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U.S.-EU Food and Agriculture Comparisons

Changing trends highlight similarities and differences between U.S. and EU food and ag sectors

U.S.-EU Food and Agriculture Comparisons. Mary Anne Normile and Susan E. Leetmaa, coordinators. Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture, Agriculture and Trade Report. WRS-04-04.

Abstract

The United States and the European Union (EU) are two of the world's largest agricultural producing, consuming, and trading entities. The commodity makeup of agricultural production in the two countries, productivity and competitiveness of each country's producers, tastes and preferences, and agricultural and trade policy determine to a large extent the level and composition of U.S. and EU agricultural trade. Both countries' agricultural sectors and agricultural policies are changing in response to the dynamics of the world market and to the growing importance of regional trade agreements. Differences between the two countries could account for fundamental differences in their approaches to agricultural trade liberalization in the World Trade Organization (WTO). The report examines similarities and differences across multiple aspects of their agricultural sectors and policies.

Keywords: U.S. agriculture, EU agriculture, European Union, agricultural policy, Common Agricultural Policy, risk management, agricultural productivity, environmental policy, food consumption, enlargement.

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Washington, DC 20036-5831

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Summary

The United States and the European Union (EU) are two of the world's largest agricultural producing, consuming, and trading entities. The bilateral trade relationship in agricultural products is among the world's largest, while the two countries also compete for export markets for many agricultural commodities. The commodity makeup of agricultural production in the two countries, productivity and competitiveness of each country's producers, tastes and preferences, and agricultural and trade policy determine to a large extent the level and composition of U.S. and EU agricultural trade. At the same time, both countries' agricultural sectors and agricultural policies are changing in response to the dynamics of the world market and to the growing importance of regional trade agreements. Differences between the two countries may contribute to agricultural trade disputes and could account for fundamental differences in their approaches to agricultural trade liberalization in the World Trade Organization (WTO). The purpose of this report is to examine similarities and differences in multiple aspects of their agricultural sectors and policies.

The first chapter provides the reader with a basic overview of agriculture's role in the two economies. In both countries, agriculture is declining as a contributor to gross domestic product (GDP) and as a source of employment. Both the U.S. and EU agricultural sectors have undergone significant structural adjustment. Farm consolidation and exit from the sector have resulted in fewer and larger farms. Changes in the farm economy and in society have resulted in an increased incidence of part-time farming and a growth in the importance of off-farm income. The two countries' farm structures remain vastly different, however—for example, the United States has a much greater endowment of farmland, with fewer and, on average, significantly larger farms than the EU.

Both the United States and the EU have undertaken significant changes to commodity policy in the past decade. They share many of the same goals for farm policy, and in some cases, have moved toward similar approaches to meeting those goals in recent years. The two countries face similar pressures from tight budgets, trade constraints, and increasing public connection of agricultural policy with issues beyond traditional goals for supporting production agriculture. The U.S. 2002 Farm Act introduced additional new policies, while the EU has enacted reforms that, if applied to all commodities, would fundamentally restructure the Common Agricultural Policy (CAP). Their commodity policies remain different in significant ways—particularly their differing reliance on income versus price support, their use of surplus disposal and supply control, and their reliance on border measures. With the recent adoption of EU policy reforms, U.S. and EU commodity policies are becoming more similar, with increased emphasis on decoupled income support and greater focus on the interactions between agriculture and the environment.

As the European Union reduces price support for some commodities and contemplates further reforms, its producers, policymakers, and others are considering the need for and the availability of risk management instruments for agricultural commodities. Policy changes that have increased exposure to world market prices appear to have stimulated demand for price risk management vehicles by creating or increasing price volatility for agricultural commodities. Agricultural insurance programs are varied across European countries, but are generally smaller and more limited in scope than the crop insurance program in the United States. Both the United States and the European Union use agricultural futures and options markets to manage risk. Many of the new European agricultural futures and option markets were introduced after reductions in price supports for major commodities resulting from successive reforms of the CAP and implementation of the WTO Agreement on Agriculture.

Farms in the United States and the EU have increased agricultural output over the decades, mostly as a result of technical change, increased efficiency and scale of production, better

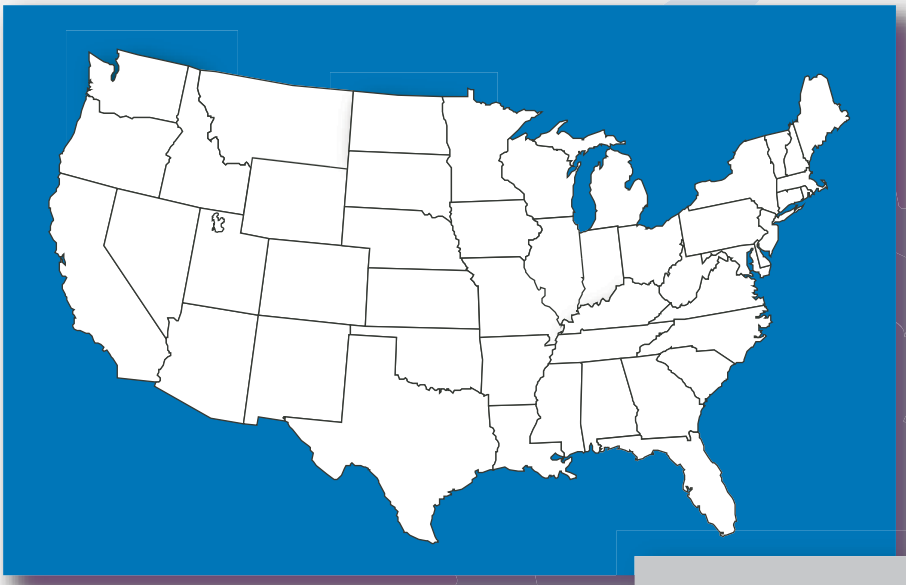
skills in the management of farm operations, and the influence of government programs. A comparison of agricultural output growth and productivity growth of the EU and the United States shows positive output growth driven by productivity growth rather than more intensive input use over the past 30 years in both cases. Technical change has been the main source of productivity growth in both the United States and the EU, although efficiency appears to be increasing in the EU. Continued productivity growth could strain budgets and risk breaching WTO limits on production-related subsidies. Higher productivity due to technical change and efficiency in the Central and Eastern European countries, who will become EU members in 2004, could result in larger grain crops.

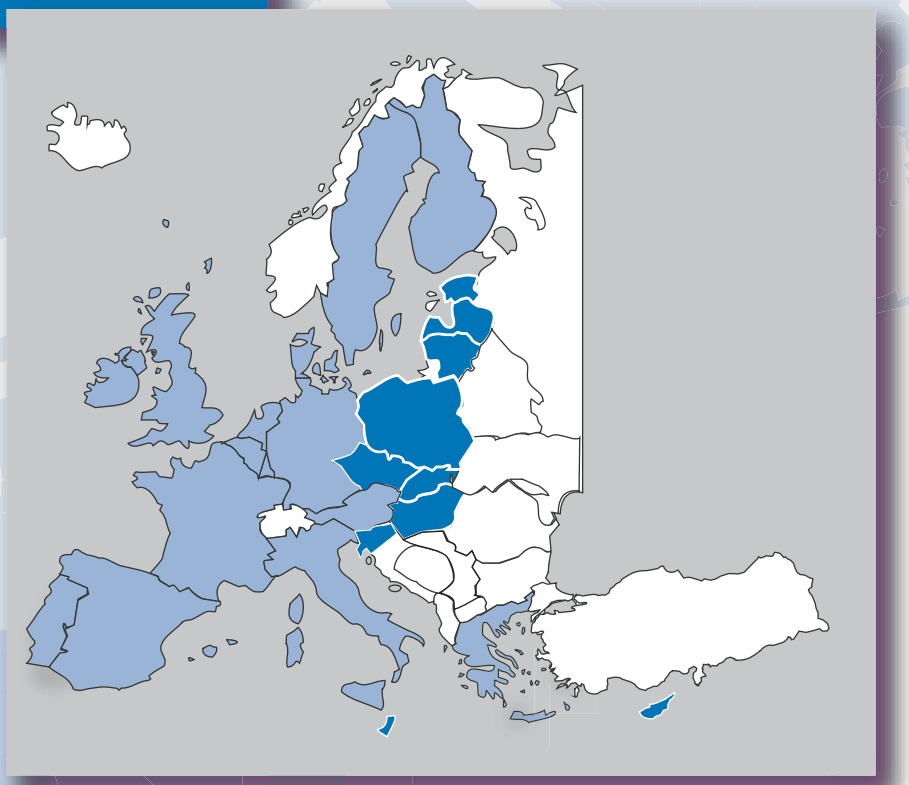
Food consumption patterns differ between the United States and the EU, yet food consumption in both countries is changing in response to similar trends, including demographic changes, longer working hours, greater consumption of prepared food, and consolidation in the food retailing sector. Differences in food consumption expenditures reflect differences in prices, income, and preferences. Differences in consumption patterns have implications for U.S.-EU trade. These may vary as much within the EU as between the EU and the United States. EU and U.S. diets differ somewhat, but rather less than regional EU variation for some food groups. While European diets are changing and even becoming more alike in most EU countries, significant differences still remain. Consumers in both the United States and the EU are becoming increasingly concerned about healthy diets, food safety, and how food is produced, with consequences for food consumption patterns.

Both the United States and the EU utilize agri-environmental programs to encourage the provision of environmental amenities and to reduce negative environmental effects associated with agriculture. Both target environmental objectives through a mixture of voluntary programs, regulatory programs, and "cross-compliant" programs. The two countries differ in the types of programs, in implementation, and in the objectives of agri-environmental policy. While conservation is at the heart of most U.S. programs, the EU's policies target rural development and provision of environmental amenities to a greater extent. At the same time, both the United States and EU use environmental programs to support farm income. Both the United States and the EU are giving increased emphasis to agri-environmental programs. Authorized funding for agri-environmental programs was increased in the 2002 U.S. Farm Bill, while the EU is strengthening the connections between environmental protection and agricultural support in its 2003 CAP reform. Farm policy's greater emphasis on environmental objectives is particularly significant in light of WTO regulations that exempt environmental programs from restrictions that apply to producer support spending.

In 2004, 10 countries—eight Central and European (CEE) countries plus Cyprus and Malta—are scheduled to become new members of the European Union. An agreement reached in December 2002 established the terms under which these countries will become EU members. Two additional CEE countries (Romania and Bulgaria) continue negotiations over eventual EU membership. The addition of 10 CEEs to the EU could profoundly change the shape of EU agriculture. With accession, levels of support to CEE producers could rise substantially, providing an incentive for producers to expand output of several products, and are likely to affect most significantly the grain and livestock sectors. Potential opportunities for U.S. agriculture are closely linked to developments in the CEE livestock sectors, but the future of U.S. trade also depends on potential for expanding markets in the CEEs for high value foods, and this potential depends on future income growth. While the December 2000 agreement was designed to keep EU spending within agricultural budget limits, in the longer term providing support to the candidate country farmers will be costly to the EU budget and could accelerate pressures for CAP reform. The result of any significant CAP reform could be further reductions to trade-distorting agricultural support, which could improve opportunities for U.S. agricultural exports.

The United States and the EU





The countries currently in the EU:

Austria
Belgium
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Luxembourg
Netherlands
Portugal
Spain
Sweden
United Kingdom

The 10 countries that will be joining the EU in 2004:

Cyprus
Czech Republic
Estonia
Hungary
Latvia
Lithuania
Malta
Poland
Slovakia
Slovenia

The United States and the European Union—Statistical Overview

Mary Anne Normile and Jason Price[1]

Introduction

As background for the comparisons that follow, this chapter provides an overview of statistical comparisons of the United States and the European Union (EU). Emphasis is on the key economic indicators relating to the general economy, agriculture, and trade. To facilitate these comparisons, the EU is treated as a single entity, although it is an economic association of sovereign nations.

The United States is a Federal Republic of 50 States and one District. Trade in goods and services among the States and District is tariff-free, and other barriers to movement of goods and people between States are minimal. The U.S. economy is a market-oriented, highly industrialized economy, where agriculture, despite its small size relative to non-farm sectors, is important politically and economically. The varied and largely favorable U.S. climate, abundance of land, and fertile soil provide the basis for a highly productive agricultural sector.

The European Union was created by the 1957 Treaty of Rome to encourage the economic recovery and development of Western Europe.[2] Its member nations are market economies that are characterized by a higher degree (although declining in many countries) of public sector involvement in the economy than in the United States (*CIA World Factbook*). The EU agricultural sector is highly productive, concentrated primarily in temperate zone crops and livestock. EU agriculture is characterized by more intensive production than in most of U.S. agriculture, owing to the relative scarcity of agricultural land.

Although a successful customs union for industrial goods has been realized within the EU, the EU still remains a compact among sovereign nations. Control of some economic policy, and particularly agricultural policy, is delegated by member states to the EU, while the rest remains the jurisdiction of the national governments. Supranational institutions like the European Commission and the European Parliament have limited power to regulate and administer mainly economic and commercial affairs at the EU level. Trade among EU member countries is tariff-free, and the "single market" reforms undertaken in 1993 have reduced or eliminated many remaining internal trade barriers. With the formation of a monetary union and adoption of a single currency in 1999 by 11 members, EU countries are approaching more comprehensive economic integration.

Macroeconomic and Socioeconomic Data

The 15 countries of the EU form a land mass equal to roughly half the area of the continental United States. However, with a much higher population (table 1-A), its population density is significantly greater, and the availability of land for agriculture smaller.

The sizes of the U.S. and EU economies are comparable; however, the U.S. economy has exhibited

Table 1-A—Population

Year	U.S.	EU
2002	287,675,526	379,270,390
Growth rate, 1990-2002 (%)	1.2	0.3

Source: U.S. Census Bureau.

[1]Jason Price is an Associate at Industrial Economics (Cambridge, MA). He contributed to this article while an intern at ERS.

[2]France, West Germany, Italy, the Netherlands, Belgium, and Luxembourg were the original members. The United Kingdom, Ireland, and Denmark joined in 1973; Greece joined in 1981; and Spain and Portugal, in 1986. East Germany unified with West Germany in 1989; and Austria, Finland, and Sweden joined in 1995 to form the EU-15.

stronger growth in recent years (table 2-A).[3] EU economic growth suffered to a greater extent than the U.S. economy from the global financial crisis of the late 1990s. Moreover, some EU national governments undertook austerity measures to meet the growth, debt, and inflation requirements of membership in the European Monetary Union (EMU). Greater differences in gross domestic product (GDP) exist between the EU and the United States on a (dollar-denominated) per-capita basis. While U.S. GDP per capita is larger in absolute terms (again, when both are expressed in dollars), it has grown at only a slightly higher rate than EU per capita GDP. Between 1991 and 2002 U.S. GDP per capita grew by 4.2 percent while EU per capita GDP grew by 3.9 percent over the same period.

Both countries exhibit significant regional variation in economic activity. In 2001, per capita GDP in the EU ranged from about $17,000 (at purchasing power parity conversion rates) to about $49,000 in Luxembourg (OECD), nearly a three-fold difference. In 2000, per capita gross state product in the United States ranged from about $23,000 in West Virginia to $47,000 in Connecticut (BEA, Census).

Throughout the 1990s, a larger share of the EU working-age population has been unemployed than in the United States (fig. 1-A). Unemployment in both countries declined at approximately the same rate in the late 1990s in response to robust economic growth. High unemployment has been a persistent problem in many EU countries, owing at least in part to inflexible labor laws and high wage taxes that raise the cost of labor. Regional variation in unemployment rates is pronounced in the EU, where 2002 unemployment averaged less than 3 percent in Luxembourg but was over 11 percent in Spain (OECD). The regional variation in unemployment rates is smaller in the United States, with 2002 unemployment rates ranging from 3.1 percent in South Dakota to 7.7 percent in Alaska (BLS).

U.S. and EU inflation rates have been similar throughout the 1990s. Inflation as measured by the Consumer Price Index declined in both countries in the mid-to-late 1990s to levels that were relatively low by historical standards (fig. 2-A). Inflation rates have remained moderate since then on both sides of the Atlantic.

[3]Expressing economic data in the same currency, such as U.S. dollars, facilitates comparisons by putting economic data in the same units, but conversions from euros to dollars introduce distortions in the data. These comparisons will reflect the relative values of the dollar and the euro, as well as the values of the data themselves.

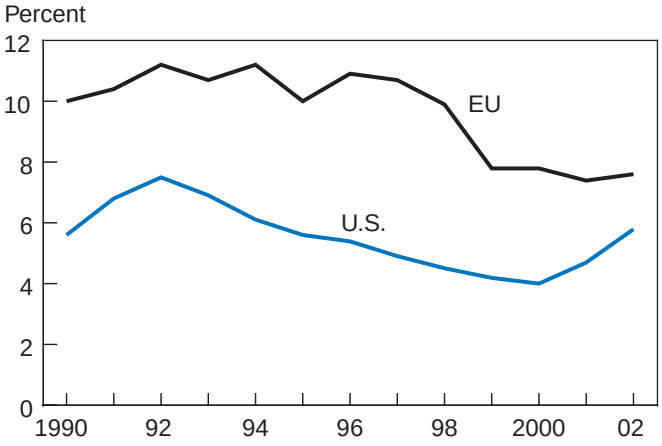
Table 2-A—GDP-Nominal and per capita

Year	U.S.	EU	U.S.	EU
	Billion U.S. dollars		*Dollars per person*	
2002	10,366	8,592	36,412	20,845
Growth rate, 1991-2002[1]	5.2%	4.2%	4.2%	3.9%

[1]EU growth rates are based on GDP in ecu/euro.
Note: The value of the euro, which weakened after 1999, accounts in part for the large difference in GDP and GDP per capita between the United States and the EU in U.S. dollars.

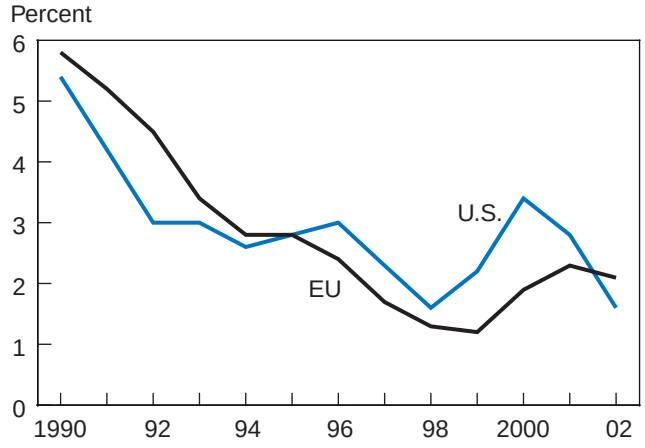
Source: OECD, Paris; U.S. Census Bureau; Eurostat.

Figure 1-A
Unemployment rate, U.S. and EU



Source: U.S. Bureau of Labor Statistics; European Commission.

Figure 2-A
Inflation rate, U.S. and EU



Source: U.S. Bureau of Labor Statistics, Eurostat.

With the implementation of the EMU in 1999, the euro replaced the ecu, or "European currency unit," as an EU-wide unit of exchange in which common agricultural prices and other values were denominated.[4] After trading positions of relative strength since the 1970s, the ecu declined against the dollar beginning in the mid-1990s (fig. 3-A). The euro, which was introduced at the same value as the ecu, declined further against the dollar following its introduction. In 2000, the euro fell below parity vis-à-vis the dollar for the first time since the mid-1980s, but regained strength and rose to parity in mid-2002. The stronger dollar mirrored the strength of the U.S. economy in the late 1990s and early 2000s, leading to increased purchases of U.S. dollar investments. However, a strong dollar has important implications for trade by raising the costs of U.S. products to importers, while improving the competitiveness of EU exports.

Agriculture in the Economy

Agriculture accounts for a nearly identical proportion of total economic activity in the United States and the EU, and its share of GDP has been declining in both countries (table 3-A). Agriculture employs a greater share of the labor force in the EU than in the United States, reflecting the more intensive character of agricultural production and the smaller farm size (fig. 4-A). The share of the labor force engaged in production agriculture has been shrinking in both countries due to farm consolidation. However, this share has declined more rapidly in the EU in recent years, owing in part to producer retirement inducements. While there has been little change in agriculture's share of employment in the United States during the 1990s, the long-term trend is downward.

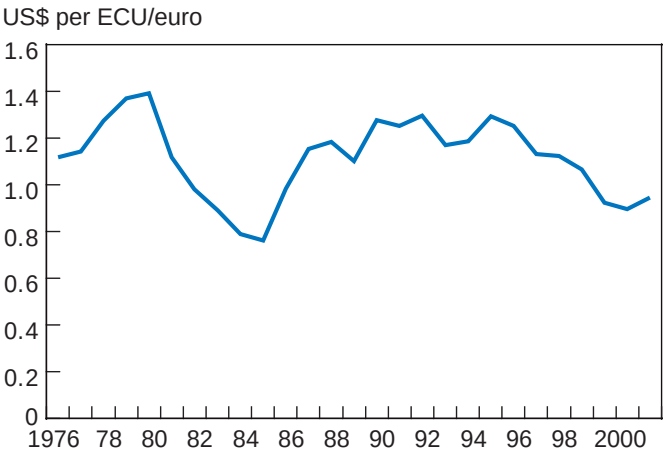
Farm Structures

While the United States contains almost three times the arable land as the European Union, the EU has more than three times as many farms (table 4-A). Average farm size is significantly smaller in the EU than the United States, about one-tenth the size of the average U.S. farm.[5] These averages mask much variation among regions in both countries. The EU's largest holdings are found in the United Kingdom (averaging about 171 acres), and its smallest in Greece (11 acres). In the United States, the largest operations are located

[4]The euro was adopted as a common EU currency in 1999, and euro coins and bills began circulating in 2002, replacing national currencies of EMU members.

[5]In the United States, a farm is defined as a farming unit with sales of agricultural products of $1,000 or more. The definition of a farm in the EU can vary by member state, but generally refers to a holding engaged in agricultural production with utilized agricultural area of 1 hectare (2.5 acres) or more.

Figure 3-A
U.S.-EU exchange rate



Note: 1999-2002 rates are US$ per euro.
Source: Board of Governors of the Federal Reserve System.

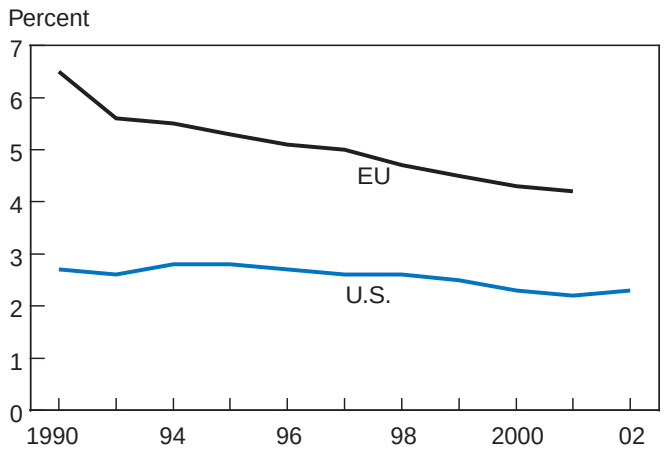
Table 3-A—Agriculture's share of GDP

Year	U.S.[1]	EU
	Percent	
2001	1.4	1.7

[1]Data for United States include forestry and fishing.

Sources: U.S.: Bureau of Economic Analysis; EU: European Commission.

Figure 4-A
Agricultural employment as a percentage of civilian labor force



Source: U.S. Department of Labor, Bureau of Labor Statistics; European Commission.

Table 4-A—Agricultural land, farm numbers, average farm size, 2001

	Units	U.S.	EU
Agricultural land	1,000 acres	941,210	316,913
Number of farms	1,000	2,158	6,766
Average farm size	Acres	436	46.2

Source:U.S.: National Agricultural Statistics Service;USDA EU: European Commission.

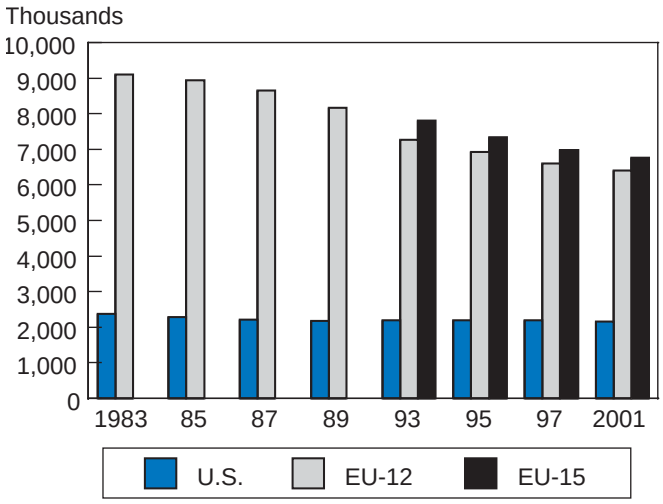
in the Mountain States (Wyoming leads with an average farm size of 3,761 acres) and the smallest in the Northeast (New Jersey, where the average farm is 86 acres). Farm numbers have been declining in both countries, but have declined more rapidly in recent years in the EU (fig. 5-A).

Data on the distribution of farms by size and sales class are not directly comparable between the United States and the European Union. Using each country's own data and definitions can provide some illustrations of the differences in size and distribution of farms between the two countries.

Farm size. More than half the farms in the EU are smaller than 12 acres (fig. 7-A). The largest farms in the EU (124 acres or more) account for only 8 percent of all EU farms. In contrast, almost half (47 percent) of all U.S. farms are 140 acres or larger. The greatest number of U.S. farms are 10-49 acres (fig. 6-A); this size class accounts for about 22 percent of all U.S. farms.

In both countries, the largest size class accounts for the greatest share of farmland. The largest U.S. farms, those of 2,000 acres or greater, account for over half of all the area in farms. In the EU, the largest farms are 124 acres or greater and account for 60 percent of all EU farm area.

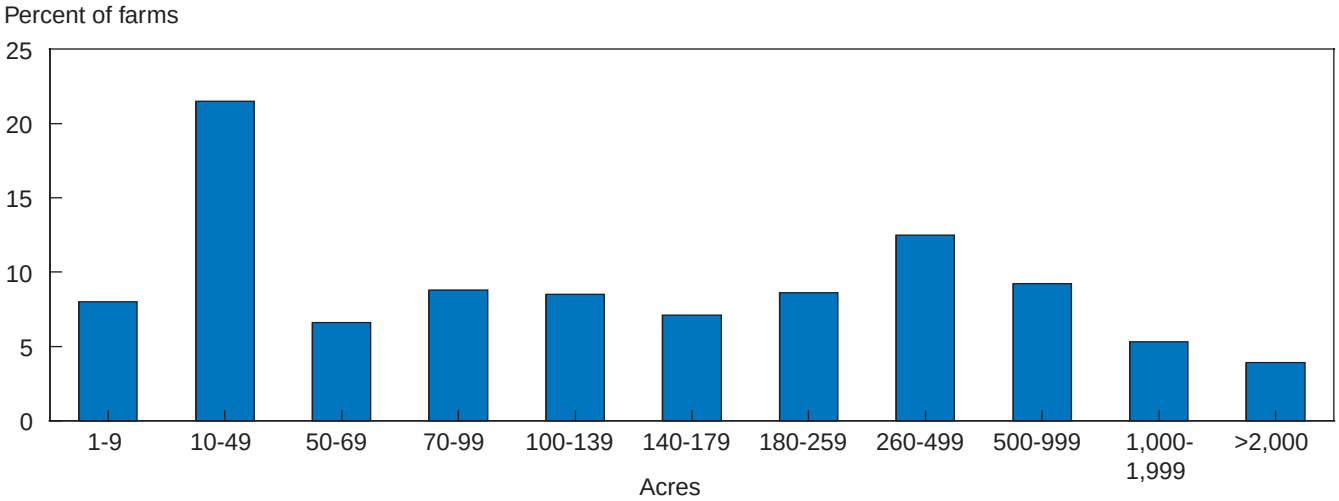
Figure 5-A
Farm numbers, U.S. and EU



Source: National Agricultural Statistics Service, USDA; European Commission.

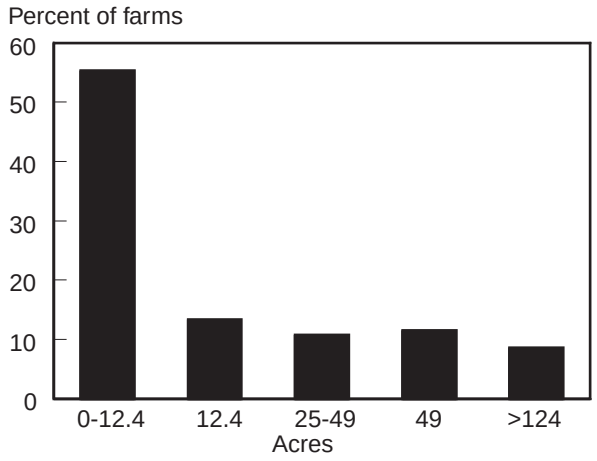
Economic size. The distribution of farms according to economic size of sales class is not directly comparable between the two countries because of differences in the way data are collected and reported. In the United States, the distribution according to sales class is available for all farms from the Census of Agriculture (USDA, NASS). Farms can fall into one of several categories, from total sales of less than $1,000 to sales of $5,000,000 or more.

Figure 6-A
U.S. distribution of farms by size, 1997



Source:National Agricultural Statistics Service, USDA .

Figure-7-A
EU distribution of farms by size, 1997



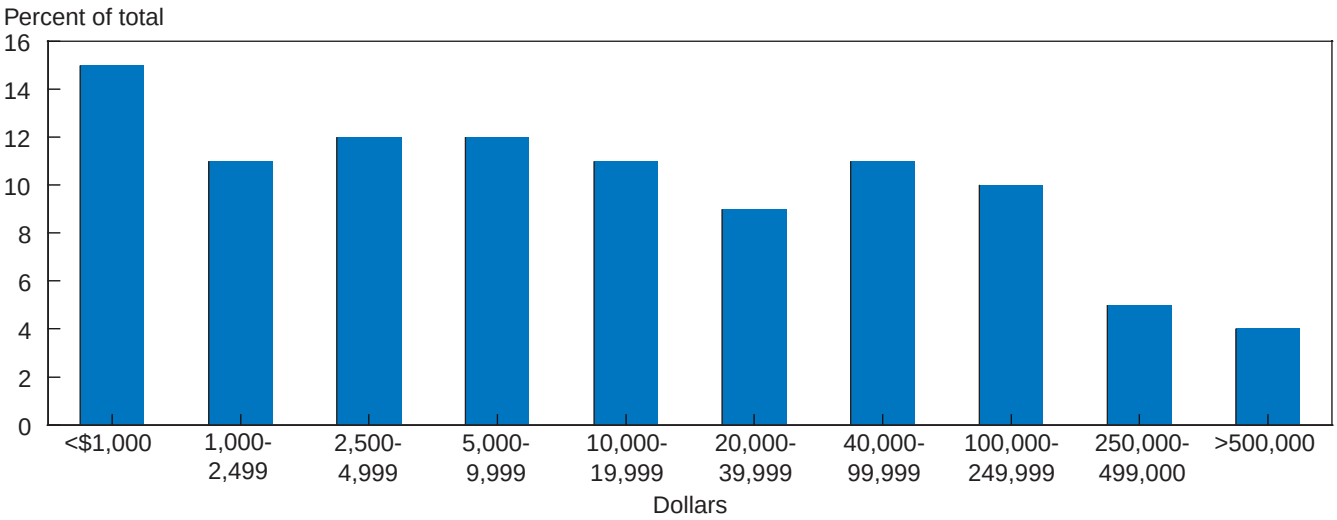
Source: European Commission.

The EU's data are from the Farm Accountancy Data Network (FADN), which is based on a sample of commercial farms. Commercial farms are those that market the bulk of their production and that exceed a minimum level of economic activity. Farms in this sample would therefore be, on average, larger in economic size than the average EU farm. The EU distribution is presented according to European Size Unit (ESU), a unit of measurement of the economic size of the agricultural holding, rather than sales class. A farm of an economic size of 1 ESU has a total standard gross margin (value of production minus certain variable costs) of 1,200 ECU ($1,080 at 1.11 euro/$). U.S. sales class data are based on revenue only, and do not include costs.

In both countries, the smallest economic size class accounts for the greatest share of all farms. U.S. farms with less than $250,000 in annual sales are considered small (USDA, ERS 2001). Ninety-two percent of all farms in the United States are classified as "small" according to sales class (fig. 8-A). In the European Union, small farms (those classified as "small" or "medium small") have approximately $17,000 or less in the value of gross margins (fig. 9-A). According to this definition, 59 percent of farms in the FADN sample are classified as being small in economic size. Sixty-two percent of all U.S. farms have sales (only) less than $20,000.

