Farm level modelling for policy analysis in Canada: An historical perspective

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Farm level policy analyses in Canada: A proud tradition

- Agricultural economics began with study of financial problems on farms
  - Comparative analyses
  - Partial and whole farm budgets
- More sophisticated analyses of farmer behaviour due to two factors
  - Increased knowledge of how economic variables affected, and were affected by, producer decisions
  - Emerging computer technologies
- Purpose of this presentation
  - Discuss early developments of farm level policy analyses in Canada

University of Saskatchewan and Agriculture Canada

- Major theoretical developments on farm level simulation models in early 1970s
  - George Lee – near-optimal solution procedures
  - Hartley Furtan – heuristic learners for farm models

- Many policy applications (examples)
  - Sonntag – growth of hog farms
  - Turner – farm growth with marketing quotas
  - Cushon – feed grains marketing

Interdisciplinary research program in Ag Canada

- Ag economists working with Agriculture Canada research scientists to build farm level models
  - Assist with planning new research projects
  - Assess technological changes at the farm level
  - Advise Research Branch on research priorities
  - Assist Economics Branch with policy analysis
- Lethbridge Research Station
  - Bernie Sonntag, Kurt Klein, Dale Russell, Bob Zentner, Elwin Smith
- Charlottetown
  - Jim Lovering, Don Russell
- Harrow
  - Max Colwell

Farm Level Models Developed: Monte Carlo Simulation and LP

- Simulated production of all major agricultural commodities in western Canada
- Hogs, beef, corn and soybeans in central Canada
- Potatoes in PEI
- Early version of CRAM

Farm level simulation models were very complex

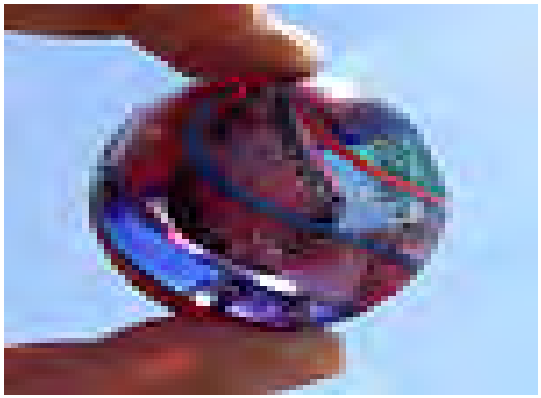
- Included numerous production and investment strategies
- Very detailed production coefficients based on research data – much of which was unpublished
- Usually ten year models
- Biweekly time periods
- Multiple financing options
- Labour requirements and constraints biweekly
- Consumption and tax functions
- Simulated uncertainty with learning function

University of Guelph and Agriculture Canada

- CANFARM and University of Guelph
  - Development of farm level LP models for grain and livestock farms
- Brinkman and Warley argued for REPFARM
  - Family of whole farm, multi-period, dynamic, simulation/optimization hybrid models for analyzing policy impacts on representative Canadian farms
  - Modification of USDA's REPFARM model
- 1987 – a Representative Farm Level Analysis unit was established in Policy Branch of Ag Canada

Farm level models used for policy analysis

- Evaluated farm level impacts of proposed changes in policies:
  - feed grains marketing regulations
  - Government-owned community pastures
  - Production subsidies in the maritime provinces
  - Crow's Nest freight rates (1976-77)
  - Medium term outlook for agriculture
  - Income stabilization (ASA and WGSP)
  - Drought proofing strategies in Saskatchewan



- Prototype of CRAM
  - Based on activities, transformation coefficients, and constraints generated in farm level models

Ideal farm model for policy analysis

- Whole farm, multi-period, recursive, dynamic
- Endogenously determine enterprise mix and resource use
- Include options on:
  - Farm programs
  - Growth and investment strategies
  - Stochastic prices and yields
  - Tax laws
  - Machinery replacement and depreciation
  - Inflation over time
  - Off-farm income
  - Family expenses
  - Debt management

Challenges for using farm models for policy analyses

- Aggregation
- Data requirements are huge (and costly)
- Validation
- Consistency with aggregate model results
- Pressure to publish quickly and often
- But:
  - Understanding farmers' behaviour is fundamental to understanding responses to policy alternatives

Enormous strides have been made in understanding:

- Producer goals and expectations
- Farm-household relationships
- Role of institutions and infrastructure
- Acquisition and use of human capital
- Farm practices on environmental sustainability

Future of farm modelling for policy analyses

- Farm Level Policy Network
  - Funding opportunities
  - Increased interest of graduate students
  - Workshops, policy briefs, outreach activities

Additional Materials

- Klein, K. K. and S. Narayanan. 1992. Farm level models: A review of developments, concepts and applications in Canada. CJAE 40: 351-368.

- Klein, K. K., E. G. Smith and R. P. Zentner. 1998. Interdisciplinary research in Canada. CJAE 46: 259-272.


Thank You