

PART VII

Summary

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Summary—Prospects and Proposals for Adjustments in Agriculture

THIS is a summary paper of the conference proposals in the preceding papers, with emphasis on regional and local research needs. It is intended to be a rather broad and general summary concentrating on discussion of the areas of research that appear most urgent.

TRENDS IN COMMERCIAL AGRICULTURE

This conference has clearly demonstrated that commercial agriculture in the United States is in the midst of a huge and continuing technological breakthrough that is putting pressure on farm prices and incomes and forcing widespread readjustments in resource use.

The major indicators of this technological change are well known to us. Since 1940 the number of people in agriculture has declined from about 30 million to about 22 million. Man-hours worked in agriculture have declined by one-third. Output per man-hour has about doubled. Yields per acre have increased. In 1956 production of crops was almost 25 percent larger than in 1940 with only a 2 percent increase in acreage of cropland.

Clearly there has been a significant technological breakthrough and we expect this to continue. In the next 15 or 20 years the farm population will continue to drop if appropriate adjustments are made. Output per man-hour in farming is expected to increase by more than 35 percent in the next 10 years.

Heady and Ackerman in their opening paper have pointed out that agriculture's share of the gross national product has declined from 16.1 percent of GNP in 1910 to 5.9 percent in 1954. In 1955 farm income was 77.9 percent of 1947-49 whereas gross national income was 148.5 percent of 1947-49. National income has increased 6 percent per year since 1950. Net income per farm from farming has declined by 23 percent since 1950. Off-farm earnings of farm families have increased significantly, however, and with the decrease in numbers of farms, the real income per farm family has not materially declined

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since 1947-49. But farm families in general have not shared proportionately with nonfarm people in the upward surge of the real level of living in the United States.

This great technological shift, which is bringing material benefits to the people of the United States, raises important economic problems for agriculture. These problems call for adjustment of resources both within agriculture and between agriculture and the rest of the economy. The upward surge in productivity per man, without a corresponding flow of labor out of agriculture, has increased the value of the marginal product ascribed to land and has shifted the terms of trade against agricultural labor resources. Land prices have risen. At the same time that terms of trade have been shifting against agriculture the price of land has risen relative to prices of farm products as well as absolutely. Labor saving and/or output increasing technological advance would, with constant prices, increase the value of the marginal product of a given unit of land. Also this advance, accompanied by excess labor resources, or by certain scale economies in equipment and non-divisibility of family labor units, has resulted in increasing the marginal rate of return to land in the family-farm unit as size of unit increases. This enables farmers to pay more per acre for an additional piece of land than they would be justified in paying on the average for the entire farm acreage.

We are therefore properly concerned with the following types of problems: (1) adjusting enterprises and size of farm (that is land and capital) to technological advance; (2) increasing the mobility of labor; (3) dealing with the capital problem which is heightened by the existence of excess labor resources; (4) finding ways of exploiting off-farm sources of income; and (5) developing policies or programs designed both to adjust supply and demand and to bring about the suggested resource shifts. We are concerned with the over-all problem. The purpose of this conference is to examine the entire structure of economic phenomena involved in solving the basic problem of adjustment.

Major elements in policy can be identified by examining the various kinds or areas of research. These can be listed as follows: (1) research on the economics of adjustment of the individual unit to technological change; (2) research on population movement, examining problems encountered and solutions reached by people who are displaced in agriculture by technological advance; (3) research on the capital problem of agriculture, including the problem of financing the increasing amount of productive assets used per worker (now at about \$18,000 per worker in commercial agriculture); (4) research on off-farm sources of income available to farm people and on the changing role of part-time farming, to determine how off-farm income can best be used to supplement the income of farm families from farming and best contribute to the productivity of the American economy; and (5) research on the role of policy or the types of programs that will be most effective in adjusting supply and demand to technological change. Such a program of research would give emphasis to the types of adjustments

required for technological growth and development and the methods of bringing about such adjustments.

There are, of course, other important areas of research in the field of agricultural economics, such as adjustments in agriculture occasioned by the development of superhighways and other transportation facilities, and changes brought about by the changing structure of markets. Also questions of taxation, school reorganization, and the like are important in the field of agricultural economics although these are somewhat outside the scope of production economics. This paper is not intended to review the individual papers in detail but rather to comment on a few remarks and attempt to concentrate on suggested areas of research.

