IPRs and the role public and levy funded research: some lessons from international experience

OECD Conference on Agricultural Knowledge Systems (AKS) Responding to Global Food Security and Climate Change Challenges

15-17 June 2011, OECD Conference Centre, Paris

Richard Gray
University of Saskatchewan

Background

- Well performing Agricultural Knowledge Systems (AKS) foster productivity improvement by generating knowledge and developing technologies that are put into use by the agricultural sector.
- This not only increases profitability and economic surplus it also contributes to the ability of the sector to address food security and environmental goals
- the policies of the public sector have been critical in shaping most AKS

Why not just rely on strong IPRs?

- Stronger intellectual property rights (IPRs) have successfully stimulated private investment in agricultural research, development and extension (RD&E)
- What is the appropriate mix of IPRs, public sector and levy based RD&E, and supportive public policy?
- What does economic theory (incentives) and international experience tell us?

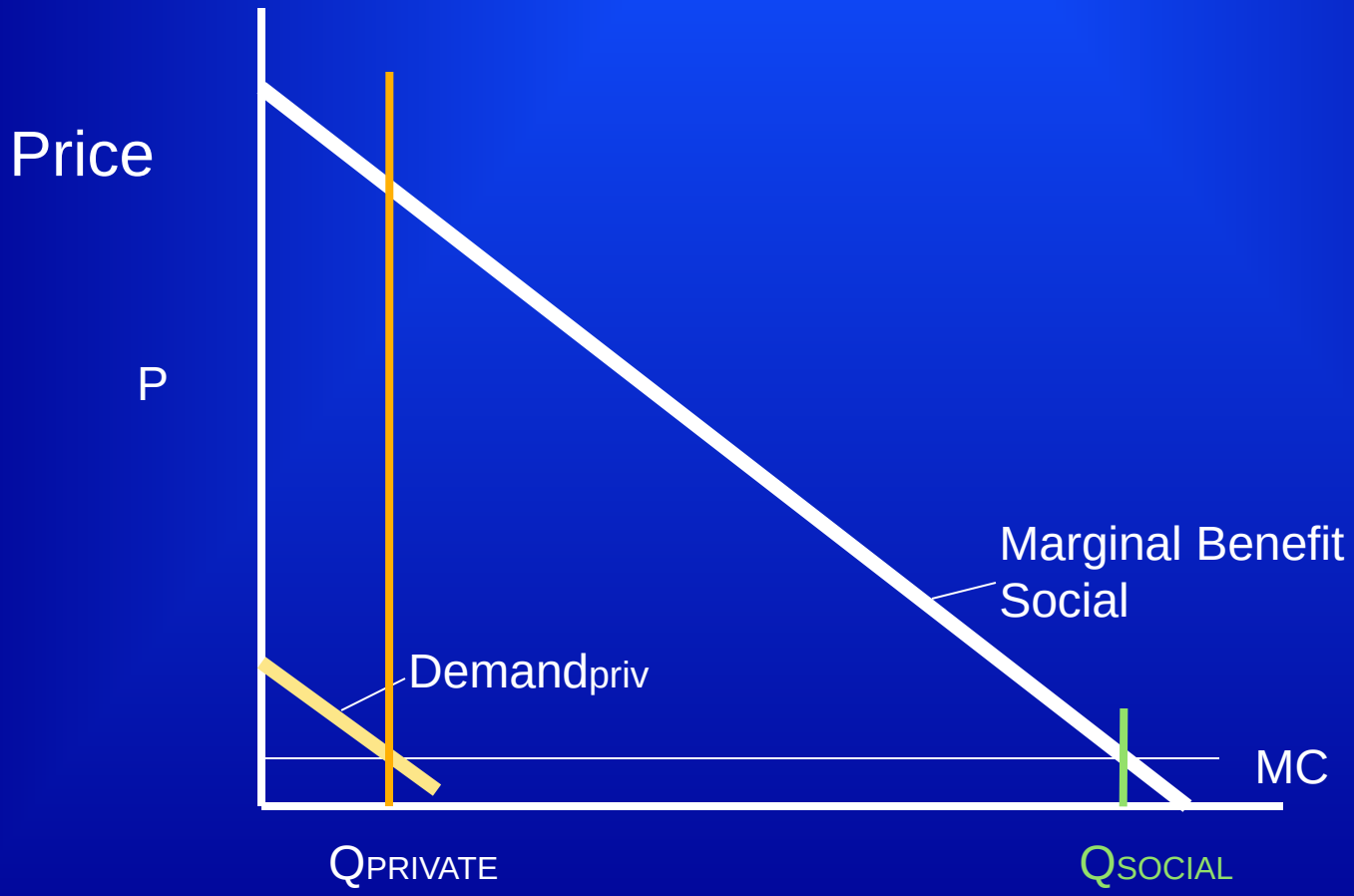
Objectives

- To describe an economic framework for AKS policy that acknowledges toll goods
- To use international examples to illustrate:
  - challenges that can arise in AKS systems
  - effective AKS systems

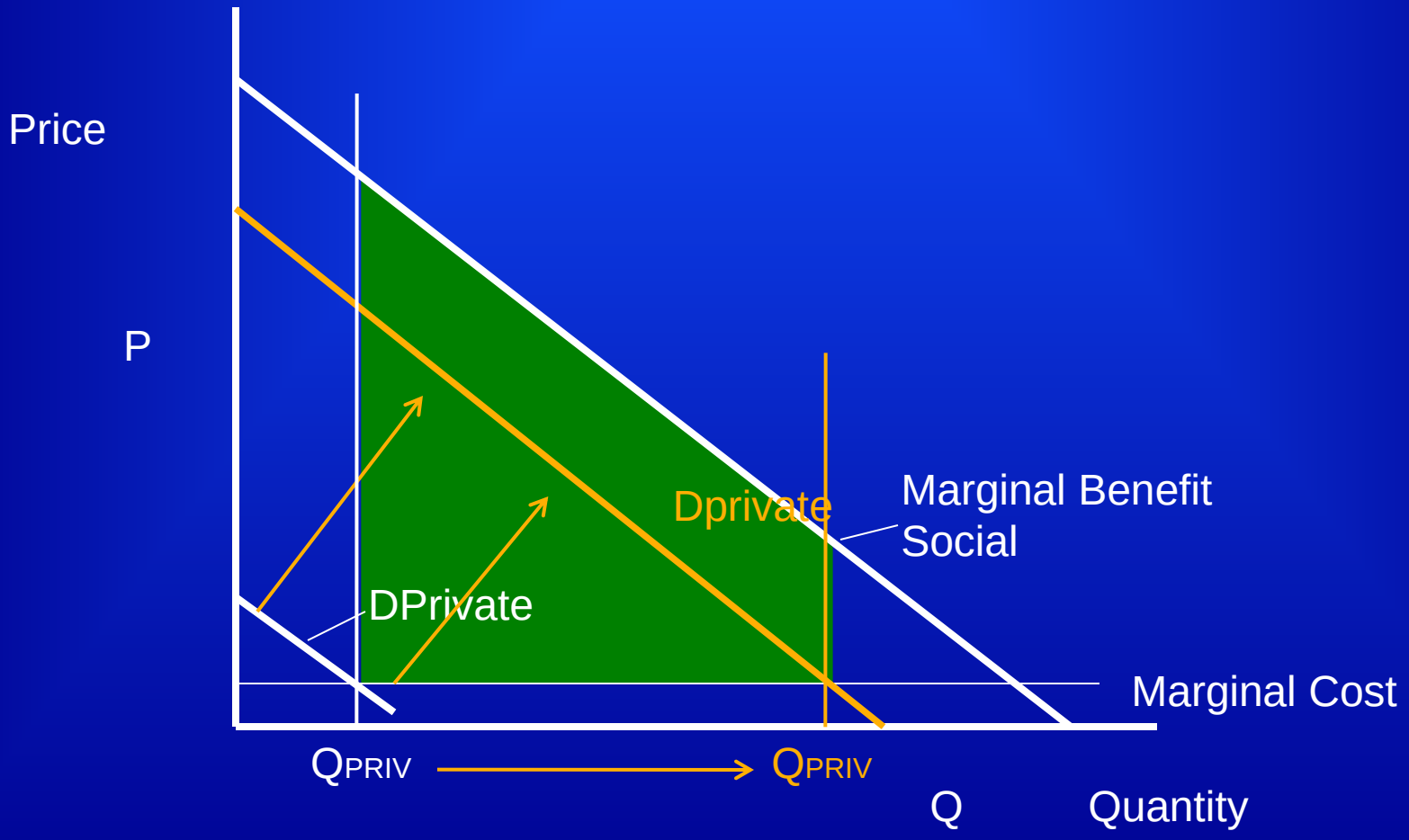
Public Goods and IPRs

* public goods are non-excludable and non-rival in use
* Governments provide public goods or subsidize quasi-public goods – often not well… many demands for finite resources
* Or… they assign property rights or intellectual property rights IPRs in the case of research

