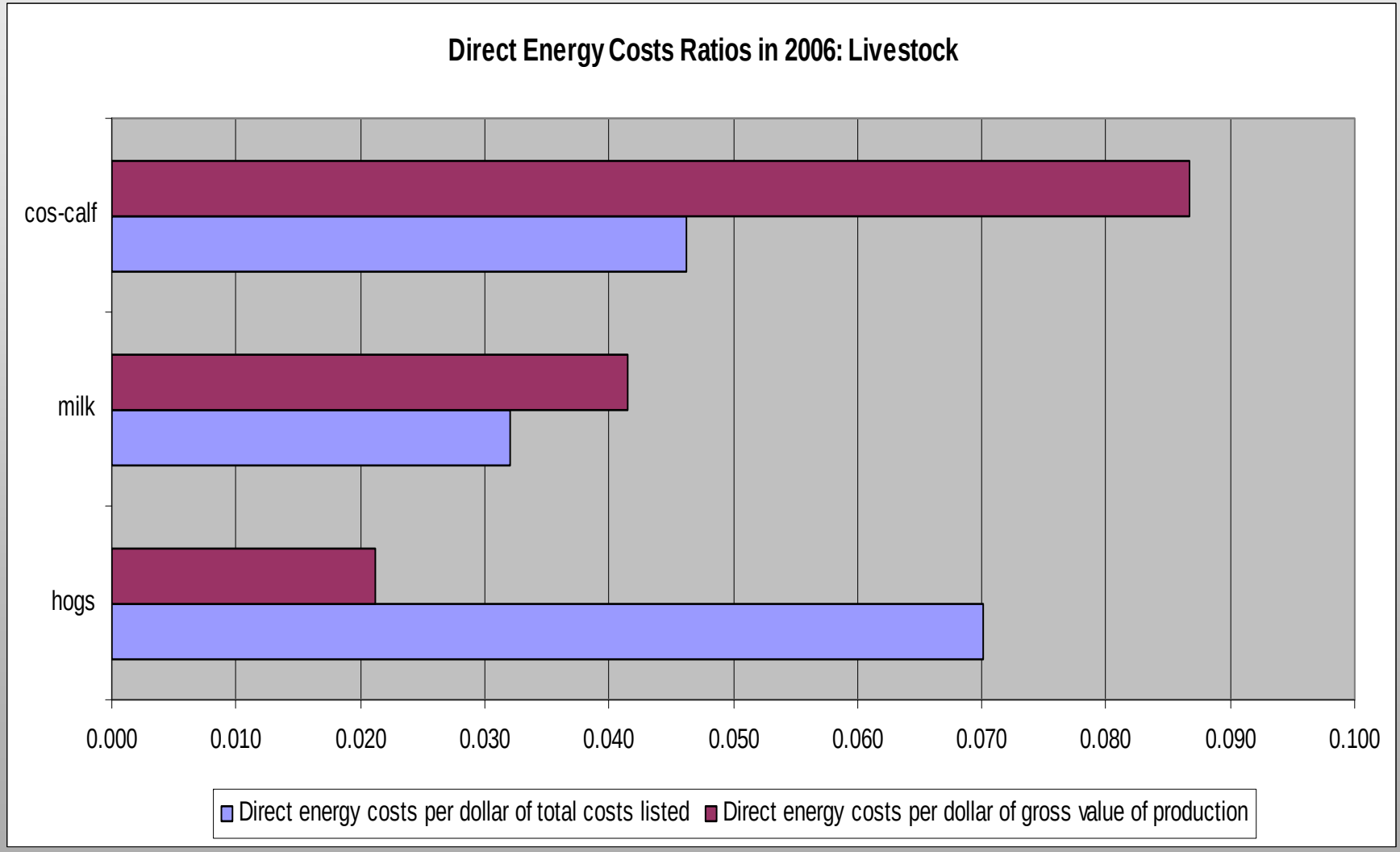
Energy use and farm production expenses

- Direct energy consumes twice as many BTUs as indirect energy, but
- Direct energy accounts for 4-6% of 2006 farm production expenses and 12% of corn operating expenses
- Indirect energy inputs (fertilizer and pesticides) account for 15-16% of farm production expenses and over 50% of corn farm operating costs
- Energy use in crop and animal production

Energy's Share of Farm Production Expenses




Direct Energy Costs Ratios in 2006: Major Crops
rice
wheat
cotton
soybean
corn
0.000
0.020
0.040
0.060
0.080
0.100
0.120
0.140
0.160
0.180
0.200
Direct energy costs per dollar of total costs listed
Direct energy costs per dollar of gross value of production


Direct Energy Costs Ratios in 2006: Livestock
cos-calf
milk
hogs
0.000
0.010
0.020
0.030
0.040
0.050
0.060
0.070
0.080
0.090
0.100
Direct energy costs per dollar of total costs listed
Direct energy costs per dollar of gross value of production

How do higher energy prices impact agriculture?

