

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

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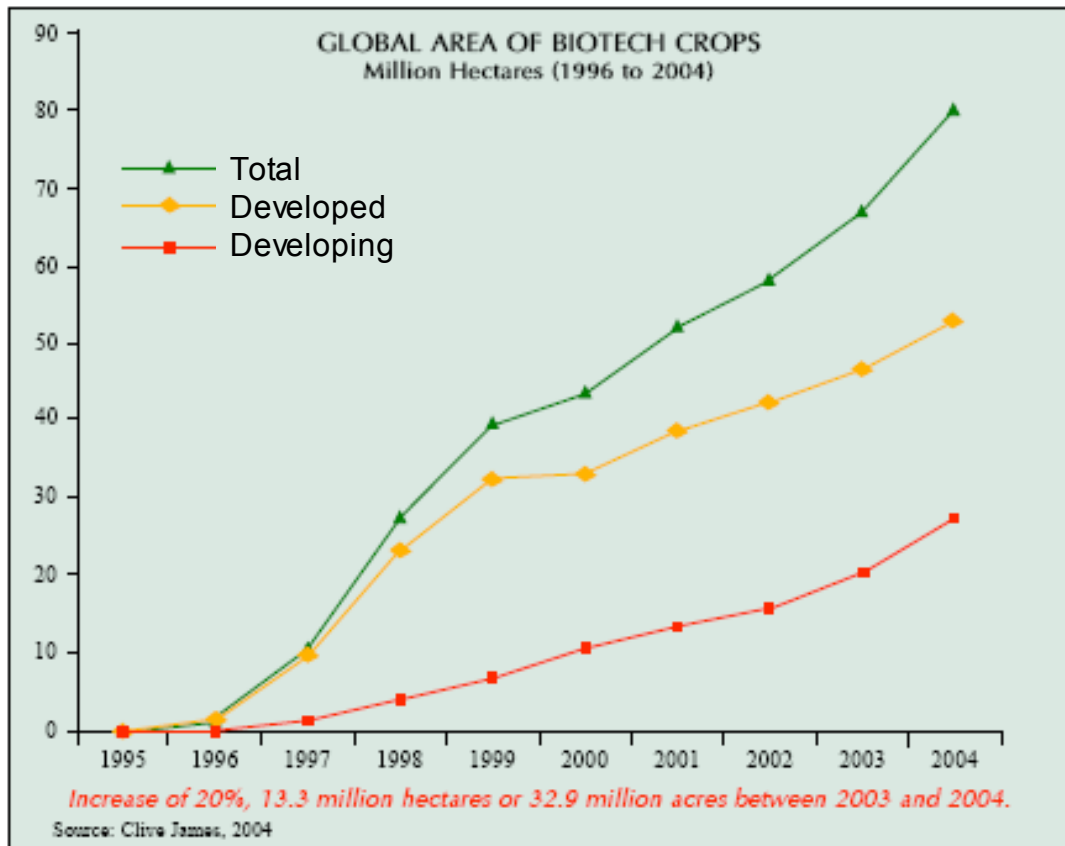
# Presentation Outline

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 developed 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



