

# ***The functioning of agriculture and agribusiness in developed market economies***

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## **Summary**

Highly sophisticated food and agricultural systems have evolved in developed market economies in response to economic growth, rapid technological change and evolving consumer preferences. These systems have done a remarkable job in supplying the growing demand for food at a reasonable cost. But as with all industries subject to rapid structural change, there are economic issues and social concerns that need to be addressed. Governments in many countries have been very active in the agricultural arena. They have often tried to support farm incomes and stabilise domestic prices. The policy mechanisms used to pursue these aims have been expensive and of limited effectiveness. They have also distorted domestic and international markets. Agricultural policy reform is important and necessary. Mechanisms need to be found that are targeted to relevant social goals and concerns, distort markets less, and are more efficient in achieving their aims.

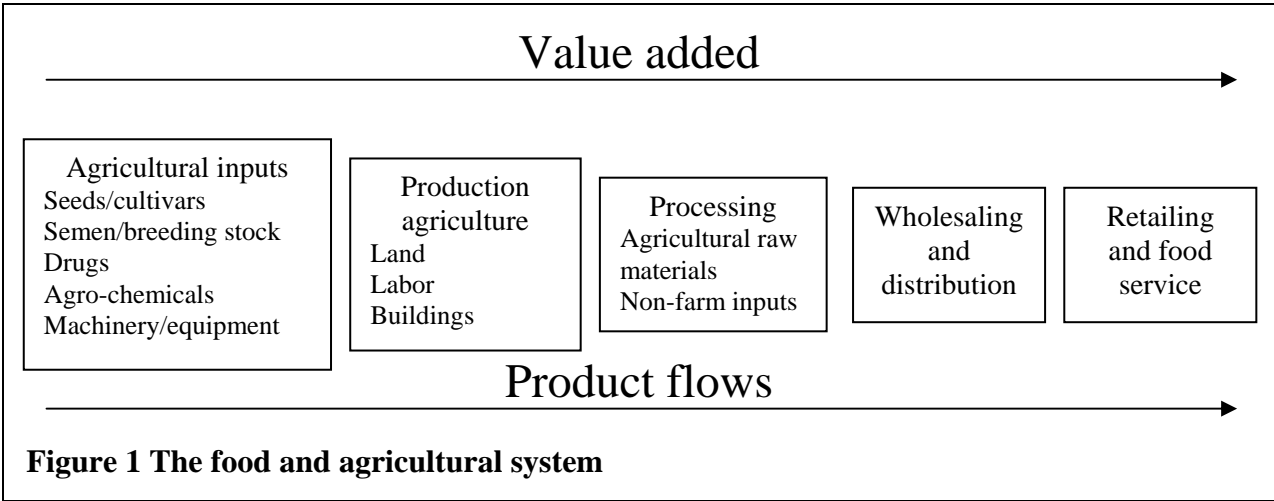
## **1. Introduction**

Since the end of the Second World War, agriculture has undergone a radical transformation in industrial countries. Rapid technological change and the demands of increasingly sophisticated consumers have led to the creation of an industrialised food and agricultural system. Farmers and farming represent only one link in a complex chain that transforms basic inputs into food and agricultural products. The process of change has not always been smooth and the rate of adjustment has sometimes been too slow. There have been winners and losers. The political influence of farmers and farm groups has meant that public policymakers have been very active in the agricultural arena. Mechanisms have been put in place that were intended to protect those who were disadvantaged by change or to maintain characteristics of agriculture and rural areas that were viewed to be socially important. Less often has effort been directed to easing the process of adjustment and facilitating change. A range of new concerns, such as those relating to the environmental impact of agriculture, is becoming prominent. Policymakers are increasingly turning their attention to these issues. Regardless of aims or intent, public expenditures on agriculture remain large, and in many countries there is a pre-disposition for policymakers to intervene in the workings of the food and agricultural system.

### **1. The food and agricultural system and the economy**

The food and agricultural system is made up of a number of inter-linked components, each of which contributes to the delivery of a final product to consumers – the food item on the supermarket shelf or the meal on the restaurant table (figure 1). The various components of the agricultural system operate together to co-ordinate the transformation of products and their movement through space and time.

Because agricultural production is usually perishable and is dispersed geographically, the structure of the sector, the robustness of the institutions that underpin it (e.g. legal framework, contractual arrangements), and the managerial skill of those who work in it have a major



impact on the efficiency with which the system functions. As industrialisation of economies has occurred, populations have grown and become increasingly concentrated in urban areas away from where food is produced. The ability of the food system to handle large volumes efficiently, and its ability to deliver products reliably to consumers in the forms that they want and the quality they expect have become increasingly important.

Technological change has meant that the first component of the agri-food system, the industries that supply inputs to farmers, has become increasingly important over time. New varieties of seeds, the use of fertilisers and pesticides, drugs and medicines have become an essential part of food and agricultural production. Farmers have eagerly adopted new mechanical technologies, such as tractors and combined harvesters; today computers (information technology) are making rapid inroads into farming and the entire food system.

There have also been major changes beyond the farm gate. Increasingly affluent and educated consumers have demanded more from the food system in terms of product attributes and delivery. Consumers demand a greater variety of foods, higher quality, and convenience. In more families it is common for both partners to work outside the home. There is less time for the preparation of food. Technological change in the household, in particular the adoption of refrigerators, freezers and the microwave oven, has meant that processors and retailers perform a greater share of the preparation of food prepared for consumption in the home. In addition, an increasing share of the household's food consumption takes place outside the home. In the United States, for example, the share of food expenditures spent on consuming food outside the home reached 39 percent in 1996 compared to 26 percent in 1970 (Lin et al, 1999).

All these changes have altered, and continue to alter, the shares of value added in the food and agricultural system that are provided by its component parts. In 1910, more than 60 percent of the value of production at the farm gate in the United States was contributed by farmers themselves (through their land, labour and fixed capital); less than 40 percent was attributable to purchased inputs (Smith, 1992). Today, farmers contribute roughly 20 percent of the value of production at the farm gate, and 80 percent is provided by inputs purchased off the farm. In the United States, for every dollar that consumers spend on food, roughly 80 cents covers the costs of processing, marketing and distribution beyond the farm gate. Much of the value added in the food and agricultural system is no longer at the farm level. Consequently, production agriculture's contribution to national income and employment is very small in most countries (table 1).

The substantial value added by industries that are upstream or downstream from the farm mean that the total contribution of the food and agricultural system to income and employment is much larger than the figures in table 1 suggest. Data are not readily available for the system as a whole in most countries. However, in the United States, it is estimated that the food and agricultural system accounted for roughly 13 percent of gross national product in 1996 and 17 percent of total employment (Lipton et al, 1998). In terms of the categories of activity depicted in figure 1 the breakdown of value added in 1996 was as follows: agricultural inputs – 30 percent; production agriculture – 7 percent; processing – 17 percent; wholesaling and distribution, retailing and food service – 46 percent.