The Public Good Market Failure



IPR Impact on Private RD&E



Policy Implications

- IPRs stimulate private RD&E – mainly development when products are close to a well defined market
- incomplete property rights including positive externalities (health, environment) require additional incentives to reach optimal investment issues
- Complementary knowledge is often lacks IPRs – this is a role for government and levy-based research

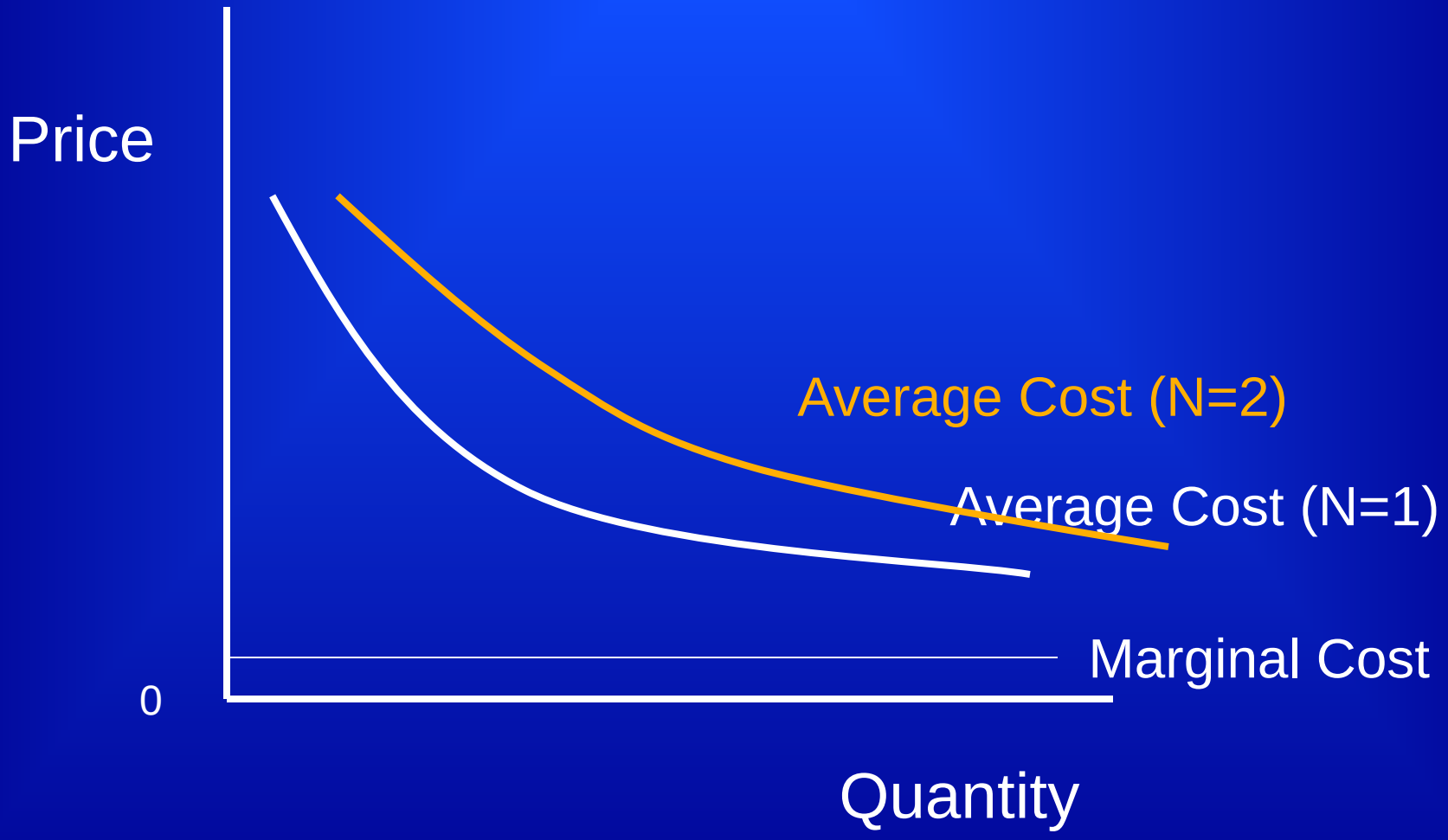
The non-rival nature of knowledge

- One firms use of knowledge does not reduce the amount available for other firms – i.e.. non-rival
- Marginal costs are close to zero. E.g. The first hectare of new wheat variety costs $1 million, the second hectare costs $50.
- With strong IPRs knowledge becomes a *toll good* and has a cost structure of a *natural monopoly*
- Cannot be a competitive industry… oligopoly structure at best. If Price = Marginal Cost then firms have negative profits