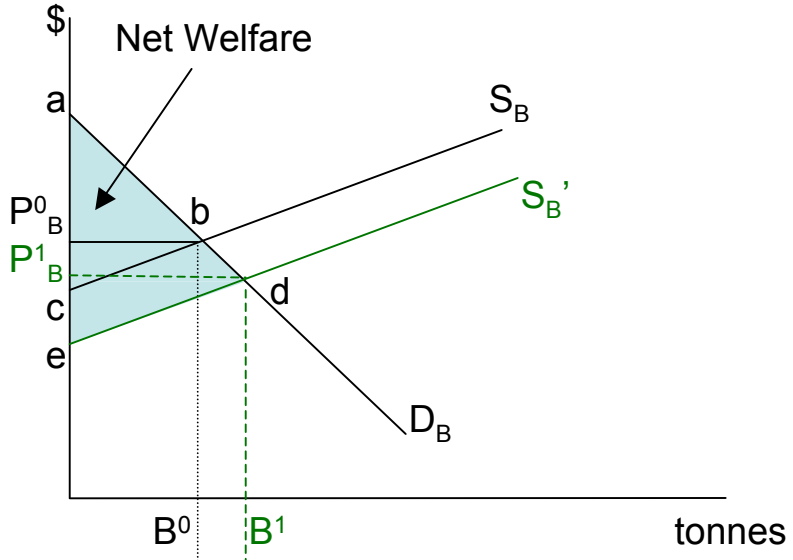
# Licensing and Adopting GM Crops

- 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

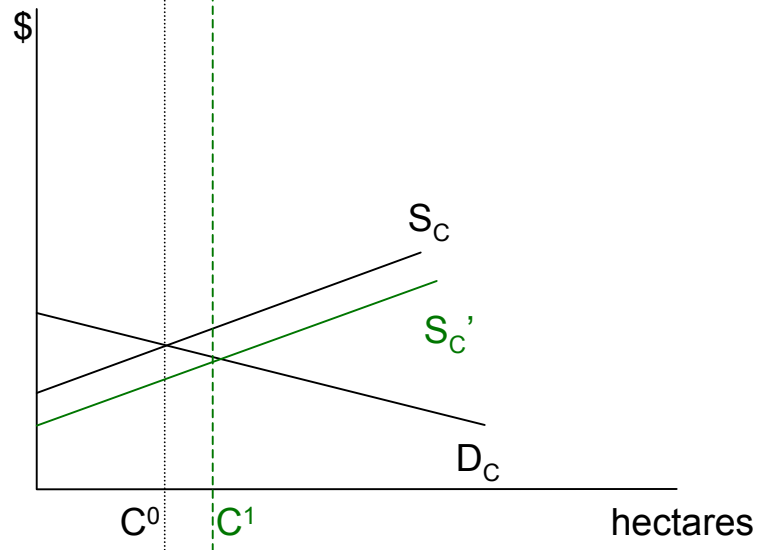


# Fixed Proportions Bean Industry

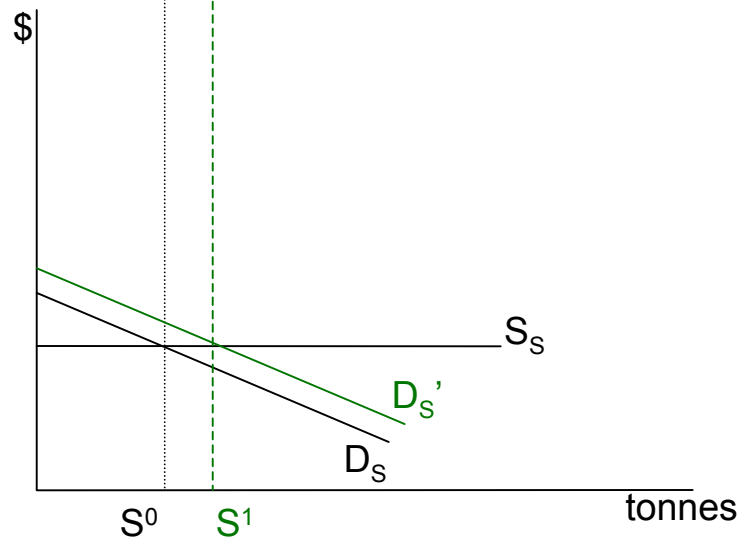
Soybean Market



Other Inputs Market



Seed Market



# Licensing and Adopting GM Crops

## GM Seed Monopoly

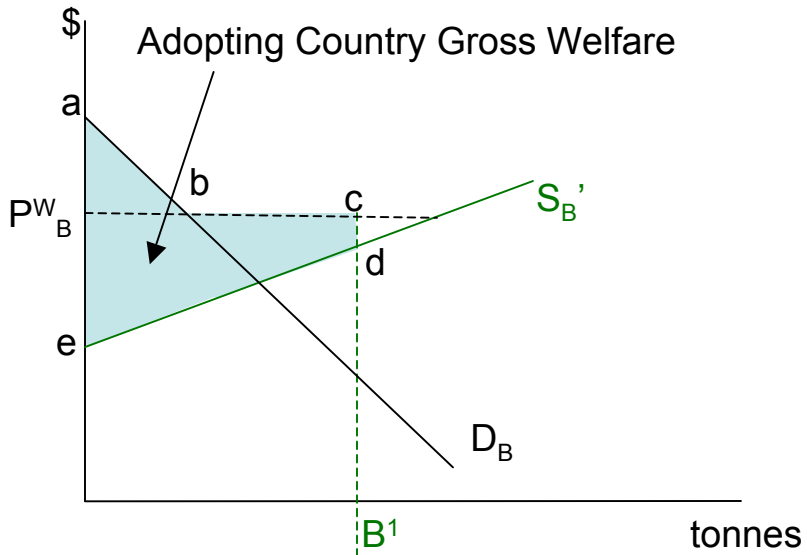
- typical paradigm for GM technology in developed countries
  - farmers enter into TUAs with patent holders
- patent holder maintains monopoly power over the use of seeds that embody the GM trait
- patent holder charges profit-maximising price for GM seeds
- adopting country possesses institutional infrastructure 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)