Structural changes in the food and agricultural system raise a number of policy issues. Food and agriculture has traditionally been a fertile area for public policy. Food is perhaps the most basic of all commodities and countries have naturally wished to ensure that a sufficient supply is always available. Unlike many other industries, agriculture is subject to the vagaries of weather and disease. Agricultural production is inherently unstable and farming is a risky business. Policymakers have been concerned about this and have used various mechanisms to try to address this issue.

**Table 1. Agriculture's contribution to national income and employment**

	1960	1970	1980	1990	1995
	Percentage of gross domestic product				
EU-15	9	6	4	3	2
Japan	13	6	4	3	2
United States	4	3	3	2	2
	Percentage of total civilian employment				
EU-15	21	9	7	6	4
Japan	30	17	10	7	6
United States	9	5	4	3	3

Source: OECD data.

Rapid technological change has exerted substantial pressure on an industry that has historically been viewed as important. The need to adjust has not always been recognised or accepted by farmers and policymakers. The scale and pace of the adjustment necessary has sometimes proven to be politically unacceptable.

Thus, industrial countries have typically spent a lot of money on trying to support agriculture. Agricultural support cost consumers and taxpayers in the OECD countries roughly US\$362 billion in 1998 (OECD, 1999). It is appropriate to ask whether this money is being spent wisely.

## 2. The farm problem

Many of the current agricultural policy mechanisms in place in industrialised countries have their origins in the period between the first and second world wars, when commodity prices were extremely depressed. During the inter-war period there was a proliferation of measures designed to support farm prices. A variety of approaches have been used, ranging from government purchases at a guaranteed minimum price to the protection of farmers from competition from lower-cost imports through the use of tariffs or import quotas. Various sorts of mechanisms have been used to restrict supply, either with the intent of increasing domestic market prices or to control the costs of acquiring large public stocks under guaranteed price schemes.

### 2.1 Impact of technical change

The reason why most governments began to intervene in agricultural markets in this way was that the rate of growth in supply was tending to outstrip the rate of growth in demand due to rapid technological change. Technological change and improved management practices shifted the supply curve outward at a faster rate than the demand curve was shifted upward through increasing population and rising incomes. The result was a fall in real prices – such as from P1 to P2 in figure 2.

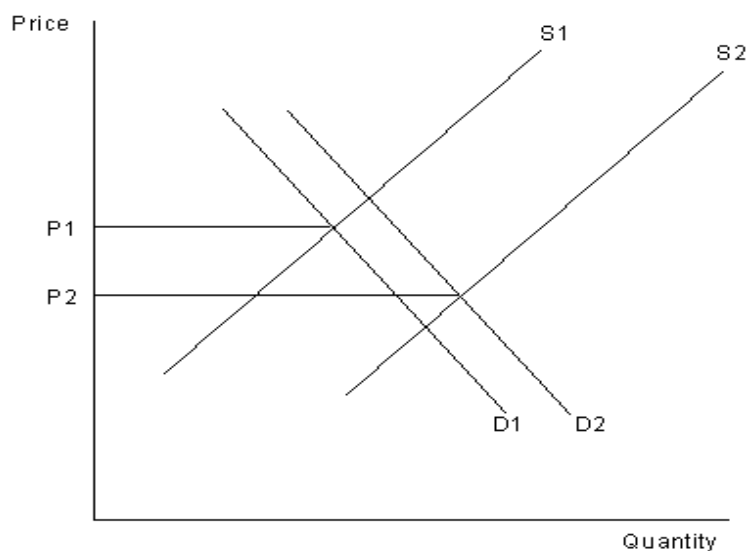


Figure 2. Effect of technical change on output prices

The decline in output prices would not have created a particular problem for average farm incomes, if the number of farmers had declined at a sufficiently rapid rate to permit an increase in farm size. Average net farm income might then have been maintained or even increased due to the change in scale. However, since farm labour was not sufficiently mobile, average incomes came under pressure and there was widely perceived to be an “income problem” in agriculture.

## 2.2 Technical change and factor mobility

Technical change and factor mobility are two key issues for agriculture. Paradoxically, there has been a tendency among the public at large to view agriculture as a “backward” sector. Yet in reality, the rate of technical change and the consequent increase in factor productivity has typically been high. The OECD Secretariat, for example, pointed out in a study completed in the early 1990s that the rate of increase in total factor productivity in agriculture in most OECD countries has tended to exceed that for the economy as a whole (OECD, 1993). This was the case for 12 of the 16 OECD countries for which data were available for the period 1973-89. The average rate of growth in agricultural productivity in these countries was 1.8 percent during that period, compared to 1.2 percent in the rest of the economy. At the same time, there has been a rapid reduction in the agricultural labour force in many industrialised countries (table 2).

Despite this, there are problems of factor mobility, particularly associated with older and less-educated farmers and agricultural workers. For those countries for which data are available, we find that the agricultural work force appears to be less educated than those of the industrial and service sectors, and the farm labor force is significantly older than the working age population as a whole (OECD, 1994a).

**Table 2. Changes in farm employment in selected OECD countries**

	<i>Years</i>	<i>Percentage change</i>
Australia	1986-91	-12
Canada	1986-91	1
France	1985-93	-28
Germany	1985-93	-24
Italy	1985-93	-7
Japan	1985-90	-29
Spain	1987-93	-21
United Kingdom	1985-93	-9

Source: OECD data.

## 2.3 Change in farm size and income

The average size of enterprises (farms) has tended to rise in industrialised countries (see, for example, the European Union in figure 3). There has been a tendency towards the emergence of a bimodal distribution in farm size. That is, a situation in which there is a relatively small number of large farms that tend to obtain most of their income from farming, and a large number of small farms for which agricultural activities provide only a small part of total income. The large farms collectively also produce most of the commercial output.

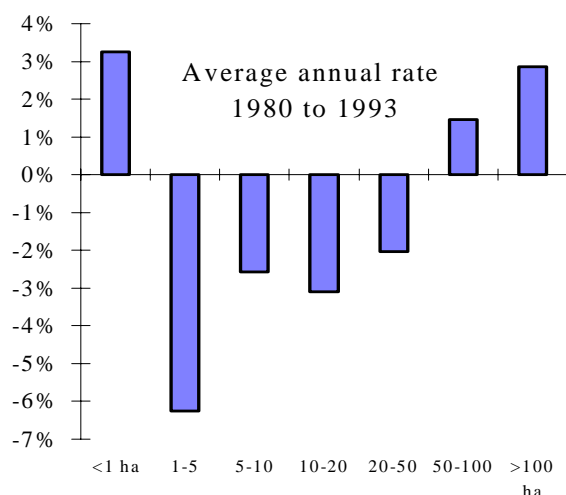


Figure 3. Change in farm numbers by size in the European Union, 1980-93

Non-agricultural activities play an increasingly important role in the well being of farmers in industrialised countries (table 3). The proportion of farm household income derived from activities other than farming in many OECD countries is large and the number of farmers who obtain most of their income from farming has been declining.