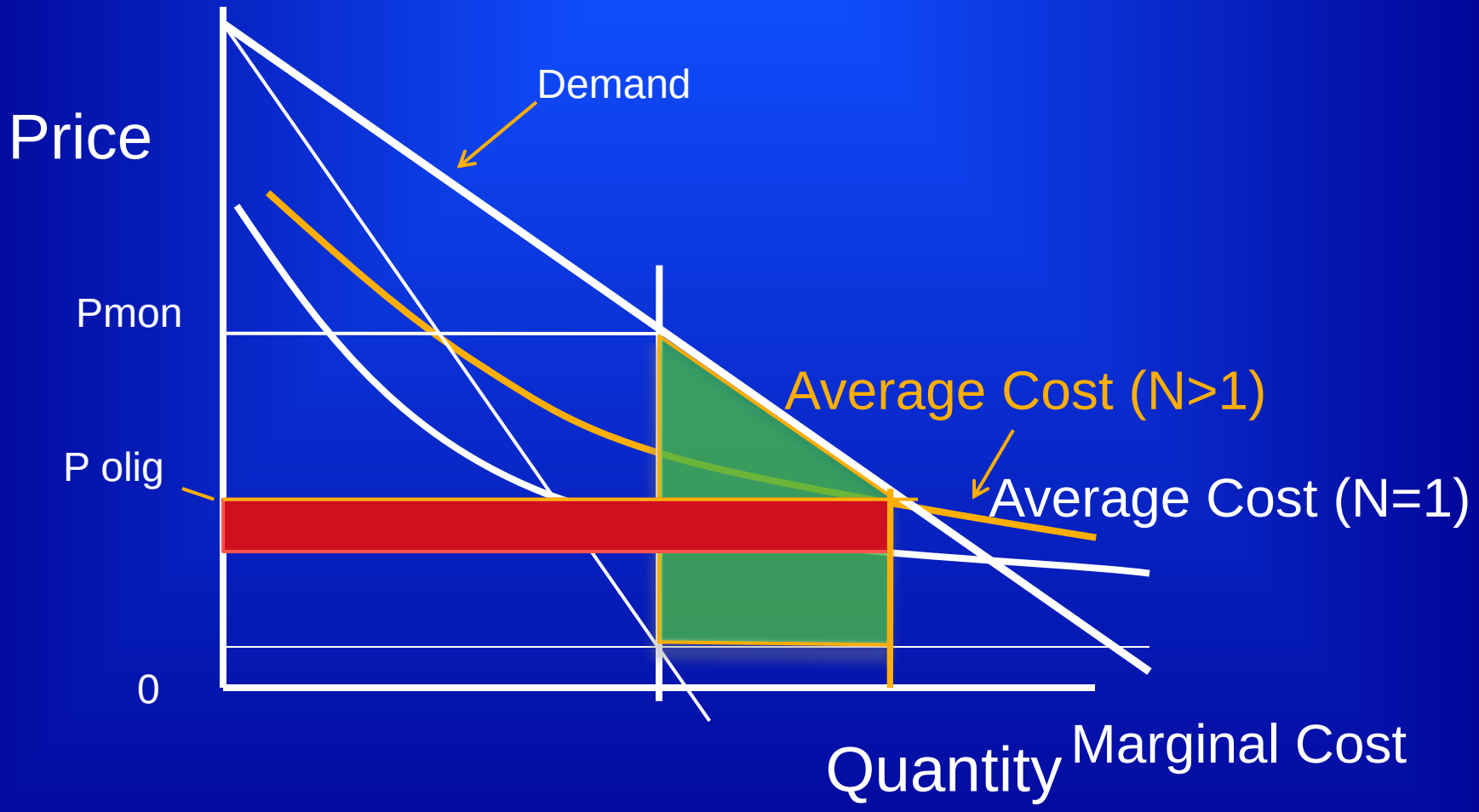
Knowledge with IPRs…..a toll good

	Rival	Non-Rival
Excludable	Private goods	Knowledge Toll goods
Non-Excludable	Common pool goods	Public goods

The cost structure of toll goods



The economic impact of entry



The entry dilemma in a toll good industry

- One large firm will have the lowest industry average cost and will be most efficient from a knowledge production perspective (i.e. a natural monopoly)
- A monopoly will use its *market power* to price above marginal cost and market power will limit investment incentives
- More firms will *reduce market power* but will drive up costs through *multiplication of effort* and *fragmentation of knowledge*
- This entry dilemma cannot be avoided in a private *toll good* industry

Fragmentation and Duplication in AKS