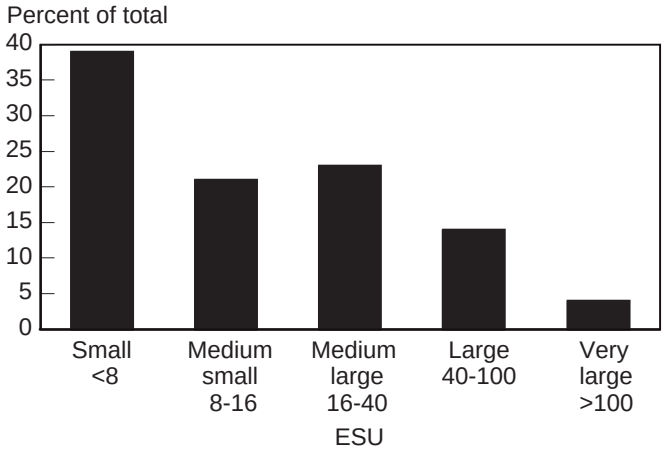
Age distribution of farmers. The age profile of U.S. and EU producers is quite similar. The underlying data define a farmer as a farm operator (U.S.) or a farm "holder also being the manager" (EU). In both countries, the largest age group is 65 or older. The United States has a larger share of "middle-aged" farmers (between the ages of 35 and 54), while the EU has more of its farmers in the 55 or older categories. In either case, the differences between the United States and the EU are not great. The aging of the EU producer has sometimes been cited as a cause for either concern—too few younger people are taking up farming—or reassurance—the problem of surplus production will be solved by demographics as older farmers exit the sector. However, a comparison with U.S. data indicates that the typical EU producer is only slightly older than his or her U.S. counterpart. Neither country's data would count as a "farmer" younger family members working the farm with a parent or older relative who expect to inherit or purchase the

Figure 8-A
U.S. distribution of farms by sales class, 1997



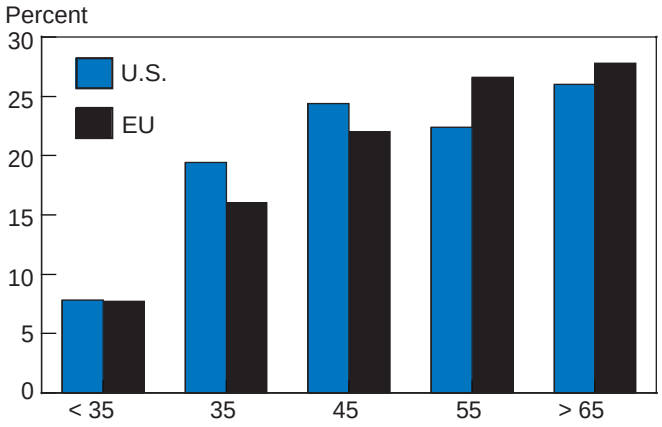
Source: National Agricultural Statistics Service, USDA.

Figure 9-A
EU distribution of farms by economic size, 1997



Source: European Commission.

Figure 10-A
Age profile of U.S., EU farmers, 1997



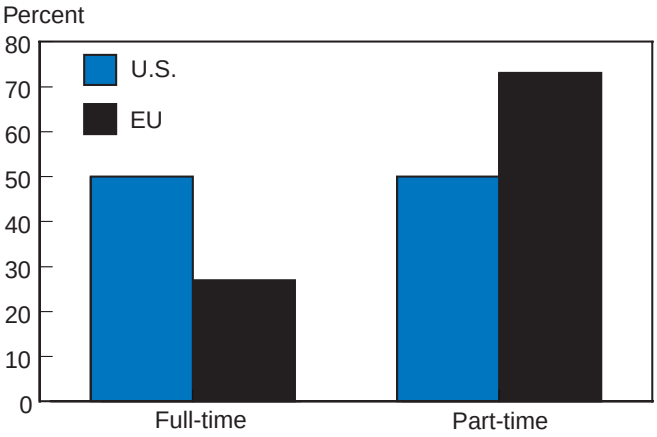
Source: National Agricultural Statistics Service, USDA; Eurostat.

operation. In both countries, the preponderance of older farmers may also reflect the difficulty faced by younger farmers in accumulating the financial resources to purchase farmland. The EU has instituted policies to encourage the intergenerational transfer of farms through early retirement incentives for older farmers and aids for establishing younger farmers.

Full-time vs. part-time farming. For a growing share of farmers in both the United States and the EU, farming is a part-time occupation. Many producers in both countries have some or considerable gainful employment outside of farming and depend on off-farm income. In the United States, "full-time" farms are those whose operators say that farming is their principal occupation (including retirees), while "part-time" farmers are those principally employed outside farming and those pursuing dual farm-nonfarm careers but are primarily employed outside farming (USDA-ERS, 2000). In 1997, the shares of full-time and part-time farmers were nearly equal in the United States (fig. 11-A). In the EU, "full-time" farmers are defined as those whose work on the farm is equivalent to the annual time of a full-time worker (Eurostat, 2000a). In 1997, only 27 percent of EU farmers could be described as full-time according to this definition. The higher share of part-time farmers in Europe is the result of the small natural resource base of many European farms and the high degree of seasonality of agricultural production in some regions of Europe (European Commission, 1999), as well as a stricter definition of what constitutes full-time farming.

Income from off-farm sources. In both the United States and the EU, a growing share of farm households depends on off-farm income. In 1999, income from off-farm sources accounted for 90 percent of U.S. farm households' income. This high share of off-farm income reflects the small size of most U.S. farms. The official U.S. farm definition requires only $1,000 of sales to qualify as a farm, and over half of U.S. farm households operate farms with sales less than $10,000. In the United States, the share of household income from farming tends to be related to the economic size of the farm. In 1999, farms with sales less than $10,000 received virtually all of their income from off-farm sources, while the largest farms (sales in excess of $500,000) received, on average, 82 percent of their income from farming (USDA, ERS, Farm Structure Briefing Room).

Figure 11-A
Full-time and part-time farmers in the United States and EU, 1997



Source: National Agricultural Statistics Service, USDA; Eurostat.

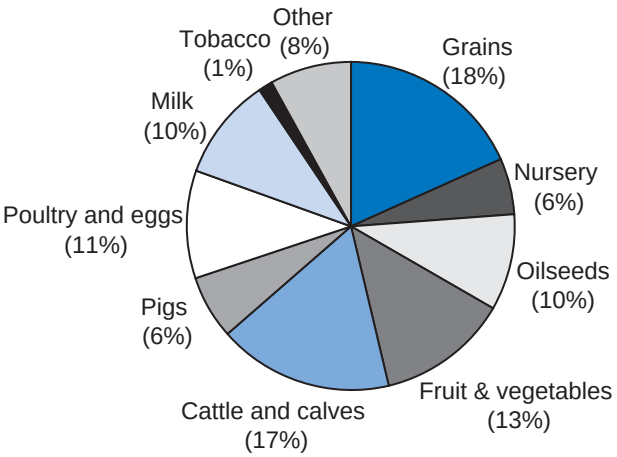
There is an important difference between U.S. and EU farm household income data. The EU data define an agricultural household as one in which the main source of income is from agriculture (Eurostat, 2000b). The share of households that meets this qualification relative to all households where there is at least some income from farming ranges from 33 percent in Denmark (1996) to 65 percent in Greece (1994).[6] Even for households that meet this narrow definition, off-farm income is frequently substantial. In 1999, EU agricultural households (so defined) received between one-third and one-half of their income from off-farm sources. It is important to note that the share of off-farm income for EU agricultural households will be lower than that in the United States because the narrower definition of an agricultural household in the EU excludes many households where off-farm income is significant, whereas the U.S. definition includes all but the very smallest operations. For EU households that receive some income from farming, but where agriculture is not the main income source, off-farm income can range from 95 percent of income in Germany to 80 percent in Denmark (Eurostat, 2000b).

Agricultural Output

The United States and the European Union, located in the northern temperate zone, are similar in the composition of their agricultural output.[7] Agriculture in both areas is dominated by grains, dairy and other livestock, and fruits and vegetables. The United States is a much larger producer of oilseeds (mainly soybeans), while dairy accounts for a larger share of EU agricultural output (figs. 12-A, 13-A). Production of individual commodities within these categories differs more substantially, reflecting climatic and other supply differences, incentives and disincentives created by agricultural policy, and differences in local tastes, preferences, and incomes.

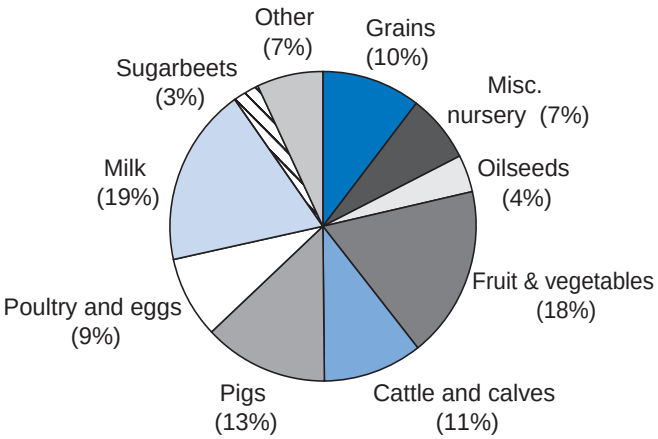
Both countries are large agricultural producers, accounting for large shares (20 percent or greater) of world production of several agricultural commodities

Figure 12-A
Composition of agricultural output, U.S. (1997)



Source: OECD.

Figure 13-A
Composition of agricultural output, EU (1997)



Source: OECD.

(fig. 14-A). The United States is one of the world's largest producers of corn, soybeans, beef, poultry, and cotton, while the EU has a large share of world production of rapeseed, milk, and pork.

Trade

Differences in production of agricultural products, the competitiveness of each country's producers, differences in tastes and preferences, and agricultural and trade policy, determine to a large extent the level and composition of U.S. and EU agricultural trade.[8]

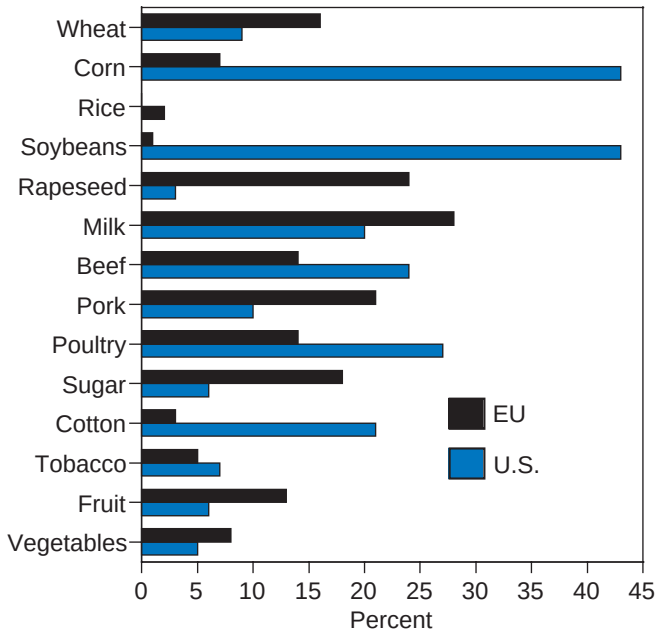
[6]There are numerous caveats that apply to the use and interpretation of this data, which are not consistent across EU member countries. For additional information, the reader is referred to Eurostat, Income of the Agricultural Households Sector: 1999 (Office of Official Publications of the European Communities, Luxembourg, 2000).

[7]The article in this report by Leetmaa et al. analyzes some of the factors that account for differences in productivity of the agricultural sectors between the United States and the EU.

[8]Consumption of food and other agricultural products in the United States and the European Union is treated in detail in the article by Mitchell. Commodity trade policy is addressed in the article by Normile, Effland, and Young.

Figure 14-A

EU, U.S. shares of world production, 2001



Source: USDA; Food and Agriculture Organization.

Table 5-A—Agricultural exports

Year	U.S.	EU	U.S.	EU
	Billion $US		*% of world trade*	
1996	62.5	51.5	21	18
1997	58.6	52.3	19	17
1998	53.1	49.5	19	17
1999	50.3	47.4	18	17
2000	52.9	48.1	19	18

Source: Economic Research Service, USDA, from UN trade data (adjusted by ERS).

Table 6-A—Share of agricultural production exported

Year	U.S.	EU
	Percent	
1995	25.8	22.7
1996	22.3	21.5
1997	21.5	24.5
1998	22.2	24.2
1999	22.8	18.7
2000	22.4	20.9
2001	22.5	20.9

Source: Economic Research Service USDA; European Commission.

Agricultural trade—exports. The United States and the European Union are the world's largest exporters of agricultural products, each accounting for nearly 20 percent of global exports in 1996-2000 (table 5-A). Based on USDA's definition of agriculture, the United States has consistently led all countries in agricultural exports, followed by the European Union. Both countries saw their agricultural exports shrink in the late 1990s, largely owing to large supplies and low prices worldwide, and to a decline in demand resulting from the Asian financial crisis. Since 1996, a record year for U.S. agricultural exports, the value of U.S. agricultural exports has fallen by significantly more than the dollar value of EU exports (EU exports measured in ecu/euros rose over the period). EU exports have been aided by the gradual weakening of the ecu/euro against the dollar during the second half of the 1990s, which gave EU exports a competitive edge over U.S. products in world markets.

Shares of agricultural production exported by the United States and the European Union are presented in table 6. As the shares are taken from each country's data, methodologies for computing these shares may not be the same, and the shares are not strictly comparable[9]. Both countries export roughly between 20 and 25 percent of their agricultural output, and both are highly dependent on foreign markets as outlets for farm output. The export share of U.S. agricultural production reached a recent high of 26 percent in 1995, but has been stable since then at about 22 percent, following a decline in the share of major bulk commodities (grains, oilseeds, and cotton) exported. Low world prices for these commodities and the appreciation of the dollar in the late 1990s were largely responsible for the lower U.S. export shares. EU exports relative to production declined significantly in 1999 due to a large increase in the value of agricultural output, in part because a reduction in the set-aside rate led to higher arable crop output.

Both the United States and the EU account for large shares of world trade in several agricultural products (table 7-A). The United States is one of the world's largest exporters of grains, oilseeds, and poultrymeat, while the EU is a leading exporter of barley, olive oil, wine, dairy products, and pigmeat. EU shares of world trade in grains (especially wheat), wine, dairy products, and meat (especially beef and veal) have all dropped since the early 1990s, owing to limits on subsidized exports implemented under the World Trade Organization (WTO) and curbs on beef exports following the BSE outbreak. Of the major commodity groups examined, only the EU share of the world pigmeat market has risen over the 1990s.

[9]For information on the methodology used to calculate official U.S. data, see "U.S. Agricultural Trade Update," FAU-59, November 2001.

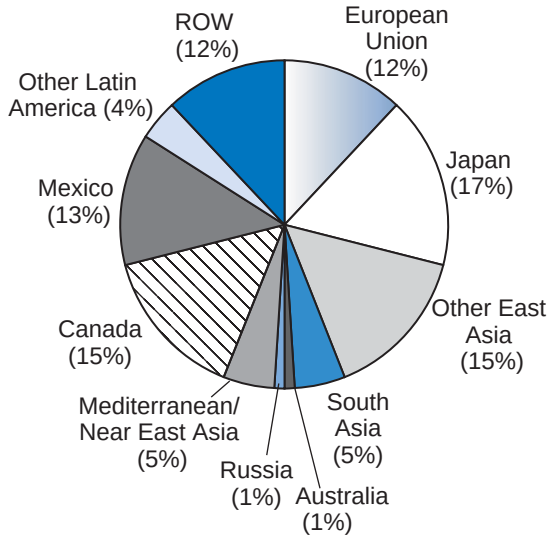
Table 7-A—Shares of world exports by value, selected agricultural products, 2000

Product	U.S.	EU[1]
	Percent	
Grains	28	19
Wheat	27	14
Corn	63	1
Barley	6	54
Rice	14	3
Oilseeds	43	2
Soybeans	59	0
Soybean oil	11	18
Soybean meal	19	5
Olive oil	1	76
Sugar	1	20
Tobacco	32	19
Wine	8	56
Milk (total)[2]	5	38
Butter	1	25
Cheese	4	44
Dry milk	4	36
Meat	27	15
Beef and veal	30	6
Pigmeat	24	36
Poultrymeat	30	13
Fruit and vegetables	17	11

[1]Excludes intra-EU exports.
[2]Milk equivalent.

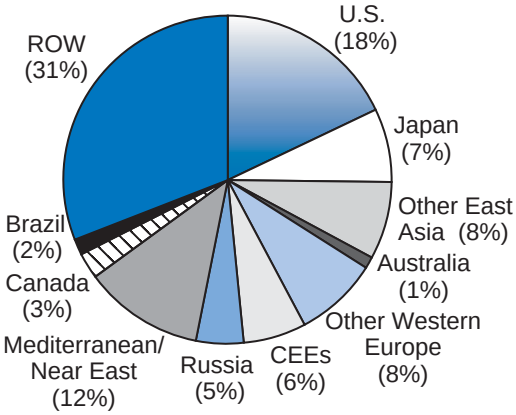
Source: FAO data (unadjusted)

Figure 15-A
Largest U.S. markets for agricultural exports, 2000



Source: USDA, FATUS.

Figure 16-A
Largest EU markets for agricultural exports, 2000



Source: European Commission data.

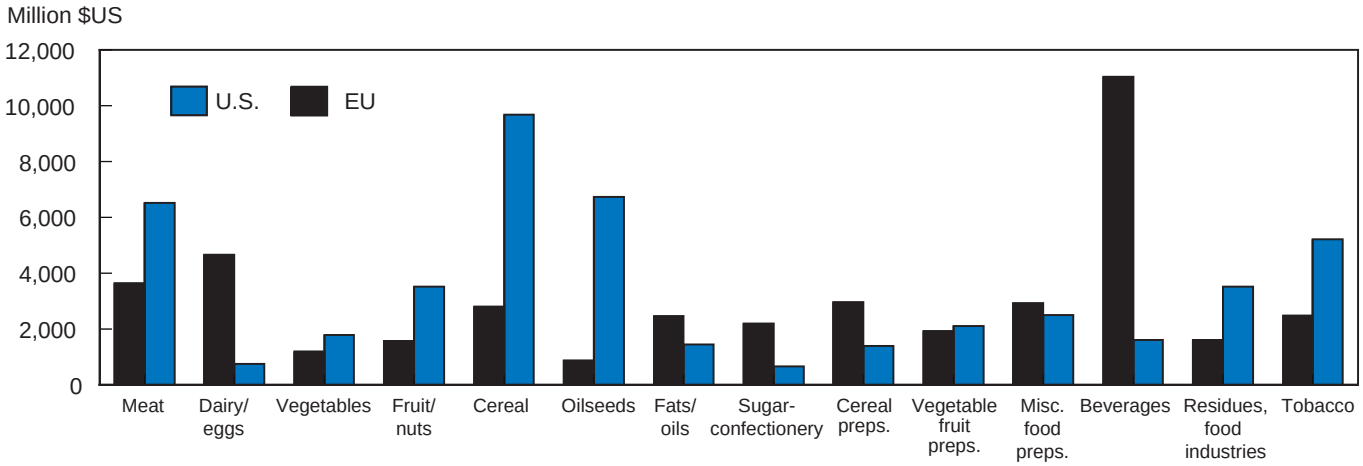
Both the United States and the European Union export their products to virtually every region of the globe. Both countries' principal markets include the largest agricultural importing countries--Japan, South Korea, and each other (figs. 15-A, 16-A). The EU's other major export markets in 2000 were Other Western Europe (Switzerland and Norway), the Central and Eastern European countries (CEEs), and the Mediterranean/ Near East, Gulf countries. The United States' largest export markets are also Japan, followed by the large East Asian agricultural importing countries (South Korea, Taiwan, China, Hong Kong), and North America Free Trade Agreement (NAFTA) partners Canada and Mexico. Although the EU remains a key market for American farm goods, its relative importance has declined steadily over the last 20 years. The share of total U.S. agricultural exports going to the EU has declined from a peak of more than 30 percent in 1982 to just 12 percent in 2000. This decline reflects primarily the rapid growth of U.S. exports to other regions such as Canada, Mexico, and East Asia. In recent years, agricultural exports to the EU have declined in absolute terms due to a strong dollar, increased competition, and EU policies that have limited imports of some U.S. bulk commodities. Principal export destinations of each country reflect, in addition to overall market size and consumer preferences, geographic proximity and the existence of trade agreements.

U.S. agricultural exports to all destinations, ranked by value, are led by cereals, oilseeds and meals, tobacco (including manufactured tobacco products), and meat (fig. 17-A). Beverages (including wine), dairy, eggs, honey, and meat dominate EU agricultural exports.

Agricultural trade—imports. Since 1996, imports of agricultural products have risen in the United States but declined in the EU (some of the fall in EU imports in dollar terms is due to the appreciation of the dollar over this period) (table 8-A). Strong economic growth in

Figure 17-A

U.S., EU agricultural exports by major categories, 2000



Source: UN trade data (unadjusted); European Commission.

Table 8-A—Agricultural imports

Year	U.S.	EU[1]	U.S.	EU
	Billion $US		*% of world trade*	
1996	37.0	67.2	12.6	22.9
1997	39.8	67.4	13.0	22.0
1998	41.1	61.8	14.4	21.7
1999	41.4	57.9	15.0	21.0
2000	40.5	54.3	14.7	19.7

[1]Excluding intra-trade.

Source: Economic Research Service, USDA from UN trade data (adjusted by ERS).

both economies led to increased demand for imported goods, including agricultural products. The European Union is the world's top importer of agricultural goods, and, since 1996, the United States is the second largest. Since 1996, the United States has imported, on average, 13 percent of world trade in agricultural products, while the EU accounted for 18 percent.

As high-income countries, both the United States and the European Union are large importers of high-valued products, including oils, meat, wine, and fruit and vegetables (table 9-A). In 2000, the United States imported 34 percent of world trade in olive oil, and over 20 percent of world imports of beef and veal. The United States was a relatively small importer of most bulk agricultural products. EU countries import a large share of world trade in oilseeds, soybeans, and soybean meal, and over 20 percent of the world trade in wine, olive oil, tobacco, and fruit and vegetables.

Beverages are the largest category of U.S. agricultural imports, accounting for more than 15 percent of U.S. agricultural imports (fig. 18-A). The United States, like

Table 9-A—Shares of world imports by value, selected agricultural products, 2000

Product	U.S.	EU[1]
	Percent	
Grains	6	5
Wheat	2	4
Corn	2	5
Barley	3	0
Rice	3	6
Oilseeds	2	28
Soybeans	0	29
Soybean oil	1	1
Soybean meal	0	41
Olive oil	34	23
Palm oil	1	16
Sugar	7	10
Tobacco[2]	4	9
Wine	32	23
Milk (total)[3]	11	10
Butter	3	18
Cheese	20	14
Dry milk	0	3
Meat	14	12
Beef and veal	23	10
Pigmeat	14	2
Poultrymeat	1	12
Fruit and vegetables	21	25

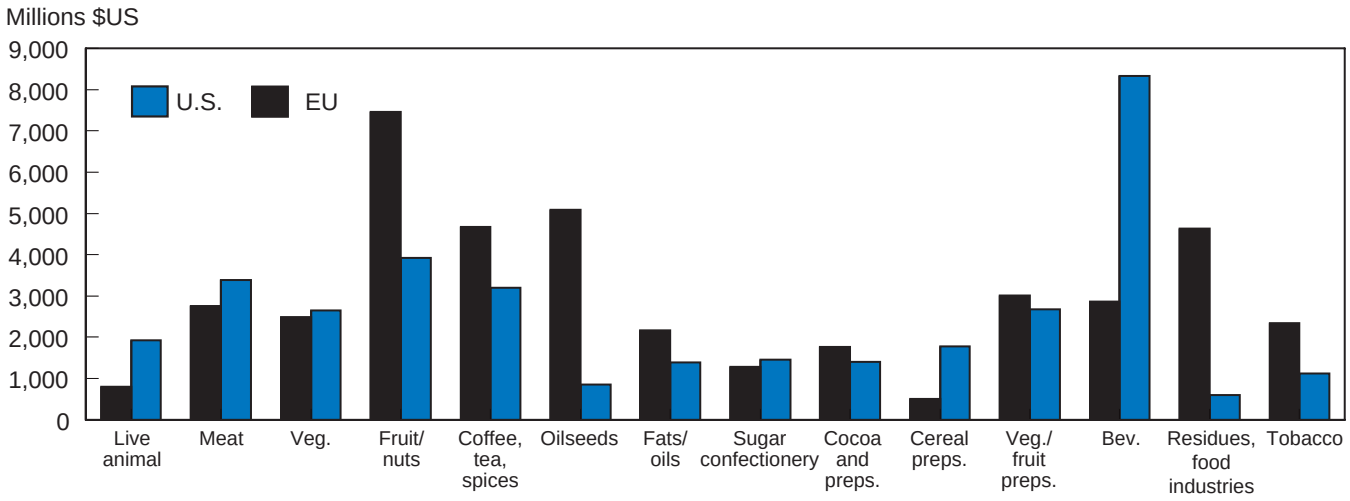
[1]Excludes intra-EU imports.
[2]Includes tobacco products.
[3]Milk equivalent.

Source: FAO data (unadjusted).

the EU, is a large importer of coffee, tea, and spices; fruits and nuts; meat; and vegetables and tubers. Both supplement domestic meat production with large imports of specific types and qualities of meat, out-of-season and exotic produce, and beverages (wine, beer, and fruit juices). The EU's two largest agricultural import categories are edible fruits and nuts, and coffee, tea, and spices, together accounting for approximately one-fourth

Figure 18-A

U.S., EU agricultural imports by major categories, 2000



Source: UN trade data (unadjusted); European Commission.

of EU agricultural imports. More than 10 percent of EU agricultural imports are in oilseeds and residues of food processing (this category includes soybean meal and corn gluten feed, important U.S. exports to the EU, as well as other residues of the food industry used as animal feed).

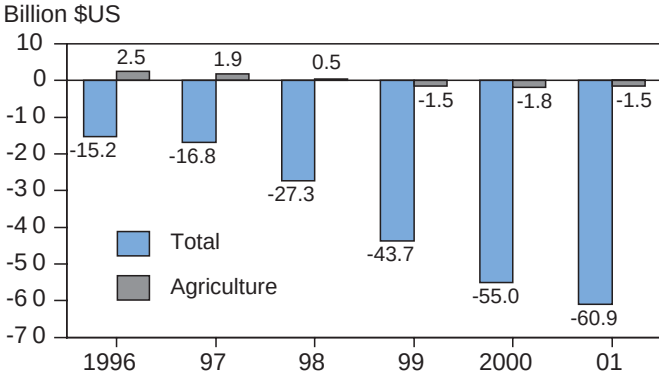
Bilateral trade. The value of U.S.-EU trade in all goods dwarfs bilateral agricultural trade. In terms of total trade, the United States has consistently been a large net importer from the EU. Until recently, the United States has been a net exporter of agricultural products to the EU (fig. 19-A). In 1999, the United States incurred an agricultural trade deficit with the EU for the first time, the result of strong economic growth in the United States and the strong dollar that made imports into the United States cheaper and exports to the EU more expensive. U.S. imports of EU agricultural products reached a record US$8.1 billion in 2000, exceeding exports to the EU by US$1.8 billion (table 10-A).

U.S. agricultural exports to the European Union have declined as well since the mid-to-late 1990s. The decline in exports to Europe was led by lower U.S. shipments of oilseeds, oilseed products, and animal products, and continued weakness in grain and feeds shipments. These declines were the result of continued strong export competition for grains and oilseeds, as well as the strong dollar. U.S. exports of corn to the EU continued to be hurt by EU policies on agricultural biotechnology products. The ban on imports of genetically engineered corn varieties not approved in the EU has hurt exports of all U.S. corn to the EU.

The largest category of U.S. agricultural exports to the EU, in value terms, continues to be oilseeds and products, an important input into EU animal feed, accounting for 22 percent of the total (fig. 20-A). Soybean exports, typically one of the largest single categories of

Figure 19-A

U.S. balance of trade with EU



Source: FAS "BICO" data; U.S. Census Bureau.

Table 10-A—U.S.–EU agricultural trade

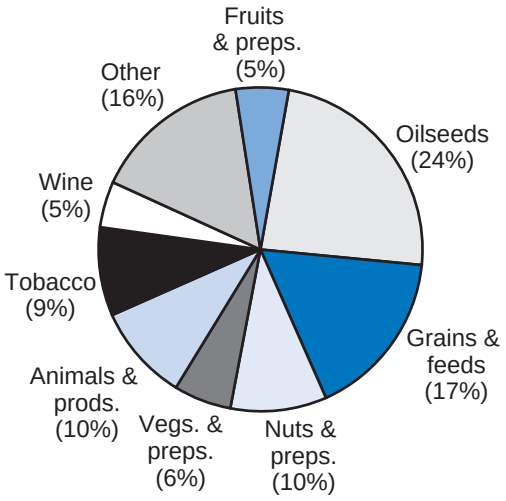
Year[1]	U.S. exports to the EU	U.S. imports from the EU
	Million $US	
1996	9,022	6,545
1997	8,907	6,987
1998	7,870	7,388
1999	6,432	7,961
2000	6,244	8,066
2001	6,420	7,936

[1]Calendar years.

Source: FAS “BICO” data.

Figure 20-A

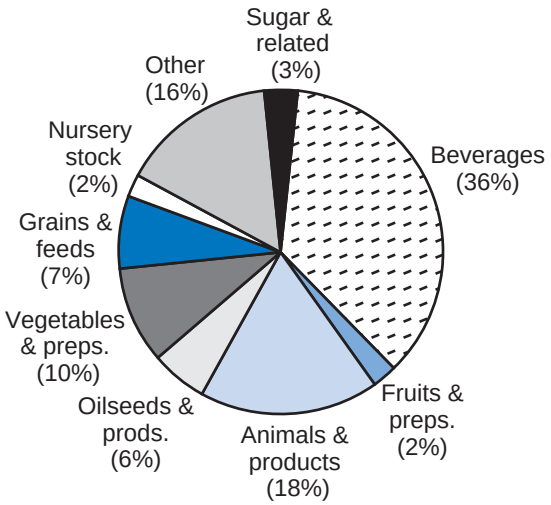
U.S. agricultural exports to EU by commodity, 2000



Source: USDA, FATUS.

Figure 21-A

U.S. agricultural imports from EU by commodity, 2000



Source: USDA, FATUS.

U.S. exports to the EU, have dropped off as a result of competition from South American suppliers and, more recently, a strong dollar. U.S. grain and feed exports, still one of the largest categories of U.S. exports to the EU, have declined with the collapse in corn exports. U.S. wine exports to the EU, small relative to total agricultural exports, continue to grow, albeit more slowly than in past years.

Europe still accounts for more than 78 percent of U.S. exports of corn byproducts (which were not affected in 1999 by EU policies on agriculture biotechnology products), 56 percent of almond exports, roughly 50 percent of U.S. exports of wine and tobacco, about 40 percent of U.S. exports of dried fruit, and 23 percent of U.S. soybean exports.

In contrast to U.S. exports to the EU, where the largest categories are bulk grains, oilseeds, and products, U.S. imports from the EU are dominated by high-value products (fig. 21-A). Beverages, consisting mostly of wine and malt beverages, are the single largest import category, followed by imports of animal products—mostly cheese, other dairy products, and red meat and products. Imports of oilseeds are primarily olive oil.

Bilateral trade is driven by many of the same factors influencing overall agricultural trade, as well as some specific to bilateral trade. Both countries are high-income consumers and mature markets for most agricultural products. Agricultural policy has been important in shaping bilateral trade. EU support to grain prices has helped create a significant market for U.S. exports of non-grain feeds and oilseeds. Trade agreements, including the WTO Agreement on Agriculture and regional trade agreements like the U.S. NAFTA and EU association agreements with Central and Eastern European countries, have increased both countries' trade with other countries. New issues, including regulations affecting trade in genetically engineered products, labeling requirements, and standards, are affecting products traded between the two countries. Changing consumer preferences and development of new categories of products, like organic foods, are leading to new trade patterns that can't be captured by examining the highly aggregate data.