Table 3. Share of farm household income derived from non-agricultural sources in selected OECD countries

	<i>Year</i>	<i>Percentage</i>
Australia	1995/96	36
Canada	1994	68
France	1995	31
Germany	1993	70
Japan	1993	84
Korea	1995	52
Netherlands	1991	26
United States	1993	83

Source: OECD data.

This is a very important phenomenon. In the past, adjustment in the agricultural labour force was typically been achieved through the migration of younger people from rural to urban areas. It is now increasingly associated with the retirement of older farmers and with multiple job holding by those who remain in farming. Multiple job holding is made possible by general economic development and the increased availability of off-farm employment in many rural areas, as well as by the possibilities for developing additional farm-related sources of income, for example, through tourism. It is also helped by the development of technologies that permit greater flexibility in the on-farm use of labour, increasing the potential for part-time off-farm employment or multiple job holding.

## 2.4 Well being of farm households

As a result of these developments, the overall “well being” of farm households on average, measured by their incomes, compares favourably to other members of society in many OECD countries (figure 4). Poverty certainly exists among farmers as it does among other occupational groups and other rural residents, particularly in areas that do not have diversified economies. However, there is no general poverty problem in agriculture in OECD countries. Such problems that exist are often localised or limited to certain groups, such as older or poorly educated farmers.

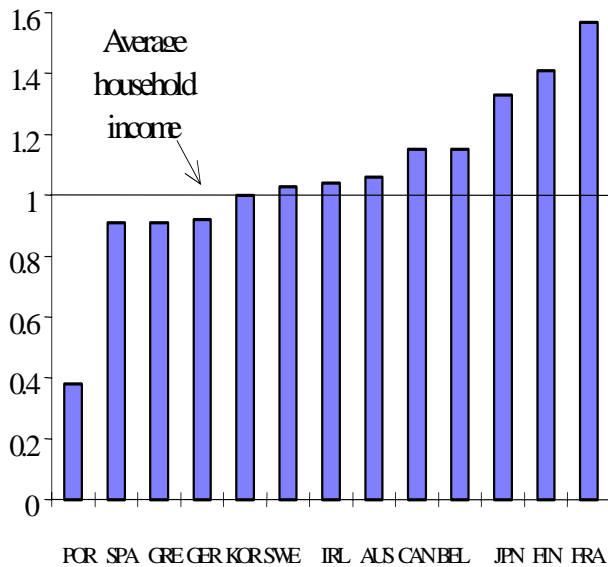


Figure 4. Income of farm households compared to other households

## 3. Implications for agricultural support

On the basis of the evidence, one might question the need for large expenditures on agricultural support, particularly if such support is not targeted to the diminishing number of economically disadvantaged farmers. However, policy-makers still provide a substantial amount of support to agriculture; the majority of which is not paid on the basis of need. As indicated earlier, consumers and taxpayers in the OECD countries spent an estimated US\$362 billion on supporting agriculture in 1998 (table 4). Consumers pay roughly half of this, through food prices that are kept higher than those on world markets by tariffs and trade restrictions. It is therefore not surprising that agricultural trade liberalisation is a major source of controversy within and among industrialised countries.

**Table 4. Transfers to OECD agriculture in 1998**

	US\$ billion	ECU Billion
Producer subsidy equivalent (PSE)	274	245
Consumer subsidy equivalent (CSE)	-181	-162
Total transfers	362	324

Source: OECD 1999.

Transfers to agriculture are achieved through higher output prices, various types of direct payments, and various other types of subsidies, including subsidies on inputs. Despite some progress in reducing the amount of support that is provided through market price support, the share of such support in the total is still large, compared to direct payments and other forms of support. Market price support made up 77 percent of the producer support estimate for the OECD countries for the period 1986-88. It had fallen to an average of 67 percent for the period 1996-98 (OECD, 1999).

### 3.1 Distribution and efficiency of support

Market price support is a very inefficient way of targeting assistance. For an individual farmer, the share of the total amount of support received is a function of the volume of production. Consequently, the largest farms capture the largest share of the transfers with market price support. It is possible to achieve a greater degree of targeting through direct payments, but available evidence suggests that in many countries the biggest share of such payments also goes to the largest farms (table 5).

**Table 5. Distribution of direct payments by size of farm in selected OECD countries (percent)**

	<i>Smallest 25 percent of farms</i>	<i>Largest 25 percent of farms</i>
Canada	1	72
France	15	49
Germany	14	38
Italy	15	49
Netherlands	31	30
Spain	17	47
United Kingdom	13	43
United States	15	41

Source: OECD data.

In addition to the question of equity that is raised by this distribution of payments, there is substantial evidence that the effectiveness of many of the transfers, in terms of the increase in net income that they generate, is fairly low. Estimates suggest that for every dollar of consumer and taxpayer expenditure on traditional price support, 20 cents or less translates into additional income for farm households (Blandford and Dewbre, 1994).

The reason why this figure is so low is that much of the transfer is swallowed up in higher production costs, since farmers have to produce in order to obtain the payment. There are also losses due to the depressing effect of transfers on consumption and on international market

prices. The transfer efficiency of input subsidies is even lower, probably 10 cents on the dollar, as these subsidies are swallowed up largely in higher production costs. Direct income support is much more efficient from the perspective of transferring income, but a dollar of direct income support will not translate into a net increase in income of one dollar if the recipients are required to remain in farming, since this requires them to forego income-earning opportunities elsewhere.

### 3.2 Other aspects of the impact of support

Roughly one third of the total OECD population lives in rural areas, but only one quarter lives in “predominantly rural” regions (OECD, 1994b). In many industrialised countries, economic development has resulted in a substantial reduction in the number of regions that can be considered to be truly “rural”. The contribution of the agri-food sector as a whole (including upstream and downstream industries) rarely exceeds 20 percent of total employment, even in those areas that are considered to be predominantly rural. While agriculture is still an important activity in many rural areas, not least in terms of its use of space, it generally represents a declining share of total rural income and employment. This raises questions about the contribution made by agricultural support to the well being of rural areas and to their future economic development.

In countries where there are concerns about the impact of agriculture on the environment, the provision of agricultural support through enhancing output prices or reducing input prices ought to be a source of concern. These forms of support are likely to lead to the intensification of agricultural production and increased use of purchased inputs such as fertiliser and chemicals.

Finally, there is substantial evidence that existing forms of agricultural support are self-defeating in the longer term, since they become capitalised into the value of land and make it difficult for new farmers to enter agriculture. Where high support prices have been combined with restrictions on production, through set asides or output or marketing quotas, support rapidly becomes capitalised into land or quota values. The price of the factor whose supply is constrained is bid up and the benefits of support evaporate into higher operating costs (e.g. through land or quota rentals or purchases). In a recent analysis of the impact of the EU milk quota regime in the United Kingdom, Colman (2000) estimates that the additional costs attributable to the leasing of milk quotas are equivalent to 12.5 percent of total farm revenue from milk production. Such additional costs represent a significant burden for anyone attempting to enter dairy farming in the United Kingdom or to increase the scale of their dairy operation.