- Pooling knowledge reduces cost because it has no opportunity cost
- Independent firms could license their IP reducing industry costs but:
  - They may strategically protect their assets
  - There are very many pieces of IP e.g. ((Stress AND tolerance) AND wheat) -3054 patents – *a patent thicket (search US patent data base March 20, 2011)*
  - There are often any owners of complementary assets leading to prohibtive transactions costs to negotiate access to other private IP – anticommons issue
- In transgenic crops most firms and public institutions have purchased and developed their own research platforms to get freedom to operate → High cost duplication of effort

Toll goods exist in other sectors

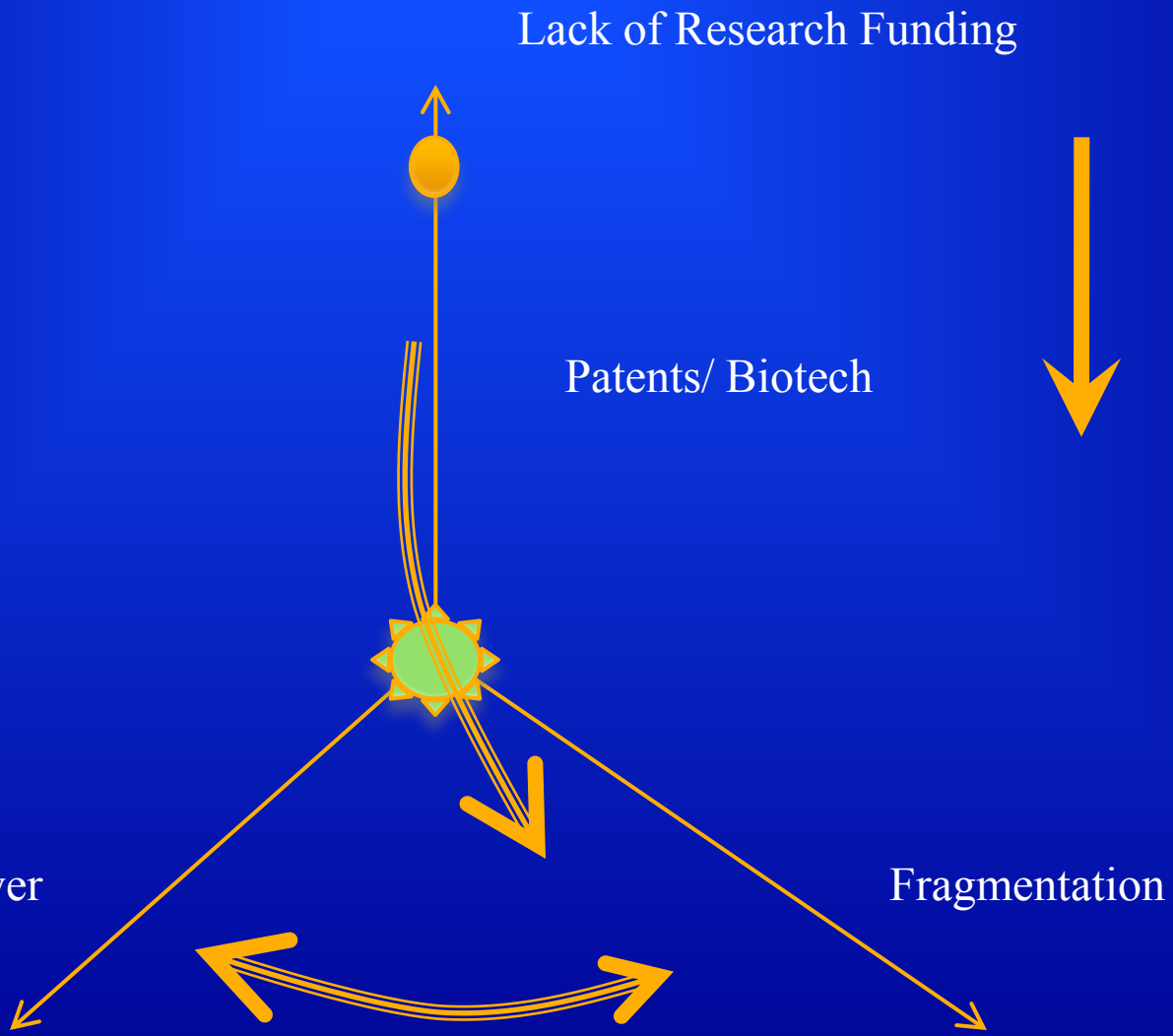
In other sectors *toll goods* are provided by:

