AGRICULTURAL ADJUSTMENT UNIT • UNIVERSITY OF NEWCASTLE UPON TYNE

The Elements of Agricultural Adjustment

S J Rogers

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THE AGRICULTURAL ADJUSTMENT UNIT

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In recent years the forces of change have been reshaping the whole economy and, in the process, the economic framework of our society has been subject to pressures from which the agricultural sector of the economy is not insulated. The rate of technical advance and innovation in agriculture has increased, generating inescapable economic forces. The organisation of production and marketing, as well as the social structure, come inevitably under stress.

In February 1966 the Agricultural Adjustment Unit was established within the Department of Agricultural Economics at the University of Newcastle upon Tyne. This was facilitated by a grant from the W. K. Kellogg Foundation at Battle Creek, Michigan, U.S.A. The purpose of the Unit is to collect and disseminate information concerning the changing role of agriculture in the British and Irish economies, in the belief that a better understanding of the problems and processes of change can lead to a smoother, less painful and more efficient adaptation to new conditions.

Publications

To achieve its major aim of disseminating information the Unit will be publishing a series of pamphlets, bulletins and books covering various aspects of agricultural adjustment. These publications will arise in a number of ways. They may report on special studies carried out by individuals; they may be the result of joint studies; they may be the reproduction of papers prepared in a particular context, but thought to be of more general interest.

The Unit would welcome comments on its publications and suggestions for future work. The Unit would also welcome approaches from other organisations and groups interested in the subject of agricultural adjustment. All such enquiries should be addressed to the Director of the Unit.

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THE ELEMENTS OF AGRICULTURAL ADJUSTMENT

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PREFACE

The economic environment of agriculture has changed substantially in the last twenty-five years. The food requirements of consumers have altered as standards of living and diets have improved. The distribution channels handling these products are still evolving, with the introduction of new marketing systems. On the production side the relative prices of the resources used in farming have altered and new systems of farming are transforming the industry. Nor is there any reason for supposing that the rate of change is lessening; quite the contrary.

In this situation the agricultural industry is under pressure to adjust its structure to the new conditions. To formulate policies which will facilitate adaptation, whether at the individual farm level or for the industry as a whole, it is necessary to understand the forces which are at work. In an attempt to identify and clarify these issues the Agricultural Adjustment Unit intends to produce a series of bulletins under the general heading 'Studies in Structural Change'. This bulletin 'The Elements of Agricultural Adjustment' is the introduction to this series. It describes the main economic, technical and social strands in the intricate weave of a changing industry. The objective is to provide a descriptive and logical framework within which subsequent bulletins can be fitted, rather than to recommend particular prescriptions. For while one must explore in some depth each separate facet of this complex matter, it is equally necessary to relate the parts to the whole and discuss the interactions between the variables.

JOHN ASHTON

Several groups of people are already engaged in preparing some of the subsequent bulletins in this series. A draft of this paper was, therefore, widely circulated and many helpful comments and criticisms were received and incorporated in the final version. This assistance is gratefully acknowledged; but can in no way be blamed for the remaining inadequacies, which must be the responsibility of the author.

THE ELEMENTS OF AGRICULTURAL ADJUSTMENT

Studies in Structural Change

S. J. ROGERS

The phrase 'structure of agriculture' is used in this bulletin in its widest sense. It embraces a whole complex of factors, not only the pattern of land use, but also the utilisation of other resources, manpower, capital and technology—including under this last heading research and development, education, training and advisory work. It also covers market structure, where co-operatives, marketing organisations, industries ancillary to agriculture and distribution networks are all relevant. Another essential element is the life of rural communities since these are affected by any changes in the economic standing of agriculture. This paper discusses these items in some detail in the above order but, first outlines some aspects of the demand for agricultural produce and the supply situation, where the technological revolution is a central theme.

The Demand for Agricultural Produce

British agriculture is primarily a food-producing industry. There are some commodities which have non-food uses, for example straw for thatching or packing, wool and flax, but the main outlet for British agriculture is likely to remain the food market.

The basic economic characteristic of the demand for food is that it is relatively inelastic in terms of both price and income. If additional quantities of produce are put onto the market, prices may fall to such an extent that the total revenue accruing to producers will be reduced.

A typical price elasticity of demand for food products is $-0{\cdot}5$, for which an increase in marketing of 10 per cent will be accompanied by a reduction in price of 20 per cent—thus reducing the total value of sales by about 12 per cent. Moreover, this calculation relates to the retail level and, when account is taken of distribution costs, demand at the farm-gate is likely to be even more inelastic. Income elasticity for food products is also relatively low, approximately $+0{\cdot}25$ at the retail level, so that when incomes rise by 3 per cent the additional spending on food is only $\frac{3}{4}$ per cent. Furthermore the spending switches towards higher quality produce, such as frozen or otherwise processed foods, where the 'agricultural' content of the final article is lower so that the farmers' share of the consumers' pound tends to decline. With an increasing population there is an automatic expansion in the demand for food, likely to be $\frac{1}{2}$–$\frac{3}{4}$ per cent per year providing income levels are maintained. There may also be a redistribution of income by welfare policies to people whose diet is thought to be inadequate as a result of low incomes and large families. This, again, provides an increase in the demand for food, but is likely to be of relatively small dimension.

There are three sources of supply which can compete to meet this relatively static demand, the British agricultural industry, overseas agricultural industries and finally non-agricultural foods.