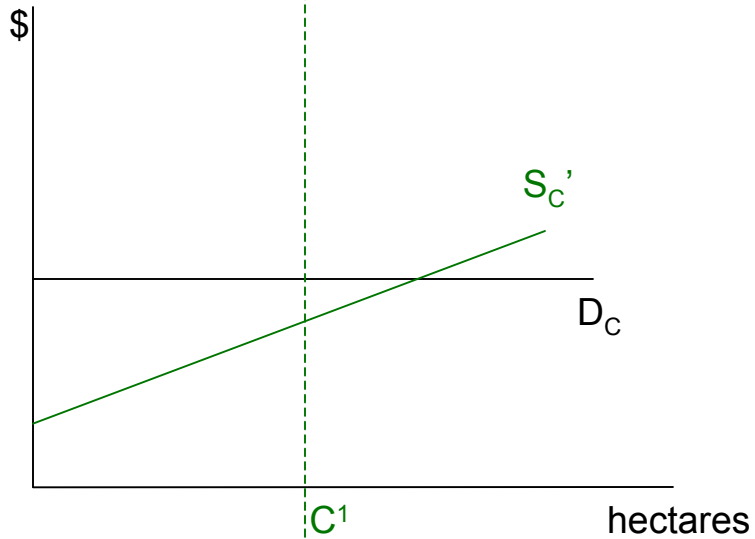


# GM Seed Monopoly

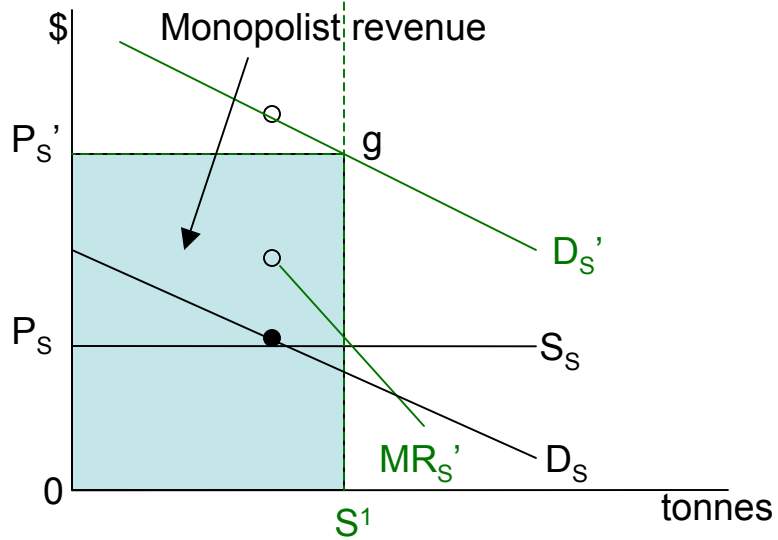
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# Licensing and Adopting GM Crops

