

# STRUCTURAL CHANGE AND PUBLIC POLICIES IN EU AGRICULTURE: AN OVERVIEW

**David Blandford and Berkeley Hill**  
The Pennsylvania State University  
[dblandford@psu.edu](mailto:dblandford@psu.edu)  
Imperial College, London  
[b.hill@imperial.ac.uk](mailto:b.hill@imperial.ac.uk)



*Paper prepared for presentation at the XI<sup>th</sup> Congress of the EAAE*  
*(European Association of Agricultural Economists),*  
*'The Future of Europe in the Global Agri-Food System',*  
*Copenhagen, Denmark, August 24-27, 2005*

*Copyright 2005 by D. Blandford and B. Hill. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.*

# STRUCTURAL CHANGE AND PUBLIC POLICIES IN EU AGRICULTURE: AN OVERVIEW

David Blandford and Berkeley Hill<sup>1</sup>

## Abstract

Substantial structural change is taking place in EU agriculture. Average farm size is increasing and labour is continuing to move out of the sector. Slow growth in food demand and the effects of technological change on supply are likely to exert downward pressure on real agricultural prices. Within this context, policies at the EU and national levels will have mixed effects on economic adaptation and structural change. There is considerable uncertainty about the long-run viability of the so-called European model of agriculture, particularly given the intensification of pressures for change through economic globalisation.

**Keywords:** Agriculture, structure, policy, EU, globalization

## Introduction

The viability of European agriculture is crucially dependent on its ability to adapt to economic forces. In recent years increasing stress has been placed on the broader contribution that agriculture makes to society, beyond the production of food. In this paper we examine recent structural changes in EU15 agriculture, their driving forces, and how public policies may affect future change.

## Analysing the Structural Characteristics of EU Agriculture

The structure of agriculture can be portrayed in various ways, for example, the composition of output, input characteristics (such as land use), types of farming process (e.g., organic or non-organic systems) or marketing channels employed. Changes in these characteristics may have important economic, environmental and social implications, but they provide limited insight into the sustainability of agriculture over the longer term. For that purpose, the focus must be on the institutional units in which production takes place – the firms responsible for bringing together the land, labour and capital that, when combined with other inputs, results in the production of agricultural goods and services. The usual way of describing agriculture's structure at this level is in terms of the number of farms, their size distributions, and their economic characteristics.

The primary source of data on farm structure is the EU's Farm Structure Survey (FSS), the Community Survey on the Structure of Agricultural Holdings, published by Eurostat. The latest FSS that we use was conducted between 1998 and 2001. It relates to agricultural holdings whose utilised agricultural area was one hectare or more or whose area was less than one hectare, but producing a certain proportion for sale or with a production unit exceeding certain physical thresholds. The data are constructed from national surveys, collated every two or three years. They relate to land use, livestock numbers and crop production, labour, and the unit on which production takes place. The concept of a farm is not defined and data relate to "holdings". Though the harmonised definition of a holding is supposed to be a single unit for production and management purposes, in practice there are national differences. Structural statistics based on agricultural holdings must be treated with caution, but are useful for indicating broad directions of change.

## Patterns of Structural Change

Despite differences of detail between EU15 countries, several common characteristics can be identified.

---

<sup>1</sup> The authors are professors at the Pennsylvania State University and the University of London, Imperial College, respectively. [dblandford@psu.edu](mailto:dblandford@psu.edu) [b.hill@imperial.ac.uk](mailto:b.hill@imperial.ac.uk)

### *Exit of labour from agriculture*

There has been a significant reduction in the number of people working in agriculture, both in absolute terms and as a proportion of the total workforce. While figures differ among sources, they point to the same pattern. General employment surveys (for example, the UK's Labour Force Survey) ask for the main occupation of individuals and cover self-employed, hired and non-paid workers (Eurostat, 1996). Restructuring since the Second World War has been dramatic and involved large sections of the population, particularly in earlier decades. For example, between 1955 and 1977 the number of people declaring agriculture as their main economic activity in Italy fell from 7.7 million to 3.1 million, corresponding to a decline from 40 percent of total civilian employment to around 15 percent. Among the other six original members of the European Economic Community large shrinkages in the workforce were also seen: for example, in Germany (19 percent to 7 percent), and France (27 percent to 11 percent). In more recent decades shrinkage has continued, though at a somewhat slower rate. Between 1980 and 2002 the total number of people in the EU15 for whom agriculture was their main occupation almost halved, from 12.7 million to 6.5 million (Eurostat *Agricultural Situation in the Community/Union*).

The shrinking labour force is also revealed by the EU's Farm Structure Survey (FSS), which records *all* persons working on agricultural holdings, whether as their main or a subsidiary occupation. As a result, this source shows larger numbers of people engaged in agriculture (13.5 million in 2000, about twice the number for equivalent general employment surveys). According to the FSS, between 1995 and 2000 the total number of people working on farms fell by 11 percent (1.7 million people). Total labour input, measured in Annual Work Units (full-time equivalents – one person on average accounting for about 0.4 AWU) declined by 13 percent over the same five-year period.