Taking the last category first, the commercial development of non-agricultural and vegetable-based protein foods is in its infancy and it is difficult to predict its likely impact on the market. Already, non-sugar sweeteners are widely used both directly by consumers, but perhaps more importantly at present by food-processing industries. Then there has been the development of filled milk, with its extensive use in catering. In the U.S.A. demonstration meals have been prepared of spun-protein where the diners were completely deceived by the simulated meat and vegetables. Apart from the possibilities of direct competition, non-agricultural foods may affect the U.K. market in two ways. If some of the nutritional needs of the poor countries of the world are met from non-agricultural industries, agricultural resources will be liberated for competing in the food markets of richer countries. There may also be the possibility that synthetic foods may form a basis for livestock feeding, thus changing the balance of output required by a conventionally-based agriculture. These are long-run possibilities, however, and though they should not be ignored in the more distant future they are unlikely to have a significant bearing on the supply of food in the next decade.

TABLE 1

DOMESTIC PRODUCTION AND IMPORTS OF FOOD 1966–67

Commodity	*Unit*	*Domestic Production*	*Imports*
Fresh Milk	million gallons	1,738	—
Butter	'000 tons	32	445
Cheese	'000 tons	110	148
Cream	'000 tons	56	10
Other dairy products	'000 tons	400	95
Beef and Veal	'000 tons	852	316
Mutton and Lamb	'000 tons	263	338
Pork	'000 tons	572	7
Bacon and Ham	'000 tons	198	399
Poultry Meat	'000 tons	424	9
Eggs	million dozen equivalents	1,203	55
Wheat	'000 tons	3,420	4,110
Barley, Oats, Mixed Corn and Rye	'000 tons	9,792	222
Maize and Sorghum	'000 tons	—	3,830

Source: Cmnd. 3558 H.M.S.O. March 1968.

More immediately relevant is the second source of supplies, namely agricultural industries overseas. The balance between domestic supplies and imports is shown in Table 1.

In a system of free trade which admittedly has scarcely ever existed, the domestic producers' share of the market would be determined by the outcome of competition between suppliers, depending on natural advantage and resource costs, transport costs and marketing methods. But we do not live in a free trade system, and by manipulating tariffs, quotas and subsidies, or by entering into international agreements, governments have considerable powers to alter the domestic producers' share of the market. This being so, it is necessary to consider what criteria are applied by governments in making their decisions and what are the implications for the domestic farmer of current policy. The most important factor in the calculation should be the cost of the domestic product compared with cost of the import—in terms of the exports necessary to pay for the import; but this is not a simple or easy comparison to make. It is not the average cost level which is relevant, but the cost of producing the extra, or marginal output. Moreover, one must examine the cost of moving men and capital into or out of agriculture. As far as imports are concerned, prices are far from stable and in any calculation some prediction must be made about trends in world markets. Nor can such evaluations be made without taking account of currency exchange rates. The recent devaluation of the pound will affect cost and price relativities and, depending on the import and export elasticities, the balance of trade. Quite apart from the question of comparative costs in agriculture, import expansion or import contraction may generate reciprocal effects on British export markets. Finally, the British balance of payments difficulties strengthen the case for import-saving by agriculture in the short-run, whatever the merits in the long-run.

Entry into the European Economic Community would, under present Common Agricultural Policy, change the price of food to consumers, the cost structure of British agriculture and the prices of food imports. Such changes would affect the consumption pattern, the import pattern and the pattern of domestic agriculture. The ease with which the domestic industry could adapt to new conditions would depend on the government policies in the transition period. Assuming that this could take place without severe dislocation, entry into the Common Market would not affect materially the general argument presented in this paper, although there may be many details calling for amendment or qualification.

To summarise, the demand for food in the U.K. is relatively inelastic and likely to grow only slowly; although a policy of agricultural import-saving may create a somewhat faster rate of growth in the market open to British farmers. Long-run prospects are inevitably less expansionist as one moves nearer to self-sufficiency.

Finally, it must be noted that, despite the limited market for food in total, the situation facing the individual farmer is quite different. Normally, the individual farmer can expand his output without this having a noticeable effect on the prices he receives. This paradoxical situation, where an expansion in output may lose revenue for the industry as a whole, but provide greater revenue for the individual farm business, is one of the central features affecting agriculture and economic change.

Changing Conditions of Supply

Having discussed demand, the other side of the equation namely supply, can be examined. In addition to product prices the underlying factors affecting supply are firstly the relative prices of resources such as land, labour and capital which enter the production process and secondly the way in which they are combined—which involves management standards and the level of technology. Land, labour and capital are treated at greater length below, but here it can be observed that, as an economy becomes wealthier, wages and salaries rise, so that labour costs become higher, while at the same time capital tends to become relatively cheaper in real terms. In response to this change in relative factor-prices, there is a natural tendency for labour to be replaced by capital and the resultant business structure will have a higher capital/labour ratio.

