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## ASSESSING THE IMPACTS OF TECHNOLOGY ON SOUTHERN AGRICULTURE AND RURAL COMMUNITIES: DISCUSSION

Christina H. Gladwin

In an excellent analysis, Dr. Ghebremedhin discusses the impacts of technological changes on "small versus large farms, public costs in rural communities, and the future direction of research needs." I cannot but wholeheartedly agree with some of his conclusions; e.g., that "technology has increased agricultural productivity and created new jobs, but it has also displaced persons from their occupations and livelihood." As Skees and Swanson point out, the idea that new technologies facilitate farm concentration is an important conceptual position since it represents a clear rejection of the popular notion of technological determinism. But it is not a new idea for agricultural economists. Schultz in the 1950s and Houthakker in the 1960s claimed that economic growth and the inelastic demand for food result in a decrease in the demand for food since, according to Engel's Law, people spend less of their incomes on food as incomes rise. This decrease in demand, supply shifts due to technological change, and asset fixities in agriculture were the main causes of the "farm problem." Although the current failure of exports to solve the oversupply problem in U.S. agriculture has undoubtedly intensified the present farm crisis, continual and unrelenting structural change in agriculture is due to the co-occurrence of economic growth and technological change, which results in overproduction and eventual decrease in farmers' profit margins.

I further concur that "small-scale farms generate low incomes and these low incomes cause such farms to exit, become part-time units, or expand to increase income whether or not economies of size exist." As a result of the oversupply problem, and the need for further capitalization of inputs due to technological change, profit margins decrease and

full-time farmers differentiate into three sub-groups. Some become bigger full-time farmers, some part-timers, and some retire or quit agriculture altogether (Gladwin and Zabawa). This differentiation process at the micro level is structural change at the macro level.

Ghebremedhin also makes clear that "small-scale farms represent an enterprise which has been largely ignored by public policy, both agricultural and economic," and "today, there is no forum to aggressively articulate or advance the unique concerns and interests of the small-scale family farm." In another paper and following Cochrane, I argue for a new federal agency to target funds on a long-term basis for research/extension projects designed especially for the part-time family farm (Gladwin). The elimination of the commodity programs, which do not benefit the 86 percent of all farms which are part-time farms, could provide the funding. The agency could function like the National Science Foundation or National Institutes of Mental Health, which have set the precedent for awarding federal funds on a competitive basis to professionals serving the larger society's interests. Since people learn to farm only by doing it, it is clearly in society's interests to help preserve the stock of human capital that knows how to farm.

Dr. Ghebremedhin and I agree on these points. I'd like to make two additional points. First, I suggest that Ghebremedhin qualify his conclusion that "in [a] competitive market economy, low productivity and low income earnings often lead small-scale farm operators to a long-run situation of **disinvestment** and **eventual relocation** in other economic sectors" (emphasis mine). Here, I object to the phrase "eventual relocation in other economic sectors." Instead, I propose that first, the im-

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pacts of new technologies (mechanical, chemical, or biotechnological) differ for **full-time** vs. **part-time** farmers, because part-time farmers use **survival strategies** that allow them to disinvest yet stay in farming. Farmers who become part-timers do so by cutting back production and getting rid of capital inputs (and debt). Their profit margins then fall still further; but these are offset by the off-farm incomes of sometimes the husband, sometimes the wife, but usually both husband and wife. Because part-time farmers are now more dependent on off-farm incomes than on their farm incomes, and given that the non-agricultural sector has not suffered as yet the depression that the agricultural sector has of late, part-time farmers have been surviving and faring much better than full-time farmers in the 1980s (Buttel and LaRamee; Gladwin and Zabawa). As Hyden has shown for small farmers in Africa, who can exercise their "exit option" and go in and out of agricultural production, small is more autonomous and thus more powerful than expected.

Full-time farmers, on the other hand, have to stay on the technology treadmill described by Cochrane. Faced with overproduction, rising capital costs, and falling profit margins, they are continually forced to adopt new cost-reducing technologies and invest in new equipment. If they don't, they in turn get differentiated out of full-time farming. New technology, whether size-neutral or not, is continually threatening the existence of the small **full-time** farmer much more than it does the equally-small **part-time** farmer.

Second, within the full-time farmer category, the impacts of technology change also differ for small vs. large full-time farms, as Ghebremedhin very thoroughly points out. But the **small full-time** farm today is not what we used to consider a small farm, with gross sales of \$40,000 or less. Today, given the definition of full-time farm as one with more

than 50 percent of its income coming from the farm, the **smallest** full-time farm is what we consider a **mid-size** farm to be, with gross sales between \$90,000 and \$160,000. In another paper, Zulauf and I show that this size farm has declined in importance in terms of farm numbers, gross cash farm income, and net farm income (Zulauf and Gladwin).

The new, bigger size of the small full-time farm puts the question of the impact of technological change in a new light, according to Buttel. In an article about the effects of bovine growth hormone (bGH), he notes that farm groups in Wisconsin and other states have already organized to delay or prevent its release, three years before FDA approval. Why the unprecedented concerns? It is anticipated that bGH will be adopted very rapidly within four years of introduction by larger operations employing capital-intensive management practices and will increase milk production per cow by 15-30 percent. Its impact, and that of other new biotechnologies, will be the displacement of more mid-size farms (or what I call small full-time farms) which are relatively more knowledgeable and powerful, and thus better able to protest, than were the small Midwestern tenant farmers displaced by tractors in the 1940s and 1950s or the black farmers almost completely gone from the South. Because small full-time farmers today are bigger, and farm groups today are more aware of how technology change affects farm structure, controversy and protest will continue to surround the development of output-increasing biotechnologies at publicly-funded land-grant institutions. The politics of public agricultural research will never be the same again, Buttel concludes, if mid-size farmers, who don't want to disappear, and public interest groups, which want both clean water and the survival of family farms, arrive at a common basis for opposing biotechnology research.

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