**Table 1. People working on agricultural holdings in the EU15**

	1993	2000		<i>Of which:</i>		
	Numbers (x 1000)	Numbers (x 1000)	Regular hired workers (percent)	AWU non-family members (percent)	AWU regularly employed (percent)	AWU irregularly employed (percent)
EU15		1,351	9.8	26.6	16.1	10.5
Belgium	132	107	11.3	15.0	12.5	2.5
Denmark	142	103	18.2	29.6	25.9	3.7
Germany	1,478	1,137	17.2	30.4	27.5	2.9
Greece	1,774	1,431	0.7	14.2	1.5	12.7
Spain	2,571	2,439	7.6	24.2	13.3	20.9
France*	1,610	1,404	15.7	24.3	na	na
Ireland	320	258	5.6	7.4	4.7	2.7
Italy	4,762	3,964	1.9	15.1	3.6	11.5
Luxembourg	8	6	10.2	15.6	13.8	1.8
Netherlands	290	276	29.7	33.3	27.7	5.6
Austria	-	527	3.7	8.1	6.8	1.3
Portugal	1,263	1,064	5.7	18.2	9.0	9.2
Finland	-	184	10.5	15.6	11.2	4.4
Sweden	-	157	15.3	24.3	20.8	3.5
United Kingdom	651	539	26.4	35.6	30.1	5.5

\* Figures for 1997 (data for 2000 not comparable). na = not available

Source: Europa website ([www.europa.eu.int](http://www.europa.eu.int)) and Eurostat (2002a)

The EU's agricultural labour force largely consists of family labour. Only about 10 percent of those working on farms are hired and thus assumed to be non-family. Family labour is some three quarters of the total (Table 1). However, there are large differences between countries. Only in France, the

Netherlands and the United Kingdom do hired workers constitute more than a quarter of the total number of persons working on farms. In contrast, they represent less than 2 percent in Greece and Italy. In terms of AWUs, the proportion provided by hired workers tends to be higher, but only in the Netherlands and the United Kingdom does non-family labour reach a third of the total. In Ireland and Austria less than a tenth of the total labour input is non-family. In Spain an unusually large share of the labour in agriculture is contributed by irregularly employed non-family workers, with relatively high figures also found in other Mediterranean members of the European Union, probably reflecting types of agriculture that have seasonal labour peaks (vineyards, olives etc.).

#### *Changes in numbers of holdings and their average size*

Successive EU farm structure surveys show a fall in the total number of agricultural holdings (Table 2). Since the total utilised agricultural area (UAA) is quite stable, the reduction in the number of holdings has translated into an increase in their average size.

**Table 2 Number and average size of agricultural holdings**

	Area UAA (000)	Holdings (x 1000)			Average size ( hectares)		
		2000	89/90	1995	2000	89/90	1995
EU-15	126 791		7 370	6 771		17.4	18.7
EU- 12	118 111	7 993	6 959	6 481	15.0	17.2	18.2
Belgium	1 394	85	71	62	15.8	19.1	22.6
Denmark	2 645	81	69	58	34.2	39.6	45.7
Germany	17 152	654	567	472	26.1	30.3	36.3
Greece	3 583	850	802	817	4.3	4.5	4.4
Spain	26 158	1 594	1 278	1 287	15.4	19.7	20.3
France	27 856	924	735	664	30.5	38.5	42.0
Ireland	4 444	171	153	142	26.0	28.2	31.4
Italy	13 062	2 665	2 482	2 154	5.6	5.9	6.1
Luxembourg	128	4	3	3	31.8	39.7	45.3
Netherlands	2 028	125	113	102	16.1	17.7	20.0
Austria	3 388		222	200		15.4	17.0
Portugal	3 863	599	451	416	6.7	8.7	9.3
Finland	2 219		101:	81		21.7	27.3
Sweden	3 073		89	81		34.5	37.8
United Kingdom	15 799	243	235	233	67.9	70.1	67.7

Source: Eurostat Farm Structure Surveys.

A significant EU characteristic is the wide diversity in the size of holding; in 2000 national averages ranged from 4 hectares in Greece to 67 hectares in the United Kingdom. Overall, 58 percent of the holdings in the EU15 were 5 hectares in size or less. More than three-quarters were in this size class in Greece (77 percent), Portugal (79 percent) and Italy (78 percent) but with much smaller proportions in Denmark (3 percent), Ireland (8 percent) and Sweden (12 percent). A larger size threshold for inclusion in the underlying surveys in these last three countries may have had an impact on the numbers. Holdings of 50 hectares and over accounted for only 9 percent of the total number in the

EU15 but for almost two thirds of the agricultural area (64 percent in 2000). Again there are differences among EU members; large holdings represented only 1 percent of the area in Greece and 2 percent in Portugal compared to 77 percent of the area in France and 86 percent in the United Kingdom.

Changes in the number of holdings have not been uniform across the size distribution. The number of large farms has been increasing while (with exceptions) the number of smaller ones has fallen. The break-point size between falling and increasing numbers differs among countries, reflecting national circumstances, but has been rising in all countries. As a consequence the average size of holdings has been increasing (Table 2). A similar pattern of change in size structure is seen at the *enterprise* level (e.g. dairy herd, sheep flock, crops grown on a farm). Again there are differences among countries in average enterprise size and in the break-point between falling and rising numbers.

An exception to declining numbers of small holdings exists in some countries (including the United Kingdom) where very small holdings have become more numerous. These are predominantly residential or hobby operations, created when the main farmed area on larger properties is sold to other farmers. Unfortunately, cross-sectional data reveal nothing about the internal dynamics of structural change. Many relatively small changes in farm area occur as operators match the size of their land holdings to evolving needs and preferences (Commission, 1980). In the aggregate, these largely cancel each other out but they are suggestive of much greater dynamism. From a policy perspective it is important to be able to distinguish between an industry in which a relatively stable size distribution reflects little change in farm ownership and occupancy from a more dynamic situation in which there are many entrepreneurial responses to economic opportunities and pressures. It is also valuable to know when small holdings cease to operate as independent units, whether their land is taken over by other small farms or, as is more likely, by much larger ones. Unfortunately, the FSS data cannot throw light on these issues.