1. government, local government (e.g. Roads, bridges)
2. private markets where profits are regulated (e.g. electrical utilities)
3. private markets where industry entry is encouraged through regulation (e.g. telecom)
4. Non-profit organisations, cooperatives as a club good with/without government support (buying clubs, credit unions etc.)

IPR Related Issues

- Three general forms of AKS market failure
  - Lack of private research incentives/ funding issues (solved by IPRs)
  - Market power – monopoly/oligopoly pricing reduces adoption &use
  - Research fragmentation restricts entry and increases cost

IPRs-Market Power-Fragmentation



The Canadian Canola Outcome

- Hybrid seed IPRs are secure
- $50 million in private investment (CSTA, 2007)
- faster yield increases than publically funded wheat
- However:
  - Two firms dominate
  - Seed costs $100 -$140 per hectare or 12-16% of gross revenue – these exceed land rents! and are steadily increasing
  - About 10% of $500 Million in rents gets reinvested in breeding
- Hybrid corn looks similar concentration/pricing/investment

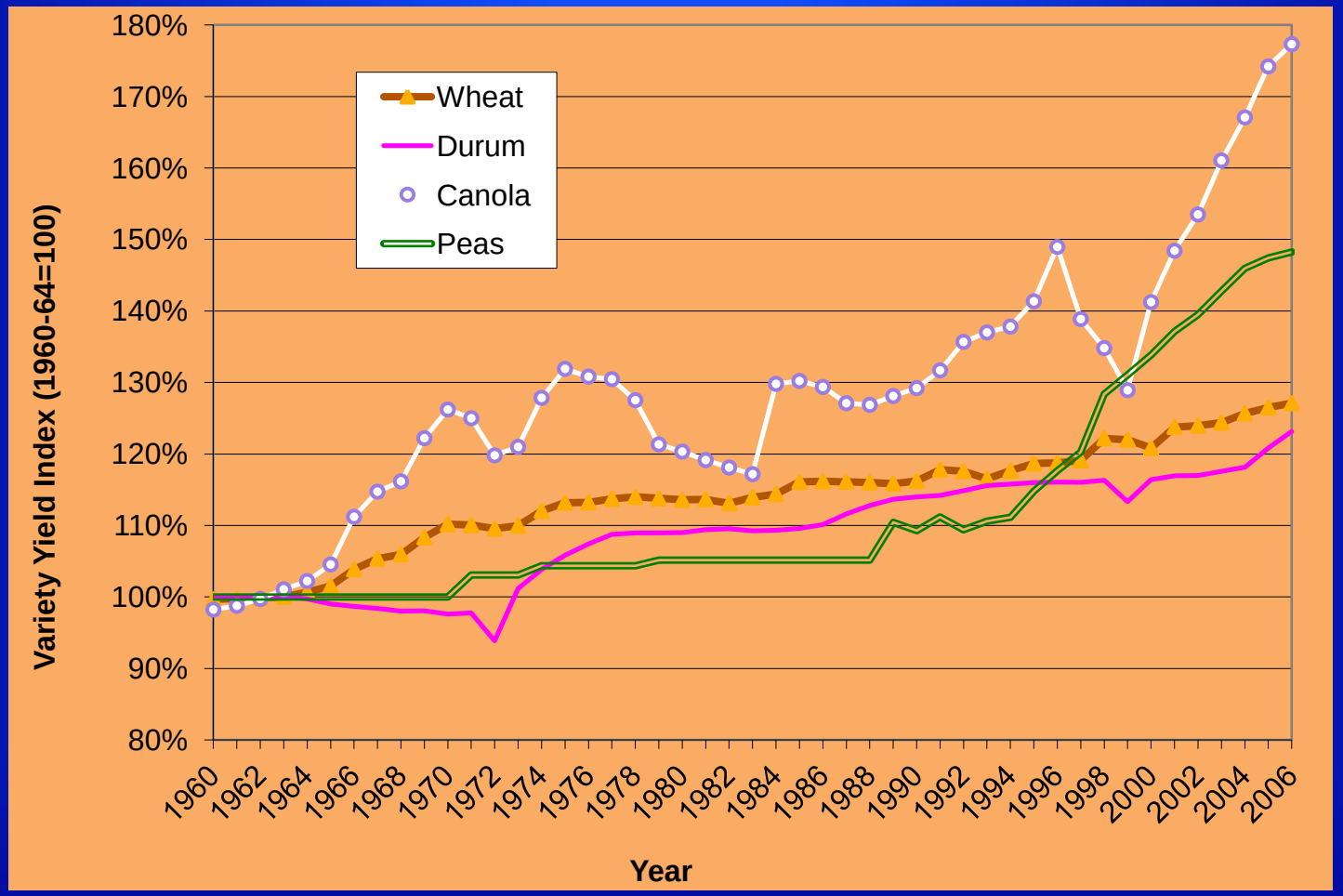
Knowledge Fragmentation in Canola

* Until recently almost no exchange of IP between competing multi-national biotic firms in Canola
* e.g. Bayer had the highest yielding/disease resistant (Invigor) germplasm while Monsanto had the best HT system.
* Given their non-rival nature it makes sense to combine these traits (i.e. anti-common's issue)
* Cross licensing has solved some of these problems

Models of levy based industry ownership

- Saskatchewan Pulse Growers(SPG)
  - Producers voted for a 1% non-refundable levy for research in 1984
  - SPG fund research and manage their IP on a contractual basis
  - Very successful – widespread adoption of pulses and high rates of return
  - SPG have negotiated IP access aggreements with industry
  - The both duplication and market power issue

Canadian AKS Outcomes



Models of levy based industry ownership

- Grains Research Development Corporation
  - Established in 1988 in Australia
  - 1% statutory levy matched 0.5% by national government
  - industry nominated Board of Directors & regional panels
  - 27 crops $A 100 in revenue per year
  - GRDC funds nearly all aspects of RD&E
  - has replaced some State level funding
- 2005-2008 created three wheat breeding companies GRDC/public/private shareholders through tender
- End Point Royalties will provide a substantial source of funding for these firms