## 4. Food demand and consumption factors

There have been enormous changes in food demand and in the structure of the food distribution system during the twentieth century. These changes affect the responsiveness of the agricultural sector to economic incentives and condition the impact of agricultural policies.

### 4.1 Continued decline in food costs

The share of consumer income spent on food has fallen rapidly and on a sustained basis in all

OECD countries, despite rapid improvements in diet and expanded food choices (table 5). Improvements in agricultural productivity have caused the price of food to fall in real terms and this has allowed consumers to divert an increasing share of their income to non-food purchases. This has happened despite the substantial increase in the share of total food expenditure that goes into value-added in the food system.

**Table 5. Share of food expenditures in total consumer expenditures in selected OECD countries (percent).**

	<i>1970</i>	<i>1980</i>	<i>1993</i>
Australia	18	17	15
Austria	26	20	15
Belgium	24	17	14
Canada	15	14	11
France	21	17	15
Germany	27	22	18
Italy	33	25	17
Switzerland	22	20	18
United Kingdom	20	16	11
United States	14	11	8

Source: OECD data.

#### 4.2 Changes in consumer preferences

As consumers become richer and lifestyles change, they demand more convenience foods or more convenient food delivery, for example through eating outside the home. The share of consumer food expenditures that actually goes to agricultural producers is small, particularly for highly processed products. The amount of money earned by wheat farmers, for example, from the sale of a loaf of bread is only a few pennies on the dollar. The farm gate value of the ingredients in a microwave dinner or a meal purchased in a fast-food restaurant is very small. Consumers are becoming increasingly demanding about what they perceive to be the quality of the foods they purchase. They want to be assured that the food is nutritious and safe. They may demand special attributes such as low-fat or “organically-produced” foods. As the major point of contact between consumers and the food system, retailers are becoming increasingly important in setting the standards that food producers and processors must meet if they are to have a market for their goods. This is especially true in countries where a substantial share of total consumer food purchases is made through a limited number of supermarket chains.

#### 4.3 Spread of vertical co-ordination

More exacting consumer requirements, combined with other important factors such as economies of scale and adaptation to price and production risks, are leading to the spread of vertical co-ordination in the food industry. Under this type of arrangement, the various agents in the food production system are bound together closely through contractual agreements. Poultry production was one of the first segments of the industry to move in this direction. Producers of poultry were brought into arrangements in which the firm that processed the birds provided chicks and feed in exchange for a guaranteed outlet for the finished product. In 1950, 95 percent of broiler production (birds produced for meat rather than eggs) in the United States was derived from independent producers. Today virtually the whole of US production is under some type of contractual arrangement with feed companies or poultry

processors, or is produced by facilities owned by such firms (Martinez, 1999). Similar systems have been developing in other segments of agriculture, such as pork production and fruits and vegetables. In 1980 only 3 percent of the sales by producers to pork processors in the United States were co-ordinated under contracts and through vertical integration. In 1998, the proportion had risen to 40 percent.

Vertical co-ordination has played a major role in the adoption of new technology and in increasing efficiency. By 1990, for example, an average of 30 percent less feed was needed to produce a ton of poultry meat than in 1955. The inflation-adjusted total cost of producing a unit of poultry meat fell by 65 percent in the two decades following the end of World War II (Martinez, 1999). Efficiency gains and the reduction of business risks have been important factors in promoting the spread of vertical co-ordination. However, consumer factors are becoming an increasingly important driver. There is growing insistence by retailers to know the exact origin of the products they purchase and even the production methods used by suppliers of these products. This is because of concerns over liability in the event of food safety episodes or to satisfy the concerns of consumers on environmental issues or animal welfare. More exacting retail requirements are leading to closer vertical co-ordination in other commodity areas, such as beef, in some countries, and it is likely to spread to the dairy industry. Increasingly it is retailers, who need to ensure that the products they sell can be guaranteed to meet the quality standards and product attributes that consumers demand, who are taking the lead in promoting vertical co-ordination in agriculture.

The net effect of the spread of vertical co-ordination on the performance of the food system in industrialised countries is difficult to judge. There are clearly efficiency gains for the participants, but these have to be weighed against other factors, such as a reduction in transparency in the formation of prices. Unlike in a traditional auction market, it is difficult to discover what prices are paid or received for commodities produced under contractual arrangements. This may make possible the exploitation of market power. Thus, for example, price fixing by a few dominant firms in the US beef processing industry in the early part of the twentieth century eventually resulted in government action and a forced reduction in the market power of these firms. However, recent allegations of renewed exploitation of market power by beef packers in the United States are not supported by empirical analysis (Mathews et al, 1999).

While co-ordination provides a way in which producers and processors can help to manage risks, it may reduce responsiveness to short-term changes in market conditions. This could be important in terms of the degree to which changes in livestock production “buffer” variations in grain prices created by weather conditions (this is dealt with further below). Whether or not the industrialisation of agriculture, of which vertical co-ordination is an important part, is beneficial in environmental terms is also a subject of debate. Nevertheless, this type of organisational structure is likely to spread in the agricultural sectors of industrialised countries.

#### 4.4 Impact of protection on innovation

As far as the development of new products and delivery systems are concerned, there is some evidence that segments of the agricultural industry that are protected by government policies show less innovation than other segments. In this regard, it is interesting to note that the producers of commodities such as fruit and vegetables, who tend to be less protected than producers of basic commodities such as grains, typically show more innovative market behaviour. An OECD study comparing growth and development of the horticultural industry in the Netherlands to that of other industries protected under the Common Agricultural Policy concluded that the absence of protection had been a major factor in the high rate of innovation in horticulture (OECD, 1994a). Grains in the European Community and milk in the United States provide examples of the impact of support policies on stimulating production of bulk low-value commodities (feed quality wheat, for example, or bulk butter and cheese) thereby inducing non-innovative behaviour on the part of farmers and processors.

### 5. Price variability

Price variability is a natural feature of agricultural markets, particularly since agricultural supply is often affected by variations in weather conditions. Good weather may produce a bumper crop and cause prices to fall; bad weather may create a rapid increase in prices, as supplies become scarce. There may also be price variations due to cyclical changes in business activity in the economy as a whole, particularly when commodities are sensitive to changes in consumer incomes or are used as industrial raw materials. In general, however, the demand for agricultural commodities tends to be fairly unresponsive to changes in price in the short run, and fluctuations in supply can translate into substantial price fluctuations. In some countries, there are private mechanisms for dealing with the risks that result from price fluctuations. Reference has been made earlier to the use of contracting as a means of spreading price risk among the participants in an industry. Markets that allow trading in futures or options contracts provide another mechanism for managing risk.