- Energy's input share and how has it changed over time
- Farmers' respond to higher energy input costs
  - In shorter run, impact costs of production and net returns
  - In longer run, impact quantity supplied
- To livestock producer, corn and other feed grains are the largest energy input share
- Increasing opportunity cost of land (cash rents)

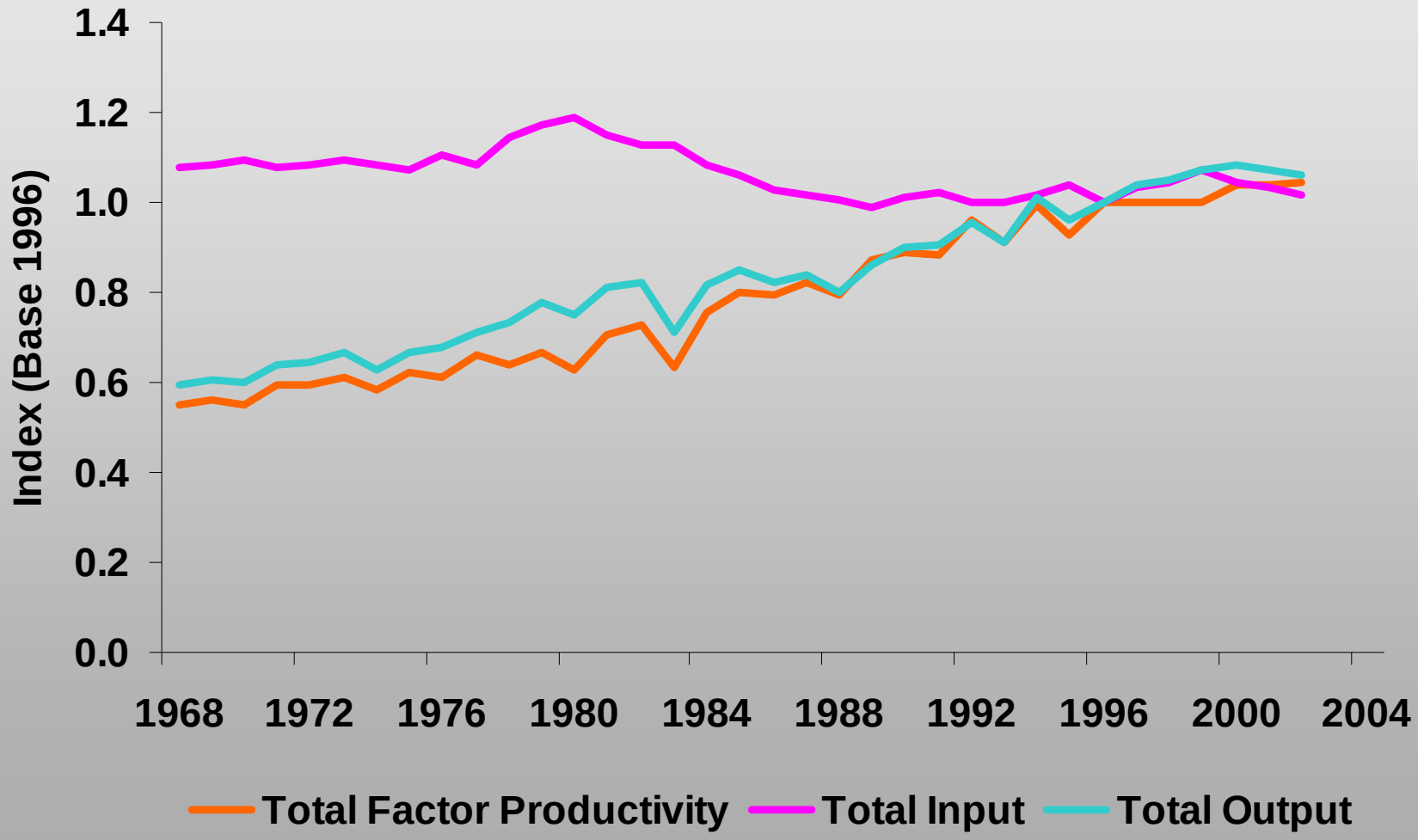
Production Cost Issues

- Long history of producers responding to real and relative energy prices
  - Substitute cheaper for more expensive inputs
  - Increase input use with higher output prices
- Energy use with energy price shocks – how do producers adjust?
- Implications for long run and energy efficiency