Some transfers of land occupancy are not captured in EU official statistics on holdings. These include the growing practice of contract farming (when the contracting-out farmer remains nominally the land holder), or the formal or informal renting of seasonal grazing. These practices can create a disparity between the area that holders nominally occupy and the area they actually farm. On balance, the distribution of holdings probably understates the number of large farms and overstates the number of small ones.

### **Key Characteristics in Structural Change**

Structural statistics provide only snapshots of a changing and shrinking cohort of operators and limited in explaining structural change in agriculture. In particular, there is little data on what happens to people who leave the industry. Nevertheless, there are some characteristics of European agriculture that will continue to be important in future structural change.

#### *The family nature of farming*

The vast majority of EU farms are operated as sole-proprietorships or partnerships, that is, as unincorporated businesses in which the institutional unit carrying out the farming activity is the household-firm. There is no legal separation between the assets of the business and the personal property of operators. Earnings are subject to income tax and reflect the overall flow of rewards to household members, not just those derived from agriculture. Operators are subject to unlimited liability for farming losses. The nature of the farm family and the farm as a business are closely interwoven, making the demographic and socio-economic characteristics of the household important in explaining responses to economic pressures and policy signals. Inheritance assumes particular importance when property takes the form of agricultural land and buildings, since this shapes the future of farm businesses and largely determines the composition of the next generation of farmers.

According to the FSS “natural persons” accounted for the operation of 96 percent of EU15 holdings in 2000. Only in France and Sweden did legal entities (such as companies) exceed 4 percent of the total holding numbers (12 and 7 percent respectively), although these figures may be affected by

definitional differences relating to business structure and family ownership. This operating structure raises issues for the evolution of structure. In particular, where labour is primarily self-employed, and income is a residual reward (calculable only in retrospect), there will be a tendency to be less sensitive to circumstances that squeeze incomes. Reliance on “belt-tightening” is an option not open to firms that operate largely with hired labour. As long as basic cash needs are being met (to pay for essential inputs) there may be strong attachment to established activities for the utility they generate (from such factors as lifestyle or tradition).

The family nature of European agriculture is particularly evident in the passing of the business from one generation to the next, which forms the main channel of entry into the industry. Studies in the United Kingdom find that more than 90 percent of the present cohort of farmers has parents who were involved in agriculture (ADAS, 2004; Lobley *et al.*, 2002). Mechanisms for inter-generational transfer differ, though it is common to find fiscal assistance through national taxation systems for the assumption of the farm business by younger relatives (van de Veen *et al.*, 2002). Major structural and land use changes occur at the time of transfer (Potter and Lobley, 1992); the lack of a successor willing to take over a small farm is a prime trigger in land disposal. On the other hand, succession is the point at which some family members with established careers may return to run the business on a part-time basis. Given the importance of succession for the continuation of farms as independent businesses, it would be useful to have information on the intentions and socio-economic characteristics of potential successors, especially those who already play some part in running the business. Some indication of the significance of this is given by the FSS that shows that there were some 2.9 million family members (in addition to the farmer and spouse) working on the EU15’s 6.8 million holdings in 2000, though the large majority worked part-time, and almost half (46 percent) had other gainful activity. Plans for family succession are common. For example, in the UK from the 1970s to the 1990s between a half and three quarters of farmers had identified a successor – typically a younger family member - though the proportion was far lower among small farms (Gasson *et al.*, 1998).

#### *Farming combined with other activities*

An important feature is that agricultural production increasingly takes place in units whose operators engage in other activities. While pluriactivity is particularly prevalent among the operators of small farms, it is present across the entire size spectrum. Operators of large farms are often in receipt of significant income from other activities, reflecting complex business portfolios. In this respect, farming in the European Union shares a universal characteristic of modern day agriculture in developed countries.

Several approaches can be used to describe the phenomenon of EU pluriactivity. First, the EU’s structural surveys provide information on the hours spent in agriculture as a proportion of total available working time. Problems exist with the measurement of working hours by self-employed people, so the results have to be treated with caution. Nevertheless, in 2000 only about a fifth (22 percent) of EU15 farmers (holder/managers) claimed to spend all their working time in agriculture. The majority (56 percent) devoted less than half their work time to farming. Second, information is collected on other gainful activity (which covers employment or self-employment). Some 30 percent of EU15 farmers had another gainful activity (OGA) in 2000, but with substantial variation among countries. Belgium was at one extreme with less than a fifth (18 percent) of holder/managers with an OGA; at the other extreme were Germany (66 percent) and Sweden (63 percent). Substantially higher figures would result if spouses were taken into consideration (poor data quality prevents publication of statistics for farming couples).

A third approach is to examine the income sources of households that are engaged in farming. Eurostat’s Income of the Agricultural Households Sector (IAHS) contains comparisons for some countries between the numbers of households that have some income from farming (a “broad” approach) and those for which farming is the main source of income of the head of household (a “narrow” approach). By subtraction, a “marginal” group can be described for which there is some household income from farming but this is not the main source for the head of the household

(Eurostat, 2002b). Table 3 shows that, for the years for which data are available, there were substantial numbers of farm households for which farming is not the head's main income source.

**Table 3. Number and average net disposable income for three groups of agricultural households in selected members of the EU15**

	<b>Denmark (1999)</b>	<b>Germany (1983)</b>	<b>Greece (1994)</b>	<b>Ireland (1987)</b>	<b>Netherlands (1988)</b>	<b>Finland (1992)</b>	<b>Sweden (1992)</b>
<b>Number of agricultural households (x 1 000)</b>							
"broad"	57	613	615	207	136	139	94
"narrow"	16	353	398	85	87	73	54
"marginal"	41	260	217	122	49	65	41
<b>Disposable income per household (All households = 100)</b>							
"broad"	99	110	114	105	210	124	81
"narrow"	105	101	86	127	267	131	79
"marginal"	92	123	166	89	108	116	85

*Source:* Eurostat (2002b) reproduced from earlier reports.