ADJUSTING THE ECONOMIC UNIT

We agree on the long-run solution to most efficient use of agricultural resources and to more satisfactory incomes for farm people. The answer is to be found in fewer labor resources in agriculture and in a smaller number of farms, such as would be achieved by a continued decline in the number of farms at a rate of 10 to 15 percent every 4 or 5 years for 15 or 20 years. If this is the case, or approximately so, then our task is to discover the alternative ways by which the agricultural economy can best reach the assumed equilibrium.

Crickman remarked that the adjustments are complex and varied depending on the structural changes needed in different farms. He placed some emphasis on the fact that farms in the Corn Belt and wheat regions have too little land rather than too much power and machinery. This clearly suggests that modern technology has changed the economies of scale and is giving some relative advantage to family farms that are considerably larger than the mean. This advantage apparently arises out of the fact that many technological developments have important secondary effects.

Robertson, in discussing "The Agricultural Production Plant," has pointed out the need for farmers to be able to choose among alternatives in modernizing enterprises and in selecting enterprises for modernization. Farmers who try to keep abreast of all technological changes at the same time encounter problems of obsolescence and capital rationing. Robertson suggests that our problem is to show how to choose among the major alternatives and how to select the most profitable enterprises on which to concentrate in the process of modernizing. He also points out that the process of selecting enterprises should include alternatives of off-farm employment. Robertson and Crickman agree that what will be appropriate or profitable to the innovator will depend on his resources and given situation.

In this connection some research effort on the decision-making process should begin with ways to identify major alternatives. Considerably more is lost to the individual and to society by failure to

identify the broad scope of alternatives than is lost through mistakes in management once the scope has been narrowed or is restricted to a given type of enterprise. Thus, considerable loss is suffered by farm youths who pass up major career opportunities either through wrong counseling, no counseling, or lack of vision on the part of themselves or their family. We have been woefully weak in career management and in the identification of major career opportunities as compared with our successes in farm management. This does not mean that the pinnacle has been reached in farm management or in production economics. Rather it suggests that the concept of management should be broadened — where this has not already been done — to cover all major alternatives of the members of the family.

In recent years production economists have made substantial progress in linear programming. The device is useful, given certain resource restrictions. Our problem now is to examine these restrictions and to develop new techniques for reaching the optimum solution when the bundle of resources is not fixed. Relationships are not linear when important economies of scale are involved. Production functions assume new shapes with technological improvements, and the problem becomes one of figuring out what new shapes are being developed and how resources can best be adjusted to new factor-product and factor-factor ratios.

The underlying assumption here is that increasing agricultural output is a continuing and basic objective of our work. Sherman Johnson points out that most innovations in agriculture have been output increasing. Shifts in production functions are not due to any one factor or technology alone, although technological advance is the only real shifter of the supply function. Thus the size of farm and the number of people in agriculture need to be changed continually if labor resources in agriculture are to receive rates comparable to those outside of agriculture. This suggests that research should concentrate on institutional changes required to adjust to technological change. As Haver points out, certain institutional rigidities must be overcome to facilitate adjustments in size of farm and in labor supply.

Jensen cites conclusions by Heady and others that farm technological advance has been output increasing and also cost increasing. If demand is inelastic and does not change, aggregate market receipts will be depressed and so will net income. I am not certain how costs are being calculated in this case as innovations must decrease average and marginal cost if they are to be adopted. They must be either factor saving or output increasing for the firm, or both; while for the industry they will be generally output increasing. The more important consideration, however, is a policy proposal for reallocating resources for technological research. Jensen suggests that research should be concentrated on commodities such as fruits, vegetables, and livestock, since this is where he expects the pinch to come first; and that research should be concentrated on cost-decreasing rather than output-increasing innovations.

