Licensing Biotechnology in Developing Countries: A Levy as a Transaction-Cost Reducing Mechanism to Protect IPRs

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Presentation Outline

1. Overview of GMGs and IPRs in developing countries

2. Options for licensing GMGs in developing countries

3. Trade policy and welfare implications of licensing options - esp. pertaining to TRIPS

4. Discussion
GMGs in Developing Countries

- developing countries account for 34% of global GM hectarage
- developing country adoption is outpacing developing country adoption (35% growth vs. 13% growth)
- five countries (China, India, Argentina, Brazil and South Africa) account for most of the developing world’s GM hectarage
- key crops are bt maize, bt cotton and herbicide tolerant soybeans
- licensing of bt rice appears imminent in China
  - world’s largest food crop
  - public research → different IPR issues
Benefits of GMGs in Developing Countries

1. Static Benefits
   - deepen natural comparative advantages
   - enhance food security through pest and weather resistance
   - improved nutritional content

2. Dynamic Benefits
   - varietal improvements via local breeding programs best suited to local agronomic conditions
IPRs in Developing Countries

• strength of IPR protection in developing countries varies widely and is difficult to measure

• core requirements of an IPR protection system
  - political will
  - legislation
  - monitoring mechanisms (technical capacity)
  - enforcement mechanisms

• recent commercial actions indicate that IPRs are not sufficiently strong for the tastes of innovating firms

• despite weak IPRs, all WTO-member countries are signatories to the TRIPS agreement and subject to its rules
Licensing and Adopting GM Crops

• Model considers 3 methods of adoption/licensing GM technology

  1) traditional patent-holder monopoly

  2) pirated GM technology

  3) government-imposed levy on GM crops

• goal is to illustrate welfare effects of adoption/licensing policies, especially pertaining to international trade policy effects

• the following assumptions are made

  1) decision to adopt GM crops has been made

  2) small country

  3) GM trait is HT/IR type - reduces herbicide/pesticide application requirements
     - technology is produced in foreign country

  4) crop is produced in fixed proportions using two inputs
Licensing and Adopting GM Crops

GM Seed Monopoly

• typical paradigm for GM technology in developed countries
  - farmers enter into TUAs with patent holders

• patent holder maintains monopoly power over the use of seeds that embody the GM trait

• patent holder charges profit-maximising price for GM seeds

• adopting country possesses institutional infrastructure to enforce monopolist’s IPRs
  - legal infrastructure
  - sufficiently low transaction costs
  - tenable and enforceable contracts

• innovation reduces costs enough that competition from non-GM seeds is not a constraining factor (a “drastic” innovation)
Licensing and Adopting GM Crops

GM Seed Monopoly - Discussion

● all proceeds from seed sales go to foreign IPR holder

● IP innovating firm earns profit

● bean output is below what it would be if monopolist did not constrain sales of seeds
  * bean output is above pre-GM level

● profits in the market for other inputs

● monitoring and enforcement costs are likely to be high, perhaps even prohibitive in developing countries
  - estimated costs of developing institutions required to protect IPRs are highly speculative
  - monitoring and contracting costs in the absence of institutions may be prohibitive for IP firm
  - this scenario may be hypothetical for developing countries

● adopting country fulfils TRIPS obligations
Licensing and Adopting GM Crops

Pirated GM Seeds

- familiar paradigm in developing countries
  - common in South American soybean market
  - local producers purchase from black market seeds from breeders or save and produce their own seeds

- adopting country lacks the institutional capacity and/or the political motivation to enforce foreign IPRs

- IP innovating firm does not have monopoly power in adopting country
  - innovating firm must either compete with black market seeds or abandon the market to piracy

- competitive price for GM seeds prevails

- this scenario forms the basis for trade retaliation under the TRIPS Agreement
Licensing and Adopting GM Crops

Pirated GM Seeds - Discussion

- best-case for adopting country if no TRIPS retaliation
  - benefits from improved technology
  - does not pay monopoly price to IP innovator
  - does not face trade sanctions
  - does not incur enforcement/institutional costs
  - if pirate seeds are domestic, then all rents remain in adopting country

- adopting country does not fulfil TRIPS obligations

- IP innovating country can retaliate in the amount of trade lost

- use estimated supply and demand functions to calculate counterfactual revenue lost to IP innovator

\[
\text{Monopolist revenue} = TRIPS\text{ retaliation}
\]

\[
S_1 \quad \text{MR}_S' \quad D_S' \quad P_S' \quad P_S \quad 0 \quad \text{tonnes}
\]

- IP innovating country can retaliate in an amount = \(P_S'gS^10\)

- sanctions are likely to affect an unrelated industry
Licensing and Adopting GM Crops

GM Technology Levy

- IP innovator is faced with abandoning market or selling at competitive price

- **threat** of TRIPS retaliation coerces developing-country government to agree to a levy as a means of averting trade sanctions

- seeds are bought on black market or reproduced locally

- a fixed, per-unit, levy is imposed at one stage of the supply chain
  - options include seed levy, elevator levy, export tax
  - Brazil, Paraguay

- proceeds divided into at least three portions
  1) IP innovator
  2) compensation for levy collection
  3) domestic research funding
GM Technology Levy

Soybean Market

Other Inputs Market

Seed Market

Adopting Country Gross Welfare

Levy Proceeds

D_B

P_B^W

S_B''

S_B'

S_B

S_C''

S_C'

S_C

D_C

D_S''

D_S'

D_S

S_S

S^11

B^{11}

C^{11}

h

e

a

d

b

c

f

g

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Licensing and Adopting GM Crops

GM Technology Levy - Discussion

- adopting country yields sizable short-run benefits
  - avoids institutional and bureaucratic costs
  - avoids TRIPS retaliation
  - benefits from GM technology at a price that is lower than in monopoly scenario

- size of the levy is negotiated between adopting-country government and IP innovator

- enforcing levy involves lower transaction costs than does enforcing IPRs through TUAs

- stage of supply chain at which levy is implemented is likely to affect efficacy

- share of levy proceeds directed to domestic research → dynamic benefits through varietal improvements

- adopting country does not fulfil TRIPS obligations but does not face retaliatory sanctions
Discussion

● best case scenario for developing country is pirated seeds
  - not tenable in the folds of the WTO

● best case scenario for IP innovator is seed monopoly
  - not tenable in developing countries

● GM levy appears to be an imperfect short-run solution
  - but this solution may have long-term consequences

● adopting-country welfare is larger with levy than with monopoly, even with same industry output

● levy may present long-term consequences for the adopting country and the IP innovator by delaying/removing the incentives to implement domestic enforcement of IPRs
  → forfeit potential benefits of strong IPRs
  → IP innovator does not obtain monopoly profits
  → reduce innovator’s incentives to invest in crops suited to developing countries

● direct some proceeds to institutional development

● distributional issues
  - profits in monopoly scenario to land owners, etc.
  - TRIPS retaliation won’t affect violating industry