There have been substantial technical advances which have had a profound effect on the supply situation. These advances can be described in scientific or physical terms, but they also have economic characteristics and it is these which are of interest here. In the first place technical progress has reinforced the pressures which have arisen from changing factor prices, and efficient farm units require increased ratios of capital/labour and land/labour. There has been a continued increase in the 'bought-in' resources on the farm—for example fertilisers and machinery. The change in the land/labour ratio has been evidenced nationally over the past fifteen years, in the declining labour force associated with an approximately constant acreage. The second economic characteristic has been that most improvements have reduced unit costs by increasing output, rather than (or sometimes, as well as), by cutting down on inputs. Thirdly, the new techniques have provided economies of scale for larger farm businesses. In the older systems of farming the production unit was based on a team of horses or a team of men and to increase production entailed the simple multiplication of these units (and there may even have been disadvantages in managing the larger business). The new systems can be very different and a larger size of enterprise may mean moving into a range of larger equipment, with little increase in manpower although the quality of skills demanded may alter. One way of achieving economies of scale in an enterprise has been for farms to specialise. Scientific developments have enabled more intensive and specialist farming systems to be developed and much improvement in

efficiency has been achieved in this way, without necessarily involving changes in the acreage of farms. Nevertheless, accepting that there may be technically efficient small farmers and technically inefficient large farmers, larger farm businesses can achieve lower unit costs than smaller farms.

There is no theoretical reason why new technology has to have the characteristics described above and individual cases can be cited in contradiction of some or all of the conditions described. But in general, progress in agricultural and non-agricultural technology has been labour saving, capital using, output increasing and favouring the larger size of business. In non-agricultural sectors it may be possible to increase the size of the industry and enlarge the market, but for agriculture (and for some non-agricultural sectors) the pressures for expansion face the limitations of demand described in the preceding section and give rise to the need for major structural change.

Before turning to the need for such change there are two subjects to be mentioned relating to changing technology. The first of these concerns the managerial input. Compared with traditional systems of farming, new methods call for a different managerial input, not necessarily more skilful overall, but requiring a greater understanding of scientific and technical matters, also demanding more attention to the minutiae of husbandry, pest and disease control. With more of the environment under control and with more intensive systems of production, the penalties of ignorant or incompetent management are greater. In addition, because technical progress continues at a rapid rate, management must possess the facility of taking up new ideas and adapting the farming systems accordingly. In a word, farm management is necessarily becoming disciplined and scientific.

The other observation is that, although some elements of technical improvement are fortuitous and some the results of individual farmers' innovations, much of the advance is the result of purposive investment in research and development, education, training and advisory services by government and industry. More than £50m. was spent in the U.K. in 1965/66 for these purposes, which can be grouped together under the heading Intellectual Investment and of this some £37m. was government financed. It is important that this spending should be appropriate to the needs of industry, there being dangers in both too much innovation (which may be beyond the capacity of the industry to absorb) and too little (which may lead to stagnation). Within the total intellectual investment one needs a balance in the allocation of resources, so that, for example, there is not too much fundamental research and too little developmental research, or an imbalance between research and advisory effort. In view of its relevance to economic development, these various services cannot be omitted from any consideration of structural change and adaptation of agriculture.

The Interaction of the Forces of Demand and Supply

By adopting new methods of production and investing new capital at the rate of £100m.—£200m. a year, the agricultural industry has over 15 years increased its net output at the rate of 3 per cent per annum. This additional output has made Britain more self-sufficient in food. However, it is most unlikely that such a rate of expansion could be accommodated indefinitely at current prices. To be realistic, commercial export possibilities are unlikely to be significant. The long-run market then, is likely to have a demand with limited growth confronting a potentially expanding supply, which will inevitably bring about pressure for reduced prices. The incidence of lower prices may be masked either by inflation of other prices or by rising government subsidies, but will nevertheless cause difficulties and could reduce agricultural incomes. To improve overall efficiency in a situation of this type, an economic environment is required which is sufficiently favourable for the efficient farms to expand and innovate, but so comparatively unfavourable to the remainder that they are persuaded to cut back production, or withdraw from the industry, so that any resultant increase in output is within the bounds of any expansion of demand.

Agriculture is an industry comprising many business units of a wide variation in size and type. This variation, of itself, may lead to differing response to economic pressures by the different sectors of the industry. The small farmer may own outright his land, livestock and buildings and may use no labour other than his own or his family's so that he has very small cash outgoings. Contrast this with the large tenant farmer, who has recently acquired and stocked a farm borrowing money in the process and has a hired labour force. Although the latter may have lower real average total costs he may have higher cash outgoings. In this situation it is the small farmer who can best survive major price reductions, which could ruin his 'more efficient' neighbour.

The situation is further complicated by the fact that land is one of the major factors of production. Land which may have sold for £20 per acre in 1935 and £150 per acre in 1955 might realise £250 per acre today. The time when a farmer acquired his land and the way in which the purchase was financed are major factors determining current cost levels and thus the degree of pressure he is under from a particular price regime. Furthermore the ownership of land, by providing the opportunity of a capital gain and relief from death duties, can be regarded as a source of income—apart from its role in the production process.

Faced with these differences in economic circumstances some farmers are more at liberty than people in other occupations to pursue non-monetary goals in the running of their businesses and may be more interested in a 'way-of-life' or in the sporting amenities of the countryside than in maximising income from commercial

farming. These non-pecuniary aspirations may lead to differing reactions to a common economic stimulus.

For this complex of reasons, therefore, it is most unlikely that any system based on freely determined market prices will create the desired economic environment. It is much more probable that it would provide a set of prices too low to encourage innovation and investment—a stagnant industry—and not low enough to drive out the less efficient, who can tighten their belts and survive, possibly from an awareness of the rather dismal prospects facing them in alternative occupations. Under these conditions agriculture would revert to being a depressed industry with low incomes. It is the appreciation of this prospect, coupled with the recognition by governments of the inherent instability of agricultural prices and the limited extent to which producers can regulate output, which has led to the almost universal intervention by governments in agricultural affairs. This is particularly true in the case of developed economies, whether it be in the predominantly industrial countries of Europe and the U.S.A. or in the more agricultural economies of Australia and New Zealand.