A futures contract is a contract to deliver/take delivery of a specified quantity of a particular commodity during a specified period of time in the future. Individuals who wish to use futures contracts to reduce price risks can hedge in the futures market. Thus a producer of grain, for example, can sell a futures contract for a given amount of wheat that he/she expects to produce at the price currently prevailing. By so doing, the producer is protected against a decline in price below the futures contract price. However, he/she also forgoes profits that might result if prices rise. Similarly a purchaser of commodities, say a flour miller, can purchase a futures contract for a given quantity of wheat for delivery in order to protect against a rise in price. However, he/she will forgo profits that might be realised if prices fall below the futures contract price.

An options contract is a more recent innovation. It gives an individual the option to buy or sell a futures contract in exchange for paying a premium. As such it is like an insurance policy. Individuals need not use futures and options as a hedging device, they may also speculate in the market. The volume of contracts traded in active futures and options markets is many times larger than the physical volume of commodities that are actually produced, since there are always those who will try to make a profit by speculating on price movements. Farmers often seem to take a dim view of speculators who may make money (or lose it!) from price movements in agricultural markets. In fact, it is the financial liquidity that is contributed by speculators that permits futures and options markets to function as efficient risk spreading

devices.

Trading in futures and options for agricultural commodities is important in some countries, for example the United States. However, it is less important where governments are active in trying to stabilise markets, since this reduces the need for private market mechanisms for risk spreading and the incentives for speculators to participate in futures and options trading.

### 5.1 Policies and adjustment to fluctuations

Many policy-makers find the prospect of fluctuations in prices unsettling, particularly if such fluctuations are rapid and pronounced. Some have tried to prevent price variations by using public stocks to augment supplies in years of poor harvests and to absorb surpluses in good years. Others have controlled trade through various devices such as import tariffs and quotas or export taxes and restrictions, so as to try to maintain stable internal prices. In this way they try to insulate their domestic market from fluctuations in international prices.

Many of these policies are expensive and are of dubious effectiveness. Left to its own devices, the private sector will hold sufficient stocks to ensure the steady flow of product through the food system during a single season. There may be a modest carry-over of stocks from one year to another, either because processors or consumers feel it worthwhile to have stocks on hand for precautionary reasons, or because producers or wholesalers expect that prices are going to rise and that by holding stocks they can make a profit. However, holding stocks for long periods is expensive because of storage costs and wastage. Thus, on the average, the private carryover of stocks from one season to another tends to be small.

In this situation, when there is a short-term fluctuation in supply due to the weather consumers and producers will make adjustments in response to changes in prices. A short-crop, which results in high prices, will likely cause plantings to increase and production to rise. This is particularly important in an international context because growing seasons vary around the world, leading to more than one planting and harvesting cycle during the year. Consumers, on the other hand, will cut back their use of the commodity if prices rise and expand use if prices fall. This is particularly true when the commodity affected is used in the production of other commodities whose demand is responsive to price changes (e.g. grains and oilseeds used in the production of livestock commodities).

We can illustrate the importance of these factors with respect to the run up of grain prices in the 1995/96 season. Low world production and stocks in 1995/96 led to a rapid increase in world grain prices in that year. As a result, adjustments occurred in both supply and demand. World cereal output in 1996/97 rose by roughly 10 percent; the use of coarse grain for animal feed fell by about the same percentage in OECD countries and by about 4 percent in the non-OECD area. These adjustments caused world prices for wheat and coarse grains to fall by 25-30 percent from the peaks reached in 1995/96 (OECD, 1997).

### 5.2 Impact of public stocks

If the government enters the picture by holding stocks, private individuals will most likely reduce the amount of stocks they hold since additional supplies can always be obtained from the government who also pays the costs of storage. Little money is to be made when public stocks exist, because the variations in prices that make private stockholding profitable are unlikely to occur. If the government that is holding stocks happens to be in an exporting

country, importers are likely to reduce their stocks in order to control their costs. How much price stability will actually result from the existence of public stocks depends on the rules that govern when stocks are acquired and released. If these rules are somewhat uneven or inflexible public stocks may not be very efficient in damping price fluctuations.

In the past, public stocks of grain, particularly those in major exporters such as the United States, have provided a buffer against fluctuations in production created by the weather. While the stockholding by the United States was not driven by the aim of reducing fluctuations in international prices, the volume of US stocks has tended to vary inversely with international prices on a year-to-year basis. If we look at the period 1975-95, for example, the correlation between season-to-season changes in total US wheat stocks and changes in an indicator world wheat price (defined by the Argentine export price) is -0.66. From a statistical perspective, this indicates a highly significant relationship between the two. By contrast, for the same period, the correlation between wheat stocks and prices in the European Union was -0.35. Given that EU policy has been aimed specifically at ensuring stability in domestic wheat prices (and, in particular, maintaining a high price level relative to world markets) it is not surprising to find that this correlation does not indicate a statistically significant relationship.

### 5.3 Market insulation and international price variability

The extent to which stocks vary inversely with world prices is important since it reflects the degree to which variations in international prices are transmitted to the domestic market. In many countries, various types of trade barriers, ranging from levies or quotas to state control of imports, have been used to ensure that domestic prices are kept relatively stable (and often above world prices). Changes introduced as a result of the Uruguay Round agreement under the General Agreement on Tariffs and Trade (GATT) in the early 1990s have altered this picture to only a limited extent. The continued existence of insulating policies means that international price variations are not fully transmitted to the domestic market. Production, consumption and stocks do not react to changes in world prices, and consequently the amount of adjustment that has to occur in other countries as a result of unanticipated fluctuations in world production is increased. When an insulating country is a large grain consumer, particularly of livestock feed, this is very important for the stability of world market prices. Adjustment in the feeding of grain to livestock is one of the principal “shock absorbers” that exists in global grain consumption. Failure to adjust will mean that world prices will be more variable as a result of fluctuations in world production.

When a government seeks to stabilise the domestic market by controlling trade, rather than holding stocks, it will permit exports in times of domestic surplus and imports in times of domestic shortfall. If it behaves in this manner regardless of what is happening to world prices, then it is likely to destabilise world prices. The magnitude of the destabilisation will depend on the average size of the fluctuations in the country’s trade volume relative to world trade. Only in the unlikely event that a country’s production fluctuations are inversely correlated with those in the rest of the world, will this type of behaviour lead to greater stability in world market prices. Thus insulating behaviour will tend to destabilise international market prices. Incidentally, it does not require a large country to create increased price instability in world markets; a lot of small countries with insulated markets can also have the same effect.

### 5.4. Changes in the ability of the market to absorb supply shocks

The global stocks-to-use ratio provides an important indicator of when the world is at risk of experiencing rapid increases in grain prices. If stocks are low relative to consumption, there is clearly a greater risk of a run-up in prices if production is below average. But it is important to note that the ratio at which price “spikes” are likely to occur is not fixed, as is sometimes assumed. In fact this ratio has been declining over time. The three major episodes of sharp upward price movements in wheat since 1975 occurred with substantially different stocks-to-use ratios (figure 5). In 1979 a run-up in world wheat prices took place with a stocks-to-use ratio of 30 percent, whereas a broadly similar price run-up in 1995/96 occurred when the ratio was less than 20 percent.

