The Competition for Land and Agricultural Competitiveness: Urbanization, Energy, and the Role of Uncertainty

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Overview

- **The Issue:**
  - Increasing competition for land based resources from many directions.
  - Many subtle effects on agricultural production systems.

- **Questions:**
  - What has recent research on land use and land use change revealed?
  - What approaches have been used to address these forces to maintain a competitive agricultural sector?
  - How have certain types of policies both helped and hurt agricultural competitiveness?
Topics

- Urbanization
- Indirect land use change
- Increasing population living at higher standard of living
  - Land for residential space
  - Energy production
Greatly improved understanding of new patterns of urbanization due to:
- Geographic Information Systems
- Digitized parcel data
- Computational resources

Change in pattern of land use at the urban rural boundary has dramatically increased potential influences on agriculture.

Fragmented low density development has become the dominant form of population driven land use change in terms of total land use.
What is Exurbanization

- Low-density fragmented development beyond area of urban/suburban zoning and infrastructure.

- 80% of new residential area on large lots (>1 acre) outside of metropolitan areas\(^1\).

- 1% increase $\rightarrow$ >>>1% increase in converted land.

- Two major questions:
  - Why?
  - Is it a problem?
Urbanization

- Attractive Forces: why cities exist
  - Spatial proximity reduces costs of production.
  - Location of productive resource (bay).
  - Employment opportunities and urban amenities.

- Dispersive Forces: why cities spread out
  - Congestion
  - Pollution
  - Crime
## Urbanization

- Dispersive forces have become stronger
  - Transportation
    - Rise of automobile important original cause of suburbanization.
    - Interstate highways through urban centers significantly reduce urban population.\(^2\).
    - Automobile subsidies increase suburbanization.\(^3\).
    - Chicken or egg controversy remains – more research needed.
Urbanization

- Dispersive Forces (cont’d)
  - Information technology
    - Can cause concentration and dispersion.
    - Concentrating - increased desire for face-to-face interaction (social networking).
    - Dispersive – telecommuting
  
- Backwash Effect
  - Growing urban areas pull in workers from nearby rural areas.
  - In Canada, effect found to exist in 200 km radius of urban center.
  - Increases in off-farm employment opportunities.
Urbanization

- **Dispersive Forces**
  - Environmental/Rural Amenities
    - Preferences for detached homes on large lots
    - Demand for environmental amenities particularly among retiring baby boomers.
  - Agricultural land is an important source of environmental amenities.
  - Why is there concern over greater dispersion of metropolitan areas?
    - Inefficient use of societal resources
    - Inefficient use of environmental resources
    - Decreased investment in agriculture and overdevelopment of agricultural land
Urbanization – Sprawl/Exurbs
Urbanization

- How does exurbanization affect agriculture?

- Sequence of events
  1. IT, roads, amenities $\rightarrow$ rural residential land
  2. Residential lots repel $\rightarrow$ leapfrogging pattern$^6$
  3. Development value of farmland increases
  4. Development
    1. Decreases efficiency of ag production
    2. Increases development value of ag land
  5. Uncertainty about future reduces investment in farming enterprises.
  6. Value of environmental amenities supplied by agricultural land not captured by farmland owners.
Impact on Agriculture
- Value of environmental amenities not captured by farmland owners → Overdevelopment of farmland
- Zone of influence of exurban land use change much larger than actual land use change

Solution: Farmland Preservation
- Create way for farmland owners to receive payments related to the services they provide.
- Pay landowners to put easement on land preventing future development.
- Exist in a number of states
- Private and public
- Different approaches used for getting the most out of limited financial resources.
Analysis of farmland preservation programs

- All are voluntary
- Easement purchase costs about $2,000/acre on average.
- Create a development ‘option value’ that slows the pace of development.
- Popular with families with children planning on staying in.
- Drawback – presence of an easement may increase likelihood of development for adjacent parcel.
Urbanization

- **Zoning**
  - Suburban infrastructure zoning
  - Minimum lot size zoning
  - Recent research has shown a ‘bad’ combination of suburban limits and small minimum lot size can cause exurban patterns of development.
Urbanization

- **Irrigated Cropland**
  - 16% of all cropland but over half of production value
  - Higher percentage in proximity to metropolitan areas
  - Irrigated cropland is in U.S. West where population is projected to grow at the fastest rate
  - Metro population growth competes for water for consumptive use and electricity generation

- California drought
- Irrigation permits in the Columbia River Basin
Urbanization

- Has the exurbanization era ended?
  - Oil prices
  - Housing crisis
  - Agricultural commodity prices

- http://exurban.osu.edu/deathofsprawl.htm
Indirect Land Use Change

- Does increased competition for agricultural land in one location cause land use change elsewhere?

- Emerging issue in 2008 as a result of biofuel policy

- Increase use of corn crop for ethanol
  - Increase price of corn and soybeans
  - Increases profitability for producers in Brazil
  - Clearing of rain forest for crop production

- Most concentrate on environmental implications, but...

- What are the long term implications expanded cropland in Brazil?
Results from modeling studies published in Science in 2008 show significant indirect land use effects of Renewable Fuel Standard (RFS).
- 1 bgal ethanol → 1.8 million acres cropland (Searchinger et al.)
- 1 bgal ethanol → 1.64 million acres cropland (Fabiosa et al.)
- 1 bgal ethanol → 726 thousand acres cropland (CARB)

If studies are correct: corn ethanol has positive net greenhouse gas production.

Significant amount of research controversy.

Political Implications: created demands to include indirect land use change in environmental assessment of RFS
- California Air Resources Board decided to include indirect land use change in GHG accounting.
Implications for North American farmers

- Increased demand for agricultural land for energy production is a huge question.
- However, very policy driven so there is great uncertainty about the future.
- What if indirect land use change is insignificant?
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  - Expansion in crop area in S. America.
  - Even if biofuel policy pulled back what is the long-term implication of expanded crop area in Brazil?
  - Is Y2K and outsourcing a relevant metaphor?
- Similar to urbanization, uncertainty about the future can exacerbate and dampen certain factors related to decisions farmland owners make today. Critical to include in studies on this topic.
Urbanization
- Separate correlation from causation in both causes and consequences of urban development on agriculture.
- Identify unintended consequences of policies.
- Identify effects that extend beyond just the area developed.
- Uncertainty affects decisions to develop.

Indirect Land Use Change and Energy
- Agricultural commodity markets are international but identifying cross-boundary land use effects is very difficult but also very important.
- Even more important with a multi-national greenhouse gas policy.
- Need to consider long-term implications of any policy that could result in expanding cropland area elsewhere.
- Uncertainty about the future of energy policy affects agricultural investment decisions today.