Not only have these considerations a wide agricultural application, but they are also pertinent, at least in general terms, to the problems of many other sectors of the economy. In Britain one can cite retailing, coal and textiles as examples. The basic ingredients are: a demand pattern which is expanding more slowly than that required to accommodate the increased supply from a changing technology within the existing structure of the industry, coupled with inadequate mobility of men and management or poor alternative opportunities available to them. Furthermore, the process of change is discontinuous, with discrete packets of technology. This presents difficulties in that firstly change is difficult to forecast and secondly it may call for massive shifts in resource use in a very short time.

Government Intervention

The acceptance of the need for government intervention is not the end of the matter for it opens up a range of new issues. It becomes necessary to determine the objectives of policy, when these have to accommodate divergent, and often conflicting, interests. Then there is the choice of the particular measure, when there are several possibilities, each of which will have advantages and disadvantages, not only directly related to the achievement of policy objectives, but also secondary effects, which may reinforce or may counteract the primary effect. For example, abating death duties on land may enable land-owners to preserve estates or single farms intact, but it may also force up the price of land so that amalgamation of farms becomes more difficult and with rising values, capital gains tax and the lower rate of death duty may still lead to the break up of estates. In this way what appears to be a straightforward purposeful policy may, in the event, be self-defeating. More generally one must look at the measures for relieving hardship

or protecting interests to establish how far they may militate against increasing efficiency.

It is not unfair to say that government policy for U.K. agriculture has only recently included any explicit recognition of structural change within the industry as a goal. In 1957 the Small Farm Scheme, by putting a minimum size on the holdings which would be assisted, recognised the size-issue for the first time. But in the main, policies have been concerned with domestic prices, and import agreements concerning the share of the market. The Agriculture Act 1967 has broken new ground and enables amalgamation grants, and retirement annuities or lump sums to be given and, in upland areas with difficult structural problems, enables Rural Development Boards to be established with special responsibilities and powers to improve farm structure in harmony with recreation, forestry and other uses of land. It is too early to predict the likely effects of the new Act, which in any case must be considered within the wider context of price policy and general taxation policy, but one task facing those giving advice to Government, whether officially or gratuitously is to examine the implications of the relevant policies and to determine how far what is being achieved is what is intended.

The remainder of this bulletin discusses in turn the major elements which would have to enter any such appraisal. After a discussion of farm income and farm size, land and capital are considered separately; then there is a section dealing with aspects beyond the farm-gate; it is followed by some comments on rural communities. It will become evident that on many topics information is inadequate and one of the main findings of this bulletin is that more knowledge is called for if meaningful policy criticisms and proposals are to be made.

Farm Incomes and Farm Size

From the farmers' point of view the agricultural adjustment problem is one of maintaining or increasing income in changing conditions. There are several courses of action which could be advocated. The most direct would be to increase income by giving farmers higher returns by manipulating consumer prices and agricultural subsidies; such a policy would have to take account of the question of imports, the possibility of generating agricultural surpluses and the reaction of the tax-payer and consumer. By improving marketing methods it might be possible for farmers to obtain higher rewards without raising prices in the shops. There have been moves in this field, with the development of vertical integration and contract farming, but it must be borne in mind that the distributive trades are highly competitive and that the potential gains here are comparatively small. Then there may be ways of improving on-farm efficiency, but in most cases these improvements will increase output and therefore reduce prices and total agricultural revenue. Finally one could consider reducing the number of farmers among whom agricultural income has to be divided, ie. structural reform. These

measures are not, of course, mutually exclusive and one would expect farmers' organisations to be pressing for action on most of them. On examination it appears that the possibility of restructuring the industry offers, in terms of income potential and economic efficiency, the best chance of long-run viability in a consumer-oriented society.*

An individual farmer, facing pressure on income,† may just continue in his present ways accepting his lower standard of living. More positively a farmer may react by reducing his costs and/or increasing the size of his business. In general, he will produce more, will require more capital and may require more land. As an alternative, a farmer may decide to quit farming either completely or in part, by giving up the farm, or by farming part-time. In reaching decisions, the farmer will consider not only his farm, but his general economic and social environment. Not least of the factors will be his taxation position, which although it is given but scant attention here is clearly of considerable importance. The summation of expansionist and contractionist activities over the country as a whole will affect total output, the demand for land and capital, the number of farmers and average

TABLE 2

THE CLASSIFICATION OF U.K. FARMS (JUNE 1965)

Class	*Standard Man-days*	*No. of farms*	*% of S.M.D. [an indication of output]*	*Normal‡ range of Average Net Farm Incomes*
Large Commercial	1,200 or more	41,900	47	£2,500+
Small Commercial	600–1,199	66,600	26	£1,500 – £2,000
Small	275–599	96,400	19	less than £1,000
Part-time	under 275	201,400	8	—
Total	—	406,300	100%	

‡ With wide variations between types of farm.

Source: The Structures of Agriculture, H.M.S.O., 1966.