Under perfect competition, which is the condition postulated for agricultural production, all innovations will increase aggregate output. Innovations, such as more efficient use of feed, that appear to be factor saving or cost decreasing in respect to the firm or to a segment of the industry, will result in economizing on given factors, thus lowering their supply price and contributing further to increases in output. Innovations have been output increasing and must continue to be. Heady clearly recognizes this in his paper on the labor force in relation to farm size, resource productivity, and output. The criterion for technological research is the relative probability of eventually increasing output from whatever product, factor, or combination; with the allocation of factors and products being guided by relative prices. Of course, research can be accelerated or delayed for income or welfare reasons. Increasing the output of wheat or cotton under current circumstances, for example, would just add to surplus stocks. This in no way invalidates the general proposition, however, that technological innovations will be output increasing for the industry and the test of research in this field is its contribution to increases in output.

Daly, Mehren, and Cochrane apparently agree on the estimate of demand expansion, i.e., that demand will probably be 20 percent larger by 1965 and 40 to 50 percent larger by 1975. Expanding the demand for farm products, however, is not the solution to the farm problem in the next decade. Our production potential is too large. Demand is, of course, important. But changes in demand alone will not be sufficient to bring returns to labor resources in agriculture that are equal to those outside of agriculture. To equalize labor returns between farm and nonfarm, extensive reorganization of units is required, and our job is to suggest how such adjustments can best be made.

RESEARCH ON POPULATION MOBILITY

The discussion by Bogholt of Parks' paper raises a fundamental proposition in respect to goals and values: i.e., that ends cannot be appraised without regard to means. Fewer and larger farms, for example, are not necessarily the correct goal of policy or cannot be adequately appraised as a policy goal without regard to the means for achieving this situation. Under certain conditions I would not hold this as a goal and would not contend that those who object to the goal are wrong. On the other hand, given a certain action program or a given type of situation in which this goal could be achieved voluntarily, the goal might be acceptable to a large majority. As I understand the discussion, Bogholt is right in asserting that the farmers' political mind is not an obstruction but rather a clear reflection of the values they hold and of their concepts of the programs or policies available for achieving various goals. Possibly many object to the goal of fewer and larger farms, for example, because the policies that they visualize in achieving this goal, or the situations for achieving it, are objectionable. Here

is a rather clear challenge to agricultural economists and others in the formulation of programs.

General reasons for the malfunctioning of the labor market have been rather clearly identified by Bishop, D. Gale Johnson, Sitterley, and Heady. People do not have enough information about alternatives and job opportunities; the information is not made available in a form easily translated into action; most people in rural areas are not well trained for alternative opportunities. As Baker points out, we are unanimous with respect to the need for migrations out of agriculture, both to increase the marginal productivity of labor in agriculture and to reduce the number of claimants. The solution, however, is not in moving marginal farm people to industry but in providing opportunities for greater mobility between farm and nonfarm employment.

In this connection we should lay much greater emphasis on the problems people have in migrating and how these problems have been met. We should team up with sociologists, political scientists, and others with the objective of determining how opportunities can be developed for greater mobility. What problems have people met when they migrated? Where have migrants gone? How have they integrated with the community? Mobility has been negatively associated with income. What steps should be taken with respect to education and the demands of the labor market in order to enhance mobility? Gale Johnson points out that the role of extension education should be to indicate to farm people the various alternatives available to them in their lifetime and that primary and secondary education is the real answer to the problem of mobility and readjustment. Given these basic needs and objectives, should we not team up with other social scientists to determine the educational needs of our time? Such research should be given high priority by some group. As Nesius points out, in addition to more and better primary and secondary education we need more information on lifetime earnings, and this information should be specific as of any given time. Employment agencies should be more skilled in locating and developing jobs for the individual. Loans and grants to finance education and to develop the abilities of the individual who is going to migrate should be a part of our policy.

THE CAPITAL PROBLEM

We are well aware of the fact that capital per farm has increased substantially. According to USDA estimates the investment per worker on "typical" family cash grain farms in the Corn Belt was about \$59,000 per worker in 1956 compared with about \$19,000 in 1940.¹ Family cotton farms in the Southern Piedmont averaged \$8,000 investment per worker in 1956 as compared with \$2,000 in 1940. In current dollars the average production assets used per farm worker has risen by 340

¹U. S. Department of Agriculture, Agricultural Outlook Charts, 1957, p. 17.

percent since 1940. In constant dollars the volume of resources per worker has increased by 70 percent.