Eurostat's results for households defined in the "narrow" way also describe the composition of income – profits from other businesses, wages, property income (interest, rent, imputed rental value of own dwellings), government social payments etc. Though coverage is incomplete, the data show that in most countries income from outside farming contributed between one half and one third of the household income of "narrowly" defined agricultural households. The second most important source in most countries was wages (earned off the farm) but for the United Kingdom it was property.

The key point is that EU farm operators appear to be heavily involved in a diversified set of economic activities. Though this may point to the possibility of further diversification and reallocation of resources by farm operators in response to economic pressures and policy changes, they do no more. Data from cross-sectional snapshots are of little use in such circumstances.

#### *Tenure and family ownership of land*

Structural change commonly involves transfers in the occupancy of land. It follows that tenure systems or other land-related legislation that inhibit transfers will make adjustment to economic change more difficult. As was noted above in relation to statistics on holdings, ways can be sought to overcome rigidities, such as whole-farm contracting, but some of these have an uncertain legal basis and may be avoided by the risk-averse. Land ownership, tenure and leasing arrangements are highly relevant to structural change.

We have noted the large contribution made by family labour in European agriculture and the dominance of the farm household business. According to EU structural surveys, families also own a large proportion of the land that they farm, though this varies considerably between countries (Table 4). National legislation on what ownership means, complexities of patterns of holding land within families, and a lack of basic statistics in some countries means that the figures must be treated with caution. Nevertheless, within EU15 countries the situation appears to have been quite stable over the 1990s, with some drift away from owner-occupation in France and towards this in the United Kingdom.

#### *Personal characteristics*

An important issue is the characteristics of the farm operators who take management decisions. Agricultural statistics commonly adopt the convention that there is only a single holder (i.e., principle farmer), so that the characteristics of this person (age, education etc.) can be linked to the data for the

holding to describe the socio-economic composition of agriculture. This is not very satisfactory for larger farms involving multiple managers. For example, in the United Kingdom in 2002 there were 349,000 people described as farmers, partners and directors and spouses working in agriculture, a figure substantially larger than the number of holdings (187,900). It is also assumed that the holder is responsible for day-to-day management decisions, something that happens on most but not all holdings (97 percent for the EU15 in 1997). In addition to the 6.5 million holders, the FSS for 2000 recorded another 2.9 million spouses working on the holding, though three quarters of these were less than half-time. Even where spouses and family members are not formal partners, there is likely to be some degree of shared decision-making. Sometimes management decisions for particular enterprises are delegated to individuals; intergenerational transfers often involve a gradual shifting of areas of responsibility to younger members of the family. Despite statistical shortcomings, the generally close association between the family and the holding, especially the head of the household, means that the two are probably best described together.

**Table 4. Key structural characteristics in the EU15 (2000)**

	Percent			
	Land owned by the farmer	Holders aged 55 and above	Holders with farm accounts	Holders with full agricultural training
EU-15	57	52		5
Belgium	32	52	40	18
Denmark	75	41	97	18
Germany	36	42	36	0
Greece	70	28	1	0
Spain	67	56	11	1
France	36	53	50	32
Ireland	81	38	58	0
Italy	76	40	31	3
Luxembourg	46	62	42	38
Netherlands	71	40	100	5
Austria	76	46	5	10
Portugal	72	29	93	1
Finland	69	65	20	6
Sweden	54	25		
United Kingdom	66	46	(100)*	12

Source: Eurostat, Farm Structure Surveys \* estimate

Though it is commonly assumed that farmers are male, in 2000 over one holder-manager in five (22 percent) in the EU15 was female. This figure was influenced by the large number of female holders in Italy where women were 30 percent of the total. Rather surprisingly, the incidence of other gainful activities among Italian holders (26 percent) in 2000 was below the EU15 average (30 percent), suggesting a relatively high degree of dependency on farming among women farmers. The figures could also reflect the practice of widows of former farmers preferring to retain ownership and nominal occupancy of the farms, but in reality renting out the land to other operators.

The FSS records the proportion of farmers that have received “full agricultural training” (what this means is not entirely clear, though it is likely to relate to technical rather than managerial training and there will be national variations in interpretation). The figures paint a rather gloomy picture, with only 5 percent of holders satisfying the standard. However, the ability to adapt to new conditions seems to be related more to the general level of education irrespective of the subject studied. Studies of the



uptake of technology and structural change give some support to this view (Gasson, 1997; Lobley *et al.*, 2002). Unfortunately, the FSS does not collect data on the general educational level of farm holders.

A key characteristic for adjustment to change is the age of the holder. Again, statistics may hide national differences due to tax legislation and eligibility for social security payments. In some countries these may provide incentives for farmers to remain nominally active in agriculture, whereas in others there may be financial advantages in being regarded as retired. Statistics may reflect choice or necessity, depending on individual circumstances. Bearing this in mind, the FSS of 2000 found that on average in the EU15 just over half (52 percent) of individual holders were aged 55 years or older, and 30 percent were aged 65 or more, with higher shares of the older age group in Italy and Portugal (almost 40 percent). Shares of the 55+ age group were greatest for holdings specialising in the permanent crops that are found mainly in the southern countries of the European Union (vines, olive groves, orchards etc.) and mixed cropping.

