Genetically Modified
Food Security, Health and the Environment

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- IP
- Regulation
- Technical Progress
- Technology Management
- Safety and Health
- Non-Profits
- Land Saving
- Biofuels
- Specialty Crops?
- Effects on Diversity

IP in Agriculture: Special Protections

- Agriculture has three kinds of protection besides patents (in US):

1. Plant Patents
   - (since 1930) – similar to common ("utility") patents, but protect only clones (why?)
   - Potatoes and other tubers exempt
   - Not available in overseas markets

Agriculture: Special Protections

2. Plant Variety Protection Certificates (PVPCs)

– since 1970 for sexually reproduced plants: term now 20 years for plants, 25 for trees and vines.

Criteria:

1. New (at least in US)*
2. Uniform
3. Stable – transmit their characteristics to their progeny

*New characteristics not necessarily *useful*

e.g. new soybean with a blue flower was approved for a PVPC

Agriculture: Special Protections

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Agriculture: Special Protections

2 (contd.): Plant Variety Protection Certificates (PVPCs)

- Farmers can save the seed for replanting, but not for sale as seed for replanting
- Seed can be used for breeding new varieties
- Related to world agreement: UPOV
- In other countries this protection covers clones also

Agriculture: Special Protections

3. Hybridization:

What is a hybrid?

Seed from a hybrid crop is not valuable for replanting

- Hybrid's progeny less productive than the initial seed
- Progeny may have very different characteristics (e.g. flowers)
- Earliest effective means (besides secrecy)

Agriculture: Special Protections

3 (contd.): Hybridization:

- Earliest effective means of protection (besides secrecy used in hybrid breeding)
- In history, who used secrecy to support a monopoly in an agricultural product?
- Hybrid corn industry in US thrived since 1930s
  - But heavy public input role through 1980s
- Horticulture relies heavily on hybrids

Agriculture: Protection Strategies

- Patent holders can also:
  - Issue licenses to exclusive buyers for the seed
  - Bag label contracts
  - Material Transfer Agreements (MTAs)
  - Technology Use Agreements
    - The last 3 ways that patent holders can control their invention involve some kind of contracts
- Most of the private research investment in plant sciences has focused on grain crops, and some horticultural crops

Regulation

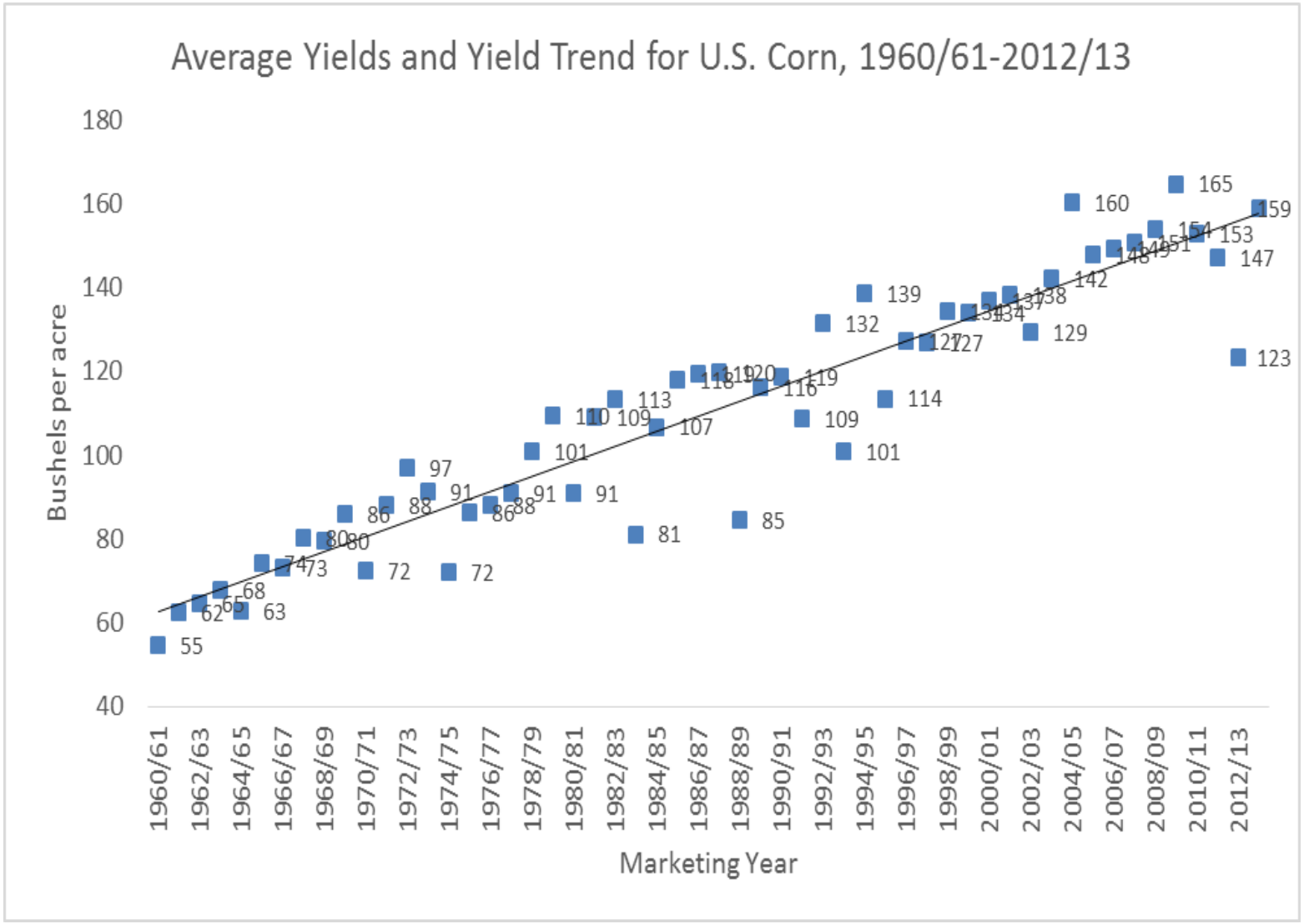
- High Fixed Costs
- Duplicative
- No Learning

IP + Regulation

- Complexity of patents –overlap, blocking
- First tools become standard
  - Even if inferior – testing costs so much, takes years
- Disadvantages entrants: Supports **Oligopoly**
- **Disadvantages developing countries**

Technical Progress

- Evident advantages
- Double Cropping in Southern Cone
- ***But …***


Average Yields and Yield Trend for U.S. Corn, 1960/61-2012/13
Bushels per acre
Marketing Year
180
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40
1960/61
1962/63
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1966/67
1968/69
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Technology Management

Private Sector advantage?

- Roundup plus Roundup Ready Seed
- Liberty Link?
- Starlink?

Safety and Health

- Justifiable concerns
- Much misinformation
- ***The left's answer to global warming denial?***
- Ban on *Bt tobacco* as unsafe
- Bt ***spray*** vs. **in plant**
- Genetic (and other) contamination – old problem
  - Castor oil plant in seed
  - Seed breeder isolation

Non-Profits

- Perverse incentives?
- Squeaky clean
  - Or just squeaky?

Land Saving

- Huge issue for
  - poor consumers
  - Environment
  - Global warming

Biofuels

- Deleted all US corn production increase since peak of 1994
- Negates “food security” argument
- Land expansions counter GM savings

Specialty Crops?

- Economics of small markets?
- Oligopoly does not care
- Should governments?

Effects on Diversity

- New England Chestnut trees?
  - Effects on native turkeys