How do farmers respond to energy prices and energy price shocks?

- Estimated response for different energy price periods and regions, 1961-73, 1974-80, 1981-99
- Energy own price elasticity is inelastic and varies from -0.9 in early and late periods and to -0.5 in middle period
- Energy substitutability for chemical, material, and capital inputs during increasing and decreasing energy prices is small
- Midwest is more homogeneous and has least responsiveness
- 100% energy price shock in during increasing energy price period increases production costs by 3% or less in short run
- What happens in the long run?

Indices of Farm Output,Input Use and Productivity in US Agriculture



Information and technology impact on long run energy efficiency

- Continuation of productivity growth
- Substituting information for other inputs
- Substituting technology for fertilizer, pesticides, energy, and pharmaceuticals
- Substituting information for traditional breeding and husbandry

Conclusions

- Producers respond to energy price shocks, in SR by absorbing increased costs
- Substitution opportunities limited in short run but occur in long run through technology and price incentives
- Productivity growth improves energy efficiency
- Thank you!

Energy efficiency and adjusting to energy price shocks

- Energy demand is driven by relative energy prices
- Shares of energy expenses impact the capacity to adjust to price increases
- Timing of real price increases is critical to adjustment capacity in production agriculture
- Agricultural productivity growth enhances energy efficiency and capacity to adjust to energy price shocks

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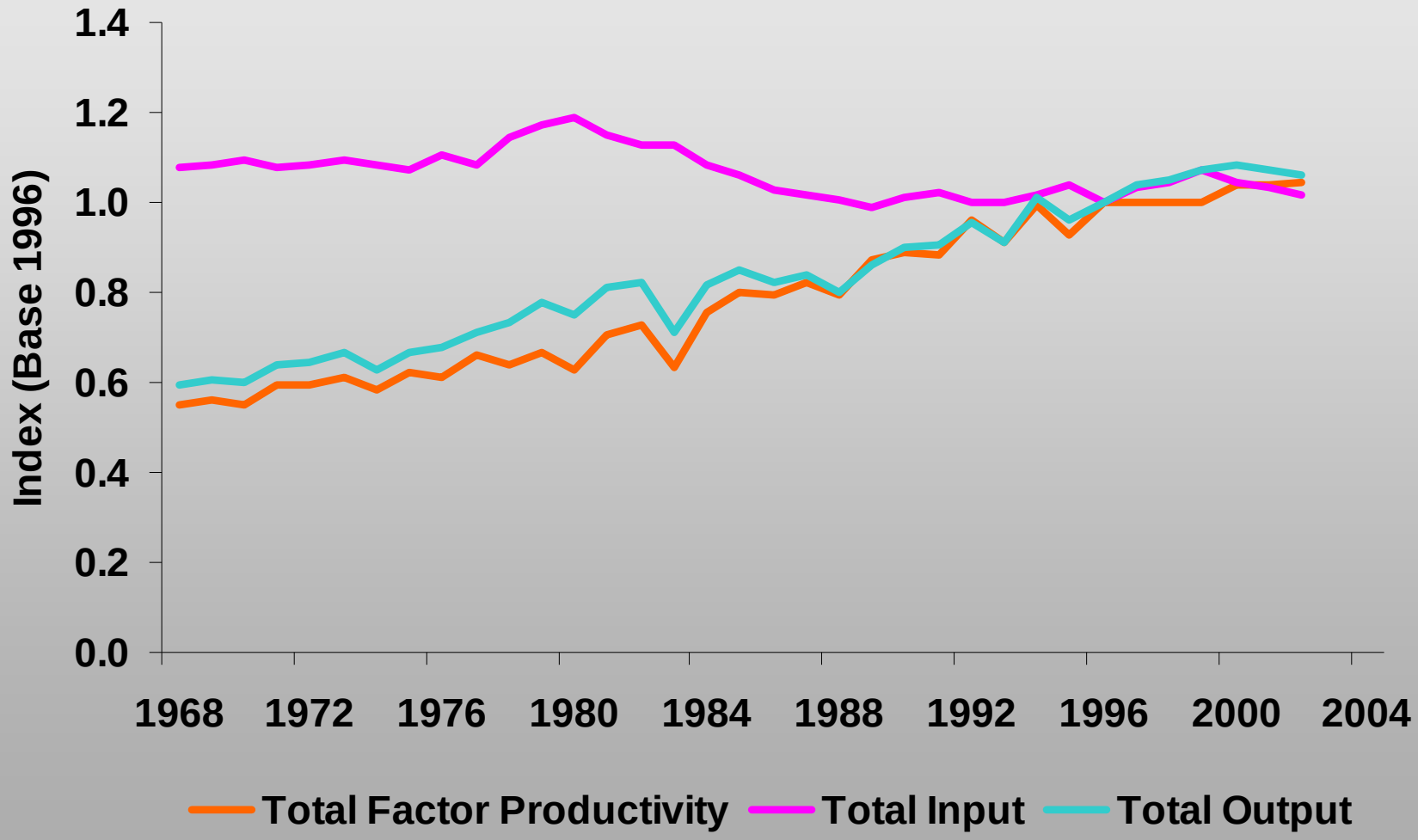