Conclusions

This overview provides a snapshot of the agricultural sectors and their place in the larger economies of the United States and the European Union. Both countries face similar pressures from farm consolidation and a decline in production agriculture's position in the overall economy. Many farmers in both countries are engaged in farming on a part-time basis or have a sizeable share of income from off-farm sources. Despite this, both countries continue to be important players in global agricultural production and trade, while for both competition from other large producers is increasing. Differences between the two countries are also important; agricultural employment is an important policy issue in the EU because agriculture employs a larger share of the work force and because unemployment is higher, providing fewer alternatives to farm work. The EU's farm struc-

ture, characterized by a larger number of smaller farms, continues to present challenges for EU policy.

Trade in agricultural products is important for both countries' producers and their consumers, and both countries account for large shares of world agricultural trade. Both countries are among each other's largest trading partners, although the mix of products traded differs.

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U.S. and EU Farm Policy—How Similar?

Mary Anne Normile, Anne B.W. Effland, and C. Edwin Young

Introduction

Both the United States and the European Union[1] maintain an array of agricultural policies with goals that range from the traditional objectives of stabilizing agricultural production and supporting farm income to those that have more recently come to the fore, such as assuring adequate nutrition, securing food safety, facilitating rural development, and encouraging environmental protection. This chapter focuses primarily on commodity policy—those programs designed to meet the more traditional goals of supporting production agriculture. U.S. and EU commodity policies address broadly similar goals, but exhibit key differences in their approaches and in the policy instruments each uses. These differences have given rise to numerous trade disputes over the years and have hindered progress in reducing trade barriers, first in the General Agreement on Tariffs and Trade (GATT) and currently in the World Trade Organization (WTO).

In recent years, both the United States and the European Union have made significant changes to their commodity policies. Some observers claim that U.S. and EU policies have become more similar, particularly under the disciplines of the Uruguay Round Agreement on Agriculture (URAA). Efforts to encourage countries to facilitate freer trade in agricultural commodities have led both the United States and the European Union to begin to move their domestic policies toward less trade-distorting programs. Yet differences remain as a result of various factors that have influenced and continue to influence development of agricultural policy in both countries.

We begin our chapter with a description of the basic mechanisms of the U.S. and EU commodity policies that set the stage for a discussion of the ways in which the two countries' commodity policies have become more similar and the ways in which they remain fundamentally different. We conclude with a consideration of those factors that influence the direction of both countries' policies and what they may suggest about future trends.

Basics of U.S. and EU Commodity Policy

U.S. and EU commodity policy instruments can be categorized generally as either income support or price support, with a residual group of other programs. The main features of current U.S. and EU commodity policy are described below and summarized in tables 1-B and 2-B with additional detail available in the Appendix.[2]

U.S. Commodity Policy

Income support measures in U.S. farm policy include *direct payments, counter-cyclical payments, ad hoc disaster assistance programs, and marketing assistance loans and loan deficiency payments. Subsidized crop and revenue insurance* also support income by reducing risk and increasing expected net returns from insurance.

[1]This paper limits its analysis to the agricultural policies of the European Union, a supranational entity with broad authority for making and carrying out agricultural policy. EU member countries, as sovereign nations, also have some responsibility for agricultural policy, but they are legally limited by EU regulations in the type of support that they may provide to agriculture.

[2]Additional information on U.S. agricultural policy and commodity programs may also be found on the Economic Research Service, USDA, website (http://ers.usda.gov) in the following Briefing Rooms: Farm and Commodity Policy; Wheat; Corn; Rice; Cotton; Soybeans and Oil Crops; Cattle; Hogs; Poultry and Eggs; Dairy; Vegetables and Melons; Fruit and Tree Nuts; and Sugar and Sweeteners.

Table 1-B—Policies by type and commodity: United States

Commodity	Income Support				Price Support				Other	
	Marketing Assistance Loans & Loan Deficiency Payments	Direct and Counter-cyclical Payments	Disaster Aid	Crop Insurance	Nonrecourse Loans (with no marketing loan provisions) or Government purchases	Tariffs	Import Quotas (TRQs)	Export Subsidies	Marketing Orders	Land Set-Aside (Conservation Reserve Program)
Wheat	X	X[1]	X	X				X[3]		
Corn	X	X[1]	X	X		X				
Other grains	X	X[1]	X	X				X		
Soybeans	X	X[1]	X	X						
Other oilseeds	X	X[1]	X	X	X	X	X			
Rice	X	X[1]	X	X		X		X[3]		
Sugar			X	X	X	X	X			
Dairy		X	X		X	X	X	X	X	
Beef			X			X	X			
Pork			X[2]			X				
Poultry			X			X		X		
Sheep			X			X				
Fruit & vegetables			X	X[4]		X			X	
Upland cotton	X	X[1]	X	X		X	X			
Noncommodity specific										X

[1]Paid on land previously planted to wheat and other program crops-this land can now be planted to any crop or left fallow.
[2]Payments made in 1999 under Section 32 of Agricultural Act of 1935.
[3]No EEP bonuses have been provided for these commodities since 1995.
[4]Not all fruit and vegetables are eligible.

Table 2-B—Policies by type and commodity: European Union

Commodity	Income Support		Price Support						Other
	Compensatory Payments	Other producer payments	Intervention	Storage aid	Import tariffs	Import quotas (TRQs)	Production/ marketing quotas	Export subsidies	Land set -aside
Wheat	X		X		X	X		X	X
Corn	X		X		X	X		X	X
Other grains	X		X		X	X		X	X
Oilseeds	X								X
Rice	X		X		X	X		X	
Sugar			X		X	X	X	X	
Dairy		X	X	X	X	X	X	X	
Beef		X	X	X	X	X		X	
Pork				X	X	X		X	
Poultry					X	X		X	
Sheepmeat		X		X	X	X		X	
Fruit & vegetables			X		X	X		X	
Noncommodity specific									

Direct payments provide income support to producers based on historical yields and area planted. Payments are available for wheat, feed grains, rice, upland cotton, oilseeds, and peanuts. Farmers are given almost complete flexibility in deciding what crops to plant on the acreage that receives direct payments. Because these payments are not related to current market prices or most farm-level production decisions, they do not have a direct effect on a producer's cropping decisions (i.e., they are "decoupled"). Similar payments called *production flexibility contract (PFC) payments* (sometimes referred to as AMTA payments) were available in 1996-2001 for wheat, feed grains, rice, and upland cotton.

Counter-cyclical payments (CCP) are available for covered commodities (wheat, feed grains, rice, upland cotton, oilseeds, and peanuts) whenever the effective price is less than the target price. The target price is set by legislation; the effective price is the amount producers will receive from direct payments and from either market prices or the marketing loan program, depending on whether prices are below the loan rate. The CCP rate is calculated as the difference between the target price and the effective price:

Payment rate = (target price) - (direct payment rate) - (higher of market price or loan rate).

CCPs are paid on the same base production as direct payments. CCPs replace most ad hoc *market loss assistance (MLA) payments*, sometimes referred to as supplemental AMTA payments, that were paid to recipients of PFCs in 1998-2001 to compensate producers for low commodity prices. MLA payment amounts were proportionate to producers' PFC payment amounts.

National dairy market loss payments (DMLP) provide a price-based safety net for dairy producers. A monthly direct payment is made to dairy farm operators if the monthly price for a particular class of milk falls below a set price. Payments are limited to the first 2.4 million pounds of milk per year per operation (about the level of production of 135 cows). While almost 80 percent of U.S. dairy farms have less than 100 cows, these farms produce about 27 percent of total milk production.

Ad hoc disaster assistance programs have provided direct payments to producers in 10 out of the last 20 years to partially offset financial losses due to severe weather and other natural disasters, or stressful economic conditions, such as low commodity prices or unusual economic events.

Marketing assistance loans and loan deficiency payments are available for wheat, rice, corn, grain sorghum, barley, oats, upland cotton, soybeans, other oilseeds, peanuts, mohair, wool, honey, small chickpeas, lentils, and dry peas. Commodity loan programs with marketing loan provisions allow repayment of commodity loans at less than the original loan rate plus accrued interest when the market price is below that level, producing a benefit termed a marketing loan gain. Providing for the marketing loan gain rather than accepting a forfeit of the commodity under loan eliminates the potential effect of supporting market prices through removal of supplies from the market and into government stocks. Producers may elect to receive an equivalent direct payment, called a loan deficiency payment (LDP), in lieu of participating in the loan program.

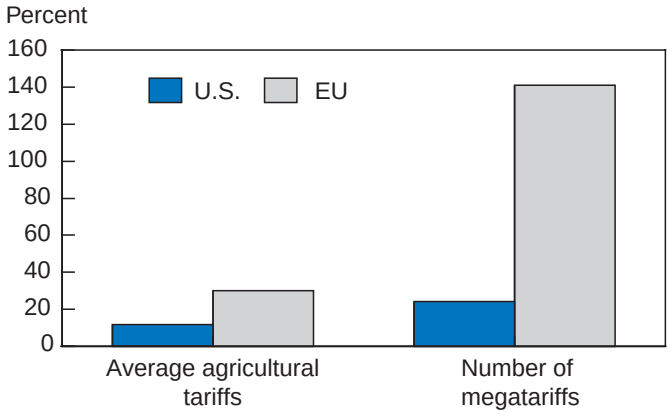
Crop and revenue insurance, made available to producers of a variety of crops at subsidized rates, makes indemnity payments to producers based on current losses related to below-average yields or below-average revenue.[3]

Price support, although declining in importance in U.S. farm policy relative to income support programs, continues to be provided through commodity-specific programs that set government support prices for sugar, tobacco, and dairy and also accounts for a portion of support received by other producers, through *commodity loan programs*, *government purchases*, *tariffs and tariff-rate quotas*, and *export subsidies*.

Commodity loan programs allow producers of specified crops to receive a loan from the government by pledging production as loan collateral. Nonrecourse loans allow producers to forfeit their crop to the government without penalty if the market price at repayment is below the loan rate plus interest. Most commodities have marketing loan provisions (except for sugar, dairy, tobacco, and extra-long staple cotton) to discourage forfeiture. When marketing loan provisions are in effect, loan programs operate as an income–support program rather than as a price–support program.

[3]For additional information on U.S. risk management programs, see the article by Dismukes et al. in this report.

Figure 1-B
U.S., EU average agricultural tariffs, megatariffs



Source: Gibson et al.

Government purchases support prices of butter, cheddar cheese, or nonfat dry milk by removing enough product from the market to ensure that prices for the milk used to make these dairy products averages at least the same price as the government support price set for milk sold for bottling.

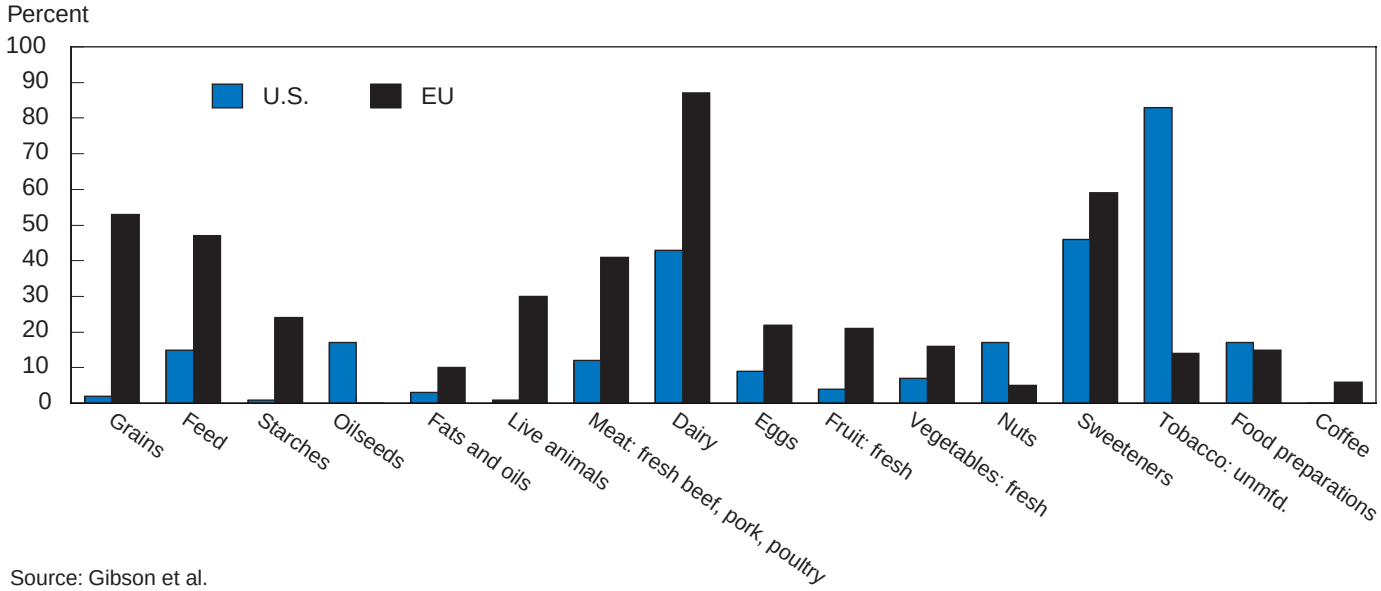
Tariffs and tariff-rate quotas (TRQ) provide price support for commodities by limiting imports of lower-priced products. With the exception of a few commodities, trade measures make a minor contribution to U.S. farm policy. The United States has among the lowest average tariffs on agricultural products of all WTO members, with average bound tariffs on agricultural goods of 12 percent (fig. 1-B). Exceptions to these low tariffs include products like dairy, sweeteners, and tobacco (fig. 2-B). The United States has only 24 agricultural "megatariffs," or tariffs in excess of 100 percent (fig. 1-B), and a relatively small number of TRQs, which apply primarily to imports of peanuts, tobacco, beef, dairy, sugar, cotton, and some of their related products.

Export subsidies are provided through two programs, the Dairy Export Incentive Program (DEIP) and the Export Enhancement Program (EEP). Under these programs, exporters are awarded cash payments or commodity certificates redeemable for government-owned commodities, enabling an exporter to sell covered commodities to specified countries at prices below those of the U.S. market. Since 1996, limited use of EEP has been made almost exclusively for poultry exports while DEIP has been used at the WTO-negotiated ceiling for skim milk powder and cheese, and to a lesser extent for butter.

Other programs include *marketing orders and environmental programs.*

Marketing orders are used for dairy and for selected fruits and vegetables. Milk marketing orders, which establish classes and prices for milk of different uses and set minimum prices for those classes, are established to help create orderly marketing conditions. Voluntary marketing orders and marketing agreements for fruit and vegetable products help stabilize market

Figure 2-B
Average tariff for selected agricultural products, U.S. and EU



Source: Gibson et al.

conditions by regulating product flow, setting standards for packages and containers, establishing reserve pools for storable commodities, or authorizing production and marketing research and development and advertising.

Environmental programs impacting agricultural producers take a number of forms,[4] but the most important are conservation compliance, the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), and the newly established Conservation Security Program (CSP). Conservation compliance provisions of farm legislation require that producers observe certain conservation requirements to be eligible for government payments. CRP is a voluntary program through which farmland owners bid to retire highly erodible and other environmentally–sensitive cropland from production for 10 to 15 years. Farmers receive payments for retiring the land, which also cover the costs of establishing the required permanent cover crop and maintaining specified conservation practices.

EQIP provides technical, educational, and financial assistance to producers to help them implement soil, water, and related natural resource conservation practices on their lands. When implemented, CSP will provide payments to producers for maintaining or adopting structural and/or land management practices that address a wide range of local and/or national resource concerns. CSP focuses on land-based practices and specifically excludes livestock waste handling facilities. Producers can participate at one of three tiers; higher tiers require greater conservation effort and offer higher payments. The lowest cost practices that meet conservation standards must be used.

EU Commodity Policy

Income support measures in EU farm policy include *compensatory payments* and *other direct payments*.

Compensatory payments were instituted as part of the 1992 reform package to compensate producers of arable crops (grains, oilseeds, and protein crops) for support price cuts. The payments, although established on a per-ton basis, are made to farmers as a per-hectare payment for area planted to arable crops. The per-hectare payment is based on the average historical yield in the region where they farm. The total area eligible for payments is limited to historical (1989-91) area planted to arable crops or in set-aside.

Other direct payments help support the incomes of producers of beef cattle and sheep and will be available to dairy producers beginning in 2005. Eligibility for these payments requires producers to comply with certain supply-limiting features.

Price support programs under the Common Agricultural Policy (CAP) include *intervention purchasing* or *product withdrawal, production and marketing quotas, import protection*, and *export subsidies*. Prices for major commodities such as grains, dairy products, beef and veal, and sugar depend on the EU price support system, although with recent reforms price support has become less important for grains and beef. Since 1992, grain support prices have been reduced by 45 percent and beef support prices by 27 percent. Other mechanisms, such as subsidies to assist with temporary storage of surpluses, and consumer subsidies paid to encourage domestic consumption of products like butter and skimmed milk powder, supplement the direct price-support instruments of the CAP in strengthening domestic prices.

Intervention purchasing involves purchase by authorities of the surplus supply of eligible products (see table 2-B for list of most eligible products) when market prices threaten to fall below established minimum (intervention) prices. The products are either stored temporarily or exported. In most market conditions, the intervention price acts as a market floor price. Products must meet minimum quality requirements to be accepted into intervention. Policy reforms since 1993 have reduced intervention prices for many commodities and replaced them with compensatory payments. *Product withdrawal,* in which producer organizations withdraw items from the market when prices fall, is limited to a few types of fresh fruits and vegetables.

Production and marketing quotas limit overproduction and support outlays for sugar and milk. Quotas help strengthen prices by reducing domestic supply.

Import protection has been a crucial feature of the CAP, both to uphold the CAP principle of preference for EU-produced goods and to prevent lower-priced imports from undermining domestic price support mechanisms. Most EU agricultural imports are subject

[4]For more information about U.S. and EU agri-environmental programs, see the article by Bernstein and Cooper in this report.

to high tariffs to ensure that imports do not undercut the prices of domestic agricultural commodities. Although policy reforms have reduced support prices for several commodities, EU agricultural tariffs remain high, averaging 30 percent for all agricultural products, with numerous tariffs in excess of 100 percent (figs. 1-B and 2-B).

Export subsidies (also referred to as export refunds or restitutions) are available for most price-supported commodities. Export subsidies help support the domestic price by funding the removal of surplus commodities from the domestic market. A subsidy is paid to exporters to enable them to sell competitively in the world market when the EU internal price exceeds the world market price. Conversely, if world market prices are above EU internal market prices, an export tax may be imposed to limit the outflow of an EU product to stabilize prices for EU consumers. Despite reductions in export subsidies implemented as part of their Uruguay Round commitments, the EU remains by far the largest user of export subsidies among all WTO members.

Other programs primarily include supply control through *land set-asides*.

For arable crops, an overall limit on area planted and a mandatory paid set-aside program are used. To be eligible for compensatory payments (described above under income support), arable crop producers must remove a specified percentage (the base rate is set at 10 percent) of their total arable-crop cultivated area from production. Small producers, defined as those whose area planted in arable crops is not sufficient to produce more than 92 tons of grain, are exempt from the set-aside requirement. Beef cattle and sheep numbers eligible for per-animal support payments are also limited and for certain payments, producers must also observe limits on the number of cattle per hectare.

Major Similarities and Differences

As this review of basic commodity policy mechanisms indicates, some of the two countries' policies have moved in similar directions in the last decades. Significant differences in their approaches to farm support remain, however, particularly in their relative reliance on income support and price support.

Both the United States and the European Union have reduced the use of price support for several commodities, replacing at least a part of their price support with income support through direct payments to producers. The European Union remains more reliant on market price support than the United States, however.

The United States' direct payments (formerly production flexibility payments) are decoupled from current production and prices, and the new counter-cyclical payments are decoupled from current production (although linked to current prices). The EU's compensatory payments for arable crops and livestock headage payments are not related to current prices, but are linked to current area planted and livestock numbers, although subject to limitations based on area caps and ceilings on eligible animal numbers.

In the United States, planting flexibility was a companion reform to decoupling support payments from production. Producers gained the freedom to plant almost any crop or leave land fallow without losing eligibility for direct payments. EU producers have a limited form of flexibility that allows them to receive payments if they continue to plant arable crops or put land in set-aside.

With reductions in support prices and government purchases, both countries have reduced the need for surplus disposal mechanisms. The United States' use of export subsidies in recent years has been limited essentially to dairy products and poultry. The EU continues to use export subsidies for many price-supported commodities, although WTO obligations have required them to reduce subsidy levels. In recent years, beef intervention stocks have continued to pose problems of surplus disposal for the EU, although part of this problem is due to the weakening in demand and policy actions in response to the BSE (mad cow disease) crisis.

The two countries also differ in their reliance on border measures, including tariffs and tariff-rate quotas, to provide support for domestic agriculture. Although both maintain tariffs, the European Union's are higher, on average, and there are a greater number of tariffs over 100 percent. The European Union also makes heavier use of export subsidies across a wider range of commodities.

Overall, while both countries provide moderately high support to their agricultural sectors relative to other developed countries, the European Union maintains a

Table 3-B—U.S. and EU farm policies—Key similarities and differences

Similarities	Differences
Price Support	
Both have reduced their use of direct price supports in recent years.	EU maintains direct price support for many commodities, intervention price acts as market floor price. The U.S. maintains direct price support for only dairy, sugar and tobacco; marketing loan rates, which determine marketing loan gains and loan deficiency payments, do not act as market floor prices.
Income Support	
Both have increased their reliance on income support through direct producer payments.	EU compensatory payments are partially decoupled (based on current area planted or livestock numbers, but subject to limits). U.S. primary direct payments program is decoupled from current production (based on historical entitlements); U.S. counter-cyclical payments are decoupled from current production, but linked to current market prices; U.S. marketing loan program provides income support coupled to current production and prices.
Planting Flexibility	
Both systems feature a degree of planting flexibility for producers of program crops.	EU producers must plant arable crops or participate in land set-asides to receive the payment. U.S. producers who receive direct payments and counter-cyclical payments are not limited, with minor exceptions, in the crops they may plant; marketing loan gains and loan deficiency payments are tied to production of specific crops.
Supply Control	
Both countries have some form of supply control.	EU uses production/marketing quotas for dairy and sugar, mandatory arable crop set-aside and limits on area planted to arable crops, limitations on numbers of beef cattle and sheep eligible for payments, and cattle stocking limits. U.S. has eliminated use of set-aside programs for supply, land retirement continues only for environmental purposes; supply control through marketing allotments and "payment-in-kind" programs are authorized for sugar.
Surplus Disposal	
Both countries have reduced chronic surpluses and large stocks.	EU continues to engage in surplus disposal through export subsidies for a number of commodities and subsidies on domestic consumption for a limited group of commodities. U.S. makes limited use of export subsidy programs (DEIP) to remove surplus.
Border Measures	
Both countries maintain tariffs on agricultural products. Both countries have some tariffs greater than 100 percent (megatariffs). Both countries use export subsidies.	EU agricultural tariffs average 30 percent. U.S. agricultural tariffs average 12 percent. EU maintains 142 megatariffs. U.S. maintains 24 megatariffs. EU provides export subsidies across a wider range of commodities and accounts for 90 percent of all WTO-notified export subsidies; EU may also impose export tax (infrequently used) to stabilize domestic market prices. U.S. provides export subsidies primarily for dairy and poultry; U.S. prohibited by Constitution from taxing exports.
Total Support	
Both the U.S. and EU maintain moderately high support levels for agriculture (as measured by PSE).	EU support higher than U.S.; EU relies to a significantly greater extent on market price support than U.S.
Both countries devote significant budget outlays to supporting agriculture.	EU budget outlays for agricultural support higher (in $US) since 1987.
Both have been shifting basic policies away from production-linked price support toward less directly linked programs, but both continue to provide substantial coupled support to parts of agricultural sector.	As measured by 1998 WTO notifications, EU provides more coupled or partially-coupled (amber or blue box) support, U.S. provides more decoupled (green box) support.

higher overall support level, has higher budget outlays for agricultural support, and provides more support that is coupled or partially coupled to production than the United States (see "Comparison of U.S. and EU Support and Protection").

Factors Influencing Commodity Policy

The factors that have shaped and will continue to shape agricultural policy formation in the United States and EU may be the best predictor of whether the two countries' commodity policies will grow more similar or more different over time. Those factors include historical differences in the policy context, constraints enforced by budget limits and trade agreements (including planned enlargement of the EU), and pressures from new issues, arising from increasing public concerns with environmental impacts of agriculture, food safety and quality, rural development, and a changing farm structure.

Historical Differences in Policy Context

Current commodity policy in the United States and the EU is the outcome of the evolution of developments and policy changes of the previous 30-plus years. The roots of the current U.S. farm policy may be found in the commodity price support programs established by the New Deal in the context of the Depression of the 1930s. In the face of dramatically low prices for farm goods, policymakers devised programs that would support farm income while at the same time ensuring availability of food at affordable prices for workers in the nonfarm economy. For much of the time since then, policymakers responded to repeated occurrences of downward pressure on prices, caused by above-average production and/or reduced global demand, by bolstering prices.

The EU's CAP, in contrast, arose from conditions that prevailed in Europe in the years following World War II, when food security was a major concern for a population whose memories of wartime food shortages were still fresh. The CAP was designed to address the problems of an agricultural sector characterized by small and fragmented farms, poor productivity, and low farm incomes. It remains today primarily a domestically-oriented policy whose main objective is to support farm income.

Since the early days of the CAP, EU agricultural productivity has soared, spurred by high support prices as well as technological advances.[5] Food security is no longer a pressing concern for the EU; production of most agricultural commodities has grown beyond the level required to meet the EU's consumption needs, in part because consumption growth has been slowed by high support prices. As a result, since the 1960s the EU has shifted from being a net food importer to one of the world's largest net exporters of wheat, sugar, meat, and dairy products. Managing surpluses has replaced food security as a major preoccupation of EU agricultural policymakers.

At the same time, however, the EU's position as a net exporter, coupled with the realities of the constraints on subsidies imposed by the URAA, has led policymakers to be increasingly concerned with the competitiveness of EU agriculture. The need for improved competitiveness underlay the additional support price cuts under the agricultural policy reforms adopted in 1999 under the "Agenda 2000" program.

In the United States, by the 1980s government-supported prices had limited international marketing opportunities, while increasing global supplies had undercut domestic supply control efforts. Government stocks of program commodities were steadily increasing, and record agricultural spending coupled with high Federal budget deficits emphasized the need to rein in agricultural support. The farm legislation of 1985 and 1990 maintained the traditional combination of price supports, supply controls, and income support payments, but introduced changes that moved farmers toward greater market orientation by reducing price supports, replacing price support for some crops with marketing loans that allowed markets to clear, introducing greater planting flexibility, and giving more attention to developing export opportunities for U.S. farm products.

The 1996 Farm Act produced a dramatic change in the character of Federal assistance to farmers. The legislation introduced a system that allowed nearly complete planting flexibility and promised continued government efforts to enhance access to international markets. To ease the transition to reduced reliance on income support, the act provided for decreasing fixed

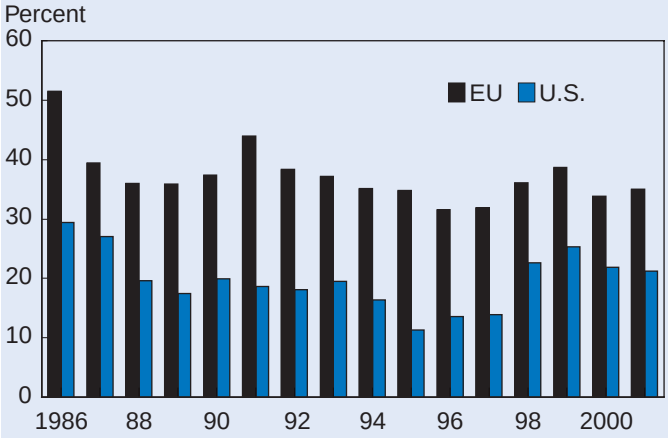
[5] For a discussion of how EU agricultural productivity has changed over the years, see the article by Leetmaa *et al.* in this report.

Comparison of U.S. and EU Agricultural Support and Protection

A convenient method for comparing relative support levels of U.S. and EU farm policy is the Organization for Economic Cooperation and Development's (OECD) Producer Support Estimate (PSE), a broad indicator used to evaluate policy measures that provide support to agriculture. The PSE is an indicator of the monetary value of transfers from consumers and taxpayers to agricultural producers arising from policy measures that support agriculture (OECD). The PSE can be used to characterize the value of farm policy and support to producers in each country, expressed either in total value terms or as a percent of the value of production (percent PSE). The PSE captures support provided to 13 common commodities that account for 66 percent of the value of U.S. agricultural production and 63 percent of EU production. The main commodities not included in the PSE are fruit, vegetables, nuts and other specialty crops, cotton, tobacco, and peanuts.

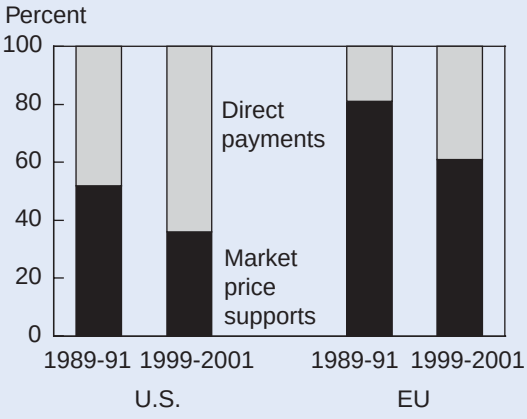
- The average percentage PSE for 1999-2001 was 23 percent for the United States, and 36 percent for the European Union, compared with an OECD average of 33 percent.
- A comparison of percentage PSEs for both countries (fig. 3-B) shows that for the past 16 years, the EU's agricultural sector has consistently derived a greater share of total receipts from government support than has U.S. agriculture.
- Market price support, which includes commodity loans, tariffs, and other price support for the United States, and intervention price support and tariffs for the EU, is the largest component of EU total producer support (fig. 4-B). Despite increased use of direct payments, the EU relies to a greater extent on market price support than does the United States. The U.S. shares of market price support and direct payments are nearly the opposite of the EU's; market price support accounts for roughly 61 percent of total producer support in the EU, and about 36 percent in the United States.
- EU income support is dominated by payments based on current planted area or animal numbers (arable crop compensatory payments and livestock headage payments). U.S. income support is more heavily reliant on payments for production (marketing loan gains or loan deficiency payments) or payments based on historical entitlements (in 1999-2001, these were primarily PFC payments and market loss assistance payments). Input subsidies for crop insurance, energy, and irrigation are a small share of total producer support in the United States.
- In the United States, producers of milk, grains, and oilseeds are the greatest beneficiaries of measured support, while livestock producers receive relatively little support (fig. 5-B). EU producers of grain receive the greatest share of EU support, followed by milk and beef producers (fig. 5-B).
- Government expenditures provide another indication of support to agriculture. They are a narrower indicator than the PSE, because they do not reflect support provided by consumers in the form of higher prices. However, they can capture the value of some government policies that affect commodities not covered by the PSE.
- Government outlays on agriculture have grown in both countries since 1990 (fig. 6-B). EU outlays on agricultural support have grown at a steadier rate, while the U.S. experienced large run-ups in support spending beginning in the late 1990s. Expressed in a common currency, EU outlays on agricultural support have exceeded U.S. outlays since 1987.

Figure 3-B
U.S. and EU percentage PSE



Source: OECD, Paris.

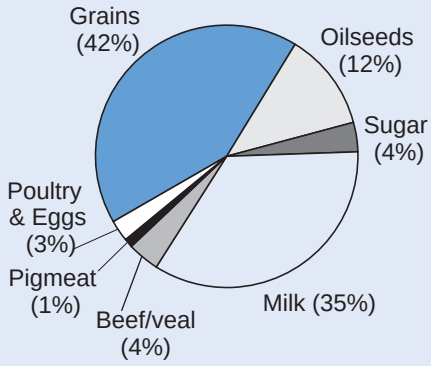
Figure 4-B
Changing composition of U.S., EU PSE



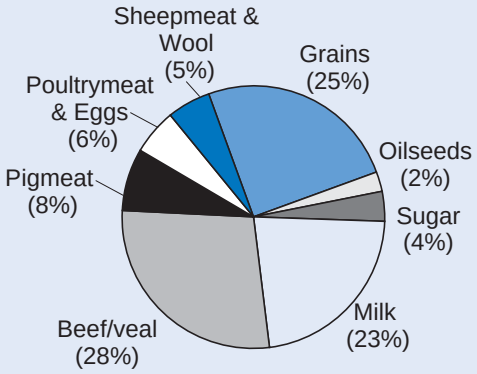
Source: OECD, Paris.