One of the greatest needs in viewing the capital problem of agriculture is finding ways and means for financing efficient family-size farms. If capital per worker is about \$18,000 and if optimum sizes of farms are built around a two- or three-man unit, then an investment of \$40,000 or \$60,000 is the minimum as an average for efficient family farm operation. We need to know more about the risks involved in financing various sizes of units. We need to know more about the "quality" of credit among different types and sizes of production units. We need to determine the efficiency of various types of tenure in different situations. For years economists have been suggesting that agriculture requires a new source or method for supplying equity funds. Should we not explore more carefully how equity funds could be applied to agriculture? Certainly research in the capital market is one of our most urgent needs.

This conference has placed relatively little emphasis on the capital problem involved in establishing efficient family-sized units. Perhaps this is more appropriately considered as a problem in credit or finance. This is one of the most fundamental problems facing farm management workers, production economists, or agricultural economists in general.

OFF-FARM EARNINGS AND PART-TIME FARMING

As agriculture has advanced in technology the off-farm earnings of farm families has increased. In order to determine how farm people can maximize their total income we need to determine how they can best combine off-farm employment with a given farm unit. We have paid very little attention to the problem of designing the farm units to maximize off-farm labor opportunities. Here is a problem uniquely adapted to production economics research. Off-farm earnings of farm people are increasing and the problem is to maximize the over-all efficiency of the farm family in farm and nonfarm employment. Since 1949 the number of part-time and residential farms (Census Classes VII and VIII) has declined sharply. The number of farms in the middle income bracket with off-farm sources of income exceeding the return from the sale of farm products has increased. Apparently, part-time farming is losing its subsistence nature and is becoming more of a complementary enterprise to off-farm work. What are the possibilities for using part-time farming as a means to facilitate migration out of agriculture? Considerably more research could be concentrated on part-time farming as a means for creating greater mobility between farm and non-farm occupations.

PRODUCTION CONTROL AND SUPPORT PROGRAMS

The crux of the problem discussed in Brandow's paper is that, with our large production potential, agricultural income will be subject to

considerable downward pressure unless government programs are maintained at least in the immediate future. He suggests that one way to support farm income without stimulating overproduction is to support only a portion of the products raised by an individual farmer and to let the amount produced above this level move at market equilibrium prices. This suggestion has the merit of supporting farm income without increasing farm output. We should be aware, however, of the difficulty of carrying out such a policy in actual programs. As I have discussed elsewhere,² the effect of income payments will depend in part on how the funds are distributed. The possibilities appear to be: (1) If the income payments are made on the basis of current output as a supplement to market price, the output effect will be similar to that of price supports above market equilibrium levels. (2) If the payments are made on the basis of the previous output of the farm, their output effect will not be so great since they will not increase the value of the marginal product. Current farm income will be the sum of farm produce at existing market prices plus the income payment which is independent of current output. But the output effect likely will be positive, especially if farmers are unable otherwise to borrow or obtain all the funds they could profitably employ at going rates of interest, because the income payments will increase the funds available both for farm operation and family living. (3) If income payments are a combination of previous output plus some allowance for family living, the output effect likely will be still smaller since the less efficient farmers will receive a larger share than if payments were based entirely on production. (4) If income payments are based on a given output quota, this will have the least effect on output in the short run. However, if payments continue to be made, the tendency would be for this money to be used for increasing the production potential of the farm unit.

CONCLUSION

Within the professional lifetime of most of us assembled here, the agricultural plant of the United States will undergo a fundamental and far-reaching change. If agriculture becomes fully adjusted to the technological possibilities of this age, the number of farms in 1970 will probably be about half of the number existing in 1940. Production per man will be three or four times as large. Capital used per man in constant dollars will probably be at least double and in some cases three or four times as much as was used in 1940. If farm people are to reach a favorable income situation in a relatively free economy, the implications of this great technological breakthrough must be understood and appropriate adjustments made. Our task is to define this problem of readjustment, to discover the alternative ways in which the adjustment can be accomplished, and to develop our economic tools as an aid in the adjustment process. This is an important challenge, and we are fortunate to have the opportunity to work on it.

²Agricultural Policy of the United States, Prentice-Hall, 1953, pp. 323-24.