## 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

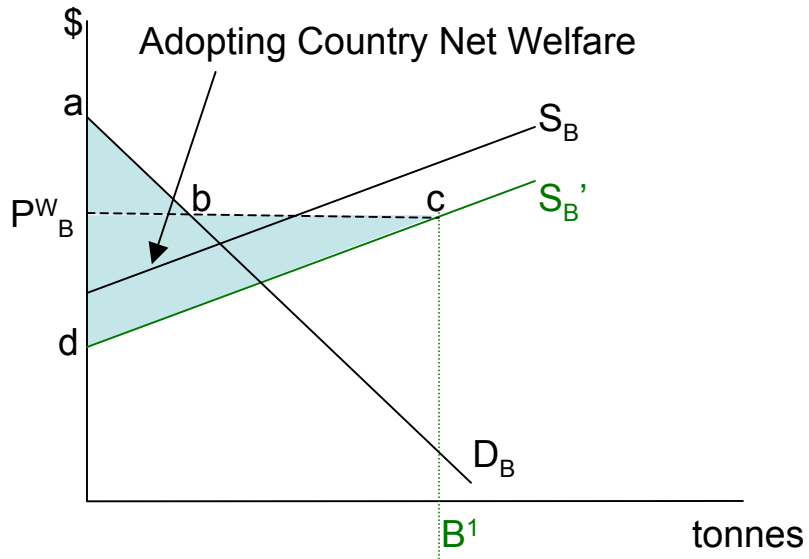
## Pirated GM Seeds

- 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

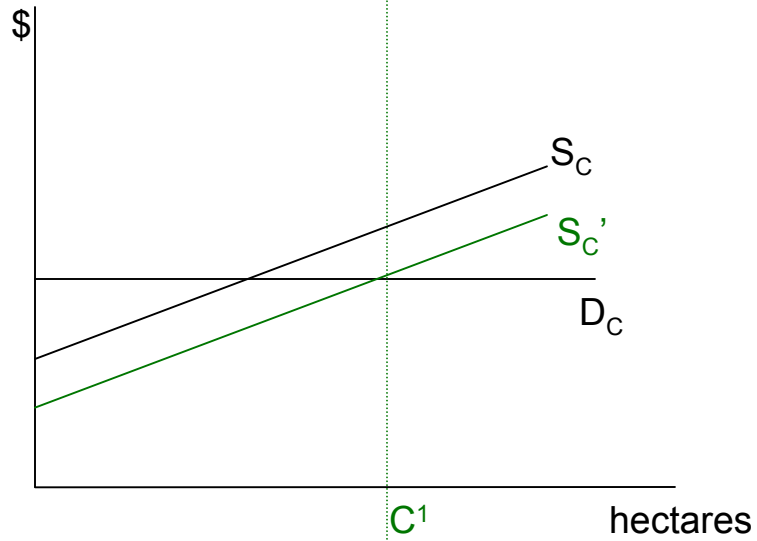


# Pirated GM Seeds

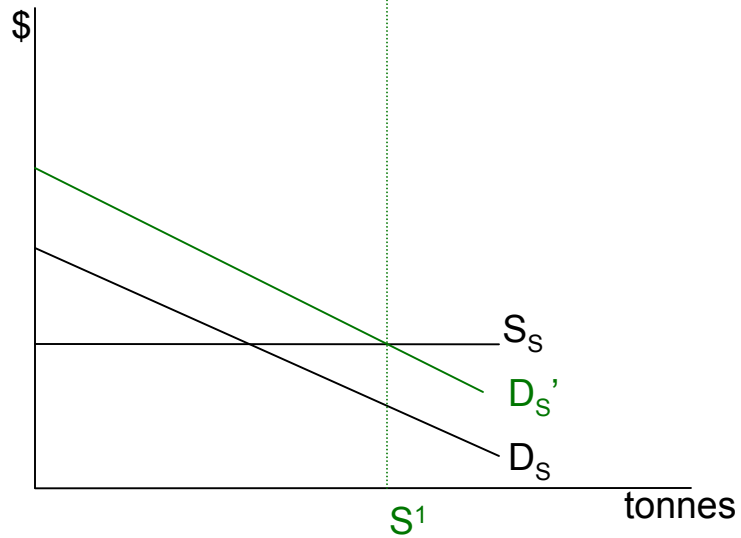
Soybean Market



Other Inputs Market



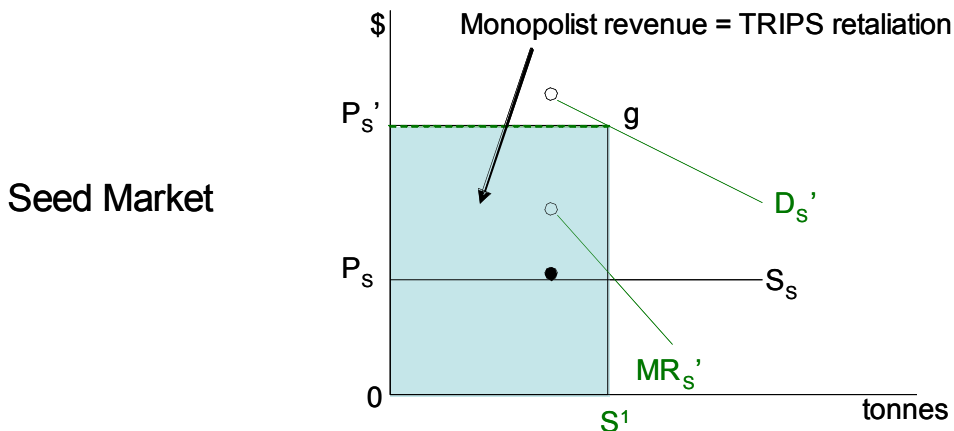
Seed Market



