[Notes on technology]

1987

Symposium:

Synthesizing Structure and Technological Changes

Topic:

Modelling Structure/Technology Relationships

"Sub-Topic":

"Reflect One or Two Experiences You Consider Important"

Structure of What?

- size distribution of "farms" (issue - what are "real" farms?)
- distribution of human capital (see Cunningham-Dunlop 1987; Macartney, 1987)

What Technology?

Hypothesis:

if the new "bio" technology is really more management-intensive and less tied to purchase of capital in which the technology is embodied,

then "bio" technology adoption rates

and the net returns to "adopting" a given level of "bio" technology should be relatively more associated with "MANAGERIAL ABILITY"

Biotechnology

Background:

Previous research has shown that managerial ability, to the extent it is capture by years of formal education, contributes positively to net returns. (For Canadian examples, see Furtan and Bollman, AJAE, November, 1979 and Cunningham-Dunlop, 1987.) This was in the context of machinery and petro-chemical (eg. fertilizer) technology utilization.

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More recent research (Shapiro et al, AJAE, May, 1987) addresses the issue of whether structure influences grow rates. (The answer was yes, but not enough to prevent continuing concentration from "spontaneous drift".) Since growth rates are not random across all firm sizes, a model of farm firm growth may be specified (eg. Sumner, AJAE, May, 1987). For a descriptive presentation, see Bollman (1983).

STATISTICS CANADA'S COMPARATIVE ADVANTAGE IN ADDRESSING THE HYPOTHESIS

Statistics Canada has an Agriculture - Population Linkage of the Census of Agriculture questionnaire and the Census of Population questionnaire that provides socio-economic information (eg. formal years of schooling) for each member of the census-farm operator household.

Statistics Canada has a micro longitudinal match of Census of Agriculture questionnaires for 1966, 1971, 1976, 1981, and soon for 1986. This allows us to monitor the changes at the micro level (Glabb, 1987).

We can see who is moving to what parts of the structure. We do not have good information on the technology being used. Nevertheless considerable valuable analysis could be undertaken, for example, using "150 H.P. tractors" or "summerfallow intensity" (eg. Macartney, 1984,1987) as evidence of the level of "technology".

To address the hypothesis directly, we should know who is using what technology. If we did, we could see how structure influences technology (eg. what farmers in what parts of the structure are using what technology). If we asked the same question on technology for two consecutive censuses, then we could see how technology influences structure. For example, do most of the idividuals with technology "X" in fact expand their operation. Do most farmers with technology "Y" in fact quit farming?

It seems the best we can do now is to assume that more farmers are using say, embryo transplants now and this should require a higher managerial expertise (proxied by years of schooling) which should have a bigger bang for the buck now than before. However, if the embryo transplants (to continue this example) arrive on the farm as veterinary services, this would appear to be the same as the former new technology of, say, combines arriving on the farm already embodied in an input (see Jensen and Pope, 1987). Thus, I am not sure how to test my hypothesis with the data at hand!

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August 1987)