Figure 5-B

Agricultural support (PSE) by commodity, 1999-2001[1]



United States



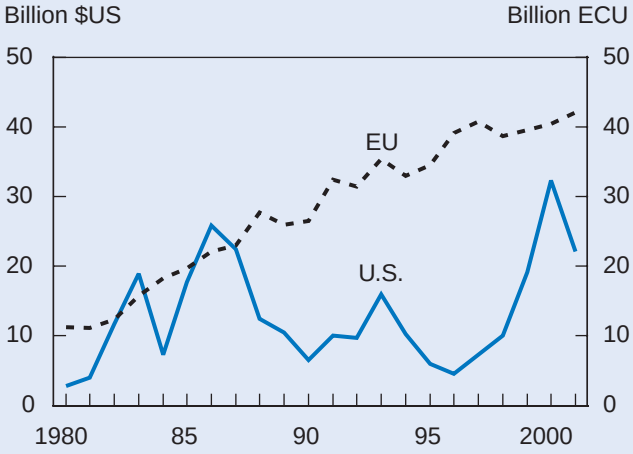
European Union

[1]Percent of support for commodities for which PSE is calculated.

Source: OECD, Paris.

Figure 6-B

Expenditures on agricultural support, national currency



Source: USDA, FSA; European Commission.

- A comparison of U.S. and EU agricultural support as reported to the World Trade Organization (WTO) provides further information on how the two countries support their agricultural sectors. The WTO categorizes agricultural domestic support policies according to the extent of their trade distortion: green box policies are considered minimally trade-distorting, amber box policies are considered trade-distorting and subject to negotiated reduction commitments, and blue box policies are considered trade-distorting but, because they meet certain criteria that limit their impact, are exempt from reduction commitments. In 1999, the latest year for which these reports, or "notifications," are available for both countries, the EU continued to provide a higher level of trade-distorting support through the amber and blue boxes (table 4-B).
- Reliance on trade measures clearly differentiates their policies as well. As measured by average tariffs applying to agricultural products, the U.S. agricultural sector is less restrictive of agricultural trade than the EU (table 5-B). The EU also relies to a greater extent than the United States on megatariffs (tariffs in excess of 100 percent) on agricultural products. The EU continues to rely heavily on export subsidies, while the United States has substantially reduced their use.

Table 4-B—U.S., EU domestic support levels, 1999

	United States	European Union
	Million $US	
Amber box	16,862	49,933
Blue box	0	20,638
Green box	49,749	20,783
Total	66,611	91,354

Source: WTO notifications.

Table 5-B—U.S., EU trade measures

	United States	European Union
Average agricultural tariff (%)	12	30
Agricultural megatariffs (number)	24	142
Average export subsidies, 1995-2000 (mil. $)	84	5,530

Source: Gibson et al.; Leetmaa.

income support payments that were no longer tied to production decisions. With the return of low prices for many commodities, a series of emergency ad hoc aid payments were made from 1998 through 2001, primarily in the form of additional direct income support payments. The 2002 Farm Act, while increasing support levels from those legislated in the 1996 Act, continued planting flexibility and basing program payments on historic production.

Constraints Enforced by Budget Limits and Trade Agreements

Budget limits. Fiscal constraints have been important in both countries, although less so in the United States in recent years. The need to reduce government expenditures in the face of persistent fiscal deficits made it difficult for U.S. legislators to increase spending on agricultural programs in the 1990s. However, budget surpluses in the early stages of the debate on the 2002 Farm Act combined with low market revenues among other things, led to significant increases in funding committed for agricultural programs. Budget concerns may again become important to U.S. farm policy in light of renewed fiscal constraints.

Supporting agriculture has also required large outlays from the EU; the CAP now accounts for about 50 percent of the EU budget (based on 2000 appropriations) but has required as much as 70 percent in earlier years.[6] The agricultural budget guideline sets an upper bound (that has been exceeded occasionally) on total EU outlays on agricultural programs. The EU also faces a unique circumstance in the anticipated budget effects of the impending enlargement of the Community. Unlimited price support with the entry of several new agricultural producing members would be unsustainable (Leetmaa et al., 1998). As EU support has shifted from a near-total reliance on price supports, which are funded primarily by consumers, toward producer payments funded by taxpayers, the capacity of the budget to provide support to producers may be further strained.

Trade agreements. Trade is important to the agricultural sectors of both the United States and the European Union. Increases in production of many commodities have outpaced the growth of domestic demand. With continued growth in productivity, both countries will have to find outlets for additional agricultural production if they are to maintain strong agricultural sectors. This need has strongly influenced U.S. agricultural policy changes since the 1980s, when policy increasingly emphasized market-driven production decisions by reducing price support, eliminating supply controls, and providing planting flexibility for many program commodities. EU agricultural policy has more recently reflected the need to improve export competitiveness through reductions in support prices for some commodities, although it has expanded supply control to limit support expenditures.

Efforts to achieve more open global agricultural trade through multilateral and regional trade agreements have increased the influence of changes in world market conditions on U.S. agriculture. At the same time, these agreements impose constraints on traditional U.S. commodity support policies. The URAA resulted in the first meaningful multilateral agreement covering agricultural trade, forcing policymakers in both countries to take into account the constraints imposed by the URAA.

The URAA was arguably a more significant discipline on EU domestic commodity policies than on U.S. policies. The EU's Agenda 2000 reforms acknowledged explicitly the importance of the URAA, citing the need to reduce support prices to comply with Uruguay Round commitments (Commission of the European Communities, 2001). In contrast, the obligations imposed by the URAA did not require major changes in U.S. agricultural policies. U.S. amber box domestic support did not exceed 29 percent of its ceiling in any of the first 3 years of URAA implementation, and export subsidies for all relevant commodities were well within ceiling levels. Orden et al. (1999) noted that "in the United States international negotiations functioned more as a source of farm policy continuity than as a force for policy change…. In the course of the 1995/96 congressional farm bill debate, the URAA was almost never mentioned."

The 2002 Farm Act explicitly acknowledges the constraints imposed by the Agreement on Agriculture on future U.S. farm support. The act requires the Secretary of Agriculture to reduce expenditures on commodity programs to ensure that such expenditures do not exceed such allowable levels.

As the two countries continue to provide for the needs of the farm sector while complying with the tightening

[6]It should be noted that the EU budget reflects a narrow set of expenditures of a supranational entity with limited responsibilities, of which agricultural support is one of the most significant.

limits on trade-distorting support, they may seek to provide support increasingly through policies that provide funding for environmental or rural development programs, which may qualify for exemption from WTO reduction commitments. The new WTO negotiations on agriculture may encourage this tendency, if they are successful in achieving further reductions in trade-distorting domestic support, tariff, and export subsidy policies. Trade agreement disciplines that limit the potential differences in level and type of trade-distorting programs between the United States and EU may lead to greater convergence in commodity policy approaches and could contribute to less contentious trade relationships and trade agreement negotiations.

Pressure From New Issues

New issues, including environmental concerns, food safety and quality, rural development, and changing farm structure, are increasingly shaping, or promising to shape, commodity policy in both countries. In the United States, environmental concerns are increasing pressures to reduce the negative effects of agricultural production on the environment. The 2002 Farm Act increased authorized support for conservation programs by about 80 percent. Outbreaks of food-borne illness and increased awareness of food safety issues are giving rise to public demands for policy changes in the EU. As nonfarm activities increasingly dominate the economic life of many rural communities, policymakers in both countries may need to look beyond traditional commodity support programs to encourage rural development. The current U.S. farm sector is highly diverse, with farms varying by size and type of operation, commodities produced, regional situation, operator age, tenure, and degree of household dependence on farm income. This diversity makes it difficult for a uniform farm policy to effectively address the very different needs of groups within the U.S. farm sector.

The EU's Berlin European Council of 1999, which adopted the Agenda 2000 policy changes, endorsed policies aimed at producing a "multifunctional, sustainable, and competitive agriculture" (Europa). The 1992 EU CAP reform introduced payments tied to environmental considerations, including payments to livestock producers that required less intensive livestock production. The Agenda 2000 policy reforms reinforced this development, strengthening the link between producer support payments and environmental protection requirements. Agenda 2000 also reflected increased concern with providing for a dynamic rural economy, and introduced or expanded a number of programs aimed at promoting rural development. The EU, through its policy of "modulation," allows member countries to shift some funding from commodity support to rural development programs, including agri-environmental programs and programs aimed at promoting increased diversification.

Concerns related to the safety and quality of food have occupied EU officials for the last several years, as mad cow disease, outbreaks of food-borne illnesses, and the foot-and-mouth disease (FMD) crisis shook Europeans' confidence in public institutions. Changes in commodity policy aimed at promoting more extensive livestock production, combined with stricter standards on animal feeds and meat hygiene, are seen as reducing conditions associated with intensive livestock production that may give rise to animal diseases, poorer food safety, and pollution (Europa).

Traditional domestic support and trade concerns will undoubtedly continue to play a primary role in commodity policy direction in both the United States and the EU, and trade goals and constraints will likely have the most influence on whether the two countries' commodity policies become more similar. However, the pressure of public demands for more attention to such issues as environmental impacts and food safety in agricultural production, some of which have yet to be fully reflected in commodity policies, will likely gain increasing influence in both the United States and the European Union.

Conclusions

The United States and European Union share many of the same goals for farm policy, and in some cases, have moved toward similar approaches to meeting those goals in recent years. Their commodity policies remain different, however, in significant ways—particularly their differing reliance on income versus price support, their use of surplus disposal and supply control, and their reliance on border measures. The two countries face similar pressures from tight budgets, trade constraints, and increasing public connection of agricultural policy with issues beyond traditional goals for supporting production agriculture. Whether these pressures will lead to similar policy responses remains to be seen. So far, they have not done so consistently, in part because levels of public

interest and pressure have not been the same in both countries, reflecting differences in current conditions and recent experiences.

In the United States, debate on the impacts of the 2002 Farm Act will continue to influence the future of U.S. farm policy as budget outlays, trade negotiations, environmental and consumer concerns, and production issues fuel discussions of appropriate and effective agricultural programs. In the EU, new reforms arising from the 2002-03 mid-term review of the CAP are spurring a similar debate (see "Latest EU CAP Reform May Increase Similarities"). In the midst of these debates, the future direction of farm policy in neither country is clear, but while significant differences will undoubtedly remain, some of the discussion suggests the possibility that U.S. and EU farm policies could be headed in a similar direction.

Latest EU CAP Reform May Increase Similarities

In June 2003 the EU adopted a comprehensive reform of the Common Agricultural Policy (CAP). The latest reform alters the way support is provided to producers of arable crops (grains, oilseeds, and protein crops), rice, nuts, potatoes for starch, dried fodder, beef, sheep, and milk. All other commodity regimes, such as fruit and vegetables, potatoes, and sugar, remain unchanged.

Main features of the reform agreement include:

- A direct income, or single farm, payment based on historical payments for arable crops, rice, beef, and sheep, will replace existing payments (mainly compensatory and livestock headage payments) that are tied to current production of commodities. Under an earlier reform, dairy producers will receive a direct payment in partial compensation for dairy support price cuts beginning in 2004. The dairy payment will be included in the single farm payment after 2008.
- To minimize risks of land abandonment, member states may opt to retain support coupled to production of arable crops and beef for some proportion of direct payments. The maximum proportion of payments that may remain coupled to production varies by commodity.
- Intervention price support for rye is eliminated, while support prices are reduced for rice and dairy products (butter and skim milk powder).
- A new carbon credit of 45 euros/hectare will be available to encourage the production of energy crops, limited to 1.5 million hectares.
- The reform expands a program ("modulation") established under Agenda 2000 that allowed member states to reduce payments for larger farms and use the savings to fund rural development programs. All member states will be required to implement such programs.
- The policy changes reflect an increased emphasis on quality, with a new quality premium available for durum wheat and producer incentive payments designed to improve the quality of agricultural products and production processes.
- Support will be available to help farmers adapt to environmental, animal and plant health, animal welfare, and occupational safety standards. Support will also be provided to defray the cost associated with improving the welfare of farm animals.
- Producer payments will be contingent on compliance with environmental, food safety, and animal health and welfare standards.
- Farmers will have increased flexibility regarding what they can produce, with the exception of explicitly excluded products (perennial crops, fruits and vegetables, or crops for which they receive payments under certain sectors that which have not yet been reformed or for which there are restrictions on new plantings).

The new features adopted in this agreement bear many similarities to U.S. commodity programs, particularly in two areas: emphasis on income support decoupled from current production and focus on the interactions between agriculture and the environment. Both U.S. policy and the new EU policy feature—for a group of commodities--direct payments based on historical payment levels and not linked to current production. The EU also joins the United States in providing farmers with greater production flexibility. Both systems increase the policy focus on protecting the environment through programs on working lands. In addition, cross-compliance, which requires producers to comply with environmental regulations and standards to receive direct payments and has been required in the United States for some time would now be mandatory in the EU. Finally, both countries continue to maintain commodity-specific income support—the EU through its partial retention of coupled payments and the United States through the marketing loan program.

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Risk Management Tools in Europe: Agricultural Insurance, Futures, and Options

Robert Dismukes, John L. Bird, Jr., and Fred Linse[1]

As Europe reviews recent changes in agricultural policies and markets and looks to the future, its producers, policymakers and others are considering the need for and the availability of risk management instruments for agricultural commodities. Many see reform of the Common Agricultural Policy (CAP) and increased exposure to world market prices as increasing the variability in crop and livestock prices, and thus risks to producers. Prominent among the risk management tools receiving attention are agricultural insurance and futures and options contracts.

Currently, a range of agricultural insurance products, covering production risks such as crop yield shortfalls, are available in Europe. Insurance programs and products vary from country to country in levels of government support and in the specific production perils covered, reflecting the variety of crops grown and growing conditions in the various countries. In some countries, government-subsidized insurance policies covering multiple perils are available for many crops, while in others entirely private insurance covering a small number of perils (most often hail) for a few crops are available.

In Spain, for example, multiple-peril crop yield insurance is available through a public-private system. Coverage is available for a large number of crops, including fruits and vegetables. Farmers choose the level of coverage and the perils to be covered, including "all-risk" insurance; the government provides premium subsidies and reinsurance, through Entidad Estatal de Seguros Agrarios and the Consorcio de Compensacion de Seguros. An association of insurance companies, Agroseguro, has a large administrative role in the program and pools risks. Public support accounts for around 50 percent of all costs, including administrative costs. Participation by producers in Spain in agricultural insurance is high relative to many other European countries: about 70 percent of the acres planted to cereals is insured.

Many other European countries, in contrast, have systems of agricultural insurance that receive less government subsidization and cover fewer crops than Spain. Perils covered are usually limited to a few named perils, such as hail and frost only, or coverage is limited to specific product qualities, such as sugar content for sugarbeets and starch content for potatoes. Germany and the Netherlands have agricultural insurance products that are, in most cases, limited to hail and plant disease coverage and are operated without subsidies.

While there is considerable variation in agricultural insurance programs across Europe, they are generally smaller and more limited in scope than the crop insurance program in the United States. The U.S. program, which has grown considerably since 1995 in levels of subsidization and types of insurance available, insured about 100 different crops in 2002, covering about 75 percent of the planted acres of major field crops. In addition to providing premium subsidies, which account for about 60 percent of the total crop insurance premium, the U.S. Government supports crop insurance through administrative and operating subsidies to insurance companies and reinsurance of crop insurance policies.

The U.S. crop insurance program includes traditional multiple-peril crop yield insurance as well as more recently developed revenue insurance. Under revenue insurance, an insured producer's coverage is set and insurance payments are triggered based on expected

[1]John L. Bird is an industry economist and Fred Linse is a supervisory economist in the Division of Market Oversight, Commodity Futures Trading Commission, (CFTC).

revenue, which is the product of historical yields and market-based price expectations. Therefore, revenue insurance provides a degree of price risk protection in addition to yield risk production. U.S. producers are also able to manage price risk through forward contracting, and by using futures and options.

In Europe, there have been considerable efforts to develop agricultural futures and option markets. At least four new commodity exchanges that offer futures and options based on agricultural commodities have been established since 1988. In addition, European commodity exchanges have introduced trading in at least 38 new agricultural futures and options markets. These new markets include futures and/or options for wheat, corn, live hogs, rapeseed, rapeseed meal, and rapeseed oil.

In addition to futures markets for agricultural commodities, a number of European Exchanges operate by actively trading futures on energy products such as crude oil and various financial instruments, including sovereign debt instruments, currencies, and equity indices. Similar to the experience of futures trading within the United States, the trading in agricultural futures markets preceded energy and financial futures trading. While trading in many new agricultural futures markets has been introduced since 1989, trading of coffee, cocoa, and potato futures has taken place in Europe since the early- to mid-1900s. In contrast, European energy and financial futures trading began in the early 1980s.

Although many of the new agricultural futures and option markets are not actively traded, changes in economic and agricultural policies in Europe over the last 10 to 15 years appear to have created conditions more conducive to the development of futures and option markets. In particular, many of the new agricultural futures and option markets were introduced after the implementation of reductions in price supports for major commodities stemming from reforms to the European Union's (EU) CAP adopted in 1992 and implementation of the 1995 World Trade Organization (WTO) Agreement on Agriculture. In addition, several new commodity exchanges and a large number of new agricultural futures and option markets were established in Eastern Europe after the fall of the Iron Curtain in 1989 as the economic policy in this area shifted to a greater reliance on market-determined prices to guide the production and consumption of agricultural commodities. These policy changes appear to have stimulated demand for price risk management vehicles by creating or increasing price volatility for agricultural commodities.

There are at least seven commodity exchanges in Europe that offer futures and options markets for agricultural commodities (table 1-C)[2]. Cocoa, coffee, and sugar are the leading markets, in both volume and open interest (table 2-C). Market prices are generally quoted in local currencies or euros. Most futures contracts specify delivery at ports, warehouses, or processing plants in Europe, although some of the coffee and sugar contracts specify delivery in the United States or other parts of the world. The size of trading units vary by commodity—from 100 metric tons for grain futures or option contracts to 5 metric tons for flour and coffee contracts. Most exchanges use electronic trading systems exclusively, although some exchanges use the traditional open outcry trading method.

Consistent with the trends in European agricultural policy toward reduced market intervention, most new European agricultural futures contracts have been designed to reflect the value of agricultural commodities produced and consumed within Europe. For example, many of the new futures contracts provide for delivery at interior European locations, rather than at export/import sites. Formerly, European agricultural futures and option markets were more heavily weighted toward commodities that either were not produced in Europe (e.g., coffee and cocoa) or were intended to reflect world market values for commodity exports from Europe (e.g., surplus refined sugar).

Trading activity on most European agricultural futures markets is substantially less than trading activity on U.S. commodity exchanges[3]. For commodities produced and largely consumed within Europe (e.g., wheat, corn, hogs, etc.), trading volume is significantly

[2]Table 1 lists those European commodity exchanges that available information indicates have offered trading in agricultural futures and option contracts since 1989. Several other exchanges that are not included in Table 1 have indicated plans to offer agricultural futures and options trading but no information is available to indicate that trading has been initiated in such products.

[3]It is important to note that trading activity on several of the existing European exchanges is limited . For one exchange, the Poznan Commodity Exchange, trading activity has declined sharply apparently due, in part, to the implementation of price support programs by the Polish Government for the commodities traded on that exchange. In addition, available information indicates that there is very little trading activity in agricultural commodities on the Futuros de Citricos y Mercaderias de Valencia.

Table 1-C—European commodity exchanges offering futures and option markets in agricultural commodities

Commodity exchange	Location	Date established	Agricultural commodities offered
London International Financial Futures Exchange (LIFFE)[1]	London, United Kingdom	1982	Coffee, cocoa, white sugar, and wheat.
Marché à Terme International de France (MATIF)[2]	Paris, France	1986	Corn, rapeseed, sunflower seed, milling wheat, and wine.
Budapest Commodity Exchange (BCE)	Budapest, Hungary	1989	Corn, black seed, feed barley, feed wheat, live hogs, rapeseed, sunflower seed, soybeans, and wheat.
Poznan Commodity Exchange (PCE)	Poznan, Poland	1991	Live hogs and wheat.
Amsterdam Agricultural Futures Market (ATA)[2]	Amsterdam, The Netherlands	1958	Live hogs and potatoes.
Futuros de Citricos y Mercaderias de Valencia (FC&M)	Valencia, Spain	1995	Navel oranges and Valencia oranges.
Warenterminborse Hannover AG (WTB)	Hannover, Germany	1998	Hogs, piglets, table potatoes, processing potatoes, London potatoes, wheat, and rapeseed.

[1]The LIFFE offered trading in financial futures products exclusively until 1996 when it acquired the London Commodity Exchange (LCE) and began offering futures and options on agricultural commodities formerly traded on the LCE. LIFFE subsequently was purchased in 2001 by EuroNext.
[2]The MATIF and ATA merged with the Brussels and Amsterdam Stock Exchanges in September 2000 to form a new exchange called "EuroNext". The ATA is the successor entity to the Dutch Pork and Potato Market, which traded potato and live hog futures prior to the establishment of the ATA.

Table 2-C—Leading European agricultural futures and option markets: Total annual trading volume during 2002 and open interest at month-end December 2002 (in contracts)[1]

Commodity/Exchange	Futures		Options	
	Volume	*Open interest*	*Volume*	*Open interest*
Cocoa/LIFFE	1,802, 142	169,133	194,682	33,678
Robusta coffee/LIFFE	1,905,319	120,558	139,394	21,087
White sugar/LIFFE	1,044,806	64,525	43,900	5,537
Rapeseed/MATIF	165,462	13,924	9,834	4,445
Milling Wheat/MATIF	107,602	4,802	1,679	1,388
Corn/MATIF	98,654	4,667		
Wheat/LIFFE	80,784	7,413	8,092	2,044
Potatoes/ATA	39,285	3,188	2,435	
Corn/BCE	9,450	1,347	305	
Wheat/BCE	9,271	909	150	

[1]The ranking shown in the table does not include commodity futures contracts traded on the FC&M, PCE, and WTB, since the FIA does not publish volume and open interest for these exchanges.

Source: Futures Industry Association, International Report, December 2002.

less than levels for the same or similar commodities in U.S. markets (table 3-C). Only cocoa futures and options approach trading levels in the United States. The differences in trading activity between Europe and the United States appear attributable in large part to the fact that the United States has historically had agricultural policies that rely more heavily on market-determined prices to guide resource allocation and consumption decisions. In addition, unlike Europe, the United States has a long tradition of relying on futures markets to set market prices and provide price risk management services for many agricultural commodities.

Patterns of commercial use of agricultural futures and option markets among market participants for risk management purposes do not appear to differ markedly between the United States and Europe. In the United States, producers historically have tended to use spot and forward contracts that frequently rely on futures trading to determine the final price, rather than use futures and options directly[4]. There are a number of reasons given for producers' preferences for spot and forward contracts over futures and options. These include avoiding unexpected adverse variation in the relationship between the cash and futures price as well as the transaction and financial costs and uncertainty associated with being able to meet futures margin calls. Also, crop loss risk—the chance that a producer's harvested production will not be sufficient to cover the quantity represented by the futures contracts acquired for hedging purposes—is often cited as a major reason for producers' reluctance to use futures for hedging crop price risk[5].

These reasons may apply in Europe as well. Available information indicates that European futures markets primarily are used by merchants and processors to hedge price risks associated with their cash market business activity. European agricultural producers appear to make limited use of futures markets. For example, a survey of grain producers in Great Britain indicated that 11 percent had used futures and 15 percent had used options for risk management[6].

The growth prospects for European agricultural futures and option markets likely will depend, in part, upon the effects of recent and future changes in agricultural policies within Europe on price volatility. Reductions in effective import protection for EU grains resulting from the Agenda 2000 support price cuts are likely to result in increased price volatility and risk for EU producers and commercial grain interests. Increased price volatility appears likely to enhance usage of certain existing European futures markets[7]. In addition, the next

[4]According to the 1996 Agriculture Resource Management Study, about 30 percent of U.S. farm operators said that they used forward contracting; about 20 percent said that they used futures.

Table 3-C—Comparison of trading activity in European and U.S. commodity markets: Annual futures and option trading volume for selected commodities in 2002 (in U.S. futures contract equivalents)[1] on all U.S. futures exchanges and leading European futures exchanges[2]

Commodity	Europe	United States
Cocoa	1,831,080	2,079,980
Coffee	554,274	2,718,508
Sugar	1,027,382[3]	6,314,773[4]
Corn	46,237	18,132,447
Wheat	107,677	6,872,891
Hogs	2,731	1,931,260

[1]European futures and option trading volumes were converted to U.S. equivalent trading volumes by adjusting for differences in contract sizes between European and U.S. futures and option contract sizes.
[2]By volume, including ATA, BCE, LIFFE, and MATIF.
[3]Includes white and raw sugar.
[4]Includes world (#11) and domestic (#14) contracts.

Source: Futures Industry Association, International Report, December 2002 and Monthly Volume Report, December 2002.

[5]Crop losses can reduce or eliminate the effectiveness of futures hedging positions established prior to harvest time and may result in increased financial risk. In particular, producers who establish short futures positions prior to harvest are exposed to the risk that prices will increase after the position is established, thereby incurring losses on their futures position which may add to any financial losses incurred as a result of crop losses. The risk of crop losses also discourages the use of forward contracts to fix prices for new crop production prior to harvest time, as producers may incur cancellation penalties or costs if they are unable to deliver the quantity contracted.

[6]Bowley, Frank, speech at workshop on Risk Management and Insurance in the European Union, sponsored by the Committee of Agricultural Organizations in the European Union and the General Committee for Agricultural Cooperation in the European Union (COPA-COGECA). Brussels, Belgium, February 1-3, 2001.

[7]Given the relatively short period of time elapsed since the Agenda 2000 CAP reforms were initiated, it is difficult to assess accurately the potential impacts of these changes on European futures market activity. Available data on aggregate measures of futures market activity indicate a mixed picture regarding pre- and post-2000 trading levels. For example, aggregate trading volume for all wheat futures providing for delivery within the European Union has been little changed from pre-2000 levels, while aggregate open interest in these markets has generally increased.

round of international trade negotiations likely will bring pressures for additional price support reductions, which, if realized, could further increase futures and option markets activity generally within Europe.

Other factors that will affect the development of European futures and option markets include the availability of alternative risk management services, the size of the market for risk management services, and the structural characteristics of the underlying cash market. For example, policy changes that have the effect of increasing the correlation between European agriculture prices and world market prices could limit further development of European agricultural futures markets by exposing these markets to competition from existing and more active commodity markets outside of Europe, particularly those based in the United States. In such a circumstance, some European market participants may opt to use related non-European futures and option markets rather than less active and less liquid European markets for risk management purposes if effective hedging transactions can be executed at a lower cost[8].

For European agricultural producers, further reductions in price supports and reduced barriers to international trade likely will mean greater reliance upon marketing methods commonly used by U.S. agricultural producers. For example, grain producers may enter forward contracts to fix prices for part of their new crop production or may simply rely on periodic spot sales of harvested crops over the course of marketing seasons in an effort to ensure they receive average prices for their crops over time rather than using futures and option markets as means of stabilizing income. Similarly, livestock producers may be more likely to use forward contracts as a means of reducing price risk associated with the purchase of animal feed as well as the purchase or sale of livestock.

[8]The cost of executing transactions includes brokerage commissions as well as the costs and risks related to execution of transactions that depend largely upon the liquidity of a market. Markets with low levels of liquidity (frequently reflected by low trading volumes) often have higher costs due to wider bid/ask spreads and higher transaction execution risks than more liquid markets. Transaction execution risks relate to the ability of market participants to establish positions quickly without affecting the market price. Traders in illiquid markets generally have less ability to enter or exit a position quickly without affecting prices and typically require longer periods of time to complete the desired transactions than traders in relatively liquid markets.

A Comparison of U.S. and EU Agricultural Productivity With Implications for EU Enlargement

Susan E. Leetmaa, Carlos Arnade, and David Kelch

Farms in the United States and the European Union (EU) have increased agricultural output over the decades, mostly as a result of technical change, increased efficiency and scale of production, better skills in the management of farm operations, and the influence of government programs. An increase in agricultural output can stem from increased use of fixed inputs, such as land, and intermediate inputs such as chemicals, irrigation, and machinery, or from increases in productivity. Increasing productivity is critical for the economic viability of the farm sector given the links among productivity, per-unit costs of production and net returns, and competitiveness. This article compares and contrasts agricultural output growth and productivity growth of the EU and the United States and examines how two different geographic regions, with two different farm policy sets have coped with similar productivity pressures on their agricultural sectors. The implications for EU enlargement and agriculture policy reform of future productivity growth are also assessed.

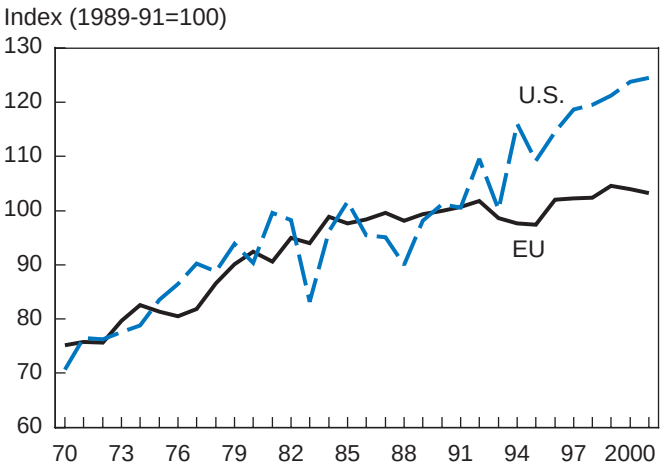
The EU and United States Are Large Agricultural Producers

In terms of production value, the EU and the United States are two of the larger agricultural producers in the world. Only China's agricultural production value is greater. In 2000, the value of crop and animal production in the EU-15 was 240 billion euros ($220 billion), which was about $25 billion larger than U.S. crop and livestock output valued at $195 billion. Six countries make up over 80 percent of EU-15 agricultural production value. France is the largest EU agricultural producer (23 percent of the value of EU-15 agricultural production), followed by Germany and Italy (both at about 15 percent), Spain (12 percent), United Kingdom (9 percent), and the Netherlands (7 percent). The remaining EU producers are all under 5 percent of the value of agriculture production.

A comparison of U.S. and EU-15 agricultural output growth over a 30-year period (fig. 1-D) indicates that the EU and the United States experienced similar agricultural output growth through the 1970s and 1980s. While the size of the agricultural sectors were similar in 2000 (as measured by value), growth in agricultural output over the 1990s was very different. Agricultural output in the EU stagnated, growing at about 0.3 percent per year, while that of the United States grew at over 2 percent per year.

An increase in agricultural output can stem from increased use of inputs or from increases in productivity (see box "Types and Sources of Change in Agricultural Output"). Productivity is the change in output that cannot be explained by changes in the level

Figure 1-D
U.S. and EU indices of agricultural production, 1970-2000



Source: FAOSTAT.

Types and sources of change in agricultural output

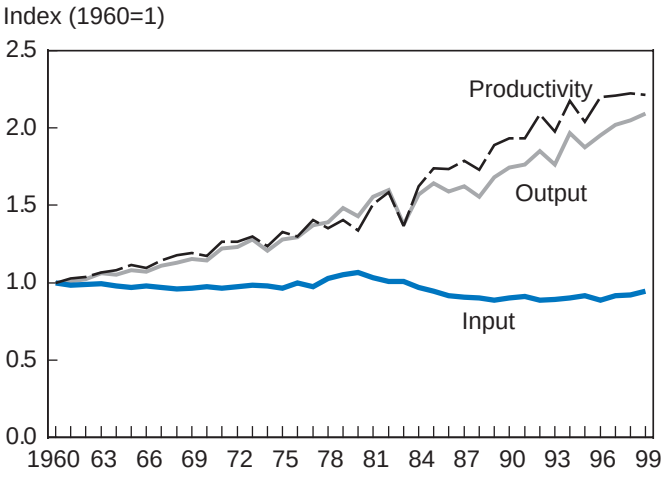
Changes in agricultural outputs	=	Changes in agricultural inputs	+	Agricultural productivity growth
Market-measured outputs:		Measured inputs:		(Change in output not accounted for by change in inputs)
Crops		Intermediate		Sources are:
		fertilizer		
		pesticides		
		energy		
		feed and seed		Agricultural research and development
Livestock		livestock		
		Labor		Extension
				Education
		Capital		Infrastructure
		equipment		
		real estate		Government programs
		inventories		

of inputs used in production. Use of better farm management practices, new technology, or the more efficient use of the mix of inputs used in the production process are examples of factors that would increase growth in productivity. Sources of productivity growth in agriculture include agricultural research and development, education, infrastructure, and government programs. For example, a comparison of growth in agricultural output, input use, and productivity for the United States from 1960-1999 indicates that growth in agricultural output since the early 1980s has been heavily dependent on growth in productivity (fig. 2-D). U.S. agricultural inputs, in the aggregate, actually declined from 1980 to 1999.

