Intellectual Property Rights and the Distribution Of Benefits from Research

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INTRODUCTION

- Protection of intellectual property embodied in life forms has always been a controversial issue in Canadian agriculture.
- IPRs stimulate innovation efforts by allowing the innovator to recoup R&D expenditures but harm farmers by giving the innovator the power to charge monopoly price for improved (new) technology.
- In 1982 Canada allowed patenting of single celled organisms and within cell processes. Patents have successfully been applied by biotechnology firms to protect plants developed through DNA transformation techniques.
- In 1990 protection in the form of Plant Breeder's Rights (PBRs) was granted to plant varieties.

PATENTS vs. PBRs

✓ **Special clauses of PBRs**:

Breeder's exemption

Farmer's exemption: farmers can replant the harvested seed

⇨ renders seed a ***durable*** good

✓ **Patents:**

Allow life-science companies to sign technical use agreements (TUAs) with farmers that forbid the use of the harvested seed for replanting purposes

⇨ seed is a ***non-durable*** good

GOALS AND HYPOTHESES

➢ GOAL: set up a theoretical model explaining innovation and pricing strategy of the life-science firm under the (i) patenting, and (ii) PBRs regimes

➢ HYPOTHESES:

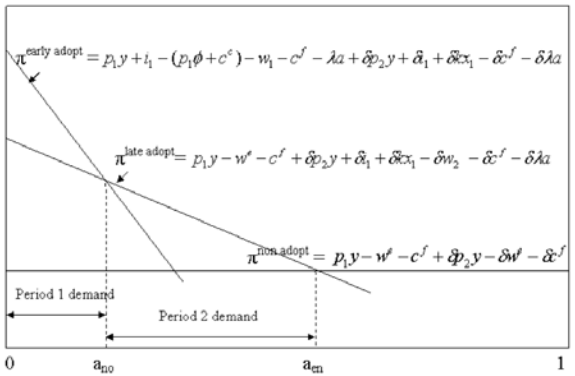
• Patents are more innovation inducing because they don't allow "farmers' exemption";

• Farmers' benefits are higher under the PBRs regime

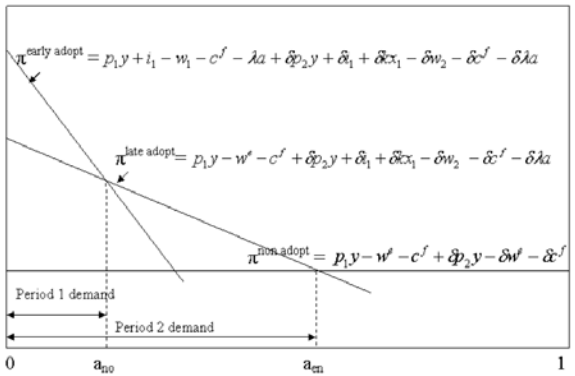
THEORETICAL MODEL OVERVIEW

- Two players in the game: farmers differentiated to some characteristic *a* that lies in [0;1] range and the monopolistic life-science company
- Under the PBRs, some farmers (early adopters) purchase the new seed in period 1 and others plant the generic variety. In period 2 early adopters retain their own seed, while some of the farmers who used generic variety in period 1 (late adopters) switch to the new technology and buy the new seed. Under patents the farmers cannot retain the harvested seed and have to purchase the seed from the life-science company in each period.
- In period 0 the life-science company decides how much to invest in the development of new variety, which produces a per acre benefit *i* for farmers. In period 1 and 2 given the farmers' demand for the new technology the company makes output and price decisions.

PBRs: *Derivation of farmers' demand for the new seed*



Patents: *Farmers' demand for the new seed*

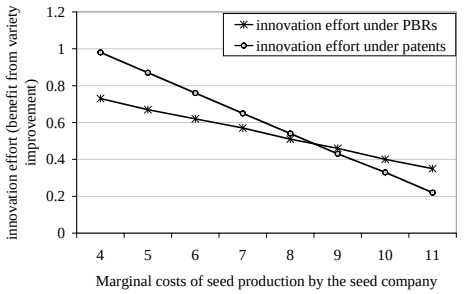


y – yield, φ – seeding rate, w – price of seed, c^f – production costs excluding seed, p – price of output

RESULTS

- Innovation effort is not necessarily greater under the patenting regime vs. PBRs: as marginal costs of seed production increase relative to the cost of seed reproduction by farmers PBRs give more stimulus to innovate.
- Farmers are worse off under patenting regime
- As the marginal costs of seed production increase (relative to farmers' reproduction costs) the seed company is better off applying PBRs rather than patents, that is, it is better off by selling the seed in the first period and letting farmers reproduce the seed.

Simulation results



Reproduction cost (pφ) by farmers is $7/acre, λ=10, price of generic variety - $13/acre, δ=0.95