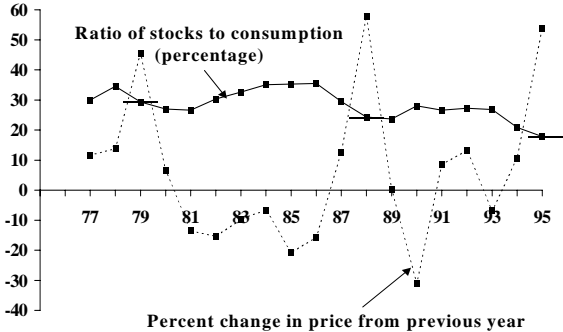


Figure 5. World wheat stocks and variations in prices

An explanation for this decline in the sensitivity of prices to the level of stocks is not hard to find. The last twenty years have witnessed an enormous increase in efficiency in the functioning of international grain markets. Information on availability and demand has become more accurate, and easier and faster to obtain. Improvements in infrastructure in many countries mean that available supplies can be moved to market positions more rapidly. The revolution in communication technologies and computing has made a significant contribution to efficiency. There are fewer stocks tied up under government programs. In some cases domestic markets have become more open, allowing more of the adjustment to a short global crop to be reflected in consumption. Thus the world can probably expect to have less variable grain prices due to year-to-year fluctuations in weather conditions in the future with lower levels of stocks. While it is likely that the volume of stocks held in private hands will increase as governments withdraw from the business of supporting prices, it is unlikely that the private sector will hold as much, on average, as the public sector has in the past. The management of intra-seasonal storage can be expected to become more significant for the private sector in countries where governments are withdrawing from the grain market. But the private sector is unlikely to find it profitable to hold large carryovers of stocks from one year to the next.

## 5.5 Policy reform and price variability

Considerable potential exists in international grain markets for adjusting to unanticipated shocks. Producers and consumers respond rapidly to price signals, when these are transmitted to them. The rapid adjustments in supply and demand in response to the high prices of 1995/96 are evidence of this. However, further policy reform is needed to promote greater stability.

As indicated above, there have been some positive steps in reforming domestic policies that contribute to distortions in international grain prices. The Uruguay Round agreement helped to consolidate such domestic reforms by putting restrictions on the use of export subsidies, increasing market access, and reducing the level of support. However, the actual progress made through the URA in opening up domestic grain markets to trade was modest. The replacement of non-tariff barriers by bound tariffs was a significant step, but many of the tariffs fixed under the Agreement are high, if not prohibitive (OECD, 1995). The market access provisions permit higher imports, but do not necessarily create a strong linkage between domestic and international prices, particularly if the import commitment is met through purchases by state trading agencies, whose activities are generally not transparent. Some countries use export taxes when world prices are high in order to maintain domestic price stability. There still exists a substantial amount of insulation of domestic markets from the international grain market.

Further progress in reducing trade barriers and the consequent globalisation of markets would help to increase the collective capacity to adjust to shocks. Policy reforms that do not lead to the closer integration of domestic and international markets can actually increase the potential variability of international prices. What is required is reductions in tariffs to levels that result in the effective transmission of changes in international prices to domestic markets. The resulting market integration would do much to contribute to greater price stability at a global level. Until such integration occurs, it is inevitable that policies and policy interventions will continue to have a potentially destabilising effect on international prices.

## 5.6 Private sector mechanisms as an alternative for dealing with price variability

A further area in which changes could be achieved is through the growth of private sector mechanisms for managing price variability and risk. In many countries in which domestic grain prices have largely been controlled by the government, agents (producers, intermediaries and consumers) have limited experience with strategies for dealing with price variability. When the government guarantees prices, farmers or merchants have little need to develop a marketing plan for their grain, to decide when to sell or to store, whether to contract forward, or whether to use futures or options as part of a risk management strategy. When the government steps out of the grain marketing picture, there is a need for agents to develop such skills and to be able to take advantage of the private mechanisms that exist for risk management.

Clearly there is great commercial potential in this area, and those who provide risk management services, such as commodity futures and options contracts, are very well aware of the possibilities. It is interesting to note the general increase in interest around the world in the potential for expanded use of futures and options for risk management in agriculture. There are many technical issues to be faced particularly where there is a general lack of experience with these mechanisms. There may be regulatory issues, particularly if the range

and availability of contracts is to be expanded. Recently there has been an enormous increase in electronic commerce for agricultural products, particularly through the Internet (Blandford and Fulponi, 1998). While much of this has focused on cash transactions, the use of the global information highway for trading in futures and options may not be far away. The opportunities for the globalisation of risk management through new technologies are intriguing, but raise numerous issues, not least for national governments and market institutions.

## **6. The food and agricultural system and the future direction of policy**

In many industrialised countries the focus of policy for the food and agricultural sector is beginning to shift from traditional concerns – such as price and income support – towards new concerns. This is not to say that farms and businesses in the sector will not take money from the public purse if this is proffered, but there is less justification for traditional types of support than in the past, and a greater focus on other issues in food and agriculture. In the future, it is likely that public policy for food and agriculture will largely centre on setting and enforcing the rules of the game, and on public goods and externalities.

The “rules of the game” dimension relates to such concerns as competition, health and safety, and animal welfare. With continuing concentration in agriculture there will be a need for surveillance in order to guard against anti-competitive behaviour. It does not necessarily follow that an industry dominated by a small number of firms will work against the public interest, but there is always a risk that this will be the case. Competition, particularly in smaller countries, can be stimulated through open trade and by eliminating barriers to entry for new firms, but some countries are reluctant to allow international market forces to operate in this manner. In such cases, they may have to use regulation. This runs the risk of being less effective and more costly.

Health and safety is a legitimate area for public policy in agriculture, although this is a complex and increasingly contentious area to deal with. Difficult issues that have to be addressed include: acceptable levels of risk, what constitute real versus imagined health risks, and what policy measures are needed to meet health and safety standards in the least costly way. Similar considerations attach to the animal welfare issue – defining standards and achieving standards while minimising economic distortions. There is a range of possible approaches of which regulation is only one option (Blandford and Fulponi, 1999).

Public goods and externalities are an increasingly important focus in agriculture. The food and agricultural sector produces both beneficial and harmful effects (externalities) that are not priced in the marketplace. Some of the negative effects are created by soil erosion and pollution associated with agricultural chemicals and animal waste. Some of the positive effects are generated by agriculture’s contribution to maintaining the countryside and providing recreational space. Policymakers in some countries often seem more predisposed to stress the positive externalities and the need to reward farmers for providing these, but the negative externalities associated with intensive agriculture are also of great concern in some areas, particularly where there are large urban or suburban populations. Some sections of the population are concerned about the sustainability of agriculture, usually interpreted to mean its long-term ecological viability. Ensuring ecological and economic viability is a challenge that faces policymakers.