Measuring Agriculture Productivity

Total factor productivity (TFP) is a measure that accounts for the change in output that is not explained by changes in the level of inputs used in production. TFP measures the productivity of all factors of production combined. TFP growth can be viewed as a barometer of technology and efficiency and other factors that influence the long-term trend in output rather than the short run variations in production that can be attributed to changes in weather, input levels, and prices.

Figure 2-D
Growth in U.S. agricultural productivity, output, and inputs, 1960-99



Source: Agricultural Resources and Environmental Indicators, 2000, Chapter 5, p. 6.

TFP growth is important because it plays a key role in increasing agricultural output over several planting seasons. Year-to-year changes in input and output prices, farm policies, and producer behavior can influence the level of inputs used annually in production. TFP growth, however, responds to prices or policies over the long run. For example, a sustained period of

high prices may induce research into, and the adoption of, technologies that work to increase TFP. For any given set of input prices, a rise in TFP reflects a decrease in the per-unit cost of production. Productivity growth is, therefore, essential for the long-term economic viability of the farm sector.

Comparison of Agricultural Productivity and Growth in EU and U.S. Agriculture

Most comparative studies of TFP across countries tend to measure the growth rates of TFP, not relative levels of TFP. Data problems and dissimilarities often preclude a direct comparison of TFP levels between countries. However, Ball, et al. (2001), calculated TFP indices for nine EU countries and for the United States. By adjusting for country differences in input characteristics and quality, Ball's approach makes possible a common equivalent measure of land, capital, and other inputs between countries. This method makes it possible to directly compare the levels of productivity between countries, as well as productivity growth.

The Ball, et al. study reports relative TFP levels for the years 1973 to 1993 for the nine major EU countries and the United States. The 1973-1993 period for the Ball, et al. study is important because it allows a comparison of productivity among countries over a relatively stable policy environment. The study period is prior to the completion of the Uruguay Round of trade negotiations (1994), prior to implementation of CAP reforms in the EU (1993-95), and prior to passage of the 1996 U.S. Farm Bill (the FAIR Act). All productivity (TFP) levels (table 1) are reported relative to the TFP level for the United States for the 1990 base year set at 1.0.

According to the authors' estimates, seven of the nine EU countries had TFP levels close to or above that of the United States in 1973. The level of agricultural TFP in France, Germany, and Greece were close to that of the United States. Agricultural TFP levels for the same year for Belgium and the Netherlands were a third higher than the TFP level for the United States, while the UK and Denmark were somewhat above the level of the United States. Only Italy and Ireland's TFP levels were lower than the U.S. level for 1973. A weighted average of TFP levels among the nine EU countries, with the individual country's portion of the EU-9 value of agricultural output as the weight, indicates that the EU-9 level of TFP exceeded that of the United States until the mid-1980s (fig. 3-D). Beginning in 1985, the level of U.S. TFP exceeded that of the EU-9 and the gap widened in favor of the United States through the end of the study period in 1993.

TFP levels listed in table 1 can also be used to compare growth in TFP over the 1973 to 1993 period. U.S. agriculture productivity grew approximately 66 percent over the period, compared with the growth in the weighted average TFP for the EU-9 of 50 percent. Growth in TFP for the EU-9 and the United States were similar from 1973 through 1984 (fig. 4-D). From 1985 onwards, growth in TFP for the United States was consistently higher than that for the EU-9, resulting in the widening TFP gap depicted in figure 3-D.

For both the EU-9 and the United States, the rate of growth of agricultural output exceeded the rate of productivity growth in most years until the early 1980s (figs. 5-D and 6-D). In both cases it was the increase in intermediate inputs such as fertilizers, pesticides, energy, and seeds that allowed growth in agricultural output to exceed growth in productivity. After the early- to mid-1980s, productivity growth exceeded that of agricultural output, as growth in the use of intermediate inputs tapered off or declined. By the early 1990s, both the EU and the United States were almost totally dependent on growth in productivity for increasing agricultural output.

TFP Growth, Technical Change, and Efficiency

Another study by Leetmaa, et al., estimates growth rates (table 2-D) for TFP indices for the 15 member states of the EU for the period 1973-1997, although the methodology, data, and variable measurement are not comparable with the Ball, et al. study. While the two studies are not comparable, in part because the Ball study employs data of higher quality and has received more rigorous peer review, the Leetmaa, et al. study covers the period of time that could capture the initial impacts of the 1992 CAP reforms that were implemented from 1993-1995. The contribution this study makes to the understanding of productivity is that it breaks down the TFP growth indices into their component parts, efficiency (Appendix table 1), and technical change (Appendix table 2). While the United States is not included in the study, the results for the EU countries are useful in identifying the principal source of productivity growth for the EU-15 countries.

Table 1-D—Comparisons of relative levels of TFP in the EU and U.S., 1973 to 1993 1/

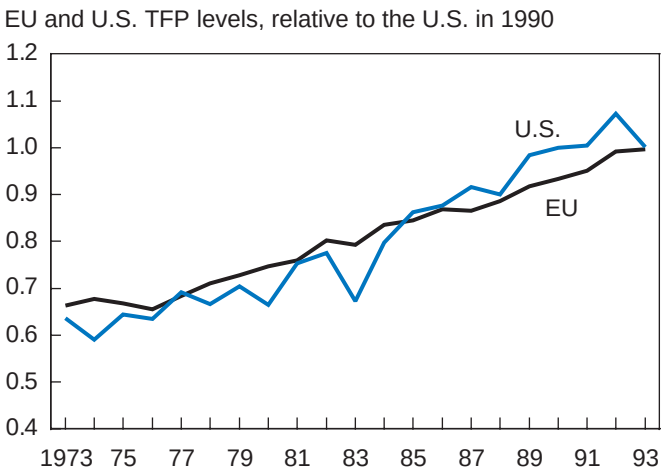
	Germany	France	Italy	Netherlands	Belgium	UK	Ireland	Denmark	Greece	EU	U.S.
1973	0.624	0.644	0.516	0.980	1.080	0.702	0.483	0.750	0.660	0.664	0.636
1974	0.646	0.637	0.527	1.020	1.080	0.705	0.500	0.839	0.680	0.677	0.590
1975	0.644	0.624	0.553	1.000	1.042	0.667	0.500	0.719	0.740	0.668	0.645
1976	0.629	0.609	0.536	1.020	1.000	0.655	0.500	0.727	0.706	0.656	0.635
1977	0.669	0.639	0.539	1.058	1.042	0.702	0.552	0.788	0.686	0.684	0.692
1978	0.689	0.677	0.547	1.093	1.083	0.730	0.533	0.794	0.745	0.711	0.667
1979	0.681	0.721	0.576	1.109	1.125	0.724	0.516	0.800	0.725	0.728	0.704
1980	0.696	0.722	0.609	1.105	1.125	0.763	0.533	0.824	0.804	0.747	0.665
1981	0.698	0.723	0.615	1.179	1.125	0.768	0.533	0.879	0.804	0.760	0.753
1982	0.763	0.796	0.619	1.214	1.167	0.791	0.567	0.909	0.824	0.802	0.776
1983	0.750	0.783	0.652	1.186	1.125	0.776	0.600	0.879	0.769	0.793	0.673
1984	0.783	0.828	0.637	1.263	1.208	0.851	0.633	1.000	0.788	0.835	0.797
1985	0.763	0.872	0.653	1.237	1.208	0.825	0.633	1.031	0.827	0.845	0.862
1986	0.802	0.890	0.668	1.305	1.240	0.826	0.613	1.065	0.827	0.869	0.877
1987	0.780	0.921	0.699	1.210	1.200	0.825	0.633	1.000	0.824	0.866	0.916
1988	0.813	0.928	0.699	1.242	1.240	0.823	0.633	1.100	0.863	0.886	0.901
1989	0.828	0.964	0.726	1.317	1.231	0.855	0.613	1.133	0.902	0.918	0.984
1990	0.838	0.996	0.711	1.367	1.231	0.880	0.677	1.167	0.784	0.933	1.000
1991	0.854	0.992	0.756	1.361	1.308	0.896	0.677	1.133	0.918	0.951	1.005
1992	0.890	1.073	0.790	1.371	1.346	0.933	0.710	1.100	0.918	0.992	1.073
1993	0.893	1.058	0.815	1.393	1.385	0.894	0.710	1.200	0.900	0.997	1.001
Compound growth (%)										50.6	66
Compound annual growth rate (%)										2.41	3.14

[1]Calculated TFP levels are relative to U.S. TFP in 1990. For example, the TFP level in France for 1973 was equivalent to 0.644 of U.S. TFP in 1990 (set to 1.0). Likewise, U.S. TFP in 1973 was 0.664 of the U.S. TFP level in 1990.

Source: Calculated from Ball, et al., (2001).

Figure 3-D

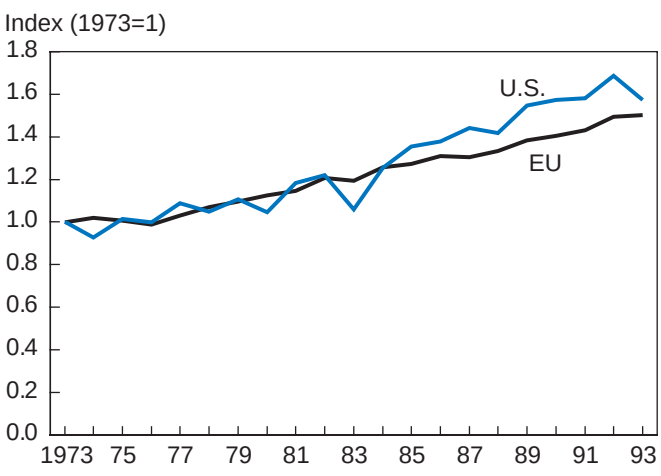
Relative agriculture TFP levels, U.S. and EU, 1973-1993



Source: Calculated from Ball, et al., 2001.

Figure 4-D

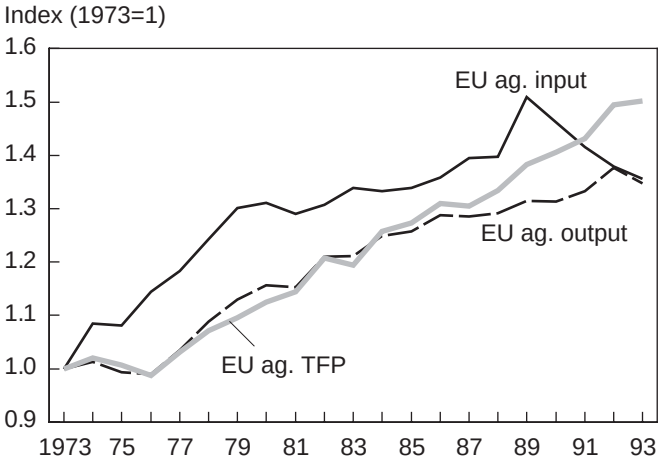
Growth of agriculture TFP for U.S. and EU, 1973-1993



Source: Calculated from Ball, et al., 2001.

Figure 5-D

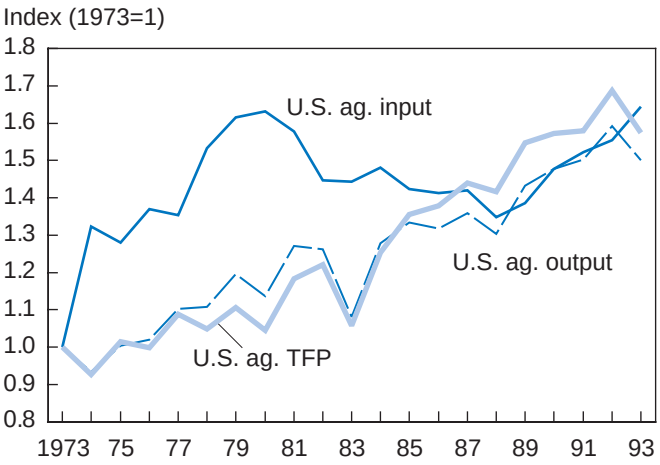
EU agriculture output, intermediate inputs, and TFP, 1973-93



Source: Calculated from Ball, et al., 2001.

Figure 6-D

U.S. agricultural output, intermediate inputs, and TFP, 1973-93



Source: Calculated from Ball, et al., 2001.

Table 2-D—Indices of total factor productivity growth, EU-15, 1973-1997

	Austria	Belgium	Den-mark	Germany	France	Fin-land	Greece	Ire-land	Italy	Nether-lands	Portugal	Spain	Sweden	UK
1973	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1974	1.03	1.07	1.09	1.02	1.00	1.02	0.89	1.15	1.07	1.00	1.00	1.09	1.04	1.01
1975	1.24	1.04	1.05	1.13	1.01	1.02	0.90	1.18	1.10	1.00	0.95	1.38	1.08	1.02
1976	1.25	1.08	1.03	1.06	1.04	1.02	0.88	0.92	1.04	1.03	0.99	1.74	1.11	1.01
1977	1.22	1.14	1.02	1.06	1.10	1.04	0.70	0.82	1.02	1.10	1.02	1.97	1.16	1.04
1978	1.23	1.23	1.09	1.14	1.20	1.05	0.75	0.67	0.92	1.21	1.03	2.22	1.21	1.09
1979	1.26	1.25	1.16	1.20	1.34	0.91	0.69	0.59	0.91	1.18	1.06	2.28	1.25	1.12
1980	1.23	1.31	1.23	1.25	1.35	1.22	0.75	0.56	0.97	1.13	0.92	2.54	1.30	1.18
1981	1.14	1.36	1.32	1.25	1.37	1.17	0.76	0.56	1.01	1.19	0.91	2.96	1.33	1.20
1982	1.36	1.45	1.47	1.39	1.56	1.32	0.75	0.62	1.03	1.25	0.93	3.76	1.48	1.30
1983	1.34	1.46	1.48	1.43	1.59	1.28	0.67	0.62	1.03	1.29	0.87	3.88	1.50	1.31
1984	1.30	1.52	1.65	1.52	1.70	1.24	0.61	0.68	1.04	1.32	0.90	4.94	1.60	1.43
1985	1.27	1.59	1.71	1.48	1.77	1.23	0.58	0.68	1.05	1.31	0.91	4.97	1.57	1.39
1986	1.37	1.68	1.78	1.57	1.85	1.17	0.59	0.72	1.08	1.36	1.22	4.93	1.66	1.43
1987	1.46	1.71	1.80	1.57	1.96	1.03	0.58	0.73	1.08	1.24	1.17	5.04	1.77	1.46
1988	1.45	1.78	1.94	1.62	1.97	1.08	0.60	0.71	1.04	1.25	1.05	4.96	1.54	1.46
1989	1.52	1.93	2.07	1.74	2.17	1.14	0.56	0.67	1.18	1.34	1.21	5.34	1.78	1.54
1990	1.57	2.01	2.22	1.59	2.30	1.23	0.48	0.71	1.17	1.43	0.96	5.11	1.91	1.59
1991	1.64	2.10	2.28	1.61	2.32	1.24	0.52	0.73	1.20	1.49	1.27	5.45	2.07	1.63
1992	1.68	2.30	2.29	2.00	2.56	1.27	0.49	0.67	1.23	1.53	1.45	5.27	1.90	1.69
1993	1.81	2.43	2.54	2.09	2.57	1.46	0.53	0.70	1.23	1.59	1.34	5.68	2.02	1.64
1994	1.87	2.45	2.56	2.13	2.66	1.62	0.59	0.71	1.24	1.63	1.40	5.81	1.84	1.70
1995	1.89	2.54	2.65	2.20	2.75	1.61	0.59	0.72	1.25	1.66	1.44	5.72	2.00	1.70
1996	1.82	2.56	2.67	2.33	2.93	1.73	0.56	0.71	1.28	1.66	1.52	6.59	2.06	1.72
1997	1.96	2.62	2.81	2.52	3.08	1.92	0.60	0.69	1.26	1.61	1.60	6.92	2.17	1.76

[1]Normalized to be one in the base year, 1973.
The numbers represent cumulative productivity change from the base year.
Source: Leetmaa, et al., (2000).

Efficiency refers to the use of existing inputs. Improvements in efficiency of input use can be a principal source of TFP growth. If production is based on an efficient allocation/mix of inputs, any reduction in input use would be expected to result in a reduction in output. In contrast, if production is based on an inefficient allocation/mix of inputs, producers could reduce inputs and maintain the same level of production, or even increase production by more efficient use of their inputs. Technical change embraces many potential sources of productivity growth, including such things as improved seeds, better management techniques, new crop rotation sequences, etc., all of which can reduce per-unit production costs.

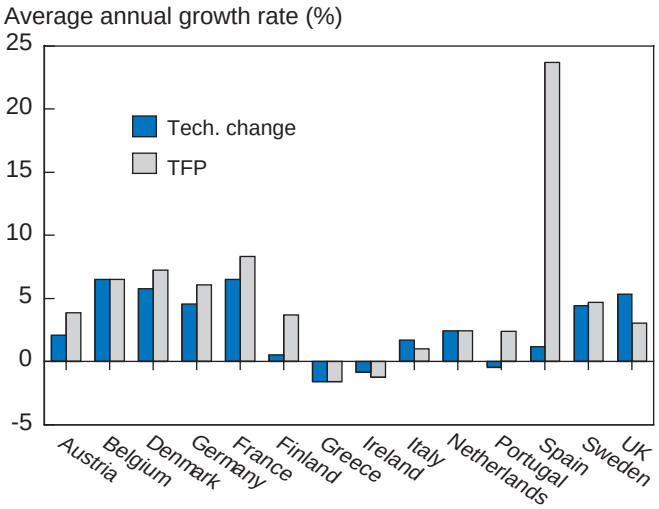
In table 2-D, the growth rates calculated from the TFP indices represent the growth rates of productivity from the 1973 base period through 1997 and are normalized at 1.0 for each country in the base period. Subtracting 1 from the index in any year represents the cumulative productivity growth from the base period. For example, table 2-D shows that the productivity of Portuguese agriculture had grown 60 percent from 1973 to 1997. In interpreting cross-country productivity indices, it is important to emphasize that each country's productivity growth begins from a different 1973 base TFP level, normalized to 1.0. Thus, the numbers in table 2-D and Appendix tables 1 and 2 do not represent differences in the productivity levels between countries, only differences in the growth of TFP.

What stands out in table 2-D is Spain's rapid productivity growth. Part of this may be attributed to Spain's initial low level of productivity. In another study, Ball, et al. (2001), found evidence of the "catch-up" hypothesis in their earlier study of EU productivity. The hypothesis states that those countries that lagged furthest behind in productivity levels should have the most to gain from the diffusion of technical knowledge, and, therefore, exhibit the most rapid rates of productivity growth. Portugal also exhibited significant growth in productivity following its accession to the EU in 1986.

The information in figure 7, developed from Leetmaa et al., compares the average annual growth in productivity (TFP) with the average annual growth in the technical change component over the 25-year period. For example, Denmark's agricultural sector experienced an average annual rate of growth in TFP of 7.2 percent over the 1973-1997 period. Much of that growth in TFP is explained by the growth in the technical change component of TFP, which grew, on average, by 5.8 percent per year. The difference between the technical change bar and the TFP bar roughly reflects the contribution of increased efficiency to TFP growth.

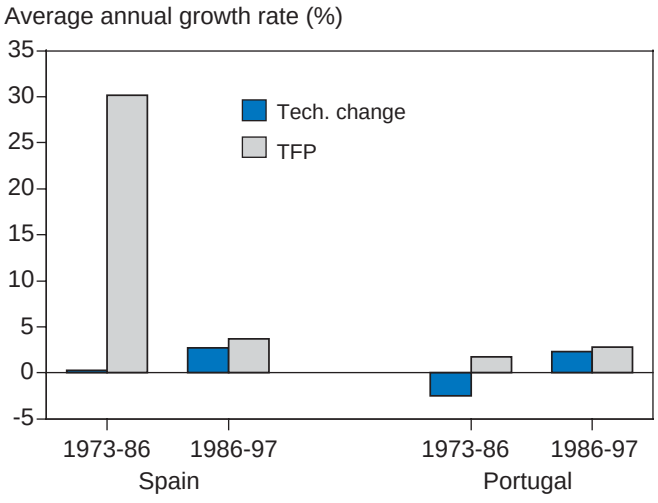
Most of Spain and Portugal's initial productivity gains came from improvement in efficiency rather than from technical change. However, splitting the entire period into pre-accession (1973-86) and post-accession (1986-97) periods show that there was virtually no growth in the technical change component of TFP in Spain over the period leading up to EU accession, and a decline in technical change in Portugal (fig. 8-D). Spain and

Figure 7-D
Contribution of technology growth to TFP growth, 1973-1997



Source: Calculated from Leetmaa, et al., 2000.

Figure 8-D
Contribution of technology growth to TFP growth, Spain and Portugal, pre- and post-EU accession



Source: Calculated from Leetmaa, et al., 2000.

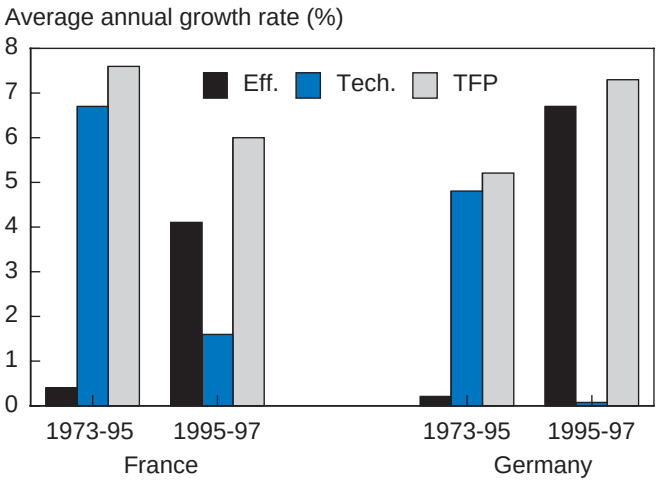
Portugal entered the EU in 1986, but their agricultural sectors underwent a significant period of reform and structural change leading up to accession, an indication of the potential importance of enlargement-driven policy reform and structural change (increase in farm size) to increasing the efficiency of production. Following accession to the EU however, technological change became the driver of productivity growth in both Portugal and Spain (fig. 8-D and Appendix table 2).

Greece presents an interesting contrast to Spain. Over time, Greece's productivity falls and the negative growth in productivity stems from a reduction in the growth of technical change rather than from falling efficiency (fig. 7-D). The falling technology index does not represent a reduction in technology use in Greece. Rather, it represents a movement to use of a less productive technology by the average producer. This may occur if there is a change in the mix of crops which are grown, a change in the mix of producers, or a change in average farm size. All three changes occurred in Greece leading up to, and following, its accession to the EU in 1981 and full adoption of CAP policies, which occurred much more quickly than other accessions. Similar arguments might explain Ireland's productivity decline after it joined the EU in 1973.

Belgium, Denmark, France, and Germany have the next highest rates of TFP growth in the EU after Spain. France and Germany are countries that have relatively large agricultural sectors in the EU, thus the high rate of TFP growth in these countries is a significant factor in overall productivity growth in EU agriculture. In contrast to Spain, all four countries' productivity growth mainly results from technical change rather than from growth in efficiency (fig. 7-D). This productivity growth probably reflects their long-term adjustment to the CAP relative to Spain that was not fully integrated into the CAP and its high prices until 1995.

While there are not enough data points to reach any definitive conclusion, it appears that the contribution of technical change to productivity growth has slowed since the MacSharry CAP reforms were fully implemented by 1995 (fig. 9-D). Estimates for France and Germany indicate an increase in the contribution of efficiency gains to overall productivity growth from 1995 to 1997. There was little growth in efficiency-based productivity gains in Germany and France relative to technical change from 1973 to 1995 (Appendix tables 1 and 2). From 1995 to 1997, Germany experienced a 14-percent gain in efficiency-based productivity gain, while France showed an 8-percent gain. By the end of the MacSharry reforms, EU grain prices had been lowered by 35 percent, motivating a more efficient use of resources.

Figure 9-D
Productivity growth



Source: Calculated from Leetmaa, et al., 2000.

The UK had a rate of growth of technical change as high as those of Germany and France, but its efficiency declined, perhaps the result of high CAP prices it adopted upon joining the EU in 1973. The high prices encouraged a change in crop mix (more wheat) and more intensive use of inputs on farms that were much larger than the EU average, thus precluding efficiency gains.

Italy was the country with the lowest positive TFP growth. Italy began to experience significant technology growth in the 1990s but its efficiency declined. In general, it is not uncommon to see a short-run decline in efficiency during the initial periods of technology growth[1] because there are adjustment costs required to adopt new technology, particularly when farm structure remains the same.

For the EU, technical change has been the major source of TFP growth relative to efficiency. The newer Mediterranean members appear to be an exception, deriving much of their productivity gains over the 25-year period from increasing efficiency. However, as pointed out above, following accession, Spain and

[1]It has been found that there are adjustment costs associated with adopting a new technology (Vasavada and Chambers).

Portugal derived most of their productivity gains from technical change.

Technical change is the main contributor to strong productivity growth in U.S. agriculture. Arnade (1998) has shown that U.S. growth in efficiency in recent decades has been small, implying that technical growth drives productivity gains in the United States. This is because the more competitive climate in the United States relative to the EU over the past few decades had already forced U.S. farms to seek out efficiency gains. Results from the same study show that the United States had a more efficient agriculture than major EU countries from 1960 to 1993.

Government Programs, Technology, And Agricultural Productivity Growth

Relatively few studies have investigated the impact of government policy on agricultural productivity, but some (Huffman and Evenson, 1993; Makki and Tweeten, 1999) find a significant and positive relationship. For example, high farm prices may encourage substitution of improved capital inputs for labor and increase the rate of new technology adoption. However, another study found a "conflicting and weak relationship between farm productivity and public commodity programs," in the United States (Makki, Tweeten, and Thraen, 1999).

Ball, et al. (2001), in their exhaustive study of productivity, found technological innovation to be embodied in EU capital and intermediate inputs, and also found a positive interaction between capital accumulation and productivity growth. The relationship between capital accumulation and productivity growth was strongest during the 1973 to 1981 period. Ball (2001) also notes that net investment in fixed capital was negative in most EU countries during the period 1982 to 1993, perhaps a contributing factor to the widening productivity gap between the United States and the EU although U.S. net investment was also negative for this period. A study by Frisvold and Lomax (1991) found a very significant and highly positive relationship between investment in research and development and farm productivity growth in U.S. agriculture.

Implications of TFP growth for EU Enlargement and Further CAP Reform

The EU is in the process of negotiating membership with 10 Central and Eastern European (CEE) countries,[2] Cyprus, and Malta.[3] The EU has undergone a number of previous enlargements since 1951, when it was established by the six charter members--Belgium, Germany, France, Italy, Luxembourg, and the Netherlands. Leetmaa, et al.'s productivity measures are estimated from 1973 to 1997, over which period the EU experienced four phases of enlargement: The UK, Ireland, and Denmark in 1973, Greece in 1981, Spain and Portugal in 1986, and Austria, Finland, and Sweden in 1995.

According to Leetmaa et al., and their decomposition of productivity, the majority of countries experienced an increase in their technology-based productivity growth after joining the EU. Only Ireland and Greece experienced declines in technology-based productivity growth following accession. Germany experienced a slight decline in efficiency-based productivity just after re-unification with East Germany (an enlargement of a kind unique to the EU), but German efficiency-based productivity growth has increased from 1992 through 1997.

The impact of expected EU accession on productivity growth during the immediate years leading up to actual membership is mixed. In those countries where more significant policy and structural adjustments were required for preparing for EU accession, significant increases in efficiency-based productivity growth were evident in the years prior to, or immediately after, actual membership, for example in Spain, Portugal, and Finland.[4] Even Ireland and Denmark showed some efficiency gains in the immediate years following accession in 1973. It is likely that in the long run, EU enlargement will result in increased productivity in the CEE. As the CEE countries make the policy and institutional adjustments necessary for accession to the EU, some efficiency-based gains in productivity are to be expected, particularly knowing that many of the agricultural sectors in these CEE countries are operating at low levels of efficiency

[2]The first set of countries expected to join are the Czech Republic, Estonia, Hungary, Poland, and Slovenia. Bulgaria, Latvia, Lithuania, Romania, and Slovakia may join at the same time or at a later date, depending on their ability to meet EU production standards and membership criteria.

[3]For a complete discussion on EU enlargement see the article by Cochrane in this report.

[4]Though efficiency measures increased for Austria, Finland, and Sweden, a 3-year sample may not be sufficient to determine whether the increase will be sustained.

compared with current EU members. These countries are also operating at a much lower technological level. Along the lines of the "catch-up" hypothesis discussed earlier, the new CEE members could experience the fastest technology-based productivity growth in an enlarged EU.

It also appears that an evolution of EU reform will continue to move EU policy towards more market-oriented policies and away from support prices, but with additional direct payments. Based on the Leetmaa, et al. analysis, it appears that most EU countries continued to experience technology-based productivity growth following the MacSharry reforms, but at a slower rate than before reforms. However, it is difficult to hypothesize how EU CAP reform, a shift from reliance on support prices to direct payments to stabilize farm income, will influence long-run total factor productivity growth.

In the example discussed earlier for France and Germany (fig. 9-D), the slowing of technology-based productivity gains were more than offset by efficiency-based gains over the 1995 to 1997 period. But, as with the enlargement-related cases, the efficiency-based productivity gains related to policy reform could be short-lived. Movements over a 2-year period (1995-1997) for only two EU producers (France and Germany), albeit major EU producers, does not allow any significant conclusions to be drawn. However, if a hypothesized linkage of CAP reform and slower technology-based productivity growth proves to hold, France and Germany may experience a slower growth in overall TFP over the longer term. If EU policies do continue to become more market oriented, slower rates of technology-based productivity growth, without sustained offsetting gains from efficiency-based productivity growth, could allow the current EU-15's TFP to continue to increase, but at a slower rate.

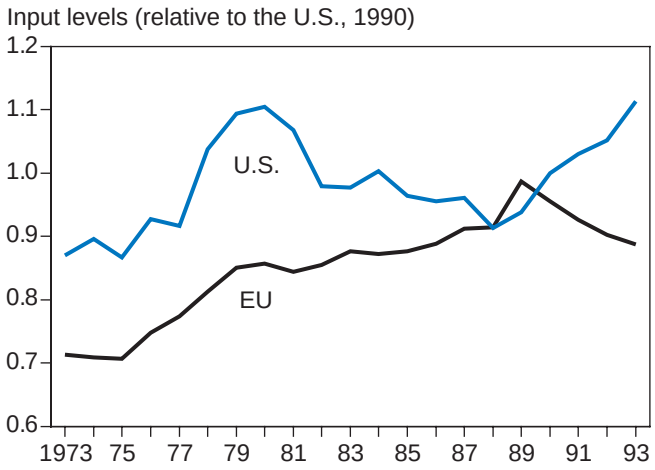
EU and U.S. Trends in Input Use

It is also important to consider trends in input use when analyzing efficiency and technical change. Major inputs to take into account are land, labor, capital, and intermediate inputs, such as fertilizer, pesticides, energy, feed and seed. With the exception of capital and intermediate inputs, long-term trends for the other input categories such as land and labor are downward sloping. The study by Ball, et al. (2001) is useful in gauging trends in the use of intermediate inputs in the United States and the EU over the 1973-93 period (fig. 10-D).

Both the EU and the United States exhibited upward trends in intermediate input use over the 21-year period. The United States had levels of intermediate input use that were higher than those of the EU-9 in all but 2 years over the 1973-1993 period. These general trends with respect to input use in the EU and the United States mask some significant differences in the movements of specific inputs (fertilizer versus feed, for example), and in year-to-year variation in the economic and program factors driving levels of input use. The principal factors affecting intermediate input use are the level and mix of planted cropland, the level and mix of livestock production, input prices, commodity prices, and farm programs (Denbaly and Vroomen, 1993).