There is also a link between the age of the holder and several other characteristics that are significant for adjustment to change. Holdings are generally smaller on average when the farmer is older. The EU15 average holding size for holders aged 55 years and over was 0.7 Annual Work Units and 10 hectares of agricultural land, compared to 1.0 AWU and 21 hectares for those less than 45 years of age. Older farmers also had fewer animals, on average only about one third of the numbers found on holdings run by farmers under 45 years. A higher proportion of the land of older farmers tends to be owner-occupied (73 percent compared with an all-age average of 57 percent) and, in countries where bookkeeping was not the norm, a smaller proportion kept accounts. In France, for example, only 20 percent of holders aged 55 and over kept accounts, compared with more than 50 percent for those below 45 years).

### **Underlying Forces for Structural Change**

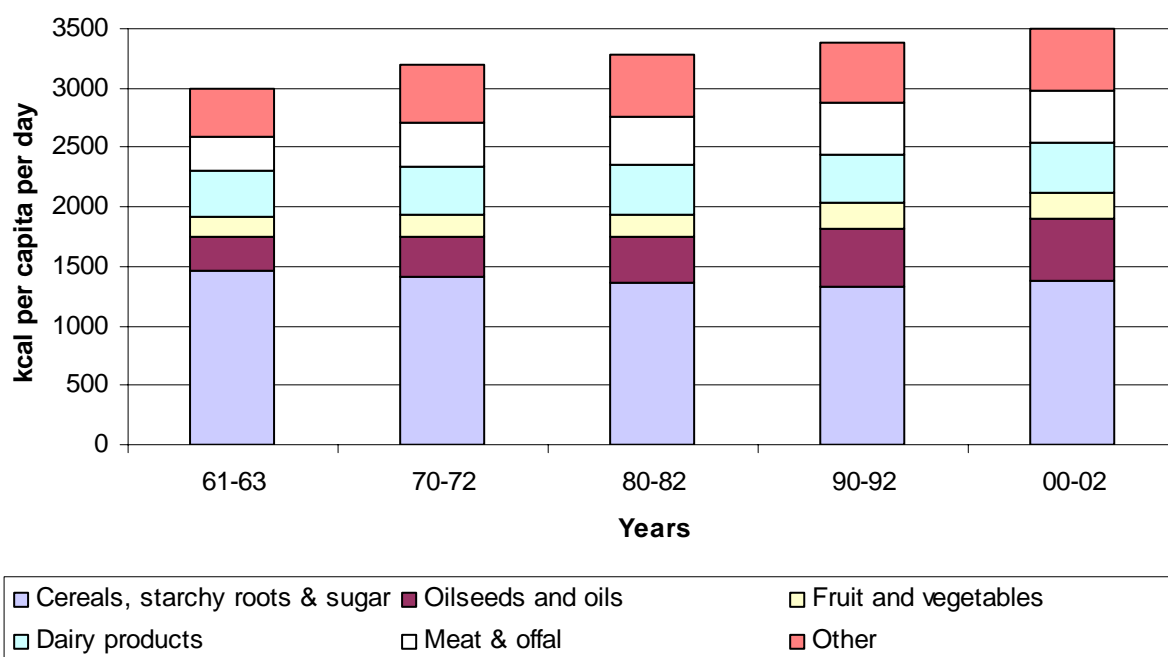
Two of the major forces for change in EU15 agriculture will be changes in food consumption and the impact of technology.

Figure 1 shows the evolution of average per capita (apparent) consumption of food in the EU15 since the early 1960s. Consumption has increased from less than 3,000 kcal per day to roughly 3,500 kcal per day. In general, the share of consumption represented by cereals, starchy roots, and sugar and sweeteners has tended to decline, while meat consumption has risen. Vegetable oils have tended to replace animal fats, and the consumption of fruits and vegetables has increased. The growth in income has enabled EU consumers to diversify their diet by reducing the consumption of cheaper products, such as cereals, and increasing consumption of more expensive products, such as meat. The share of food in total consumer expenditures has declined substantially in EU countries (Table 5).

EU food consumption is likely to increase very slowly in the future. Low rates of population growth and a rapidly ageing population will be important factors. Health concerns, particularly relating to the growth of obesity in many EU countries, may also have an impact.

Technological change is a second major factor driving structural change in EU agriculture. Europe has resisted the introduction of new plant varieties and animal strains produced through the application of biotechnology, but globally the area planted to transgenic crops has expanded from roughly 3 million hectares in 1996 to 80 million hectares in 2004 (ISAAA, 2004). The field of nanotechnology, which involves modification at the atomic level, may have important implications for agriculture in the future. There are several forms of nanotechnology, ranging from the incremental improvement of existing materials through to the creation of sophisticated machines that operate at the biological level (Jones 2004). Work in this area relating to agriculture is relatively recent but is proceeding in a number of directions. Research is underway to develop more efficient and effective agro-chemicals. Other areas being explored relate to food processing and packaging (particularly the detection of pathogens or contamination), and the development of synthetic alternatives to agricultural products (e.g., fibres).

**Figure 1. Structure of Food Consumption in the EU15.**



Source: FAO data.

**Table 5. Share of food in total consumer expenditures.**

	1970	1980	1990*	2000
France	21	17	16	14
Germany	27	22	14	12
Italy	33	25	18	15
United Kingdom	20	16	13	10
United States	14	11	9	7
* 1991 for Germany.				
Source: OECD National Accounts.				