Finally, there will continue to be a social role for public policy in agriculture, in terms of

helping to facilitate social adjustment to economic change, and helping to support research and development that improves the efficiency of agriculture and helps it to satisfy social concerns, such as sustainability.

## **7. Conclusion**

The food and agricultural system in industrialised countries is complex and sophisticated. For the most part it is a modern and efficient industry. It responds rapidly to the opportunities offered by new technologies and to changing consumer demands. Government intervention in agricultural markets has often been driven by a perceived need to protect farm incomes and stabilise domestic prices, although these are less relevant today. Other policy concerns are becoming increasingly important. The challenge will be to address these concerns in a more efficient and effective manner than has been the case in the past.

## References

- Blandford, D. and J. Dewbre. "Structural adjustment and learning to live without subsidies in OECD countries". *American Journal of Agricultural Economics* 76: 1047-1052. 1994.
- Blandford, D. and L. Fulponi. "Electronic markets in the agro-food sector". *The OECD Observer*, No. 208, October/November, 1997, pp. 20-23.
- Blandford, D. and L. Fulponi. "Emerging public concerns in agriculture: domestic policies and international trade commitments. (General issues and a case study of animal welfare)". *European Review of Agricultural Economics*, 26:409-424. 1999.
- Colman, D. "Inefficiencies in the UK milk quota system". *Food Policy* 25: 1-16, 2000.
- Lin, B-H, E. Frazão and J. Guthrie. Away-from-home foods increasingly important to quality of the American diet. Economic Research Service, U.S. Department of Agriculture, Agriculture Information Bulletin No. 749. Washington DC. January 1999.
- Lipton, K.L., W. Edmondson, and A. Manchester. The food and fiber system: contributing to the U.S. and world economies. Economic Research Service, U.S. Department of Agriculture, Agriculture Information Bulletin No. 742. July 1998.
- Martinez, S.W. Vertical coordination in the pork and broiler industries: implications for pork and chicken products. Economic Research Service, U.S. Department of Agriculture, Agricultural Economic Report No. 777. Washington DC. April 1999.
- Mathews, K.H. Jr., W.F. Hahn, K.E. Nelson, L.A. Duewer, and R.A. Gustafson. U.S. beef industry: cattle cycles, price spreads and packer concentration. Economic Research Service, U.S. Department of Agriculture, Technical Bulletin No. 1874. April 1999.
- OECD. Technological Change and Structural Adjustment in OECD Agriculture. Paris. 1993.
- OECD. Farm Employment and Economic Adjustment in OECD Countries. Paris. 1994a.
- OECD. Creating Rural Indicators for Shaping Territorial Policy. Paris. 1994b.
- OECD. The Uruguay Round: a Preliminary Evaluation of the Impacts of the Agreement on Agriculture in the OECD Countries. Paris. 1995
- OECD. The Agricultural Outlook: 1997-2001. Paris. 1997.
- OECD. Agricultural Policies in OECD Countries : Monitoring and Evaluation 1999. Paris.
- Smith, S. "Farming" – It's declining in the U.S. *Choices*. First quarter 1992, pp. 8-10.

# ***The functioning of agriculture and agribusiness in developed market economies - Addendum***

***D. Blandford***

The global food system continues to experience rapid change. In this addendum, I shall address two particular aspects: 1. the transformation of the food system from a supply chain to a demand chain; and 2. globalization.

## **1. The Food System as a Demand Chain**

New technologies are affecting the operation of the food system at all levels. As consumers become wealthier, they are also becoming more demanding about the products they consume and the ways in which these are produced. The food system is rapidly being transformed from a supply chain to a demand chain. In a supply chain, producers are the primary determinants of what is made available to consumers. Consumer preferences are signalled through changes in the prices that producers receive. In a supply chain, auction markets are the primary mechanism through which consumer preferences are expressed. In a demand chain, consumers and the agents who provide the final contact with consumers – retail stores and food service operations – determine the products that are offered and their characteristics. The information on product requirements is passed down the chain to suppliers who produce to specification. In a demand chain, contracts are the primary mechanism for the transmission of information on consumer preferences.

Technological progress, particularly in the area of information technology, is a major driving force in the transformation of the food system from a supply chain to a demand chain. In the United States, some of the key events linked to information technology were the introduction of product barcodes and scanners in the 1970s, and the development of electronic data exchange (EDI) and vendor managed inventory (VMI) in the 1990s. Electronic data interchange is the electronic exchange of routine business transactions, such as purchase orders, invoices and payments. EDI permits rapid transmission of orders from retailers to food manufacturers, and reduces the costs of transactions. Vendor managed inventory takes the process one stage further by making manufacturers responsible for maintaining a retailer's inventories. This is in contrast to the traditional business model in which inventory management is the responsibility of the retailer. These new systems, reliant upon low-cost and reliable technologies, have created a new business model in which profits depend crucially on the management of information. They permit the provision of commodities to consumers at lower costs. Companies who have made the most extensive use of such systems (e.g., Wal Mart in the United States) are exploiting the competitive edge that these systems provide to become a global force in retailing.

At the same time, the growth in consumer incomes, education and awareness has resulted in the emergence of “niche” markets in the food system. Consumers who are particularly concerned about their health and well being are demanding functional foods – foods whose composition is modified to provide particular medical or nutritional benefits, such as improved intestinal tract health or reduced tooth decay, hypertension or cholesterol levels. There is also an increasing demand for nutraceuticals – herbal or non-herbal extracts that convey, or are believed by their users to convey, particular health benefits. Health concerns, together with other concerns such as animal welfare, are leading to growing demand for “animal friendly” and organic products, and to an expanding range of vegetarian products in

many countries. The demand for convenience is also having a major impact. The share of retail space occupied by ready-to-eat foods or foods that require minimal preparation is increasing steadily in the average European or North American supermarket. Take-away foods for immediate consumption, once the province of restaurants, are a growing part of the sales of supermarkets in North America, many of which are configuring the interiors of their stores to replicate the “food court” approach pioneered by shopping malls. Many stores are encouraging in-store consumption of food by incorporating snack shop, coffee bar, or restaurant facilities.

As indicated above, the development of the demand chain is being made possible by advances in technology. An enormous amount of information must be handled in monitoring production processes and ensuring that products meet consumer requirements. Traceability and identity preservation become important when consumers need to be assured that exacting requirements are being met, and when food processors, retailers and distributors run the risk of financial loss if this is not the case, not least through legal action. The value of branded food products, for example, is increasingly related to “brand capital”, which is a function of the confidence that consumers place in the safety and quality of a product or product line. Brand capital may be associated with the name of particular food product (e.g., Heinz Ketchup), a manufacturer (e.g., Nestlé), or with a range of offerings by a retailer or food distributor (e.g., Safeway Supermarkets). Brand capital can be destroyed very quickly if consumers lose confidence in a product or its source. The precipitous loss of market share by Perrier mineral water due to a relatively small number of cases of benzene contamination in 1990 is a clear example of this phenomenon. Food retailers are at increasing risk from the loss of consumer confidence if the quality of the products they sell is viewed to be suspect. Loss of confidence is likely to lead to a drop in sales and reduced market share. Both processors and retailers are at risk from legal actions brought under product liability laws. Traceability and identity preservation are important in the maintenance of brand capital, and in limiting exposure to the risk of financial loss. Since it is difficult to guarantee traceability for products obtained through auction markets, contracting has become increasingly important as a means of sourcing products in the food system, not simply because of the potential costs savings that contracting may offer, but also as a means of guaranteeing product characteristics and quality.