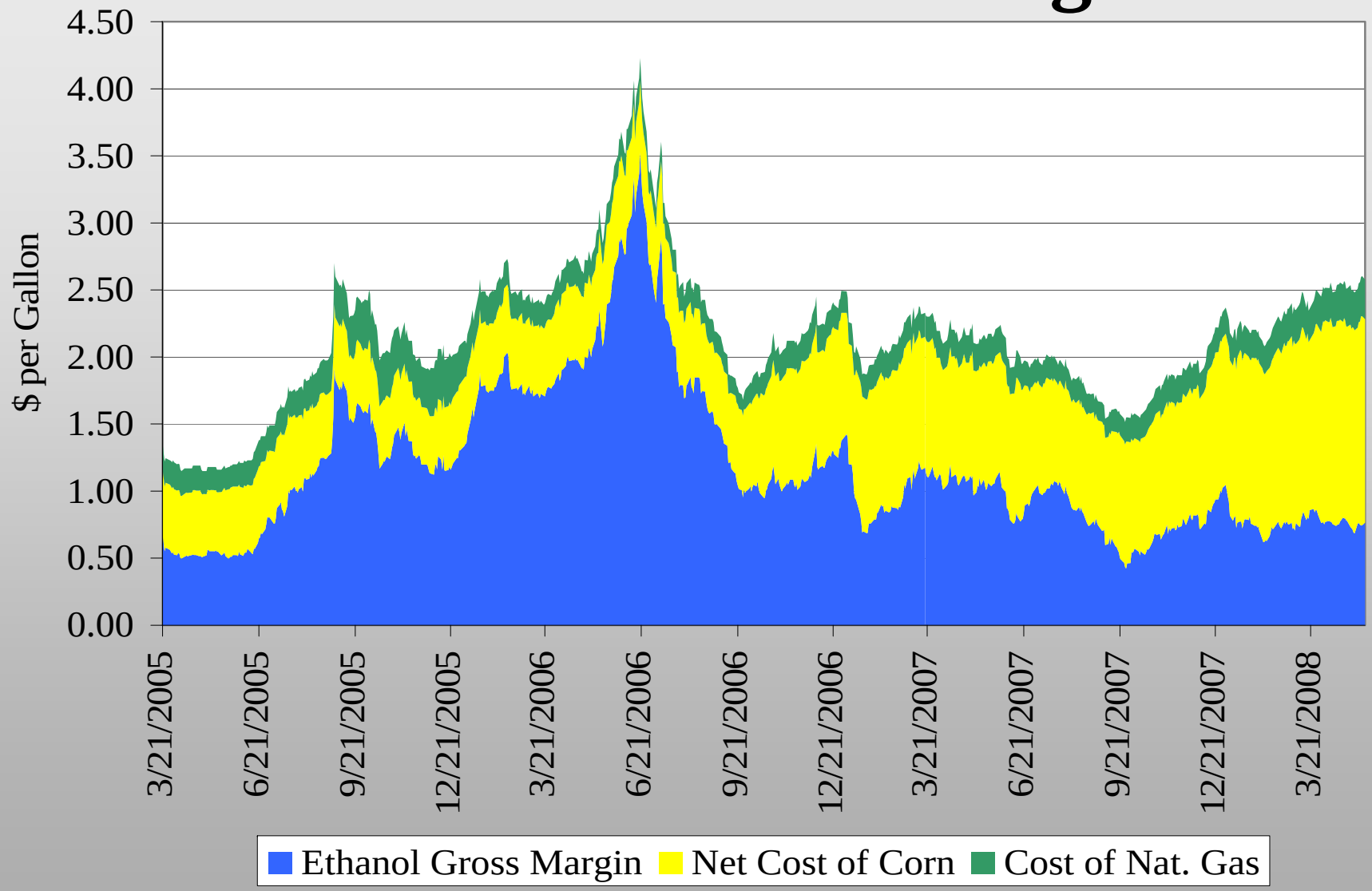
Energy substitutability and response to energy price shocks