The development of mechanical technologies continues at a rapid pace. In recent years, information technology has found important applications at the farm level. One of the more advanced is represented by “precision agriculture”. This involves the use of remote sensors, geo-positioning, wireless communications and computers for the micro-management of cropland. Thus, for example, rather than using a general application rate for fertiliser based on average conditions applying in a given area, farmers can vary application rates almost by the meter depending on topography, soil type and other characteristics. Irrigation or applications of manure can be optimized by taking into account local differences in soils. Yields and crop characteristics (e.g., moisture levels) can be monitored continuously at harvest time in order to ensure quality and to provide data for the future management of the land. Information technology is helping to develop automated systems for land preparation and crop harvesting as well as for the management of animals (e.g., automated feeding systems and the robotic milking of dairy cows).

Technologies that permit fine tuning in the use of variable inputs and labour can result in significant cost savings. Technological developments place greater demands on the managerial skills of farmers, but can also increase the returns to management. Adoption can provide a competitive edge to some

farmers, placing pressure on others follow their example. New technologies can increase the efficiency with which resources are used, but may also require an expansion of scale to be cost-effective. Over the longer term, the efficiencies created by new technology, combined with slow growth in the demand for food, means that the historical tendency for real global prices of agricultural products to decline over time, is likely to continue.

Considerable uncertainty exists over the willingness (or ability) of EU farmers and food processors to adopt some of the technologies that are likely to shape global agriculture in the future, particularly those that involve the modification of plants or animals. As noted above, there is public resistance to some of these products. Regardless of what Europe decides, producers in other countries are likely to adopt new technologies if they perceive that these confer a competitive advantage. The European approach seems to be to try to limit imports of products that embody certain technologies while simultaneously trying to protect the competitive position of its farmers through product differentiation. This is reflected by the stress being placed on geographical indicators. To some extent this dual pronged strategy may protect EU producers from low-cost competition in the domestic market, but it is unlikely to enhance their competitive position in international markets. It is unclear whether the strategy will prove to be viable over the long run.

## **Policies and Structural Change**

Within this background, how are policy factors likely to affect structural change and competitiveness?

### ***EU agricultural policies***

Beginning with the MacSharry reforms to the Common Agricultural Policy (CAP) in 1992, the European Union has gradually been shifting away from market price support towards the use of direct payments. This has resulted in a more market-oriented environment in the production of many crops, although there are still some notable exceptions (for example, sugar whose production is regulated through quotas). Elements of the EU's livestock production, such as pork and poultry, have traditionally been subject to less public intervention. Other elements, such as beef, have gradually moved to a more market-oriented environment. Dairy production, however, is still subject to quotas.

Overall, successive reforms in the CAP have reflected a trend towards a more competitive (less-regulated) market environment, with less government intervention. This trend has been driven by the need to control the costs of the policies and, to a lesser extent, to adapt to a more open environment for international trade. A basic question is whether the way that the CAP is evolving will change further the economic environment facing EU farm-firms and how it will affect their ability to adapt to that environment.

Quotas have been used by the Union to limit the costs of price supports for commodities such as milk and sugar. Such schemes limit the ability of individual producers to adapt to changing economic circumstances and to take advantage of economies of scale. However, they do not prevent the adoption of cost-reducing technologies and may actually intensify pressures to adopt these, since such technologies affect the size of the quota rent generated for an individual farm. Tradeable quotas allow lower cost producers to expand and to exploit economies of scale, but impose additional production costs through the need to pay for an additional productive asset (the quota). The rental (purchase) of quota redistributes income (wealth) from current producers to former producers. The use of national quotas, rather than a global EU quota with full tradeability, limits the ability of EU dairy producers as a whole to become more competitive in the face of increased international competition (in particular, tendencies for production to move to lower cost production areas) and limits the ability of individual dairy farm-firms to grow. The strong national preferences implicit in the quota scheme (and in other elements of policies in the EU) limit the growth potential of individual farm-firms in more competitive regions.

Despite proposed changes in the sugar regime, designed primarily to eliminate exports of subsidized sugar by the EU and some adjustments in milk quotas under the Agenda 2000 reforms, it seems likely

that quotas will continue to affect the ability of individual farm-firms to adapt to a changing economic environment in the Union, and the international competitiveness of the sectors involved.

Under the MacSharry reforms, direct payments were linked to the area in production or the number of livestock. Recent reforms under the Mid-term Review (2003) provide for a single farm payment (SFP) that can be completely decoupled from current crop area or livestock numbers. Payments that are coupled to current production introduce greater rigidity into the reallocation of factors in agriculture in the EU than payments which are unrelated to current production. The new system will not entirely eliminate such rigidity. In order to receive payments farmers must satisfy a series of statutory management requirements relating to the environment, public, animal and plant, and animal welfare – a total of eighteen of these are listed in the relevant council regulation (EU Council 2003). Farmers are required to keep the land upon which payments are based in good agricultural and environmental condition. They are prevented from using the land for permanent crops or for fruits and vegetables. The transfer of payment entitlements may be made through sale or any other definitive means, with or without the land, but only within a given EU member country, and may be restricted regionally within that country. The owner of subsidy rights must have a matching area of land (in agricultural use, for production or set-aside) in order to claim the subsidy. The renting of payments rights is only possible in combination with land rental.

The SFP is being implemented on a national basis and countries differ in terms of the proportion of the payment that is linked directly to production and other production requirements.<sup>2</sup> Differences in the design and implementation of the payments, in particular the degree of coupling adopted, will affect the economic environment for agriculture within and between member countries. Furthermore payments are, to all intents and purposes, attached to the land. This may encourage producers who are entitled to payments to stay on the land, and thus inhibit the growth of more competitive farm-firms through land rental or sales, or the transfer of land among generations. The enduring nature of payments (that they are not time-limited, at least not for the foreseeable future, although budgetary constraints may ultimately make this necessary) means that they (like dairy quotas) affect the cost structure of farming. Ultimately, the payments are reflected in the cost of land (as reflected explicitly in the market or in the terms of succession) and in higher overall costs of production for individual firms. Even where markets for the rental or sale of land function relatively efficiently, the increased costs created by the payments may discourage the expansion of farm size.