# 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



- 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

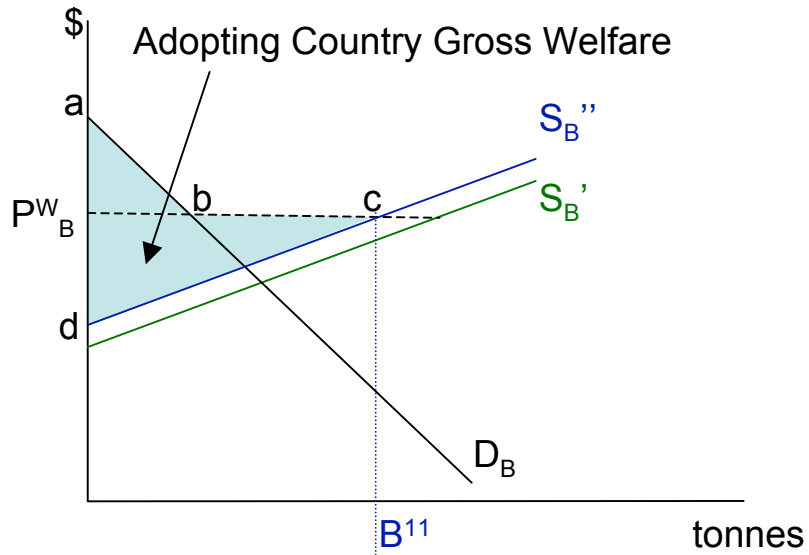
## GM Technology Levy

- 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

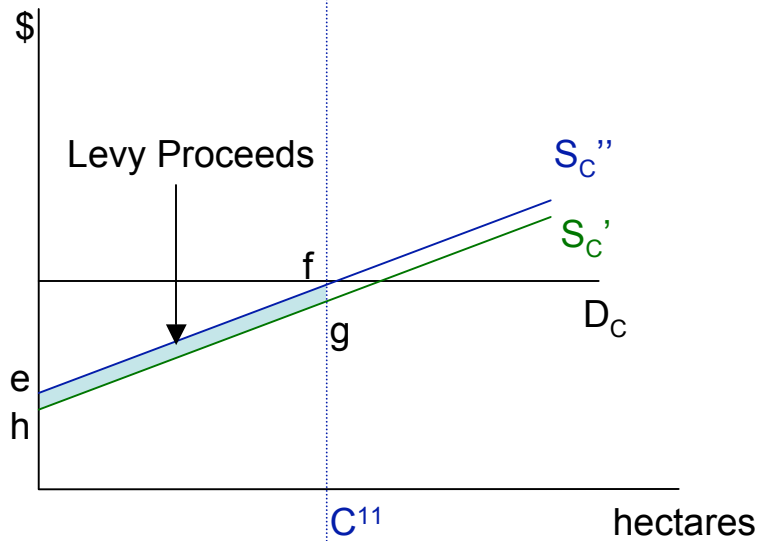


# GM Technology Levy

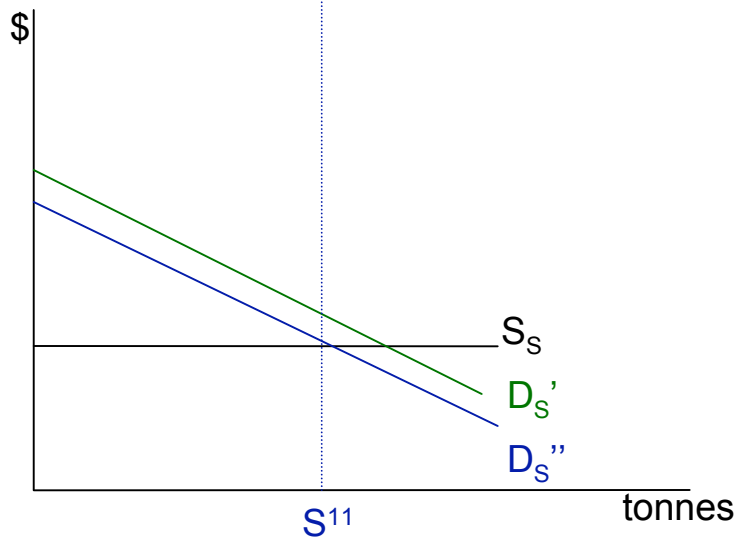
Soybean Market



Other Inputs Market



Seed Market



# 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

