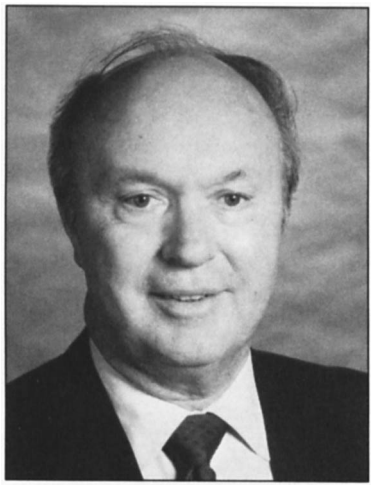

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Agricultural technology: Put the genie back in the bottle?

The economic malaise in parts of U.S. and California agriculture in recent years has caused some agriculturists to question the benefits of continued development and diffusion of technology. One view is that investments in research leading to further technological advance should be curtailed because there are agricultural surpluses. Another view is that research should be reoriented toward reducing costs rather than increasing output. A third would limit transfer of technology to foreign countries.

All are fallacious arguments.

Reducing investments in research would have little effect on near-term rates of growth of productivity, output, or surpluses. It could, however, have serious negative effects a decade or more into the future on productivity, production costs, and our competitiveness in world markets. Agricultural research cannot be turned on and off like a spigot. It requires continuity of investment over a long period. Furthermore, to attribute current economic surpluses to research and technology alone is to ignore the many other contributing factors—rigid, poorly constructed farm policies, economic policies that constrain demand in domestic and foreign markets, protectionist policies in foreign countries that limit or prevent access of U.S. farm products, for example.

The suggestion that research should concentrate on technologies that reduce per unit costs of production rather than output is a non sequitur. Given the competitive nature of agriculture, technology that reduces per unit costs will, in all likelihood, stimulate agricultural output relatively quickly.

The concern about transfer of U.S.-generated agricultural technology to foreign countries arises from the contention that such transfers erode our competitive position in world markets.

Our competitiveness is influenced by many factors, not just the flow of technology. As events of recent years clearly illustrate, the currency exchange rate and government policies have a powerful influence on our competitiveness.

Even if we chose to limit transfer of technology, there would be practical problems in "keeping the genie in the U.S. bottle" in an interdependent world with rapid, easy communication across national boundaries. Technology is transferred in numerous ways—through the scientific community, through the physical transfer of goods, and through the assignment of production rights. It occurs through public programs such as foreign technical assistance, and through the establishment of businesses abroad by private U.S. firms. Patenting and licensing may slow the diffusion of technology, but they do not prevent transfer abroad. The rapid global diffusion of computer technology is an obvious example of difficulties in keeping the genie in any one nation. Occasional public policies to prohibit transfer of U.S. technology have succeeded only in diverting business from U.S. firms to foreign competitors.

Two other aspects of the issue merit attention. Transfer of U.S. agricultural technology generally must be accompanied by adaptation in the recipient foreign country. The immediate productivity effects of the technology may be quite different in the recipient country than in the United States. Some technologies that are highly successful here may find little or no success in foreign countries.

Then, there is the implicit assumption that the United States is the sole or dominant source of productivity-enhancing agricultural technology. In reality, many countries, developed and developing, have expanded their scientific and agricultural research capacities in recent decades. If transfers do not come from the United States, they will surely come from other countries.

The "catch 22" in restructuring U.S. technology transfer is even more apparent when our agricultural trade interests are considered. A major part of the global growth in demand for farm products in recent decades emanated from developing countries. With demand for food in the developed countries approaching satiation and with slow population growth in most of those countries, future growth in export demand for U.S. farm products is likely to be increasingly dependent on expansion of markets in the developing countries. For that to occur, there must be economic growth in those countries, and that will require increased productivity and growth in agriculture.

There is substantial evidence that, as per capita incomes rise in the developing countries, demand for livestock products and related foods as well as demand for upscale, value-added products expands. Thus, technology transfer that stimulates productivity, incomes, and economic growth in the developing countries may be of long-term benefit to U.S. agriculture as a whole.

If it is neither practical nor desirable to limit foreign transfer of technology, what can be done to ensure that U.S. agriculture benefits as fully as possible from U.S.-generated technology?

Perhaps the most important strategy is to ensure a balance between basic research to create new knowledge and applied research to ensure that technology is developed, adapted, and transmitted as fully and quickly as possible for commercial use in U.S. agriculture. Land-grant universities have excelled in these functions in the past century. However, as the pace of science quickens and its results become ever more broadly diffused globally, we may need to modify current methods of transferring technology from the public to the private sector. The anticipated flow of biotechnology lends some urgency to reexamination of public-private relationships for transfer of that technology from the laboratory to the field. Rather than attempting to "bottle up the genie," we should seek the most effective means of applying its power.