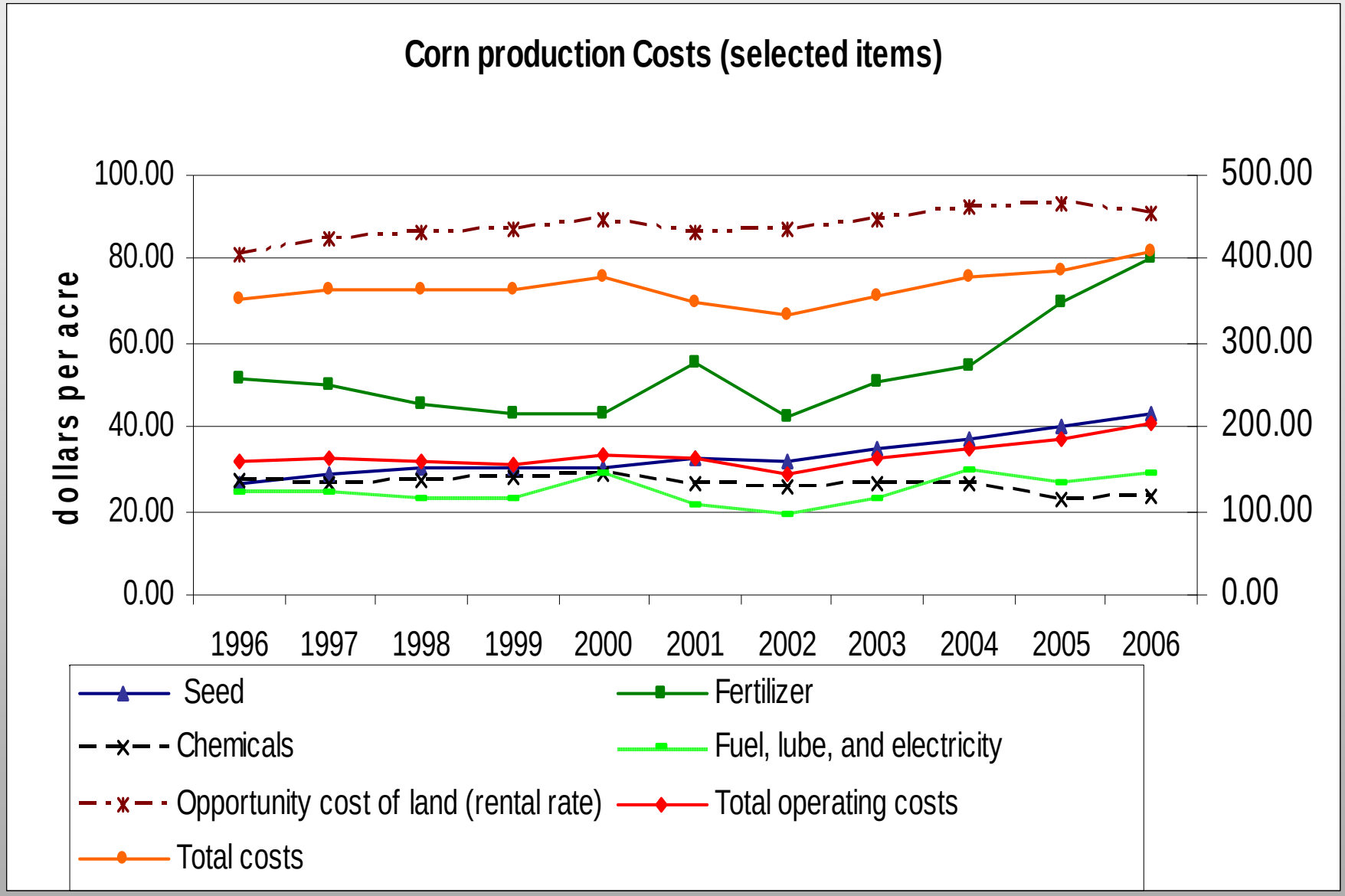
- US state level data, 1961-1999, 1961-73, 1974-80, 1981-99
- Energy price response decreased for energy from 1974-80, and increased 1961-73 and 1981-99, and opposite for chemical and material inputs
- Energy own price elasticity varies from -0.9 in early and late period and drops to -0.5 in middle period. Most and cross price elasticities small and several not significant
- 100% energy price shock would increase production costs by 3% with fixed output but much less in other two periods