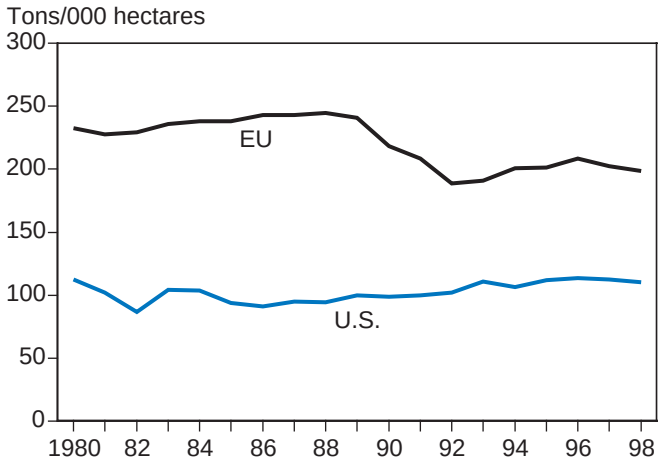
Fertilizers—Fertilizer usage is one of the intermediate inputs that tends to be responsive to many of the factors listed above. During the three seasons (1998/99-2000/01), the EU averaged almost 17 million tons of commercial fertilizer per year, a drop from peak use in 1988/89 of over 22 million tons. Average nutrient use from commercial fertilizers for the United States in the late 1990s was about 22 million tons. While the United States uses approximately 5 million tons more fertilizer than the EU, the United States has nearly three times as much agricultural production. Thus, fertilizer application rates are much lower than in the EU. EU application rates are about twice the levels in the United States (fig. 11-D).

Figure 10-D
Relative levels of intermediate input use, U.S. and EU



Source: Ball, et al., 2001.

Figure 11-D
U.S. and EU fertilizer use



Source: FAOSTAT.

In the EU, about half of all fertilizer is applied to wheat and coarse grains, nearly a quarter to grassland, and the remaining quarter to oilseeds, sugarbeets, and fruit and vegetables. In the United States, corn, wheat, and other grains account for almost 60 percent of all commercial fertilizer use. Differences in crop mix between the United States and the EU does not appear to explain the much greater fertilizer application rates in the EU. In fact, the EU has a much greater portion of its cropland in "permanent" crops, such as fruits, nuts, and olives, which use less fertilizer than grains, such as corn and wheat (table 3-D).

The ratio of the price of fertilizer to the internal price of commodity outputs perhaps does most to explain the very intensive fertilizer usage in the EU. At the peak of commercial fertilizer use in the EU (1987-1989), the average price for the most common compound fertilizer (N-P-K: 20-10-10) in the Netherlands was roughly $212 per metric ton. The average EU wheat intervention price over the 3-year period was $202 per metric ton, yielding a fertilizer-to-grain price ratio of 1.05, i.e., a ton of fertilizer cost roughly 5 percent more than a ton of wheat. In the United States over the same 1987-89 period, the average price of a common fertilizer, ammonium nitrate, was $188 per metric ton. The average farm price for wheat was $123 per metric ton, yielding a fertilizer-to-grain price ratio of 1.53 compared with the EU ratio of 1.05. The much higher EU price for wheat accounted for most of the substantial difference between the United States and the EU fertilizer/grain price ratios and encouraged a more intensive use of fertilizer by the EU. By 1998, well past the phase-in of the MacSharry reforms, the intervention price for wheat was reduced to $134 per metric ton, and the EU fertilizer/grain price ratio had increased to 1.7 making the intensive use of fertilizer less economic.

Farm programs in the United States can also influence the intensity of fertilizer use, although not nearly to the extent of the EU's high support prices prior to the MacSharry reforms begun in 1993. For example, research by Ribaudo and Shoemaker (1995) indicates that economic incentives from participation in commodity programs caused program participants to apply fertilizer at greater rates than non-participants. Additionally, under the U.S. Federal Agriculture Improvement and Reform (FAIR) Act of 1996, declining prices for both corn and soybeans resulted in farmers' planting decisions being partly based on the respective loan rates and expected loan deficiency payments for corn and soybeans. One analysis indicated that an additional 1.7 million acres of soybeans was expected to be planted in 1999 because of the higher loan rates for soybeans, relative to corn (Lin, 1999). Since soybeans are a less fertilizer-intensive crop than corn, aggregate and per-acre fertilizer use was likely less than expected due to a policy-related shift in the crop mix.

It is difficult to fully explain the causal factors behind the EU's abrupt decline in commercial fertilizer usage levels over the 1989-92 period. One complication is that in the EU, commercial fertilizers are responsible for only about half of all nutrients applied to EU cropland, the other 50 percent coming from animal and industrial wastes. In the United States, commercial fertilizers make up over 80 percent of total nutrient applications. Crop prices in the United States generally don't make transport and handling of animal and industrial wastes over distances an economically viable option.

According to the European Fertilizer Manufacturers Association (EFMA), environmental considerations as well as farm management improvements are constantly triggering a more targeted use of nutrients on EU farms. At EU, national, and regional levels, environmental policy and programs do affect fertilizer usage, such as the EU Nitrate Directive (1992), which calls for EU producers to improve their environmental performance by using nutrient accounting and by applying codes of good agricultural practices. According to the EFMA, environmental policy and

Table 3-D—Agricultural land use in the EU and the United States, 1971-2000

Year	European Union				United States			
	Permanent Crops	Pasture	Arable	Total AgArea	Permanent Crops	Pasture	Arable	Total AgArea
	1,000 hectares							
1971	11,634	64,718	80,415	156,767	1,760	243,400	188,140	433,300
1972	11,665	64,434	80,173	156,272	1,755	243,000	187,545	432,300
1973	11,784	64,225	79,630	155,639	1,750	242,400	187,050	431,200
1974	11,867	63,738	79,653	155,258	1,746	241,940	186,472	430,158
1975	11,965	63,590	79,343	154,898	1,746	241,940	186,472	430,158
1976	11,971	62,973	79,050	153,994	1,746	241,940	186,472	430,158
1977	11,930	62,777	79,075	153,782	1,741	242,038	186,552	430,331
1978	11,956	62,523	79,319	153,798	1,869	237,539	188,755	428,163
1979	11,894	62,352	79,106	153,352	1,869	237,539	188,755	428,163
1980	11,774	62,039	78,971	152,784	1,869	237,539	188,755	428,163
1981	11,748	61,779	78,946	152,473	1,869	237,539	188,755	428,163
1982	11,729	61,535	78,950	152,214	2,034	241,600	187,765	431,399
1983	11,878	60,704	78,426	151,008	2,034	241,600	187,765	431,399
1984	11,797	60,248	78,658	150,703	2,034	241,600	187,765	431,399
1985	11,709	59,981	78,636	150,326	2,034	241,600	187,765	431,399
1986	11,642	59,689	78,637	149,968	2,034	241,600	187,765	431,399
1987	11,574	59,408	78,660	149,642	2,034	239,172	185,742	426,948
1988	11,538	59,486	78,229	149,253	2,034	239,172	185,742	426,948
1989	11,482	59,447	78,148	149,077	2,034	239,172	185,742	426,948
1990	11,486	59,082	77,970	148,538	2,034	239,172	185,742	426,948
1991	11,273	56,680	77,241	145,194	2,034	239,172	185,742	426,948
1992	11,098	56,582	76,842	144,522	2,050	239,249	184,130	425,429
1993	10,971	56,467	76,329	143,767	2,050	239,250	181,950	423,250
1994	10,949	56,901	75,755	143,605	2,050	239,250	178,950	420,250
1995	10,796	56,932	74,725	142,453	2,050	239,250	176,950	418,250
1996	10,789	56,702	75,230	142,721	2,050	239,250	176,950	418,250
1997	10,888	56,310	75,164	142,362	2,217	228,660	174,500	405,377
1998	11,035	56,592	74,698	142,325	2,217	228,660	174,500	405,377
1999	11,110	56,678	74,296	142,084	2,217	228,660	174,500	405,377
2000	11,122	56,006	73,499	140,627	2,217	228,660	174,500	405,377

Note—U.S. data from 1997 adjusted to reflect 1997 U.S. Agricultural Census.

Source: FAOSTAT Agriculture Data.

farm management improvements may have contributed most to the early 1990's decline in fertilizer use.

Another complication in the EU over this period of the early 1990s was the use by the EU Commission of an array of non-price instruments to influence market conditions. The Commission tightened standards for grain coming into intervention, accepted less tenders for export subsidies, and paid less than the listed intervention price. The effective price of grains was lowered in the EU and the amount of grains eligible for intervention was lowered, leading to some disincentives for continued intensive use of fertilizer. In addition, oilseeds had replaced some grains, thus lowering overall fertilizer use since oilseeds require less fertilizer per acre than grains.

EU application rates of fertilizer were expected to decline after the MacSharry reforms lowered grain prices. However, fertilizer use increased slightly from 1993 to 1996, in part because of a crop mix that favored grains that need more fertilizer over oilseeds. However, fertilizer application rates tapered off marginally in 1997 and 1998. Agenda 2000 brought additional reductions in price supports in the EU. The EFMA, in its latest forecast of fertilizer use, expects nitrogen, phosphorus, and potassium use in the EU to decline by 6 percent, 14 percent, and 12 percent, respectively, over the next 10 years. Among the economic factors underlying the forecasted decline in fertilizer use was the CAP reform of Agenda 2000 and an anticipated stepwise reduction in price support and market protection.

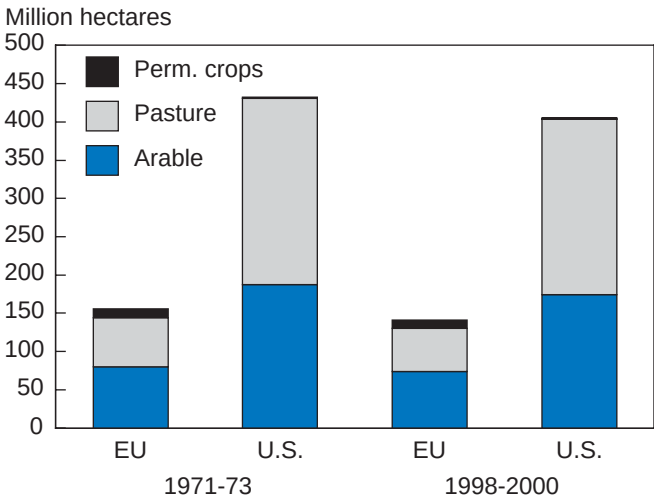
Other Chemical Inputs—Pesticide usage is more difficult to compare, as there are many types of plant protection products with many active ingredients. According to the European Environmental Agency (EEA), pesticide usage in the EU has declined since the early 1990s in terms of active ingredients in both absolute levels and in application rates. The EEA attributes the decline to the MacSharry CAP reform, as well as to improvements in pesticide effectiveness and crop-specific formulas, though they admit that pesticides have become more toxic as they have become more potent. Expenditure on herbicides is three times the expenditure of other pesticides in the EU. Pesticide use has declined because of environmental regulations and the land set-aside program of the MacSharry CAP reform.

Much of the increases in crop yields throughout this century have been credited to pesticide technology. Between 1950 and 1980, U.S. herbicide use increased to nearly 100 percent of U.S. corn, soybean, cotton, and many other crop areas according to USDA's *Agricultural Resources and Environmental Indicators* report. U.S. pesticide use peaked in 1982 when area planted to crops was at a record high, a greater proportion of acres were treated with pesticides, and application rates per treated acre were high (USDA). U.S. pesticide consumption declined between 1982 and 1990 as commodity prices fell and land was idled by Federal programs, but has been increasing since then. U.S. pesticide consumption surpassed 1982 levels in 1996 and continued to increase marginally through 1997 (USDA).

Land

Agricultural area (fig. 12-D and table 3-D) declined by 9.3 percent in the EU and 6.2 percent in the United States between 1971-73 and 1998-2000, but with an agricultural area nearly three times that of the EU, the United States lost more than the EU--26.8 million hectares to the EU's 14.5 million (table 3). Permanent pasture (fig. 12-D) suffered the largest decline in the EU at 12.5 percent compared with only 5.9 percent for the United States, but the United States lost 14.2 million hectares compared with the EU at 8.5 million. Arable land declined similarly in the EU (7.3 percent) and the United States (7.0 percent), but the larger size of the United States led to a loss of 13.1 million hectares compared with 5.9 million hectares for the EU. Permanent crop area rose slightly in the United States over this period but is small compared with the EU which lost a significant amount of land in this category, presumably because of less area dedicated to olive production, particularly in Spain and Italy.

Figure 12-D
EU and U.S. agricultural land use, 1971-73 and 1998-2000



Source: FAOSTAT.

Irrigated area accounts for a higher percentage of arable land (16.6 percent) in the EU than in the United States (12 percent), which has contributed to the EU's higher yields. U.S. irrigated area was more than twice that in the EU in 1971, but the gap has been narrowing as the EU has nearly doubled its irrigated area since 1971, while U.S. irrigated area increased by 60 percent. U.S. irrigated area was only 81 percent greater than the EU in 1998 at 22.3 million hectares compared with 12.3 million hectares in the EU.

Both the United States and the EU have implemented set-aside schemes for crops in order to control overproduction and/or promote environmental goals. EU set-aside schemes began in 1993 on a large scale with the MacSharry reform and reached a peak in 1996 when nearly 10 percent of all arable land was idled, 7.3 million hectares (EU Commission, Agricultural Situation…). Prior to the MacSharry reform, the EU had a voluntary 5-year set-aside program that is included in the 1996 total amount of set-aside. The set-aside is currently at 5.5 million hectares or 10 percent of what the EU calls its base area, which is smaller than its arable land area. The EU set-aside area is likely to remain at this level which at 7.4 percent of arable land is comparable with the U.S. figure of 7.7 percent.

The United States has a longer history of land set-aside for supply control and various programs have been in effect since the 1950s. Current programs conjoin both land-idling for supply control with environmental objectives. The principal program is the Conservation

Reserve Program (CRP) which has about 13.4 million hectares idled in this long-term program or about 7.7 percent of U.S. arable land. A wildlife habitat program has also idled about 6 million hectares of agricultural area but not all could be classified as arable land. The wetlands conservation program has idled another 380,000 hectares (USDA).

Implications for Productivity-Driven Agricultural Output Growth

Farmers in the EU and the United States have been able to continue to increase yields and agricultural output in the face of lower prices and less input use thanks to increasing productivity. That increase in productivity is based on increasing use of new technologies and better farm management practices, and the embodiment of technology in the improved quality of inputs. This steady increase in productivity growth and its effect on agricultural output growth will continue to pose challenges for both EU and U.S. policymakers.

An obvious benefit of the long-term gains in productivity growth in the United States and the EU is the potential for increasing net returns to agricultural activities and increasingly viable agricultural sectors. The relative productivity gap between the United States and the EU widened in favor of the United States in the early 1990s. There are signs, albeit statistically weak, that CAP reforms, first begun in 1993, may potentially slow the EU's rate of productivity growth. The U.S. competitive position in global markets could improve under such a trend.

Another consequence of productivity-driven increases in agricultural output is the increased government outlays that could potentially cause problems for both the United States and the EU because of WTO restrictions on support linked to production. Payments on U.S. marketing loans and loan deficiency payments (LDPs) are made on a per-unit basis, so as production increases, government expenditures increase as well. The same is true for EU expenditures on purchases into intervention stores. The EU is required to purchase as much as a farmer is willing to sell into intervention provided the commodity meets intervention quality standards. If production increases, government spending on intervention purchases could increase as well. For the EU, increased productivity growth within the new CEE members is a major concern. In addition, increases in EU and U.S. expenditures due to such production increases and consequent government outlays would be classified as amber box payments that are not allowed to increase (see WTO article).

Farmers in the EU and the United States have been able to continue to increase yields and agricultural output in the face of lower prices and less input use thanks to increasing productivity. That increase in productivity is based on increasing use of new technologies and better farm management practices, and the embodiment of technology in the improved quality of inputs. This steady increase in productivity growth and its effect on agricultural output growth will continue to pose challenges for both EU and U.S. policymakers.

The EU is reliant on subsidies for the export of many of its goods because it provides high domestic prices to its producers. Although the EU has met its WTO commitments on export subsidies in the past, it has been close to the limits for many dairy products and coarse grains. The dairy quota will help keep the EU near its bound levels for dairy products, but productivity growth in coarse grains could drive up excess supplies such that the volume bound will prevent some from being exported. This type of pressure has caused the EU to modify its policies in the past. Both the MacSharry and the Agenda 2000 reforms reduced internal prices, compensating producers with direct payments. This reduced the EU's reliance on export subsidies. As productivity increases, the pressure to reform will likely build again unless world prices rise sufficiently.

The United States also uses export subsidies to be price-competitive in targeted overseas markets where competitor countries are making subsidized sales. Nearly all of the U.S. subsidies of this nature since 1995 have been for dairy products as part of the Dairy Export Incentive Program (DEIP). The United States has been exporting at, or close to, its WTO volume limits for skim milk powder, other milk products, and cheese.

Finally, continued productivity increases will also have implications for the impending enlargement of the EU to include several Central and Eastern European countries. Productivity in many of the CEE countries has been lower than in the EU, and with adoption of EU technology and commodity prices that are generally higher than in most CEE countries, the enlarged EU could have larger surpluses of some crops. (For further discussion about EU enlargement see the article in this document by Cochrane.) The EU agricultural budget could be strained by increased CEE productivity, and WTO constraints could potentially come into play.

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Appendix Table 1-D—Indices of efficiency-based productivity growth, EU-15, 1973-1997

	Austria	Belgium	Den-mark	Germany	France	Fin-land	Greece	Ire-land	Italy	Nether-lands	Portugal	Spain	Sweden	UK
							(1973=1.0)							
1973	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1974	1.10	1.00	1.15	1.08	0.95	1.07	1.00	1.31	1.07	1.00	1.28	1.11	1.01	1.00
1975	1.27	0.99	1.09	1.16	0.96	1.02	1.00	1.31	1.04	1.00	1.17	1.31	1.04	1.00
1976	1.27	0.98	1.07	1.09	0.94	1.04	1.00	1.06	1.03	1.00	1.17	1.62	1.04	0.99
1977	1.23	0.96	0.98	1.00	0.93	1.14	1.00	1.31	1.07	1.00	1.81	2.30	1.02	0.94
1978	1.16	0.95	0.96	0.99	0.93	1.01	1.00	0.94	0.93	1.00	1.58	2.25	0.97	0.90
1979	1.25	0.92	0.96	0.98	0.98	0.96	1.00	0.90	0.97	1.00	1.81	2.52	0.94	0.88
1980	1.25	0.92	0.98	0.98	0.95	1.26	1.00	0.80	0.94	1.00	1.40	2.58	0.98	0.90
1981	1.11	0.90	0.99	0.92	0.91	1.14	1.00	0.75	0.95	1.00	1.25	2.90	0.95	0.86
1982	1.26	0.92	1.06	0.99	0.99	1.24	1.00	0.81	0.97	1.00	1.27	3.64	1.01	0.89
1983	1.26	0.92	1.06	0.99	0.99	1.24	1.00	0.81	0.97	1.00	1.27	3.64	1.01	0.89
1984	1.26	0.91	1.11	0.99	1.00	1.24	1.00	0.91	1.05	1.00	1.44	4.92	1.01	0.91
1985	1.23	0.93	1.14	0.95	1.02	1.27	1.00	0.95	1.04	1.00	1.63	4.92	0.98	0.87
1986	1.28	0.93	1.12	0.96	1.01	1.17	1.00	0.95	1.07	1.00	1.81	4.75	0.98	0.85
1987	1.35	0.97	1.15	0.98	1.09	1.14	1.00	1.01	1.03	1.00	1.81	4.96	1.15	0.88
1988	1.24	0.93	1.11	0.95	1.02	1.16	1.00	0.97	0.93	0.97	1.66	4.76	0.96	0.81
1989	1.27	0.99	1.15	1.00	1.09	1.20	1.00	0.92	1.05	1.00	1.81	5.03	1.07	0.84
1990	1.22	1.00	1.15	0.86	1.09	1.28	1.00	1.06	1.01	1.00	1.81	4.90	1.14	0.82
1991	1.22	1.00	1.15	0.86	1.09	1.28	1.00	1.06	1.01	1.00	1.81	4.90	1.14	0.82
1992	1.21	1.00	1.14	1.05	1.12	1.30	0.94	0.98	0.99	1.00	1.81	4.61	0.99	0.83
1993	1.25	1.00	1.15	1.05	1.06	1.42	0.98	0.99	0.95	1.00	1.81	4.70	1.01	0.76
1994	1.24	1.00	1.15	1.04	1.08	1.51	1.00	0.95	0.89	1.00	1.81	4.60	0.89	0.77
1995	1.23	1.00	1.15	1.04	1.09	1.45	1.00	0.93	0.89	1.00	1.81	4.39	0.94	0.75
1996	1.18	1.00	1.15	1.11	1.14	1.52	1.00	0.91	0.93	1.00	1.81	5.03	0.97	0.76
1997	1.29	1.00	1.15	1.18	1.18	1.69	1.00	0.88	0.88	1.00	1.81	5.35	1.03	0.76

The numbers represent cumulative efficiency change relative to the base period.

Source: Leetmaa, et al., (2000).

Appendix Table 2-D—Indices of technology-based productivity growth, EU-15, 1973-1997

	Austria	Belgium	Den-mark	Germany	France	Fin-land	Greece	Ire-land	Italy	Nether-lands	Portugal	Spain	Sweden	UK
						(1973=1.0)								
1973	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1974	0.94	1.07	0.95	0.95	1.05	0.95	0.89	0.88	1.00	1.00	0.78	0.99	1.03	1.01
1975	0.97	1.05	0.96	0.98	1.05	1.00	0.90	0.90	1.06	1.00	0.81	1.06	1.04	1.02
1976	0.99	1.10	0.96	0.97	1.10	0.99	0.88	0.87	1.01	1.03	0.85	1.08	1.06	1.02
1977	1.00	1.18	1.04	1.06	1.18	0.92	0.70	0.63	0.95	1.10	0.56	0.86	1.14	1.10
1978	1.06	1.29	1.14	1.16	1.29	1.04	0.75	0.72	0.99	1.21	0.65	0.99	1.25	1.20
1979	1.01	1.37	1.21	1.22	1.37	0.95	0.69	0.65	0.94	1.18	0.59	0.91	1.32	1.27
1980	0.98	1.42	1.25	1.27	1.42	0.97	0.75	0.70	1.03	1.13	0.66	0.99	1.32	1.32
1981	1.03	1.51	1.34	1.36	1.51	1.02	0.76	0.74	1.06	1.19	0.72	1.02	1.41	1.41
1982	1.08	1.57	1.39	1.41	1.57	1.06	0.75	0.77	1.06	1.25	0.73	1.03	1.47	1.46
1983	1.07	1.58	1.40	1.44	1.60	1.03	0.67	0.77	1.06	1.29	0.69	1.07	1.49	1.48
1984	1.03	1.68	1.48	1.53	1.70	1.00	0.61	0.75	0.99	1.32	0.63	1.00	1.58	1.57
1985	1.03	1.70	1.50	1.55	1.73	0.97	0.58	0.72	1.00	1.31	0.56	1.01	1.60	1.59
1986	1.08	1.81	1.59	1.64	1.83	1.00	0.59	0.75	1.00	1.36	0.67	1.04	1.69	1.69
1987	1.08	1.78	1.57	1.61	1.80	0.91	0.58	0.72	1.05	1.24	0.65	1.02	1.54	1.66
1988	1.17	1.92	1.75	1.71	1.94	0.93	0.60	0.74	1.12	1.29	0.63	1.04	1.60	1.80
1989	1.20	1.95	1.80	1.74	1.98	0.94	0.56	0.73	1.13	1.34	0.67	1.06	1.67	1.84
1990	1.28	2.01	1.93	1.84	2.11	0.96	0.48	0.66	1.16	1.43	0.53	1.04	1.69	1.93
1991	1.34	2.10	1.98	1.87	2.13	0.97	0.52	0.68	1.20	1.49	0.70	1.11	1.83	1.98
1992	1.39	2.30	2.02	1.90	2.30	0.98	0.52	0.68	1.24	1.53	0.80	1.14	1.91	2.05
1993	1.45	2.43	2.21	1.99	2.42	1.02	0.54	0.71	1.29	1.59	0.74	1.21	2.00	2.17
1994	1.51	2.45	2.22	2.05	2.45	1.07	0.59	0.74	1.40	1.63	0.77	1.26	2.06	2.21
1995	1.54	2.54	2.30	2.11	2.54	1.11	0.59	0.77	1.40	1.66	0.79	1.30	2.14	2.27
1996	1.55	2.56	2.32	2.10	2.57	1.13	0.56	0.78	1.38	1.66	0.84	1.31	2.12	2.28
1997	1.53	2.62	2.44	2.14	2.62	1.14	0.60	0.79	1.43	1.61	0.88	1.29	2.11	2.34

The numbers represent cumulative change in technology since the base period.

Source: Leetmaa, et al., (2000).

U.S. and EU Consumption Comparisons

Lorraine Mitchell

Consumers in the EU and the United States are sometimes regarded as being very different. In his 1976 book *The Joyless Economy*, Tibor Scitovsky refers to "the greater choosiness of the European buying public", and discusses the many differences in European and U.S. food preferences. However, there are a number of similarities in the consumption trends occurring in the United States and the EU. Food consumption patterns originally came from Europe to the United States, along with immigrant populations, but in recent decades, some food consumption trends have traveled from the United States to the EU, and to the extent that rising incomes drive food trends, higher incomes in the United States mean that the United States will experience food trends ahead of the EU (Connor, 1994). Additionally, both the EU and the United States exhibit variation among regions, although the variability seems to be higher within the EU.

This article examines EU and U.S. food consumption patterns and finds that the percentage of income spent on food and food prices (given income) are somewhat lower in the United States, and there are definitely some differences in EU and U.S. preferences for food characteristics and specific types of food. However, in some cases, the differences among EU countries in food preferences dwarf the differences between the EU and United States. Additionally, the EU and the United States are experiencing similar demographic changes. In both regions, people work more hours, cook less and eat more prepared food, and consolidation is taking place in the food retailing sector.

The first section of the paper discusses prices, expenditures, and income. The second section deals with food availability and consumption patterns, the third discusses preference trends, the fourth discusses demographic trends, and the fifth discusses food retailing.[1]

Prices, Expenditures, and Income

Prices

Many foods are less expensive in the United States than in the wealthier countries of the EU, but food is somewhat more expensive in the United States than in the less wealthy countries of the EU. Both the EU and the United States have much higher food prices than the wealthiest Eastern European countries, with the exception of Slovenia. One problem with comparing purchasing power parity from country to country, or even within the EU or the United States, is that qualitative differences might be difficult to capture. Meat is generally of lower quality in Eastern Europe (Bjornlund et al., 2002). Products available vary within the United States from region to region, and are different from those available in the EU. Thus, some of the price differences might be capturing differences in quality. Table 1-E gives purchasing power parity indices for food prices in the countries considered here. A quantity of bread and cereals items that cost $100 in the United States would cost $156 in Denmark, but only $85 in Portugal, and only $40 in the Czech Republic. Meat costs are higher in most EU countries than in the United States, but are much lower in the Eastern European countries. A quantity of meat costing $100 in the United States would cost $210 in Denmark, but would only cost $73 in Hungary or Poland.

Food prices not only vary between the United States and the EU, but there is remarkable variation within

[1]Gracia and Albisu (2001) use a structure similar to this article and cover a number of the same issues.

Table 1-E—Incomes and food prices

Country	1998 GNP per capita (constant 1995 $US)	Average growth rate of GNP per capita, 1994-98	Bread and cereal price index 1998 (PPP)	Meat Price Index 1998 (PPP)
United States	29,316	2.66	100	100
EU				
Austria	30,841	2.21	114	163
Belgium	29,284	2.36	116	161
Denmark	36,892	3.30	156	210
Finland	27,807	5.23	147	156
France	28,028	2.19	125	157
Germany	30,941	1.65	145	187
Greece	12,111	2.32	104	102
Ireland	19,469	7.78	80	103
Italy	19,363	1.68	101	135
Luxembourg	50,851	1.22	NA	NA
Netherlands	28,344	2.81	106	176
Portugal	11,573	2.82	85	116
Spain	15,405	2.66	89	91
Sweden	26,613	2.34	151	179
United Kingdom	20,214	2.72	90	128
Eastern Europe and Cyprus				
Cyprus	12,942	3.10	---	---
Czech Republic	5,070	1.84	40	78
Estonia	3,889	4.98	47	80
Hungary	4,726	3.25	52	73
Poland	3,833	5.79	50	73
Slovenia	10,717	4.36	71	117

Source: World Bank World Development Indicators, 2000.

the EU and the United States. Using Sweden as a benchmark of 100, the food price index in the EU ranges from 109 in Denmark to 65 in the UK and Portugal, a 68-percent difference (Lennernas et al., 1997). This means that a balanced basket of food, representing the consumption of the average consumer, that costs $65 in the UK, would cost $109 in Denmark. This price variation is mirrored in the United States. A basket of groceries that cost $141.50 in Manhattan would cost $93.30 in Houston, a difference of 52 percent (ACCRA, 1999).

A number of factors contribute to the divergence of food prices. Lipsey and Swedenborg (1993) studied the variation in food prices among OECD countries (the United States, the EU, Japan, Australia, New Zealand, and the non-EU Scandinavian countries[2]) in 1993. The study indicated that differences in income, taxation of food, and protection of agriculture from international competition[3] explained the differences in food prices, and that the importance of those three factors differed for different countries. They also hypothesized that wage patterns might also explain some of the differences. Taxation in the form of value-added taxes (consumption taxes) were very important in explaining the high prices in Denmark and Sweden, while in Finland, taxation and agricultural protection were equally important. These results suggest that income might explain the differences in prices among many countries in table 1-E, while differences in agricultural protection, consumption taxes, and wage patterns could explain part of the reason why the United States has lower food prices than EU countries with comparable incomes.

[2]Sweden was not an EU member in 1993.

[3]Protection that increases agricultural prices can include market price support, where the government sets a price for a product higher than the world price, and then enforces the price by placing tariffs on cheaper imports.

Expenditures and Income

Differences in food prices and incomes lead to some differences in the percentage of household expenditures spent on food. Food prices are lower in the United States, and incomes are high relative to some EU countries. Thus, in 1997, U.S. consumers spent only 13.8 percent of household expenditures on food (Bureau of Labor Statistics, 1998). For the EU as a whole, for 1997, food consumption was 17.4 percent of household expenditure, ranging from 13.9 percent in Germany to 30.5 percent in Ireland, and 36 percent in Eastern Europe (European Commission, 2000, Josling and Tangerman, 1998).[4] This higher percentage of expenditures stems partly from the higher prices in the EU, which explains why expenditure shares are slightly higher in some of the wealthiest countries of the EU than in the United States. In some EU countries, like Greece and Portugal, and in Eastern Europe, expenditure shares are much higher, even though prices are on par with the United States. In these countries, incomes are much lower, so that despite relatively low food prices, food is a more prominent component of household expenditures. Additionally, regional differences in diet might mean that the preferences of some EU countries are more expensive than the preferences of another (Meade and Rosen, 1997). In such a case, if two countries have the same income but one prefers a diet that includes more expensive items, including prepared foods and high-quality foods, that country's food expenditures might be higher.

The United States has some variation in the percentage of income spent on food, but not nearly as much as the variation across the EU. In 1999, the national average spent on food was 13.6 percent of household expenditure, but was only 12.9 percent in the Western States, while residents of the Northeast spent 14.3 percent of their household expenditures on food (BLS, 1999). Interestingly, Northeastern States have the highest incomes, while Western States have the second highest incomes.

Food expenditure as a share of income is falling in both the United States and the EU, as incomes rise and food prices fall relative to other goods. Engel's Law states that the income share of food expenditure falls, as incomes rise, since consumers don't tend to increase their food intake very drastically. For EU countries, the proportion of food expenditure in total income declined during the 70s and 80s. Food expenditure as a percentage of total household expenditure declined in the United States as well, but not very quickly, dropping from 15 percent of household expenditure in 1984.

Changes in food prices will have greater effects on countries where food is a greater share of the budget. Consumers in the EU can be expected to be more sensitive to changes in food prices than U.S. consumers, with the countries about to join the EU the most sensitive, and those wealthy EU countries only slightly more sensitive than the United States.

Policy implications

Many differences in prices and shares of income spent on food are the result of different income levels among and within countries, and, therefore, policy differences matter relatively little. However, some price differences could be the result of differences in agricultural protection and consumption taxation, as well as differences in wage structures and marketing. Food prices are often a composite of the prices of many different inputs, including commodities, distribution and transportation, marketing services, and processing costs (see McCorriston, 2002). Further research will be necessary to understand the source of all of these differences.