* In September 1967, before the Community's Economic & Social Committee the Vice-President of Commission of E.E.C. observed that a policy which affects only markets and prices cannot achieve a fair standard of living in a reasonable time and the only way was to modify the structure of agriculture (this was, admittedly, in a different situation).

† Table 2, above, shows a wide variation in farm incomes. While it may be true that income pressure on £5,000 per year may bite less severely than on £1,000, it is by no means certain that the higher-income farmer will be less responsive, when he may be much better placed in terms of capital and managerial ability to undertake an expansion programme, and more sensitive about the return on his capital.

size of farm business. In this way the process of structural change takes place continually, but its total effect depends upon the economic and institutional environment. These items should therefore be examined to see their effect on the current situation and rate of change.

The net reduction in the number of full-time farmers (i.e. retirements less new entrants) has been between 2,000 and 3,000 a year, although this rate may have accelerated recently. In 1966 the total number of farmers was 205,000. But the total is not comprised of a homogeneous set of farmers. Types of farming vary over the country, but more important are the variations in farm size and farm income. Table 2 gives the breakdown of the industry by size of business and average net farm income.

Those holdings with less than 600 S.M.D.'s are for the most part said to be too small to provide a reasonable living for the full-time farmer. One can therefore assert that policies hitherto have been inadequate if farm income were taken to be the main criterion. Some 27 per cent of output comes from farms of non-commercial size, and other things being equal, the industry would have to be restructured with perhaps 50,000 less full-time farms, if an income criterion were to be met.

Having established that there is room for, and need for, structural improvement, both to enhance farm incomes and to increase economic efficiency, it is necessary, before considering the process of structural reform, to look at the several inter-related aspects.

Farmers' Mobility

The number of farmers alters year by year depending on the balance of new entrants and retirements. These two categories can be dealt with separately, but before doing so a word is called for on the different tenurial arrangements under which farms can be held. A tenancy may not allow a farmer the option of becoming part-time or reducing his acreage; equally an expansion of size of business and acreage will depend on the attitude of the landlord and possibly the longevity of adjacent tenant farmers, although a tenant always has the option of buying additional land, if the land and finance are available. On the other hand once a tenancy falls in, it is an easy matter for the landlord to restructure his estate—either by taking the farm in hand or reletting it to a nearby tenant. A tenant-farmer may be reluctant to give up farming altogether, when his capital is limited and capable of earning more in the business than in other investments. The owner-occupier is freer to acquire or dispose of land providing he has no embarrassing constraints, but may find the purchase of freehold land beyond his financial capacity. He may also be reluctant to sell land, when there is a prospect of a capital gain. Any consideration of farmer mobility cannot, therefore, ignore the land tenure situation,

or the historic fact that in Britain as compared with say the U.S.A. tenant farmers and owner-occupiers have been relatively immobile.

Mention has already been made of the differences in aspirations and objectives of farmers and there may be factors influencing farmers' retirement. Among them may be the desire to be one's own master. In few industrial or commercial sectors is there a similar opportunity to be self-employed. Apart from these influences there are several more directly economic factors which may inhibit farmers' retirement. The giving of assurances by Government about the future of agriculture may, by providing a favourable economic picture, slow down the rate of exodus. There is the possession of the farm-house which may be a considerable asset. As in the case of the farm worker, farmers are often ill-suited to the alternative occupations which may exist. When it comes to complete retirement a farmer may consider his capital inadequate to sustain the required standard of living.

Under the Agriculture Act of 1967 small* farmers who are prepared to allow their holdings to be amalgamated may receive a grant or an annuity, in addition to the proceeds from the sale of their agricultural assets. Rural Development Boards will have powers enabling them to purchase any land put onto the market except where the proposed transfer is between close relatives. To the extent that these measures are effective they will, by reducing the number of farms, cut the rate of recruitment of farmers. Whilst the effect of this on total numbers may be small, it might have a large proportionate effect on recruitment of new farmers resulting in a later imbalance in the age structure of the farming population. On the other hand to the extent that the measures are successful in promoting some acceleration in retirement, overall age structure may not be worsened. The outcome depends on the time span one is considering.

The other side of the coin is the new entrant to farming. Here again there are a range of types. The most common is the farmer's son, who takes over upon his father's retirement or death. But there are farm workers and farm managers who are also capable—in terms of finance and management—of becoming farmers. There are also those who enter from a non-agricultural background, who may or may not have plenty of capital, may be serious commercial farmers or hobby farmers.

There are several automatic deterrents facing potential farmers. Fewer tenancies are coming onto the market and they tend to be for larger acreages, so that—as with owner-occupation—the capital requirement may be substantial. On the other hand, there is nothing to prevent land fragmentation and there is still talk of a 'farming ladder' where by diligence one can build up from next-to-nothing.

*Small is defined as an uncommercial holding under present management which is capable of providing at least 100 man-days work in the year. A grant is payable only where non-farm income is less than £400 or does not exceed ⅓ of his total income.

There may be a need for an educational programme pointing out the pitfalls of such arguments, but it might be questioned whether education by itself is enough. In some parts of Sweden, where farm structure is particularly poor, 'concentrated rationalisation' programmes have been initiated. These seek to encourage farmers through group discussions and meetings to consider the possibilities of leaving agriculture. As these measures have been in operation at the same time as others, including retraining assistance and help with moving costs, it is difficult to estimate the importance of their effect. Studies of farmers' adoption of new practices suggest that the demonstration effect can be important; this may be equally true within a comprehensive structural programme.