### ***Environmental and animal welfare policies***

Increasing attention has been devoted to the relationship between agriculture and the environment in European Union. It is argued that agriculture is multifunctional, i.e., provides a range of non-commodity outputs that are of value to society but are not traded in organized markets, in addition to the production of agricultural commodities. The precise nature of the non-commodity outputs and the way that they are related to agricultural production is often unclear, which complicates the formation and implementation of appropriate policies to ensure their supply.<sup>3</sup> In Europe much of the focus has been on promoting the positive environmental contributions of agriculture (as opposed to addressing negative contributions, such as pollution). This has been reflected in the incorporation of environmental (particularly land-use) conditions for the receipt of income support payments, or the provision of inducements that are specifically targeted to achieving environmental aims. The impact of both of these approaches on the farm-firm depends on the costs of achieving the environmental outcome, and the extent to which the conditions attached to the payment limits production choices. Payments that are linked to the preservation of existing farming systems (e.g., use of techniques, capital intensity, preservation of existing farm structure) may limit the ability of farmers to take advantage of economies of scale. From the perspective of the individual farmer this may not be a

---

<sup>2</sup> The complexity of the choices open to individual countries is described by Kelch and Normile (2004).

<sup>3</sup> See Blandford and Boisvert (2005) for a discussion of the non-commodity attributes associated with agriculture under the heading of multifunctionality and the broader grouping of non-trade concerns in the debate on trade liberalization. We argue that optimal policy choice is crucially dependent on whether the attributes in question are pure public goods, technical externalities or pecuniary externalities.

problem, providing that the payment received is sufficient to cover the costs of providing the environmental service, including any income lost from foregone efficiency gains. However, if the conditions attached to the payment affect the competitiveness of the firm over the longer term this may intensify downward pressure on the total net income derived from farming. The long-term sustainability of such policies in the absence of structural change, either in farming itself or in the sources of income of farmers, is perhaps open to question.

Higher animal welfare standards are being driven by EU and national policies, as well as through the proliferation of private standards (Blandford et al. 2002). Higher animal welfare standards are likely to result in higher costs of production which may not be able to be recouped by individual producers. Unless consumers perceive a difference from welfare-friendly products that they are willing to pay for, lower-cost non-conforming products may displace conforming products. Labeling may be used to address this and the EU is also proposing that offsetting subsidies should be allowed, i.e., that there would be welfare-enhancing payments that parallel environmentally-enhancing payments. The use of payments to promote production practices that satisfy higher animal welfare standards is not currently permitted under international law (the green box provisions of the Uruguay Round Agreement of the General Agreement on Tariffs and Trade). Private standards might be viewed to be less problematic for a firm, in that production to specific purchaser requirements may be viewed to convey a commercial advantage (this is one of the benefits of the supply of products under contract). To the extent that product standards help processors or retailers capture market share and sell their products at a premium, they may be willing to cover some of the additional costs of meeting the standards at the farm level by paying higher product prices. However, in a competitive commercial environment, processors and retailers will be concerned about controlling their costs and this will affect what they are prepared (or able) to pay their suppliers over the longer term.

### ***Other policies directly affecting agriculture***

A range of policies, implemented at the national level can influence the economic environment for farm-firms in addition to those already discussed. Probably those with the greatest direct effect are those that govern the sale, rental or use of farmland. In all EU countries the quantity of land exchanged each year through sales is rather small (typically less than 2 percent of total agricultural land in the United Kingdom), and this includes nominal sales between different generations of the same family. Policies with respect to the leasing of land are of great significance, since this provides flexibility in matching individual demands for land with availability. This was a major element in the argument in the United Kingdom for preserving the traditional landlord-and-tenant system that accounted for almost 90 percent of farmed area in the early 1900s (now reduced to about 37 percent). Legislation on security of tenure for renters may, however, severely constrain the potential for leasing to assisting adjustment. For example, in the UK the legal framework of agricultural tenancy since the Second World War reflected the view that tenants had to be given great security if improvements in production and productivity were to be achieved. Basically, as long as a rent was paid (but with owners only having limited opportunities to raise this) the tenant had occupation for life, a situation made more extreme by subsequent extension of the right to three generations of tenant, though this law was later reversed. As might be expected, the legislation led to a reduction in the amount of land available to rent. A “grey” rental market developed, of questionable validity and generally only for tenancies of a single year. Subsequently legislation on “farm business tenancies” has allowed a system to operate that enables leases to be negotiated for a series of years that provides a degree of security and reasonable planning horizons for the tenant and yet which enables the owner to assume occupancy at a predetermined time.

In countries where farmers own the majority of the land, the operation of the land market is crucial for adjustment. In many countries there is government involvement in land transactions (OECD, 1998); often special tax treatment is available that encourages the retention of land by existing farmer-owners. Such concessions, which relate to annual taxes, capital gains and for inheritance, gifts or sales to designated types of purchaser, also encourage purchase by non-farmers and put upward pressure on land prices. In the process, they negate part of the intended concession and create incentives for existing landowners not to sell. The small size of the land market in most EU15 countries and, in

some, the degree of legal control exercised over it, can be seen as potential brakes on economic adjustment and structural change.