Response to higher energy prices

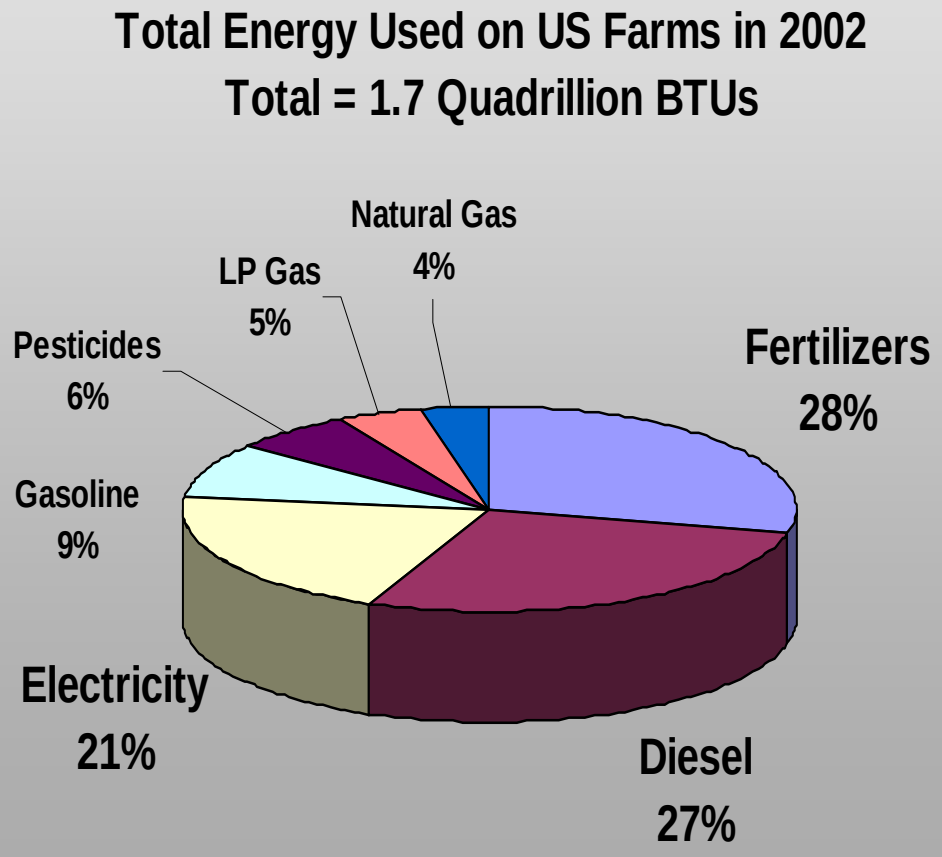
- Producers respond to energy price shocks by absorbing modest increase in costs
- Substitution opportunities limited in short run but may occur in long run through technology and real price incentives
- Generally, productivity growth improves energy efficiency

Historical Ethanol Margins




Corn production Costs (selected items)
dollars per acre
100.00
80.00
60.00
40.00
20.00
0.00
500.00
400.00
300.00
200.00
100.00
0.00
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Seed
Fertilizer
Chemicals
Fuel, lube, and electricity
Opportunity cost of land (rental rate)
Total operating costs
Total costs

2006: Fertilizer 34%; Diesel 30%; Electricity 22%



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