There are, then, a number of factors affecting the retirement and recruitment of farmers, where it is possible for the government to take action in order to facilitate structural change, but since land occupancy is an integral part of the issue, there is merit in considering both aspects together.

Land

The farmer who wants to expand his size of business will need additional capital. For several types of farming system, much of this capital will be used to acquire additional land rather than to buy machinery, buildings and livestock. This will not be the case for intensive pig and poultry enterprises and may only apply to a limited extent to dairying and some types of beef and sheep production, where intensification of grassland management may be possible. But for arable farming and more extensive grazing systems increase in business-size involves augmenting farm-acreage. Although there is generally a free market in land, there are also a series of legal, taxation, institutional and social factors which influence the way in which this market operates. It may therefore, affect the pace of structural change in land occupancy.

In the landlord/tenant sector landlords presumably stand to gain either by amalgamation of tenanted farms to reduce maintenance cost and eventually permit higher rents or by taking the land in hand. Offsetting any preference of the landlord for reducing the number of tenancies is the security of tenure afforded to the tenant—which may encourage the individual to contemplate long-term improvements, but may also slow down the rate of structural change. Landlords may also resist amalgamation of tenancies for social reasons, for example, feeling that the son of an existing good tenant should be found a farm on the estate if possible.

In the owner-occupier sector, apart from the desire of farmers to continue in agriculture which was referred to in the previous section, there are several economic determinants of land value which are not directly related to its use in commercial farming. There is the amenity value of land including sporting rights. There is the

death duty abatement, where a 45 per cent rebate is given on the value of land and some other items in the estate of a deceased person. This gives land an enhanced value to those with wealth who wish to hand a major proportion of their assets to their descendants. There is the possibility of capital gain, either because of generally rising agricultural land values, or more dramatically for mineral workings or urban development.

Even within commercial farming there are additional items to be taken into account. The combination of technical change and continued government support has materially reduced the risks in farming, so that one would expect a lower rate of interest, which for a given income would be reflected in a higher capital value. Finally, a particular block of land may have a very high marginal value to neighbouring farmers, both because its proximity enables the land to be worked with existing capital equipment and also because the likelihood of another nearby tract of land becoming available is fairly remote. For this mixed set of reasons the value of land may not be directly determined by its value in commercial farming and any attempt to increase farm acreage to improve commercial farming efficiency may be correspondingly penalised.

On the other side of the coin we can note that there are very limited powers at present to prevent land fragmentation, which may meet the immediate demand for small farms, but may give rise to long-term disadvantages. Existing policies include changes in the land tenure arrangements introduced by the Agricultural Act, 1958. Under the 1967 Act assistance with amalgamation and retirement can be given and, in the upland areas, it is possible to establish Rural Development Boards, with wide powers. But it may be that additional policy measures will be required if it is thought that improvement in the structure of land occupancy is not proceeding at a sufficiently rapid rate, and it can be noted that new tenurial arrangements are already being developed to meet changing circumstances. There are the production groups which represent a co-operative form of farming. There is also growing interest in partnership agreements, where if the land owner can claim his return as earned income he will reduce his tax liability and have a more direct interest in the profitability of the farm. These are also lease-back agreements.

It would be a major aside to embark at this point on an evaluation of the state of knowledge on this subject, with some assessment of the research needs, but at a minimum one would ask for a classification of the way in which land has been changing hands, some definition of the parties to the transactions (e.g. how many new entrants to farming have taken over from retiring farmers) and also how these transactions have been financed. Such studies would have to take as a starting point that land is a particular form of capital investment and would have to examine the land situation within the total context of capital in agriculture.

Capital

The changes which have occurred in the desirable ratio of capital/labour and in the economies of scale have dictated a substantial increase in the capital requirement of the individual farm business. This can be exemplified by considering dairying. In the pre-war days of hand-milking one man managing fifteen cows on forty acres of grass might be employing (at today's values) £9,000 of land and buildings plus £2,500 for stock, machinery and working capital, a total of less than £12,000. Currently, one man on a hundred acres machine milking sixty-five cows might be using £25,000 and £11,000 respectively, or more than three times the capital of the older technology. The tendencies for capital requirements to increase in the future are fairly strongly indicated. Thus one can ask whether adequate supplies of funds are likely to be forthcoming and if not, whether a shortfall of capital would slow down progress materially. If so it suggests a case for government intervention.

In looking at the industry in total there would appear to be a satisfactory equity structure, as shown by Table 3.

TABLE 3

THE ASSET STRUCTURE OF U.K. AGRICULTURE 1965

	£m.
Landlords' capital in land and buildings	6,500m.
Tenants' capital in livestock, crops, machinery, stocks of feed, etc.	2,700m.
Total assets	9,200m.
Indebtedness	
Clearing Banks	504m.
Relative and private mortgages	460m.
Merchants	130m.
A.M.C.	84m.
Others	30m.
Total liabilities	1,208m.
Equity	7,992m.

Source: C. I. C. Bosanquet—Investment in Agriculture, *J.A.E.* 1967 Presidential Address, revised.

Now that more than half the total number of farmers are owner-occupiers, the distinction between landlord and tenant capital is somewhat artificial. Bearing this qualification in mind, the return on landlords' capital (excluding capital gains and other possible benefits) may be some 2–3 per cent p.a., while the return on tenants' capital is currently of the order of 14 per cent p.a.

