Water pricing in agriculture in an era of rising energy prices

David Zilberman
UC Berkeley
Elements of the economics of water systems

- Private cost extraction
- Conveyance cost
- Externality cost
- Future value of water inventory-reflecting uncertainty and scarcity
- Benefits (Marginal benefits = demand)
Optimal Vs subsidized water - water is over used and under paid
Optimal pricing

\[ P = MPC + MCC + MEC + MFC \]

Price=
Marginal extraction cost+
Marginal conveyance cost+
Marginal environmental cost+
Marginal storage cost

Many systems are subsidized and instead of being at point A they are at N.
Implication of optimal pricing in Ag

Subsidies are not accidental, removal is painful

Optimal pricing will reduce water use resulting in:

- Adoption of conservation technologies
- Transition to cities-lower prices in cities
- Reduction in acreage of low value crops
- More environmental benefits
- Less water projects constriction over time
- More stable systems
frequent failures of ag water allocation

- Subsidization of water in case of surface water and energy in ground water
- Water rights systems where -
  - you lose your rights if you don’t use them or
  - you are not allowed to trade
- Pricing that does not respond to spatial differences
- Ignoring externality or future cost
Elements of reform

Moving towards efficient allocations
- Introduction of tradable permits
- Reduction (elimination) of subsidies- especially to ground water
- Pay responsive to spatial and water quality differences
- Incentives against pollution (polluter pay)

Reform has transaction cost should occur if benefits exceed costs

Occurs during crises
Energy situation & Agriculture

- Rising energy price
  - Growing demand (China, India)
  - Limited supply

- Contributes to rising food prices

- Water is energy dependent - pumping, conveyance, desalination

- Higher energy prices increase marginal costs of water
When demand is inelastic, increases in energy prices primarily increase water prices.

When demand is elastic, increases in energy prices primarily reduce water use.
The impact of energy cost through water transfer depends if the source region is above or below using region.
when water go downhill

- With hydro electric
  - We distinguish between price at the source and for the agricultural user

- Higher energy cost may lead to
  - Increase price water at the source
  - Increase water use
  - Reduced water price to final water user.
When water go uphill

- The systems buy energy
- Increased energy price lead to
  - Increase water price at source
  - Reduced water use
  - Increase water price for final user
Under optimal system final water users do not necessarily lose from high energy price

- **Losers**
  - Ground water users with no water transfer lose
  - Surface water where water require extra transfer cost - beyond hydroelectric gain

- **Winners**
  - Surface water users who are part of a system that generates hydroelectric power

- **Higher energy prices may lead to reduction of irrigated farming with ground water and increase irrigation resulting hydroelectric projects**
Subsidized ground water in era of increasing energy prices

- Ground water pumping is subsidized through energy subsidies
- With high energy prices their costs are doubling and more
- Overtimes water level decline- so higher energy prices and deeper well may quadruple price of water in some cases-example
  - Initial well 10 meter deep
    - New one 20-meter
  - Price of electricity doubles
  - Results price of water (and cost of subsidy) quadruples
High energy price and water reform

- Higher energy costs increase
  - Financial costs of subsidy
  - Social cost of inefficiency
- Increase likelihood of water reform
  - Trading
  - More efficient pricing
  - Improved infrastructure
- Resulting in
  - Adoption of improved irrigation
  - Less groundwater depletion
Impacts of Biofuels

- Almost 2% of fuel use
  - Corn in US in China
  - Sugar cane Brazil
  - Bio diesel Europe

- Increases pressure on land and water

- Reduce gasoline prices (4%)

- Increase food prices - food inventory decline may be a food security risk

- Low Environmental Impact of corn ethanol
High energy prices increase the value of innovation

- Higher benefits are from more productive technologies that increase productivity of
  - Traditional crop (GMO)
  - Biofuel crops (Cellulodic ethanol)

- Higher Values of water and energy saving technologies

- Higher values for improved policies and management techniques
Policies

- Carbon tax desirable policy - biofuel support payments have major flaws
  - Reduce subsidy - mainly to insure against down risk (if at all)
  - Link subsidy to greenhouse gas reduction
- Develop food inventory monitoring
- Pursue 2nd generation - if technology is good biofuel is viable in long run
- Integrate ag, environmental and energy policies
- OECD-
  - Documents and compare resource allocation, energy, water & economic environmental impacts of biofuel (direct and indirect)
  - Study policies - analyzing comparing suggesting alternatives
  - Study trade and competitiveness issues