Policies in this area are often implemented with the intent of protecting small farms, to provide a mechanism for the allocation of land to new entrants, for equity reasons (in particular the balance of advantage between landlord and tenant when land is rented), and to prevent the reallocation of land to non-agricultural uses (through specific agricultural land policies or through more general land-use and zoning policies). A key issue is the extent to which such policies limit the ability of farms to increase the scale of their operations, constrain the ability of land to be allocated to its most profitable use or limit the injection of new and superior human capital into farming.

### **The Future Structure of EU Agriculture – Some Key Questions**

The current Agriculture Commissioner has stated that the European model is one in which the agricultural sector “must be versatile, sustainable, competitive...it must be capable of maintaining the countryside, conserving nature and making a key contribution to the vitality of rural life, and must be able to respond to the consumer concerns and demands regarding food quality and safety, environmental protection and the safeguarding of animal welfare” (Boel, 2005). A number of questions are raised by this view. Is the current (relatively small-scale model) of agriculture necessary to achieve these desired outcomes? Is the small-scale model of agriculture sustainable?

As European agriculture moves to a more competitive international economic environment, it may be difficult to sustain the European model, at least in terms of current structure. As indicated earlier, downward pressure on real global prices for agricultural commodities is likely to persist. The reduction of trade barriers will expose European farmers to greater international competition. If farmers are to be able to compete in this environment, they must be able to increase the efficiency of their operations. In many cases, this will mean increasing size and scale. Current policies do not seem to be conducive to such a development.

To supply the non-commodity attributes that are demanded of them, farmers must be remunerated either by the market or through non-market means (government payments). While European farmers may be able to increase returns through product differentiation to some extent, at least within Europe, this is unlikely to provide sufficient remuneration for the provision of all the attributes desired. Public funds for agriculture, at least at the EU level are likely to be increasingly limited. It seems unlikely that national governments will be willing (or able) to take a much more prominent role in providing financial incentives to their farmers, given the competing demands that they face upon their budgets. It is an open question whether European consumers and taxpayers will be willing to pay the costs of maintaining the current agricultural system over the long term.

### **Conclusions**

European agriculture seems likely to face increased pressure for structural change in the future. Important elements of policy at both EU and national levels may act to retard adaptation. Economic globalization will pose challenges to the continuation of the European model of agriculture. It is unclear whether the general public will be willing to bear the costs of sustaining the model over the longer term.

### **References**

- ADAS (2004) *Entry to and Exit from Farming in the United Kingdom*. Report to Department for Environment, Food and Rural Affairs, London.
- Blandford, D. Bureau, J.C., Fulponi, L. and Henson, S. (2002). Potential Implications of Animal Welfare Concerns and Public Policies in Industrialized Countries for International Trade. *In* Global Food Trade and Consumer Demand for Quality, B. Krissoff, M. Bohman, and J. Caswell eds. Kluwer Academic Press, New York.

- Blandford, D. and R.N. Boisvert (2005) "Non-trade concerns: reconciling domestic policy objectives with trade liberalization." *Int. J. Agricultural Resources, Governance and Ecology* 4 (forthcoming).
- Boel, M.F. (2005). "CAP Reform and the European Model of Agriculture." Speech to the General Assembly of the European Livestock and Meat Trading Union, Portorož, Slovenia. June 10.
- Commission of the EC (1980) *Factors influencing ownership, tenancy, mobility and use of farmland in the United Kingdom*. Information on Agriculture No 74. Luxembourg.
- EU Council (2003) Council Regulation (EC) No 1782/2003. Official Journal of the European Union 21.10.2003.
- Eurostat (1996). *Agricultural Labour Input in the EU 1973-1995*. Theme 5 Series .C Eurostat, Luxembourg.
- Eurostat (2002a) *Structure of agricultural holdings in the EU: Main results of the Community survey 1999-2000*. Statistics in Focus, Theme 5 – 22/2002
- Eurostat (2002b) *Income of the agricultural households sector 2001 report*. Theme 5. Eurostat, Luxembourg.
- Eurostat (various years) *Community Survey of the Structure of Agricultural Holdings*. Eurostat, Luxembourg.
- Eurostat (various years) *The Agricultural Situation in the Community/Union*. Eurostat, Luxembourg.
- Gasson, R. (1997) *Educational Attainment Levels of Farmers*. Department of Agricultural Economics and Business Management, Wye College, University of London.
- International Service for the Acquisition of Agri-biotech Applications (2004) Annual report. Ithaca, New York.
- Jones, R.A.L. (2004) *Soft Machines: Nanotechnology and Life*. Oxford University Press, Oxford.
- Kelch, D. and Normile, M. A. (2004). CAP Reform of 2003-04. Economic Research Service, U.S. Department of Agriculture. Report WRS-04-07. Washington, DC. August.
- Lobley, M., Errington, A., McGeorge, A., Millard, and Potter, C. (2002) *Implications of Changes in the Structure of Agricultural Businesses*. (University of Plymouth, Department of Land Use and Rural Management, Seale Hayne campus). Department for Environment, Food and Rural Affairs, London.
- OECD (1998) *Adjustment in OECD Agriculture: Reforming Farmland Policies*. Organisation for Economic Co-operation and Development, Paris. ISBN92-64-16027-2
- Potter, C. and Lobley, M. (1992) *Aging and succession on family farms: the impact on decision making and land use*. *Sociologia Ruralis* 32, 317-34.
- Van der Veen, H. B., van Bommel, K. H. M. and Venema, G. S. (2002) *Family farm transfer in Europe: A focus on the financial and fiscal facilities in six European countries*. Agricultural Economics Research Institute (LEI), The Hague.