In broad terms there would seem to be ample resources against which to borrow capital and, on the tenants' side, a reasonable earning power to service the debt. However, the overall picture of credit-worthiness may not be the whole story. To begin with, farmers may be reluctant to borrow capital and may insist on creating capital out of income, in which case one must rely on the surplus of income remaining after paying tax and after meeting normal living expenses. Even where farmers are prepared to borrow, there may be problems at the level of the individual farm business. For example, an owner-occupier borrowing at 8 per cent half of the capital required for the purchase of land and buildings may find that some of the return to tenants' capital is required to service this debt on landlords' capital. Alternatively, a section of the industry most in need of structural change and capital injection may be the least well placed—in terms of current net worth and current net income—to attract and service the necessary loans. It is therefore necessary to look at different sizes and types of farm, in various asset situations, to determine as accurately as possible the requirements for additional capital and whether they are likely to be met by existing arrangements.

Labour

A consequence of the continuing increase in the optimum ratios of capital/labour and land/labour has been the reduction of the agricultural labour force in the U.K., from 938,000 man-equivalents in 1955 to 731,000 in 1965, a decline of about 2 per cent per annum. Over the same decade net output increased so that crude labour productivity has risen by some 5 per cent per annum. In part this has been possible because of better production methods, but to a large extent it is due to the considerable investment of capital. Inevitably, with increasing output and changing factor proportions, the factor which is declining shows high productivity gains, but it is misleading to attempt to draw conclusions from such figures of crude productivity gain to argue in favour either of a slowing up or an acceleration of the migration of labour from agriculture.

The size of the labour force in an industry is the outcome of several forces, the demand of that industry for labour (in terms of willingness to pay) compared with that of competing industries and the attitudes of workers to the conditions of life which that occupation seems to offer relative to others. When an industry's

requirement is reduced it is less willing to pay high wages, recruits at a lower level and may lay off workers. The resultant surplus labour finds employment elsewhere. In this way a labour force is assumed to adjust to an industry's requirements. In practice there are several reasons why the adjustment may not proceed smoothly.

Quite often farmers are reluctant to dismiss loyal hands, even when surplus to current requirements and are prepared to retain their services until the workers leave voluntarily or reach retirement age.

If the farm-worker is to move easily out of agriculture, perhaps the most important pre-condition is that the region in which he is living should be economically buoyant, so that there are, in fact, alternative employment opportunities for him. But even when there are such opportunities the move may not be easy. The high cost of urban housing relative to rural housing, may present a serious financial obstacle to migration. It may, of course, be possible for the workers to change jobs without moving house. Many redundant agricultural workers may be unsuited for the opportunities available to them because of age or lack of training. Retraining provision, although it exists, is relatively scarce and not always appropriate. The existence of opportunities and the suitability of the worker are not enough. He must be aware of the prospects before him. The farming community, particularly in non-industrial areas has been relatively self-contained and inward looking. It is possible that the advent of television, by revealing the supposed delights of urban living, has been a major contributory factor facilitating rural emigration.

The size of agriculture's labour force is the product of new entries, migrants and retirements. In general, agriculture recruits heavily from the under-21 age group many of whom are living at home in country areas. It loses a high proportion of these workers in their twenties and then has a low out-migration until retirement. A weakness of this system is that the workers leaving agriculture in their twenties are normally destined for unskilled or semi-skilled jobs in other sectors because their years in agriculture were at the time when industrial training would usually have been available. Also this system of over-recruitment and early movement from agriculture produces an odd age structure. Up to a point such a pattern of employment may make it easier to adjust the size of the total labour force. By reducing the recruitment rate a fast rundown of labour may be achieved. Although this may provide an appropriate reduction in the number of bodies engaged in agriculture one can question whether it will leave adequate numbers possessing the new skills required by modern methods. Furthermore the required rate of rundown of labour may be too fast for it to be met solely by curtailing recruitment and allowing normal retirement.

There are existing government provisions to help mobility, to provide re-training, and to ease the hardship of redundancy. There is, then already considerable intervention in the labour market, but a detailed examination might suggest that this may be inadequate in some respects and that there is not yet an appreciation of the importance of mobility and efficient deployment of manpower.

The Long-run

So far in the discussion of the on-farms issue attention has been focussed on the short-run aspects, but some consideration of the long-run is also necessary. With today's technology the reasonably sized family dairy farm is using £35–40,000 of capital (at current values). On a similar basis one might assess the capital in a 300 acre arable farm at £100,000 and a 60-sow pig-farm at £30,000. Capital requirements are likely to increase over the years and one must ask whether it will be realistic in the future, to link a working farmer on the one hand and on the other a capital input which would produce a handsome unearned income. In other words, is a capital intensive agricultural economy based on the family farm a viable long-run concept? As an alternative possibility, one might examine the prospects of company farming, joint-stock ventures and the like. The merits and demerits of alternative long-run structures must take into account economic and non-economic arguments. But, and this is the main point, the present economic, taxation, legal and political environment is, deliberately or otherwise, influencing both the direction and the pace of evolution of agricultural structure. To the extent that one can establish long-run objectives and foresee emerging difficulties, so can improved policies be recommended.