## **2. Globalization**

Structural transformation in agriculture and the food system has been taking place at a very rapid pace. Multinational firms have played a key role in the diffusion of new technology, production and marketing methods that have contributed to structural change. Particularly since the early 1980s, this diffusion process has become increasingly important in the processing and service components of the food industry, as demonstrated, for example, through the spread of the outlets of major restaurant chains throughout the world. Between 1980 and 2000 investment in overseas operations by U.S. food processing companies increased from \$9 billion to \$36 billion. Globalization is now spreading to food retailing as major supermarket and retail chains develop an international presence. U.S. companies have been a major force in the globalization of the food system, but many European companies have also been extremely active. Thus, for example, investment by foreign companies in U.S. food retailing increased from roughly \$2 billion in 1982 to \$13 billion in 1999 (USDA, 2001).

An indication of the importance of globalization through investment flows is provided by the U.S. food industry. Protective import policies in other countries have contributed to only modest growth in U.S. exports of processed food since the early 1980s. In 2000, such exports

amounted to around \$30 billion. In contrast, sales by subsidiaries or foreign affiliates of U.S. food processing companies were \$150 billion. These sales increased by roughly 280 percent between 1982 and 2000. Sales of foreign-owned affiliates in the U.S. food industry (from processing through to food service) amounted to \$176 billion in 2000. That figure had increased by more than 330 percent since 1982 (USDA, 2001).

A major driving force behind globalization is the search for lower costs, expanded market share, and higher profits. The margins (profits per unit of sales) are often very small for participants in the food system. In the United States, for example, the combined pre-tax profits of all the companies involved in the processing and marketing of food accounted for only 4.7 percent of the value of food sold in 2000 (USDA, 2001). In order to increase sales and profits, many companies have looked outside the borders of their home countries to develop new markets. Globalization has been reflected in the food and agricultural system by flows of international investment rather than through flows of agricultural and food products. Firms have taken the opportunity to grow in size through international mergers, acquisitions and joint ventures and to transfer business models that have proved to be successful domestically to other countries. Frequently they have taken advantage of their brand capital to expand internationally. The globalization of the farm equipment industry and the global spread of the “fast food” industry are two examples of these developments at opposite ends of the food system.

The supply of agricultural inputs has become increasingly concentrated globally as a result of mergers and acquisitions. Thus, for example, the manufacturing of agricultural machinery is now dominated by a small number of international firms. One is a US company, AGCO, which developed from the Allis-Chalmers Company in 1990. AGCO acquired Massey Ferguson in 1993 and Fendt GmbH in 1997. Headquartered in Georgia, it has manufacturing operations in four European countries, Brazil and Mexico, in addition to the United States. The Fiat group, headquartered in Turin, has also become a major global player in agricultural machinery through its CNH global division, which includes the Case and New Holland brands. CNH has manufacturing facilities in seven European countries, Australia, Brazil and India, in addition to the United States and Canada. The development of such large global companies has been replicated in other areas of the input supply component of the agricultural system, such as the production of agro-chemicals. Continued changes in agricultural technology, for example, the development of biotechnology, seem likely to accelerate the trend towards concentration and globalization in this area.

At the other end of the spectrum, globalization has affected food distribution, most dramatically through the development of a global “fast food” industry. Thirty years ago, the operations of restaurant chains such as Burger King and McDonald’s were largely confined to North America. Today, McDonald’s operates in 121 countries. Its first restaurant in Europe opened in the Netherlands in 1971, as did the first one in Japan. McDonald’s now has over 5,000 restaurants in Europe and over 7,000 restaurants in Asia. In the first quarter of 2002, 47 percent of McDonald’s total sales of \$9.7 billion were outside North America, and those operations accounted for over 60 percent of the corporation’s revenues of \$3.6 billion (McDonald’s, 2002). Burger King opened its first European restaurant in Madrid in 1975. It now operates in 57 countries; roughly 30 percent of its more than 11,000 restaurants are located outside the United States. In 1989, a European company (Grand Metropolitan)

acquired Burger King, again showing that investment in the food industry is fluid across international boundaries.<sup>1</sup>

The international success of food companies, such as McDonald's, reflects the strength of their business model and the impact of changing consumer preferences, lifestyles and behaviour. Fast food restaurants have spread around the world because of the ease of duplicating a standard operation, delivering standard products at competitive prices, often relying on local capital for growth through franchising. Changing tastes, particularly among the young, have driven the popularity of the products sold. This has been a major factor in the global diffusion of well-known retail outlets for a range of food, clothing and other products. McDonald's alone spends over \$13 billion annually on the raw materials for its products (primarily food and paper). Volumes of purchases such as these cannot fail to have an important impact on the food and agricultural system of which such companies are a part.

Globalization has affected the structure and operations of other parts of the food system. Multinational companies are a major force in food processing. Large supermarket chains, based in Europe, North America and elsewhere, are becoming increasingly important in food retailing.

The globalization of the food system has occurred largely through the movement of capital internationally, rather than the movement of goods. Agricultural markets were relatively untouched by efforts to liberalize trade through the GATT until recently, although regional trade liberalization, particularly the formation and expansion of the European Union and the creation of the North American Free Trade Area (NAFTA), has undoubtedly had an important impact on trade among the countries involved. Despite this, the most important force for change has been the international transfer of technology, know-how, and capital that has taken place despite, and in some cases because of restrictions on flows of agricultural products between countries. The current WTO negotiations, particularly the part of the negotiations directed towards agriculture, focus on barriers to trade in agricultural products. Regardless of the progress made in these negotiations, it seems likely that globalization will continue to be a major force for change in the food system.

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<sup>1</sup> In 1997, Grand Metropolitan merged with Guinness to form Diageo PLC. Diageo announced its intentions to separate Burger King Corporation from its portfolio in June 2000. In July 2002, Diageo announced that a consortium made up of the Texas Pacific Group, Bain Capital and Goldman Sachs Capital Partners are to purchase the Burger King Corporation thus transforming it again to an American-held company.

## **References**

McDonald's Corporation. Press Release on McDonald's global results for the quarter ended March 31, 2002. April 18, 2002. <http://www.mcdonalds.com>

U.S. Department of Agriculture. Economic Research Service. *Food Review* 24(3) September-December 2001.