The Future of Australian Wheat Breeding

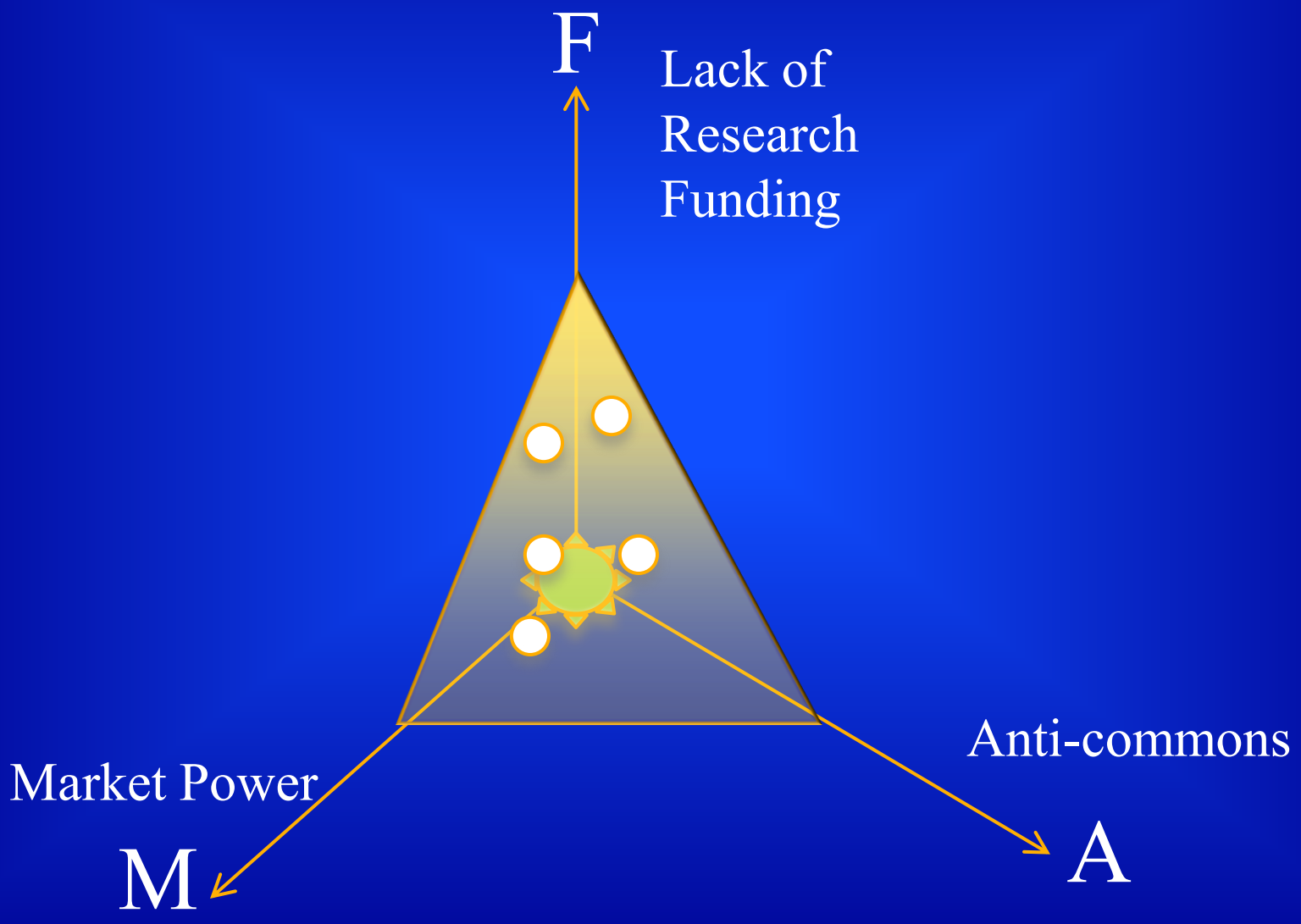
- EPRs create incentives similar to hybrids for industry consolidation and pricing
- EPRs are steadily rising and will continue to rise as new varieties are better than older varieties
- Will entry keep the breeding competitive? where will revenues be invested?
- Will State and GRDC shareholding make a difference to pricing, investment or consolidation?
- What will the industry look like in 2030?

The Royalty Model in France

- Farmers pay an End Point Royalty on bread wheat varieties
- The royalty rate of .5Euro/t is negotiated between farm organsation and the seed organisation for 3 year terms
- The uniform EPR is simple to collect
- Similar to a regulated utility rate used in other industries

Summary - Three Lessons

- Many aspects of RD&E cannot be protected by IPRs, leaving an important role for taxpayer and levy based funding.
- Private research industries produce toll goods where market power and research fragmentation will be persistent issues. Policy instruments can address pricing, entry and knowledge sharing.
- levy based RD&E can be effective giving voice to those who pay for and benefit from RD&E.


F
Lack of
Research
Funding
Market Power
M
Anti-commons
A


Questions?