Market Structure

As an alternative to structural reform at the individual farm level, it may be possible to achieve most of the economies of scale necessary for prosperity in agriculture by group action on the part of farmers. There are several organisational possibilities; there is the production group where the whole programme for the farmers in the group is planned and implemented under centralised management; there are marketing groups; there is the formal agricultural co-operative, supplying requisites and performing marketing functions; there is the vertically integrated operation, often controlled by firms in the processing and distribution industries, where farmers operate under contract. By taking advantage of the economies offered by these systems, it is argued, the need for changing the size of the individual farms can be reduced. This assertion depends for its validity on the managerial ability within the group or co-operative project and the potential economies of scale which are available. The necessity for competent management is self-evident. Regarding economies of scale, it can be noted that, for many types of joint action,

while it may be true that farmers within a co-operative organisation are better placed than those outside, it may be equally true that—within the organisation—large farmers still have a considerable advantage over small farmers. That is to say co-operative action may ameliorate the condition of the under-sized farm, but possibly not to the extent of being a substitute for structural reform of production units. There are, nevertheless, advantages to be gained by improving marketing methods.

In this connection, one must take into account the role of the marketing boards, many of which were established to meet the needs of the industry at an earlier date and with objectives which did not then recognise the forces for structural change. It is not unreasonable to suppose that the fundamental changes in agriculture require an adaptation in objectives and operational methods of marketing boards, which may call for some amendment in their legal and constitutional framework. This comment could be applied with equal force to the array of institutional bodies, official and unofficial, with varying degrees of autonomy, which impinge on agriculture.

The ancillary industries (i.e. those who sell to, and buy from, agriculture) have been facing similar pressures and are having to make similar structural adjustments. New methods of producing fertilisers call for large-scale plants. The feeding-stuffs industry is having to accommodate the substantial increase in the domestic supply of coarse grain and at the same time assimilate new technology. On the retail distribution side, the growth of supermarkets and the movement of chain stores into the food market have changed both the nature of the marketed product (in favour of washing, grading and prepacking) and also the distribution network itself, since these organisations often seek contracts direct with farmers or farmers' organisations. Developments in the ancillary industries have had, and may increasingly have, an effect on farming programmes, the pattern of enterprises, the methods of production and the methods of disposal. Moreover, the ancillary industries are becoming involved in the vertical integration process. Feedingstuffs firms enter the livestock production and marketing fields. Distribution and marketing firms may enter production and even animal breeding fields. These processes of vertical integration may take the form of a direct entry into the new field or may result in a series of contractual agreements between the different stages in the production-distribution network. Under such conditions the concept of agriculture as a separate, unique industry becomes meaningless and one must think of a redefinition in terms of the production and distribution of food, in which the agricultural production system is but one part of an organic whole.

In recent years increasing attention has been paid by the agricultural industry and by government to the marketing aspects. It is clear that changing market structure and marketing reform are essential elements in the agricultural adjustment process, just as necessary as any consideration of farm structure.

Rural communities

There are still many parts of the U.K. where agriculture is the dominant industry, where changes in the agricultural work-force, its numbers and its earnings, have a direct and noticeable effect on the rural community. In some areas a growing commuting population may lessen the impact; in others there may be an influx of retired people; occasionally the development of countryside recreational amenities may be taking place. It is therefore, impossible to generalise about the effects of the rundown of the agricultural work-force on rural communities. Nevertheless, in many areas the effects are very apparent. It is not simply the population numbers which are reduced; the age distribution is affected, income levels are altered. The requirements of this smaller community change and may affect the appropriateness of social services like education and health and of public utilities like transport or electricity. Voluntary bodies, churches, youth organisations and clubs, may find their membership reduced and a new pattern of needs emerging.

Not surprisingly these effects on communities are detected at the local level, often with great concern. However, remedial action to counteract the undesirable consequences of change (and the consequences are not all undesirable), is not always easy and calls for an appropriate diagnosis of the causes of the present situation and the likely trends in the future. In seeking solutions it may be necessary to think of new methods of providing social services in rural areas and new methods of financing them. Agricultural policy, as implemented hitherto in the U.K. has been mostly concerned with the agricultural industry rather than with the social condition of the rural areas. It may be more relevant to today's circumstances to widen the scope of these policies, so that they legislate for rural communities, which perforce are directly affected by the changes taking place in agriculture, so that—by taking account of these indirect effects—change can be accommodated with less social stress.

Conclusion

Economic, technical and social forces have put the agricultural industry under pressure to adapt its structure. These forces are likely to continue, so that one cannot expect any future period of stability, but rather a continuous process of change. There are good reasons for supposing that the adaptation to new conditions, if left to a free market system may be both too slow and also too painful to be acceptable, by today's criteria of economic progress and social welfare. In any case it is politically unrealistic to expect any major move towards laisser faire and there is likely to be continued government intervention. For such intervention to be effective and acceptable, interested parties must recognise overtly what is taking place.

Agricultural adjustment is complex, involving not only farming, but the infrastructure within which agriculture operates. The variables to be considered are inter-related in such a way that looking at any one factor in isolation can be misleading. In some instances there may be direct conflict of interest between one group and another. The evolution of policies is therefore likely to be slow. Nevertheless two principles can be enunciated. The first is that the primary objective should be the improvement of the economic efficiency of the industry, by facilitating change and mitigating hardship, and not a slowing-up operation, which by attempting to preserve an untenable status quo, simply postpones difficult decisions and increases the size of any future problem. The second principle is to admit that insufficient is known about agricultural adjustment, to undertake a more systematic research programme in this field, and to disseminate the findings and recommendations of such research in order that there is a better basis for public decision.

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