Patterns of Food Availability And Consumption

Food availability, described below, and consumption patterns vary substantially across the EU and also differ from those of their U.S. counterparts. Mediterranean countries, far Northern European countries, and Eastern European countries all have distinct dietary patterns. While the United States does not differ markedly from the EU in some respects, consumption of a few key commodities is substantially higher in the United States.

FAO food balance sheets (1999) can shed some light on differences in food consumption among countries. These data provide food availability, a measure of the per capita supply of foodstuffs available after imports, exports, and processing needs have been added in, and these data are reflected in table 2-E. These figures don't reflect actual consumption, but they give a general picture of food available to consumers in each country. Food availability patterns taken from the FAO

[4]Some sources state that food is between 30 and 35 percent of income for Eastern European countries.

Table 2-E—Food availability by country

Country	Food availability per capita (in kg)						
	Cereals	Starchy roots	Sugar & sweeteners	Oil crops	Vegetable oils	Vegetables	Fruits
Mediterranean							
Greece	150.8	71.4	32.0	13.5	27.7	281.5	175.2
Italy	160.3	39.4	31.7	3.1	26.2	178.9	134.2
Portugal	129.3	129.7	35.1	2.5	16.5	188.3	132.9
Spain	99.6	87.0	31.0	5.9	27.3	163.4	114.6
Far Northern Europe							
Finland	97.5	70.2	40.2	1.4	11.1	70.8	85.5
Sweden	102.4	52.5	44.6	2.4	18.2	78.1	107.2
Austria	114.2	66.4	46.8	3.4	16.2	99.3	110.1
Belgium (LUX)	107.5	107.4	50.1	2.8	22.8	148.2	110.5
Denmark	115.5	72.0	56.5	1.5	6.7	103.5	105.2
France	114.4	67.2	41.0	2.7	16.5	125.2	89.1
Germany	99.8	77.5	42.5	3.2	17.7	73.7	111.7
Ireland	129.7	127.4	48.1	3.2	14.2	73.1	69.3
Netherlands	73.7	83.7	46.9	2.9	15.6	87.7	135.3
United Kingdom	107.2	110.5	38.1	3.8	18.4	88.6	85.5
EU (15)	114.7	78.2	39.0	3.7	19.9	122.4	110.1
USA	113.7	64.2	74.2	6.0	24.0	134.2	108.6
Cyprus	114.8	37.1	46.1	9.9	15.9	178.6	163.7
Czech Rep	121.9	78.9	46.3	3.9	17.1	81.8	73.4
Estonia	178.1	150.3	22.0	0.5	7.4	68.0	70.3
Hungary	111.0	70.0	58.0	1.6	15.6	105.6	71.9
Poland	151.5	137.3	43.1	1.3	12.8	126.4	53.3
Slovenia	135.0	57.0	17.9	0.8	11.4	98.0	94.8

Country	Food availability per capita (in kg)						
	Alcohol	Meat	Offal	Animal fats	Milk	Eggs	Fish, seafood
Mediterranean							
Greece	63.0	85.5	4.1	3.5	257.1	10.3	26.7
Italy	79.1	91.3	3.9	10.4	260.5	12.9	23.5
Portugal	128.1	92.8	6.2	12.1	206.5	9.3	58.1
Spain	108.2	113.1	4.2	3.9	164.5	13.9	40.9
Far Northern Europe							
Finland	94.7	67.3	1.9	11.4	373.6	9.3	35.6
Sweden	74.6	72.4	1.5	17.3	345.4	11.6	27.5
Austria	151.5	90.9	1.3	18.7	279.2	13.0	14.1
Belgium (LUX)	125.3	84.0	7.8	26.2	219.0	14.4	20.2
Denmark	153.1	112.4	1.0	27.6	199.2	14.7	24.4
France	105.1	99.9	9.9	19.0	265.2	16.0	28.7
Germany	151.2	85.3	4.2	22.3	239.1	12.2	14.6
Ireland	158.5	99.4	19.6	17.8	263.1	6.9	15.4
Netherlands	98.5	85.9	2.3	9.4	364.1	16.1	15.9
United Kingdom	118.6	76.3	2.3	8.3	233.2	9.2	22.1
EU (15)	114.7	90.3	4.8	14.3	246.8	12.6	24.6
USA	101.8	124.0	1.0	6.7	256.0	14.5	20.3
Cyprus	62.4	117.6	4.1	5.2	194.7	11.2	23.0
Czech Rep	175.2	81.3	5.0	9.5	202.9	16.4	11.5
Estonia	56.3	57.6	3.0	7.6	202.7	11.4	19.7
Hungary	109.0	84.3	2.6	22.0	169.5	15.7	4.7
Poland	77.3	70.2	2.7	13.4	189.3	10.5	14.1
Slovenia	116.6	96.2	6.6	17.4	252.4	10.4	6.7

Source: FAO Food Balance Sheets, 1999.

balance sheets indicate that consumption patterns still differ from country to country, sometimes probably due to regional cost differences or income differences, but sometimes with few discernable patterns.

Southern European countries have different patterns of food availability than other EU countries or the United States. The fact that there is a distinctive "Mediterranean Diet", with an emphasis on grains, fruits, vegetables, olive oil, cheese, yogurt, and fish, and with little red meat or sweeteners, has been recognized by nutritionists, and some research suggests that the diet can contribute to reductions in heart disease (NAL, 2002; Gracia and Albisu, 2001). Some of those food patterns attributed to Mediterranean diets are reflected by the food availability data in table 2-E, although the patterns are not completely uniform across all Mediterranean countries. Compared with the other countries examined, southern European countries--Greece, Italy, Spain, and Portugal--exhibit high availability of vegetables. They are the lowest consumers of sweeteners in the EU, although not that far below the average. Spain and Portugal have very high availabilities of fish, and Italy and Greece have high availabilities of cereals and fruits compared with the EU average. Italy, Spain, and Greece have the highest availability of vegetable oils, probably due to high production and consumption levels of olive oil. Other studies confirm these observations. The European Economic Digest (1998) confirms that Spain and Portugal consume large amounts of fish, and Gil et al. (1995), suggest that historically, little meat has been eaten in Mediterranean countries.

There is some evidence that changes are taking place in the Mediterranean diet. Gil et al. (1995) indicate that animal calorie consumption increased and then fell on average in EU countries from 1970-1990. In the 1970s 19 percent of consumption in Mediterranean countries came from animal products, compared with 30 percent in other countries, while the 1990 average was 34 percent of total consumption (Gil et al., 1995). Meat consumption in Mediterranean countries has risen since the 1980s (FAO, 1999, 1998b; Gracia and Albisu, 2001), and the food balance sheets for 1999 indicate that meat consumption is now somewhat high compared with the rest of Europe for a number of Mediterranean countries. Fruit and vegetable consumption is decreasing in the Mediterranean countries (Gracia and Albisu, 2001). Some of these changes may be driven by rising income.

Two of the Far Northern European countries, Sweden and Finland,[5] have a distinctive diet as well. These countries have low availabilities of vegetables and meat, and high availability of milk. Their availability of cereals and fruit is below the EU average, and fish availability is above the average, although availability in these food categories differs from the average by 20 percent or less. This is supported by other research. Northern European countries have high proportions of calories from animal fat, milk, dairy, and sugar (Gil et al., 1995). Consumers in Finland purchase more meat products and fewer grain products than other OECD countries (Herrmann and Roder, 1995). Historically, the Scandinavian countries have not traditionally had the climate or land necessary to grow vegetables or fruits cheaply, so that traditional diets might incorporate fewer of those products, and relative prices will be higher due to the need to transport such foods.

Change seems to be taking place in these countries as well. As noted above, in many categories, Sweden and Finland differ from the EU average, but not by large amounts. The FAO data conflict somewhat with other research, which suggests that Scandinavia is the biggest consumer of bread and pasta (EED, 1998). In Finland, vegetable consumption has risen, and grain and potato consumption have fallen (Finnish National Public Health Inst., 1999). In Finland, meat consumption has decreased over the last decade, and fish and dairy consumption have decreased in both countries (Gracia and Albisu, 2001).

Many of the Eastern European countries are on the high end of cereal consumption, and many have a relatively low availability of fruit, fish, and milk. Meat consumption is on the low end, and cereal consumption is high, although availability for both categories is within 20 percent of the EU average. Across the countries examined, table 2-E suggests an inverse correlation between cereal availability and income, and a positive correlation between milk availability and income, so that some of these differences could be due to lower income in Eastern Europe. The fish availability could reflect either low incomes and/or low access to the sea in those countries. Other researchers have found that Eastern Europeans eat more canned foods, more rice and pasta, more chicken, and more spicy food (FAS, 1996a).

[5]Interestingly, Denmark, also a Northern Scandinavian country, does not have the same dietary pattern.

The United States has markedly more meat and sugar and sweetener availability than its EU or Eastern European counterparts, as indicated by table 2-E. Other researchers have found that beef and poultry consumption is higher in the United States than in the EU (Connor, 1994). This finding is probably due to the low prices of meat in the United States relative to the price of other foods. Meat consumption has risen in the 90s, mostly due to an increase in poultry consumption (Putnam, 2000). The United States also falls on the low side of animal fat availability, with an availability that is 50 percent lower than the EU average.[6] Only Cyprus and Greece, two major olive-producing states, exceed the United States in oil crop supply per capita. In other categories, the United States falls in the middle of the distribution of selected countries with respect to cereals, fish, milk, fruit, and vegetable availability, and is within 20 percent of the EU average availability for these food categories. Compared with countries with similar per capita incomes,[7] the United States is again very high in meat and sugar consumption, and is among the higher consumers of oil crops, vegetable oil, and vegetable consumption.

A number of studies have considered whether European diets are converging and becoming more similar, as incomes rise and trade in food products occurs. One study finds that convergence has occurred in animal calories, cereals, pulses, fruits, and vegetables, while no convergence has occurred in proportion of calories from meat, fish, and eggs (Gil et al., 1995). However, another study found that wine and meat consumption converge for OECD countries (Herrmann and Roder, 95). Gracia and Albisu suggest that there is a great deal of evidence to support convergence, but European countries still have dietary differences (2001).

Over time, the Eastern European diet is also undergoing some changes. Eastern European diets differ rather substantially from those of the EU, probably due to income and relative price differences. Ellsner and Hartmann (1998), looking at a number of Eastern European countries between 1988 and 1995, including Hungary, Poland, the Czech Republic, and Estonia, find that the Estonian diet is clearly converging with that of the EU, and the structure of food consumption in the Czech Republic is converging with that of the EU. The results are more mixed for Poland and Hungary, possibly because they were more similar to the EU with respect to diet at the beginning of the period in question. Eastern European countries also experienced a decline in calorie intake between 1988 and 1995, as incomes fell and prices rose. These results have implications for trade. Ellsner and Hartmann also find that intra-industry trade, i.e., trade in similar products, has increased between the EU and Poland and Hungary, despite the fact that incomes in Poland and Hungary fell. This suggests that the countries are developing similar preferences beyond those that would be influenced by changes in income.

The evidence cited above indicates that while European diets are changing and even converging in most countries of the EU, significant differences still remain. EU and U.S. diets differ substantially with respect to meat and sugar consumption, but in other food categories, differences among EU countries are sometimes greater than differences between EU countries and the United States. Differences in consumption patterns have a number of implications for trade between the United States and the EU. Markets with different dietary composition will have different demand curves for a given product.

Why do consumption patterns differ among countries? Differences in expenditure on different types of foods can usually be explained by differences in income and prices (Connor, 1994). Taste differences can be the result of differences in geography, which makes the production of some goods easier in particular countries (Gracia and Albisu, 2001). This results in lower prices for that good, and in its incorporation into the traditional diet. Additionally, lower income countries will consume relatively fewer high-cost goods, like meat and fish. However, the explanatory power of prices and income declines, as a society grows wealthier, and food becomes a smaller share of income (Connor, 1994; Herrmann and Roder, 1995; Ellsner and Hartmann, 1998). We would therefore expect that consumption patterns would reflect relative price differences in countries, but the wealthier the country, the looser the relationship between prices and consumption.

So if prices and incomes are becoming relatively less important in explaining dietary differences and dietary convergence, what other explanatory factors can we find? Changes and differences in tastes, information,

[6]Gracia and Albisu (2001) note that many countries in the EU are moving away from animal fats and toward vegetable fats.

[7]Austria, Belgium, Finland, France, Germany, and the Netherlands.

and demographics all contribute to dietary patterns in different ways. These will be discussed in the next two sections.

Preference Trends

As consumers gain affluence, their attention turns from having enough food, to the quality of food they eat. Consumers in wealthy, industrialized nations are becoming more concerned about healthy diets. Additionally, consumers are becoming more concerned about food safety, like pathogens and disease risks. Finally, consumers are becoming more concerned about the production methods of the foods they eat, particularly the consequences for the environment and animal welfare. While both the EU and the United States are experiencing these trends, some specific concerns are more prevalent in the EU.

Health

Both U.S. and EU consumers are trying to improve the quality of their diets in ways that will improve their health. Evidence, however, indicates that both regions are struggling with these attempts.

Both the United States and EU are reducing fat consumption (Connor, 1994). Putman and Gerrior (1999) note that fat consumption in the United States began to fall during the 90s, although this occurred after two decades of increasing fat consumption. Several individual countries report evidence of increasing consumption of individual foods that are lower in fat than their traditional counterparts (see Finnish National Public Health Inst., 1999; FAS, 1996b). In the United States, cholesterol consumption has been decreasing, and for a large percentage of the population, it is within recommended levels (Kennedy et al., 1997). Egg consumption has fallen in Europe due to cholesterol concerns (Gracia and Albisu, 2001). However, U.S. fat and sugar consumption are still substantially higher than the recommended USDA guidelines, and consumption of added sugar and other sweeteners has risen throughout the 1990s (Kantor, 1997; Putnam et al. 1997; Putnam, 2000). In the EU, most member states, with the exception of Portugal and Ireland, report diets with greater than 35 percent of calories from fat, and the percentage of total energy from fat actually rose very slightly between 1996 and 1998.

In addition to reducing their intake of foods that can damage health, consumers in wealthy countries are trying to increase their intake of foods linked to disease reduction, but are not yet consuming recommended amounts. In the United States, fruit, vegetable, and grain consumption have risen over the last 30 years, but fruit consumption was substantially lower than USDA guidelines recommend (Putnam and Gerior, 1999; Kantor, 1999). In the EU, fruit and vegetable intake varies substantially, and in many countries is inadequate (Byrne, 2001). It has increased over time, however (Gracia and Albisu, 2001). In half of the EU member states, the average fruit and vegetable consumption is less than 70 percent of the World Health Organization's recommended value (Robertson and Knai, 2000).

Improvements in diet have not been adequate to improve all health indicators. Studies in both the United States and the UK report that obesity is rising, and the EU reports increases in obesity as well. Both the UK's National Accounting Office study and the U.S. Center for Disease Control attributed this trend to high fat diets, exacerbated by the increase in fast food intake, and sedentary lifestyles. The EU reports that there is variation in the prevalence and increases in obesity across member nations (European Commission, 2000). There is also some moderate variation in obesity among regions in the United States.

Why is it that consumers in both regions are trying to improve their diets, but struggle? As more and more research indicates that diet is one of the determinants of risk for heart disease and cancer, two of the leading causes of death in the United States, governments are encouraging consumers to reduce cholesterol and fat intakes. Additionally, education and income are related to diet in both the EU and the United States, with better educated and higher income consumers making choices to eat more fruits and vegetables and less fat, and making more conscious choices about the health consequences of diet (Lennernas et al., 1997; Kennedy et al., 1997; Connor, 1994; Robertson and Knai, 2000). Thus as education and income levels rise, we might expect more pursuit of a healthy diet in both the United States and EU. However, the more sedentary lifestyles that accompany wealth are contributing to obesity in some countries. Some scholars suggest that the increasing tendency for U.S. and EU consumers to eat out, especially when they purchase fast food, can contribute to a less healthful diet (NAO, 2001). Indeed, in 1995, Americans consumed 34-38 percent of the fat, sodium, and cholesterol in their diet away from home, while they consumed 27-29 percent of minerals and

fiber away from home (Lin et al., 1999). These opposing forces mean that consumers are both gaining and losing ground in the quest for better health.

Food safety

Food safety concerns, mostly concerns about contaminants and pathogens in food, are changing consumers' purchasing behavior. Fear of the disease Bovine Spongiform Encephalopathy (BSE) or mad cow disease has drastically reduced beef consumption in the EU, with total consumption for 2001 expected to be 10 percent below the previous year (FAS, Market Circular, 2001; Gracia and Albisu, 2001; Thompson, 2001). Other crises, like dioxin in chicken feed in 1999 or foot and mouth disease[8] in the UK have led to sudden changes in consumption patterns, as manufacturers pull some foods, or consumers reject them, while consumers stock up on substitutes. Some food scares have led to large fluctuations in the supply and/or demand for various food products. In the United States, food scares have been more isolated, and have had smaller market impacts. More recently, concerns about Starlink corn resulted in some corn products being pulled from the shelves.

Smaller effects in the United States might be related to confidence in regulation of the food supply. In a 1995 survey of American consumers, 52.3 percent indicated that they trusted food safety information from government publications (Buzby and Ready, 1996). The September 1999 Gallup poll indicated that 61 percent of Americans place "a fair amount" and 15 percent place "a great deal" of confidence in the Federal Government to ensure the safety of the food supply. European results are more mixed. Recent crises have reduced consumer confidence (Gracia and Albisu, 2001). When asked what factor that gave them certainty about a food's safety, 66 percent of consumers reported "national controls"[9] to be a factor (Eurobarometer 49, 1998). More chose national controls than any other determinant. However, when asked whether various institutions tell the whole truth, part of the truth, or none of the truth about food safety, 52 percent of European consumers chose the whole truth for consumer associations, while only 26 percent chose that option for government authorities (Eurobarometer 49, 1998).

[8]The concern about foot and mouth disease occurred in spite of the fact that humans generally don't contract the disease.

[9]As opposed to "European controls" or "controls undertaken by large retailers such as wholesalers and supermarkets".

Production process preferences

Consumers are becoming increasingly concerned about not just the characteristics of the food they eat, but also the production processes used to make their food. In these cases, firms need to communicate information about the production process to the consumer, since the consumer cannot personally verify which production process manufactured their food. Comparisons across countries are rendered somewhat difficult by the fact that there are no international or even domestic standards for defining some production processes, while for others, like organic production, some international standards exist. If the desired production process is more costly, consumers might need to pay a premium to get the products they desire.

There are indications that EU consumers are, in some instances, willing to pay the extra expense of food produced with techniques that are perceived to be friendlier to animals. Bennett (1997), in a survey of British consumers, finds that consumers would be willing to pay 6-30 percent more for eggs, if such an increase were the result of a ban on battery cages, towers of small cages used to house individual hens. Since surveys don't require that consumers spend money, actual market behavior is more indicative of willingness to pay for certain traits. In Denmark, eggs from non-caged hens have a 40-percent market share, in France, free-range eggs have a 6-7 percent market share, and a 15-percent market share in the UK. (Sorensen and Kjaer, FAS, 2000d; British Egg Information Service, 2001). In a survey done by the Market & Opinion Research International (MORI) in 1995, 67 percent of U.K. consumers surveyed indicated that they had purchased free-range eggs or chickens in the previous year. However, in some countries, like Spain and Italy, little free-range egg production exists (Int'l. Egg Commission, 1999; Blandford et al., 2000).

Some evidence indicates that U.S. consumers are willing to pay more for products that they perceive to provide greater animal welfare, but this trend is not nearly as pronounced in the United States as it is in the EU. Bennett and Larson, in a 1996 survey of U.S. college students, find that students were willing to pay 18 percent over market price for free-range eggs and willing to pay taxes of about $8.00 per person to fund practices that they believe will improve conditions for veal calves and hens. However, the share of free-range animal products is much smaller in the United States than it is in the EU.

Organic food is also growing in popularity in the United States and the EU. Table 3-E indicates the average share of agricultural land and food sales held by organic products in various countries. In the individual countries of the EU, anywhere from 1 to 9 percent of agricultural land is farmed organically. Organic food sales represent 0.5 to 3 percent of total food sales, attaining that share of the market only in the wealthiest countries in the EU and in the United States. Some consumers believe that eating organic food will improve their health, and others believe that organic production improves the environment and reduces pollution.

The higher costs of organic production mean that organic products are more expensive than conventionally grown products. Some consumers are willing to pay these premia. Seventy-five percent of Danish consumers had purchased organic goods in the last 6 months. An FAO study (2001) looked at a number of countries, including nine EU countries and the United States. The premia for organic products in the EU varied a great deal, depending on the product and country. Denmark maintains low premia for organics, while other countries average 20-30 percent, and still other countries exhibit wide variation (from 15-150 percent) in the size of organic price premia, depending on the product. In the United States, the premia were also quite variable depending on the product and had similar values to those of several EU countries, ranging from 11 to 121 percent. Such willingness to pay could result in robust markets, but only if the consumers are willing to pay enough to cover increased production costs.

Organic production is rising in many countries, as is the consumption of organic products, despite the high prices. Organic sales rose by 40 percent in the UK from 1998 to 1999. Estimates by the International Trade Commission in 1997 suggested that sales of organic foods would grow by 5-10 percent in Germany, 20-30 percent in the United States, and 30-40 percent in Denmark (Greene, 2000). In some countries, however, like Portugal, much of the organic production is exported.

Many consumers are paying close attention to production processes for foods engineered with biotechnology. Some consumers in both the United States and the EU have voiced concerns about environmental and unknown risks of cultivating and consuming genetically engineered foods. Opinion polls in the United States and EU vary substantially in their results,

Table 3-E—Organic production and consumption

Country	Percent of agricultural land farmed organically	Organic products share of total food sales	Organic share of other food products
United States	.01 (1997)	1-2 (1997)	
Austria	9	3	
Belgium			
Denmark	5.5	3	Milk - 22 percent, Eggs - 13, Oat grains - 18, Beef - 2
Finland	5.8	2	Vegetables - 3.6, Milk 0.8
France	1.1	0.5	
Germany	2.5		
Greece	0.5		
Ireland	0.7		
Italy	5.3	1.5	
Luxembourg	0.8		
Netherlands	1.17		
Portugal	1.3		
Spain	1.5		
Sweden	6.25		Vegetables - 3, Milk - 3, Pork - 0.2
United Kingdom	1.2	1	
Slovenia	0.38		
Poland	0.03		
Estonia	1		
Czech Republic	2.5		

Sources: organic-europe.net; *Agricultural Outlook*, 2000.

depending on the questions asked. Some opinion polls that ask the same questions of consumers in the EU and the United States indicate that EU consumers are more concerned than U.S. consumers (*Environics*, 1999, *The Economist*, 2000). A later Angus Reid poll indicates that there are differences on some issues but not on others. As noted above, actual market behavior sometimes gives a more accurate picture of consumer preferences. In both the EU and the United States, some demand for foods that are free of biotech ingredients exists. In the United States, fewer such foods exist, and are generally sold by smaller, "natural foods" stores, although 100 percent organic products do not contain biotech ingredients. By contrast, in the EU, food containing biotech ingredients must be labeled, and most large supermarket chains have attempted to eliminate biotech ingredients from their food products.

Additional trends in taste

Vegetarianism is on the rise in some countries. Vegetarians adopt the diet for many reasons, which might include a desire to reduce cholesterol in the diet, ethical concerns about eating animals, or even a desire to reduce food spending. Finding a strict definition of vegetarian is difficult, and some vegetarians still eat meat of one kind or another. However, consumers in wealthy countries are trying to eat less meat. In the UK, 7 percent of the population consider themselves vegetarians, an increase over the last 5 years, and many are cutting red meat consumption, particularly as high-quality meat substitutes are available (FAS, 2000b). In France, vegetarian foods have a 2-percent market share, which is rising (FAS, 1999a).

Affluent countries generally experience the most concern about food quality, and the United States and the EU, not surprisingly, demonstrate this fact. Not only is the concern about being able to obtain adequate food quantity less acute in wealthy countries, but consumers are also more willing to pay what it takes to get a variety of products. If all products are the same, firms can take advantage of economies of scale, and produce products for lower costs. If consumers instead want small quantities of a wide variety of products, free-range chicken vs. organic chicken vs. soy-based faux chicken, firms will be smaller, and incur slightly higher costs.[10]

[10]Anderson and De Palma (2000) find that in some special cases, competition among differentiated products can lead to lower prices.

The taste for variety also stems from a number of other developments. Behrman and Deolalikar (1999) find that taste for variety generally rises with income. As transport costs fall, consumers find that they can now purchase goods from a variety of firms, some of whom are now farther away, and higher population densities mean that more varieties of goods can be supported (Anderson and De Palma, 2000).

Effects of preference trends

These trends can have an effect on food expenditures. As noted above, consumers spend a smaller percentage of their income on food as income rises, yet they also are willing to purchase different foods, higher quality food, and more varieties of food as income rises. Since these latter trends usually involve spending more per calorie, the effect of Engel's Law is dampened. However, we can observe from the data presented in the first section that the decline of expenditure shares of food with higher incomes outweighs consumers' tendency to purchase more expensive food as income rises.

These trends can also help to explain similarities and differences in diets. As consumers become more concerned about their health and as vegetarianism becomes more popular, countries that ate relatively fewer fruits and vegetables might increase their intake, as Gracia and Albisu (2001) suggest. Increasing taste for variety, coupled with trade, can lead to greater dietary similarity. These factors could help to explain some of the dietary similarities among EU countries and between the United States and EU.

Policy implications

These changes in preference trends have a number of policy implications. The EU and the United States already regulate food safety aggressively. Foodborne illnesses still occur, however, and both the United States and the EU find that they need to respond to periodic food safety crises. Responding effectively is a paramount consideration in order to preserve the health of the population and to maintain the confidence of the public in the food supply.

Additionally, as consumers begin demanding more information from producers on the products they purchase, governments could have a role to play in making certain that the information that firms pass on to consumers is correct and not misleading, particularly as some of the characteristics that consumers

value, like production processes, are difficult for them to observe.

These roles of government have varying effects on trade between the United States and the EU. On the one hand, differences in food safety regulations, differences in standards for defining production processes, for instance, different definitions of "organic", or differences in desires for product characteristics among countries, can disrupt international trade flows. The United States and EU have had very vocal trade disputes over food produced with biotechnology, beef produced with growth hormones, and a number of other products. In other cases, countries have found ways to get around trade disputes, for instance by having firms in many countries adhere to third-party definitions of the term "organic".

Additionally, when consumers develop a taste for variety, they frequently import more goods. If firms only supply the domestic market, differentiated products can be more costly than homogeneous ones, as noted above. If, however, firms can supply foreign markets as well, they can take advantage of economies of scale and reduce production cost per unit. However, when foreign competitors export to the domestic market, this increases competition domestically (Bernhofen, 2001).

Demographic Trends

A number of demographic trends are also altering food consumption in the EU and the United States. These include the age and composition of the population, and the tendency to have two-income households with proportionate reductions in time spent on meal preparation.

Both regions have small households and aging populations. The United States and the EU are experiencing declining birth rates. In the United States, fertility fell from 3.0 births per woman in 1980 to between 2 and 2.1 in the 1990s, which leaves the United States just slightly below replacement level. EU fertility has dropped from 2.59 children per adult woman in 1960 to 1.45 in 1998, and all countries of the EU have fertility rates below replacement level (European Commission, 2000; Lutz, 1999). The EU experiences less immigration than the United States, so the effect of declining birthrates will have a greater effect on population growth. The percentage of people living in single-person households in the EU went from about 8 percent in 1981 to 11 percent in 1998, while in the United States, the percentage was higher (25.6 percent), but had grown much less (from 24.6 percent in 1990) (Eurostat, 2000; Statistical Abstract of the United States, 2001). Average household size in the EU in 1998 was about 2.5 people and for the United States in 2000, it was 2.59. (Eurostat, 2000; U.S. Census, 2001). Again, variation exists, with larger household sizes for the Mediterranean states and Ireland, and smaller sizes for the Nordic states (while birthrates reflect the opposite pattern) (Eurostat, 2000). In the United States, household size also varies by State (U.S. Census, 2000). Interestingly, smaller households lead to greater food expenditures per capita because economies of scale are lost (Connor, 1994). Single people tend to eat more prepared food and eat away from home more often (Gracia and Albisu, 2001).

Aging populations also bring demographic changes. The proportion of the population under 15 decreased slightly in the EU and was steady in the United States from 1988 to 1997. The percent of the population over 65 rose from 14.2 percent to 15.8 percent in the EU, and in the United States, it rose from 12.7 to 13.2 percent (Eurostat, 1998). Changes in the age mix of populations can alter the allocation of consumption across different foods. Gracia and Albisu (2001) note that the population in the EU is aging, and that older consumers are more likely to stick to eating trends of the past, like eating at home and avoiding new food products. An aging population might have a higher demand for dietary supplements (Bernstein, 1997).

New foods from non-European cultures, already very popular in the United States as new waves of immigration introduce new products into the market, are becoming very popular in the EU as immigration increases there (Connor, 1994; Gracia and Albisu, 2001). Immigration is fueling new tastes in food, and ethnic food sales are rising in the UK and Germany, while Italy has experienced increased demand for non-Italian foods (FAS, 1996d, 1999b, 2000a).

Women are entering the work force in increasing numbers in both the EU and the United States. In many Scandinavian countries, women constitute more than 45 percent of the labor force (Eurostat 2000; FAS, 1996c 1996b, 1996f; Finnish National Public Health Inst., 1999). In other countries of the EU the same trend is occurring, and women's employment share in the EU has risen from 39 percent in 1986 to 42 percent in 1998, again with variation across coun-

tries. In the United States, the women's share of the labor force is slightly higher and rises more slowly, moving from 45 to 46 percent between 1988 and 1998 (BLS, 1999/2000).

Two-income families eat out more (Connor, 1994; Gracia and Albisu, 2001). The United States spends a larger proportion of its food budget on food eaten outside the home than does the EU. In the United States, only 60 percent of food expenditures in 1997 was for food prepared at home, a decrease over previous years, compared with 73 percent in the UK in 1998 and 74 percent in Spain in 1997 (Lin et al., 1999; FAS, 1998b 2000b). In both the United States and the EU, the proportion spent on food away from home is rising, and the United States, the UK, and Germany have experienced a large increase in dining out (Lin et al., 1999; FAS, 1996i; FAS, 2000b; Gracia and Albisu, 2001). In addition to the increase in dual-earner families, some particular cultural arrangements also support the trend toward eating away from home. In Finland, all children eat lunch provided by their school, so institutional systems provide a significant number of meals (Finnish National Public Health Inst., 1999).

Two-income families also tend to eat more convenience foods and spend less time cooking, as no one member of the family spends a large portion of the day on meal preparation. More women in the work force have led to increasing use of convenience foods in Europe, and processed food consumption has grown rapidly (Gracia and Albisu, 2001). In France, time spent on meal preparation went from 1 hour to 30 minutes, and meal times have fallen drastically since the 1960s (FAS, 2000a). Ownership of microwaves is higher in North America than in Europe (Connor, 1994). It can be rather difficult for smaller European dwellings to incorporate space for large freezers and microwaves (Gracia and Albisu, 2001). However, the consumption of frozen meals and microwave ownership are rising in the EU. Many EU countries, including some on the lower end of the income scale, report ownership rates for microwaves in excess of 30 percent, and/or an increase in the demand for frozen and convenience foods. (FAS, 1996b, 1996c, 1996d, 1996e, 1996f, 1998b, 2000a, 2000b). Fast food restaurants are on the rise in Greece, Portugal, and Sweden, sometimes taking market share from sit-down restaurants (FAS, 1996e, 1996f, 1997). Mediterranean countries are moving toward more processed foods, and throughout Europe, processed meat consumption as a proportion of total meat consumption is rising (Gracia and Albisu, 2001).

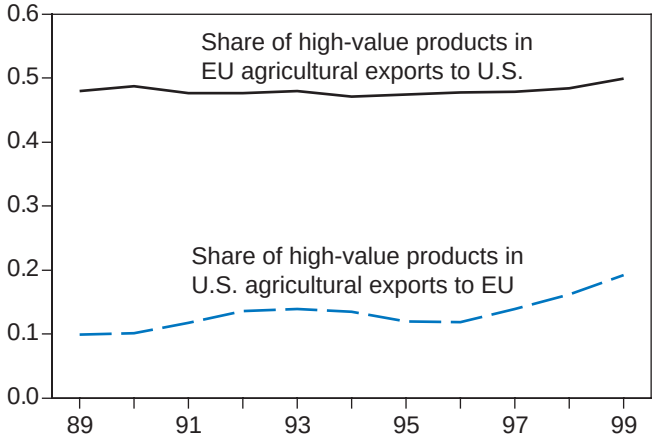
Effects of demographic trends

These changes in demographics have implications for trade in the United States and the EU. The fact that these trends are experienced in both the United States and the EU generally means that products that respond to the demographic changes have been well received in both the EU and United States Tastes for new foods, along with a strong United States economy, are fueling imports in the United States, with imports as a percentage of food consumption rising slightly during the 90s (Putnam and Allshouse, 2001). The demand for high value processed products could also have implications for trade as well. Interestingly, between 1989 and 1999, the share of high-value processed products in U.S. agricultural exports to the EU rose from around 10 percent to around 19 percent (fig. 1-E), perhaps reflecting the increased demand for these products in the EU. The share of high-value products in EU agricultural exports to the United States remained fairly constant, but at a much higher level, hovering between 47 and 50 percent for most of that period.

Food Retailing

Retailers are consolidating in both the United States and the countries in the EU. Once again the consolidation varies from country to country. Table 4-E indicates that level of concentration of the grocery retailing sector in various EU countries. Belgium, Denmark, France, Finland, Germany, Sweden, the Netherlands, and the UK all have very high levels of concentration,

Figure 1-E
High-value export shares



Source: IBAT, 2000 (UN, Economic Research Service).

Table 4-E—Retail consolidation in the grocery sector

Country	Number of retailers	Share (percent)	Market measure	Year
United States	20	48	Grocery store sales	1998
U.S. cities, average	4	69	Supermarket sales	1998
Belgium	4	62	Market	1998
Denmark	5	80	Market	1996
Finland	2	88	Market	1996
France	5	77	Food purchases	1999
Germany	5	62	Sales	1997
Greece	18	60-70	Market	1996
Italy	3	15	Market	1999
Sweden	5	97	Retail sales	1996
United Kingdom	5	48	Wholesales and retail sales, market	1997

Source: FAS Annual Marketing Plans, 1996-98; Kaufman, 2000.

with the top five supermarkets garnering in excess of 60 percent of the retail sales in most cases (see also Gracia and Albisu, 2001; McCorriston, 2002).

The concentration is lower in Southern European and Eastern European countries. Gracia and Albisu (2001) note that consolidation is lower in Southern Europe because it started later. In Italy, the largest three supermarket chains only have 15 percent market share (FAS 1999b), and in Greece, it is the top 18 supermarkets that have 60-70 percent of the market, as opposed to the top four or five (FAS, 1996e). In the Czech Republic, the seven largest chains have only 20 percent of the market (FAS, 1996a).

In the United States, by contrast, the largest 20 grocery retailers have 48 percent of the market in 1998 (Kaufman, 2000). However, the United States is substantially larger than each individual EU country, so regional competition within the United States might be a more accurate comparison with individual EU countries. Data on regional competition in the United States are less readily available, but Kaufman (2000) considers data on competition within large U.S. cities. On average, for a metropolitan area in the United States, the share of sales of the top four supermarket chains in each city was 69 percent, a figure comparable with individual EU countries. As in the EU, there were large variations in the degree of consolidation, with the four top firms holding anywhere from a 29-percent share to a 90-percent share of supermarket sales (Kaufman, 2000).

Consolidation has been on the rise in some countries. The top four retailers in the United States went from a 15-percent market share in 1992 to a 29-percent market share in 1998 (Kaufman, 2000). A number of EU countries have experienced marked retail consolidation in the last few years (McCarriston, 2002). The large share of a few retailers in France has been the result of large changes in the retailing sector (Gracia and Albisu, 2001). In others, consolidation is still increasing. The trend toward consolidation is expected to continue in Greece (FAS, 1996e). Southern European countries are experiencing more consolidation in general (Gracia and Albisu, 2001). Here, however, has been some backlash; in Greece, the government has restricted store sizes outside the largest cities (FAS, 1996e).

Retail chains are growing in size, and so are the stores in which consumers shop. Many of these large retail chain stores are supermarkets, and some of these stores are hypermarkets, selling a lot of non-food items in addition to grocery items. These larger stores seem to do particularly well in higher-income countries.[11] In lower-income countries, the smaller, traditional stores have greater roles.[12] Seventy-one percent

[11]In Germany, 42 percent of food sales take place in hypermarkets (FAS, 1998a). In Belgium, 52 percent of food sales occur in large supermarkets (FAS, 2000c).

[12]Traditional stores are 58 percent of shelf space in Italy, 40 percent in Spain, compared with 35 percent in Germany and 20 percent in France (FAS, 1999b).

of Czech consumers shop daily and although more are turning to supermarkets to obtain quality food, most still visit small shops (FAS, 1996a). However, even within income groups, there is variation in store sizes. For example, in Spain, 72.6 percent of sales are hypermarket and supermarket sales, while in Portugal, such sales are only 36 percent of the total, and small stores have a large market share, although that is expected to shrink (FAS, 1998b, 1997).

While supermarkets have been fixtures in the United States for decades, supercenters—large combination food and merchandise stores similar to hypermarkets—are just beginning to become significant. Wal-Mart, the major grocery retailer that uses the supercenter format, is ranked fifth, behind the major chains, if only grocery sales are considered (Franklin, 2001). Wal-Mart supercenters in the United States tend not to open in large city centers, but in small cities, rural areas, and outer suburbs. Supercenter chains in the United States also tend to specialize in discount-priced consumer goods.

Consolidation to reduce costs can have positive or negative impacts on consumers. Consolidation within food retailing represents the desire of firms to obtain economies of scale; for some industries, the more units they process, the lower the cost per unit. In grocery or retail distribution, firms are finding that they are able to take advantage of economies of scale in ordering, distributing, and marketing (Kaufman, 2000). For firms, costs have fallen, so they could reduce their prices.

Consolidation can affect that process in one of two ways. The smaller number of firms can reduce competition, so that firms don't need to pass on their cost savings to the consumer. On the other hand, even if there are only two firms in the market, they can sometimes compete so fiercely with one another that they will lower prices as much as they possibly can to capture a larger share of the market than their respective rivals. What do we actually observe in the market place? Some studies find, even when controlling for quality, that more concentrated markets charge higher prices in the United States (Cotterill, 1999), while others have found no relationship between prices and consolidation (Kaufman and Handy, 1989). In the EU, some larger firms have larger profits than smaller ones, but it is unclear whether the large firms charge higher prices or have lower costs (Viaene and Gellynck, 1995). A recent study by the UK Competition Commission (1999) "concluded that there was no evidence from such comparisons that UK grocery retailers were acting in an anti-competitive manner so as to generate higher prices than would otherwise be the case." Their bases for comparison, however, were other markets in the EU and the United States.

The larger stores also reflect some demographic trends in the EU and United States, as well as economic ones. As more women enter the work force, daily shopping is no longer possible, so people want to be able to purchase a week's worth of goods at a time, and to purchase everything they need at one store. To carry it, they might be more likely to drive to the store, so stores need to locate near convenient parking, or very near to people's homes. Additionally, people are more able to stock up on food. In Portugal, for instance, 20 years ago, people shopped daily because refrigerators were not as common. Now people shop weekly (FAS, 1997).

Policy implications

As noted above, retail consolidation can have positive or negative effects on consumers. Many governments of wealthy countries have laws that regulate the consolidation of industries. These laws exist in order to make certain that reduced competition does not have a negative impact on consumers by forcing them to pay higher prices. The United States has a somewhat longer history of enforcing laws of this nature than the EU, which has been looking harder at such issues over the last decade or so. McCorriston (2002) suggests that more research is needed to determine the impact of consolidation on consumer welfare in the United States and in the EU.

Conclusions

Consumers in the United States and the EU differ in some ways in their preferences and behavior, but are very similar in others. Diets differ somewhat, but rather less than regional EU variation for some food groups. Indeed, the United States is more similar to a wealthy EU country in some respects than the poorer and wealthier EU countries are to each other.

Some trends, like increasing obesity, larger percentages of the food budget spent outside the home, aging populations, smaller households, increases in households with all adults working outside the home, increasing consumption of newer foods, organic food popularity, and the rise of the hypermarket and retail

consolidation, are occurring in both the United States and the EU, although each trend may be more pronounced in one country than the other. Demographic trends are changing the demand for processed foods, prepared foods, and a wide variety of foods and are having an effect on the structure of the retail sector.

In other ways, like concern about biotech goods, concern about animal welfare, food prices, share of income spent on food, and meat and sugar consumption, the differences between the United States and the EU are somewhat more pronounced. Differences in preferences across countries affect consumption patterns. Also, differences in agricultural policies still affect relative prices, which in turn can also affect consumption patterns.

While prices haven't become irrelevant in explaining consumption patterns, several authors have noted that as income rises, prices and income become less important. Demographic patterns, concerns about food quality, and retail changes can all be expected to create demands for different types of foods, including processed foods, foods with specific health implications, and foods produced in certain ways.

These changes in consumption can be expected to influence trade and investment patterns between the United States and the EU. Increases in processed food's share of exports from the United States to the EU and increases in the significance of imported food in the U.S. food expenditure basket are two potential indicators of the future direction of food trade. Additionally, as countries join the EU, the dietary preferences of the new countries will alter trade patterns, but will probably also be altered by trade patterns.

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Agriculture and the Environment In the United States and EU

Jason Bernstein, Joseph Cooper, and Roger Claassen

Introduction

Agriculture is more than just the production and sale of commodities; it also produces many intended and unintended positive and negative by-products. Negative by-products, or disamenities, include nutrient and pesticide run-off, soil erosion, air pollution, and the loss of biodiversity (ERS 2000). The positive by-products, or amenities, provided by agriculture can be relatively tangible goods such as open space and scenic vistas, while others, such as the spiritual or symbolic value of preserving our farming heritage, are more abstract and nonpecuniary (Mullarkey, Cooper, and Skully). Many environmental amenities or disamenities of agricultural production affect society as a whole and have a social benefit or cost much greater than the private benefit or cost affecting those involved in agriculture. In such cases, there is an economic rationale for the government to subsidize the environmental amenity (or tax an environmental disamenity) to produce the desired level of environmental protection. Indeed, both the United States (U.S.) and the European Union (EU) employ a series of Federal and State agri-environmental programs to encourage both the provision of environmental amenities and the reduction of environmental disamenities associated with agriculture.

While there has been a long history of agri-environmental programs in the United States and the EU, such programs began to play a larger role in Federal farm policies during the 1980s, at least in part due to greater concern about the environmental damage resulting from agricultural production. Since that time, agri-environmental programs have increased in their importance and will likely continue playing a vital role in future EU and U.S. farm policy debates. Both the United States and EU use a mixture of three types of programs to address agri-environmental issues: voluntary incentive-based programs, regulatory programs, and cross-compliant programs.

Different Instruments of Environmental Protection

Agri-environmental policy in the United States and the EU generally consists of a combination of voluntary instruments (incentives or subsidies) and involuntary instruments (taxes and regulatory requirements) in order to promote the use of environmentally sound farm practices.[1] Cross-compliance is another agri-environmental policy instrument that is sufficiently different from the instruments above to merit a separate discussion in this section.

Agri-environmental taxes are per-unit charges (either on an emission or on an input) designed to serve as a disincentive for using environmentally damaging practices. Total tax payments depend on the farmer's behavior; the further from the environmental goal, the higher the payment. The advantages of environmental tax policies are that they are consistent with the "polluter pays" principle, which argues that the public owns environmental resources and those who pollute these resources must pay compensation to the public (Krissoff et al.). In addition, taxes do not promote expansion of environmentally damaging activities. On the other hand, taxes have a negative impact on farm income. Taxes do not play a significant role in the agri-environmental policies of either U.S. Federal policy or EU-wide policy.

Agri-environmental incentives are payments to the farmer to adopt environmentally sound practices or to retire environmentally sensitive land from production. The advantage of incentives, such as those sharing the

[1]Only a brief overview is provided here; for a more detailed overview of the economic instruments pertaining to U.S. agri-environmental policy, see Claassen et al., (2001).

costs of adoption of environmentally benign management practices or paying farmers to set aside land, is that they increase the likelihood that farmers will adopt the desired practices or retire land. The disadvantage of incentives is that achieving desired levels of adoption of environmentally benign management practices or of land retirement with them may be costly for taxpayers. Incentives can also have the effect of expanding production by the farm, or increasing entry into the sector, so even if the disamenities produced by each farm (or on each field) decrease, more farms (or fields) now produce disamenities.[2]

Regulatory requirements, or standards, represent involuntary (or mandatory) participation approaches that establish standards that all targeted actors must adhere to. The ban on the production and application of the chemical DDT is one such example. Unlike policy choices in which farmer participation is uncertain, regulations simply require that all farmers participate. This feature is particularly important if the consequences of not changing practices are drastic or irreversible. On the other hand, regulatory requirements are a blunt tool and can be the least flexible of all policy instruments, requiring that producers reach a specific environmental goal or adopt specific practices. Producers are not free to determine their own level of participation, based on their costs. Unless regulators know farm-specific costs (which is unlikely) and can use this information to establish farm-specific regulations, agri-environmental effort is not necessarily directed toward producers who can make changes (achieve gains) at the lowest cost. Consequently, regulation can be less flexible and less efficient than economic incentives such as taxes and subsidies. Regulatory requirements receive less prominence than other instruments within traditional agri-environmental policy in both the EU and the United States, but the regulatory environment is becoming increasingly complex.

Cross-compliance requires a basic level of environmental compliance as a condition for farmer eligibility for other government programs that farmers may find economically desirable, such as those that provide producer payments. Technically, cross-compliance is a voluntary, indirect incentives-based instrument, but as it represents a standard for receiving a subsidy, in practice it may not strictly be perceived as voluntary, particularly when the existing subsidy represents an important share of total farm income. It may be difficult for a farmer to forego cross-compliance when the value of the existing subsidies exceed the farmer's costs of adopting the mandated practices.[3] In this circumstance, loss of these payments is dramatically different from foregoing an *additional* subsidy that is offered as compensation for adopting conservation practices. An advantage of cross-compliant programs is that less government outlay is required than with subsidies to address environmental problems. Disadvantages are that it will have lower capacity for impact on farms that are not traditional clients of Federal farm payment programs or in situations when program payments are low.[4] Also, the administration of cross-compliance programs may require intergovernmental coordination of programs with divergent goals.

While some agri-environmental instruments tend to be more cost-effective than others in producing environmental benefits, the cost-effectiveness of any specific program depends greatly on the details of implementation.[5] For example, significant variation in climate, soils, crops, and proximity to environmental resource (e.g., rivers or lakes) means that the ability to produce environmental benefits (or reduce environmental damage) can vary widely among farms, particularly in a national program. Highly erodible soils, located near a major river in an area of high rainfall intensity, are likely to deliver significantly more sediment to the river than less erodible land located farther from the river or in an area

[2]According to Baumol and Oates, a firm that would be unprofitable under a tax may be made profitable by an incentive (subsidy). While a tax may drive a firm out of a competitive industry and so generally lead to a decrease in its output, an incentive may increase entry and induce expansion in competitive outputs.

[3]In recent years, government payments have accounted for a large share of farm income, particularly in grain-producing States. Moreover, farm commodity programs have been in place for sufficient lengths of time in both the EU and the United States--more than 65 years in the United States--that payments are largely capitalized into the value of land (Barnard *et al*., 1997; Duffy *et al*., 1994) and are generally built into producers' financial calculations. For many producers, the ability to purchase land or pay cash rent depends significantly on farm program payments.

[4]Cross-compliance requires levels of monitoring and enforcement that are adequate to ensure environmental compliance. Of course, the other programs discussed here may also require monitoring and enforcement to ensure that the farmers adopt the desired practices. However, the costs of monitoring and compliance may vary across types of programs. For instance, land retirement may be easier to verify than adoption of particular farm management practices.

[5]See Claassen et al., (2001) for a more detailed discussion of these issues.

of lower rainfall intensity. The cost-effectiveness of specific policy instruments can vary widely depending on the extent to which this type of variation is recognized and accommodated within the program. This and other potential variations in implementation (e.g., the level of flexibility accorded producers) make it difficult to rank the cost-effectiveness of instruments irrespective of other program details.

In practice, however, both the United States and EU use environmental programs to support farm prices, incomes, or both, as well as increase environmental amenities or reduce pollution. Agri-environmental policies often have the dual objective of environmental protection and farm income support, at least implicitly. The fact that some agri-environmental policies are trying to fulfill the twin objectives, in part, explains their structure.

U.S. Agri-environmental Policy

"U.S. Agri-Environmental Programs" lists major U.S. agri-environmental policies (ERS, 2000; Claassen et al., 2001). Nearly all agri-environmental programs authorized under the 1996 FAIR Act were continued and many received large funding increases in the 2002 Farm Act. Several major new programs were also established. Overall, conservation funding is slated to increase by 80 percent with the 2002 farm bill.[6]

Major U.S. agri-environmental programs can be categorized as either incentive programs or cross-compliance mechanisms. Environmental incentive programs can be further categorized.

- **Land retirement** programs remove land from crop production. In exchange for retiring land, producers receive rental or easement payments plus cost sharing and technical assistance to aid in the establishment of permanent cover. Economic use of the land is limited.
- **Working land conservation** programs support adoption and maintenance of land management and structural conservation practices on agricultural land, including cropland, grazing land, and in some cases, forestland, in exchange for cost-shares or incentives.
- **Agricultural land preservation** programs help retain land in agricultural production by purchasing the right to convert land to other uses.

Finally, a number of regulatory programs affect agriculture, but are generally originated outside of the House and Senate Agriculture Committees in Congress and are primarily concerned with non-agricultural industries. For a discussion of regulatory programs in agri-environmental policy see Claassen et al., (2001).

Land Retirement. The Conservation Reserve Program (CRP) offers annual payments and cost sharing to establish long-term, resource-conserving cover on environmentally sensitive land. Contracts are for 10 to 15 years. Economic use of the land is limited during the contract period, but landowners retain the right to return land to crop production at the end of the contract. The Wetlands Reserve Program (WRP) provides cost sharing and long-term or permanent easements for restoration of wetlands on agricultural land. Landowners retain land ownership and rights to recreational uses, such as hunting and fishing.

Land retirement has dominated Federal agricultural conservation spending since 1985 (fig. 1). Roughly 50 percent of all USDA conservation spending since 1985 has been for land retirement. About 10 percent of U.S. cropland--nearly 35 million acres--is currently enrolled in a Federal land retirement program, largely through CRP (33.8 million acres). The 2002 Act expands the CRP acreage cap to 39.2 million acres, while the WRP acreage cap is more than doubled, from 1.075 to 2.275 million acres.

Land retirement programs have lowered U.S. agricultural production, resulting in higher prices for commodities such as wheat, corn, and soybeans. According to a study conducted by the Farm Service Agency (cited in ERS (2000), chapter 6.2), the combination of higher commodity prices and land retirement payments have increased farmer income more than any loss of income due to non-production on unused land. Increases in farm income have also exceeded the increase in consumer expenditure due to higher commodity prices. Land retirement programs have been shown to have positive environmental effects on soil productivity, water quality, and air quality but these effects are small compared with the effects on farm income and consumer expenditure (ibid).[7] Besides these impacts, land retirement programs have the added benefit of being relatively easy to implement

[6]See ERS (2002) for more details on policy changes in the 2002 Act.

[7]However, it should be noted that monetary values of only a subset of environmental impacts have been estimated.

U.S. Agri-Environmental Programs (administered by the USDA)[1]

Voluntary Programs

- Environmental Quality Incentives Program (EQIP)—Through use of technical assistance, education, cost-sharing, and incentive payments, EQIP assists farmers and ranchers in adopting land management and structural practices that improve environmental performance.
- Conservation Security Program (CSP)—Provides payments to farmers in return for their use of a wide range of environmentally-benign land management practices. The program has three "tiers" for participation; with higher tiers requiring greater conservation effort and offering larger payments. Existing practices can be enrolled. This program is new under the 2002 Farm Bill.
- Wildlife Habitat Incentives Program (WHIP)—Similar to EQIP but aims to protect wildlife habitats.
- Conservation Reserve Program (CRP)—Provides rental payments to agricultural producers who retire environmentally sensitive cropland for 10 to 15 years.
- Wetland Reserve Program (WRP)—Assists landowners in restoring wetlands on agricultural land through easement payments and restoration cost sharing.
- Conservation Technical Assistance (CTA)—Provides technical assistance to farmers and ranchers who implement soil and water conservation and water quality improvement.
- Farmland Protection Program (FPP)—Allocates funds for purchase of conservation easements and other types of interest in land with prime, unique, or other highly productive soils. The new version of FPP under the 2002 Farm Bill receives a 20-fold increase in funding and extends eligibility to land with "historically important land areas and structures."
- Emergency Conservation Program (ECP)—Provides financial assistance to farmers who conserve water while recovering from natural disasters such as severe drought.
- Grassland Reserve Program (GRP)—Using contracts or easements in conjunction with compensatory payments, up to 2 million acres of grassland will be protected from conversion to other uses.

Regulatory Programs[2]

- Clean Water Act (CWA)—Operators may be subject to effluent discharge permits if CWA standards are not met.
- Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)—Uses restrictions and bans on certain pesticides.
- Endangered Species Act (ESA)—Under ESA, farmers may not "take a member" (e.g. reduce the population) of a listed species.
- Clean Air Act—The use of methyl bromide, a fumigant, is largely being phased out under this act.

Cross-compliance Programs

- Conservation Compliance—Introduced in the 1985 Farm Bill, conservation compliance requires conservation systems on previously cropped highly-erodible land (HEL) as a condition of eligibility for certain Federal farm programs, including farm price and income support.
- Sodbuster—Producers who bring HEL into production must apply strict soil conservation systems to be eligible for farm programs.
- Swampbuster—Producers who covert wetland for agricultural production can lose Federal farm program payments.

[1]For an in-depth description of U.S. agri-environmental programs and related expenditures, see ERS (2000) and ERS (2002).

[2]These programs are not administered by the USDA.

and enforce since land retirement can be easily confirmed.

Working Land Conservation. The Environmental Quality Incentives Program (EQIP) provides technical assistance, cost sharing, and incentive payments to assist livestock and crop producers with adoption of a wide range of environmentally benign production practices, or best management practices (BMPs). The Wildlife Habitat Incentives Program (WHIP) provides cost sharing to landowners and producers to develop and improve wildlife habitat. The new Conservation Security Program (CSP) will provide payments to producers for maintaining or adopting a wide range of structural and land management practices that address a variety of local and/or national resource concerns.

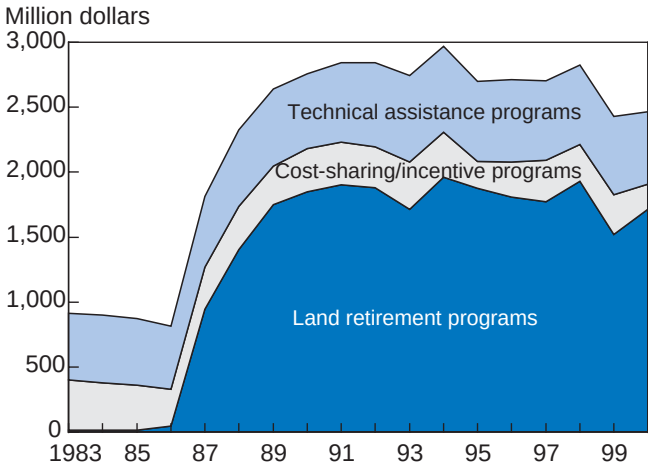
CSP could fund the installation and/or maintenance of the same types of practices funded under EQIP, with the notable exception of livestock waste handling and storage facilities, which may be funded under EQIP, but not under CSP. Finally, USDA also provides conservation technical assistance (CTA) to producers who adopt agri-environmental BMPs outside of other USDA conservation programs.

In the past, funding for working land conservation has been modest in comparison with land retirement (fig. 1-F). The 2002 Act provides a large increase in these programs, relative to increases for land retirement (fig. 2-F). EQIP is slated to receive $5.8 billion over the 6 years of the 2002 Farm Bill (2002-07), an average of $966 million per year, nearly five times the $200 million annual funding authorized by the 1996 FAIR Act. The CSP could receive up to $3.8 billion over the next 10 years, although the Congressional Budget Office (CBO) estimated that CSP will spend only $987 million through fiscal year 2007 (the end of the 2002 Act).

Because working land programs are generally quite flexible when compared with land retirement, this change in funding may lead to a broader array of options and greater flexibility for producers in meeting the requirements of the program. Namely, working land programs may represent a large suite of management practices the farmer can choose from in building a conservation plan, while land retirement essentially represents to the farmer a choice between keeping the land in production or not. Greater flexibility allows producers to develop conservation strategies that are tailored to their own climate, soils, and management skills, potentially delivering agri-environmental gains at a lower cost. In EQIP, for example, producers can choose from a wide range of conservation practices in developing a conservation plan. Plans can include both land management practices such as nutrient management or conservation tillage and structural practices such as waste storage/handling systems, grass waterways, and filter strips. EQIP contracts can be as little as 1 year or as long as 10 years in length.

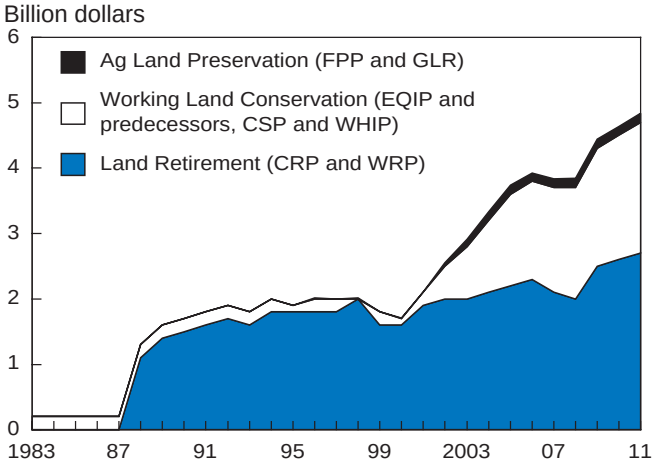
Perhaps the biggest innovation of the 2002 Act is the creation of the CSP. A key difference between this program and existing agri-environmental programs, such as EQIP, is that under CSP, agri-environmental payments for specific environmentally benign best management practices (BMPs) would be available to

Figure 1-F
U.S. conservation expenditures by program type, 1983-2000



Source: USDA.

Figure 2-F
Conservation expenditures by program type, 1983-2001, with projections to 2011



Sources: Office of Budget and Policy Analysis, USDA, and the Congressional Budget Office.

farmers who implement such practices prior to enrolling in the program. Specifically, CSP will offer payments to farmers who have already installed or are already using conservation practices as well as to those who will adopt them upon entry into the program. Farmers could receive a payment based on land rental rates (5-15 percent of land rental rates, depending on the level of conservation effort) and cost-sharing for ongoing BMP maintenance. In this sense, CSP will be more than a cost-share program and is essentially a U.S. analog to several types of EU agri-environmental subsidies allowed under EC

Reg. 2078/92. Although the details are still being worked out, CSP will have three "tiers" for participation, with each successive tier requiring greater conservation effort and offering larger payments. The upper bound on total payments per farm is $45,000. To reduce the possibility that this program will promote an expansion of farmed acreage, cropland will be eligible for CSP only if farmed 4 of 6 years prior to 2002.

Agricultural Land Preservation. The Farmland Protection Program (FPP) funds purchases of development rights on agricultural land in urban fringe areas, preserving it for agricultural production. Projected over 10 years, FPP is slated to receive funding of $985 million--a nearly 20-fold increase over the $53.4 million provided between 1996 and 2001. Under the new Grassland Reserve Program (GRP) producers can enter long term contract or easement agreements to maintain grassland for grazing and/or haying.

Compliance Mechanisms. With the exception of a handful of regulatory requirements, cross-compliance programs represent the most demanding environmental requirements for U.S. farmers. Introduced in the 1985 Act, compliance mechanisms require farmers with environmentally sensitive land to adopt certain resource conservation activities in order to be eligible for Federal agricultural payments, such as commodity loans and direct and counter-cyclical payments. Under wetland conservation provisions, widely known as "swampbuster," agricultural producers can lose Federal farm program benefits if they convert wetlands to make agricultural production possible. Producers may also lose benefits if they produce crops on highly erodible land (HEL) without applying an approved conservation system. For highly erodible land that was cropped before enactment of cross-compliance requirements, producers must actively apply conservation systems designed to "substantially" reduce soil erosion. These provisions are widely referred to as "conservation compliance." For HEL not cropped prior to compliance requirements, producers must meet a more stringent standard of soil erosion control. These provisions are widely referred to as "sodbuster." The conservation measures required under this program come closest in the United States to representing a basic level of "good farming practice" or environmental compliance such as exists in the EU.

Since producers must pay the costs of complying with conservation compliance programs, it is difficult to quantify the expenditures on such programs compared with the voluntary programs funded by the U.S. Government in "U.S. Agri-Environmental Programs." The evidence on the costs and benefits to producers of complying with HEL and wetland provisions is mixed. Costs include applying an approved conservation system or the opportunity cost of not using HEL or wetland for crop production. Some practices, such as conservation tillage, have probably lowered production costs for some (but not all) producers who have adopted them as part of a conservation system. ERS (2000, section 6.3) presents more detail about the benefits and costs of conservation compliance.

One of the advantages of U.S. agri-environmental programs is their flexibility for both individual producers and the government. Although conservation programs are designed and operated by USDA, producers can choose which programs to participate in and often have significant flexibility in selecting conservation practices that fit their own climate, soils, crops, and management skills. At the same time, USDA can target specific environmental problems or areas with greater environmental needs, although authority for environmental targeting is reduced in some programs, particularly EQIP, by the 2002 Act.

U.S. agri-environmental programs are primarily directed at preventing or alleviating specific environmental problems that are a direct result of agricultural production, such as soil erosion, water pollution, destruction of wildlife habitats, or production on wetlands and HEL. With few exceptions, the United States does not use Federal level agri-environmental policy for the purposes of promoting what are considered by some to be the "positive" environmental by-products (i.e., amenities) of agriculture, such as open space, scenic vistas, or small-scale farms. Such "environmental" goals are left to other U.S. Federal or State programs.[8] The EU, on the other hand, supports such amenities of agriculture as part of the EU-wide agri-environmental policy, although the European Commission has limited control in the design and operation of specific programs. With the 2002 Act, U.S. Federal policy appears to be moving in the direction of directly addressing the amenities of agriculture. Namely, the new version of the Farmland Protection Program extends eligibility to land with "historically important land areas and structures."

[8]See American Farmland Trust (1998) for a list of U.S. State agri-environmental programs.

EU Agri-environmental Policy

Like U.S. agri-environmental policy, EU agri-environmental policy uses a combination of voluntary, regulatory, and cross-compliant programs to achieve environmental goals. However, while the similarities between the United States and EU in general agri-environmental policy measures and goals are greater than the differences, the EU gives greater latitude to member states in the design and implementation of agri-environmental programs than does the United States, where Federal-level programs apply to all States. "EU-wide and EU Member Country Programs" shows the EU-wide and some of the EU-member country programs conforming to current EU agri-environmental legislation. Unlike the U.S. Government, the European Commission does not design or run the day-to-day operations of most agri-environmental programs. The Commission instead establishes guidelines for three broad categories into which both EU-wide and EU member state programs are placed. The amount and source of compensation, if any, depends upon the category under which the agri-environment program falls.

Basic legal standards are regulatory rules that apply to all EU member states and their farmers. Farmers must comply with these environmental regulations without receiving any compensation. The EU Nitrate Directive is an example of a basic legal standard that applies specifically to agriculture ("EU-wide and EU Member Country Programs").

The June 2003 CAP reform agreement provided further incentives for producers to observe environmental rules by tying producer payments to compliance with statutory environmental standards, as well as food safety and animal health and welfare standards. In addition, there is a new requirement that producers maintain land in "good agricultural and environmental condition" to receive payments. The reform makes compulsory the cross-compliance provision that was previously optional to member states.

Good farming practices are basic environmental standards that farmers are expected to observe without receiving direct compensation at the federal level. However, unlike basic legal standards, the Commission does not mandate good farming practices but allows each member state to decide what good farming practice is. Member states can make good farming practices mandatory or cross-compliant by tying the adoption of such practices to federal payments. Prior to the 2003 reform of the CAP, only a few EU member states had such programs in place. The general principle behind "good farming practices" is similar to the requirement that farmers undertake certain conservation practices under the USDA's cross-compliance rules. EU member states have the ability to tie EU payments to state agri-environmental regulations; States in the U.S. do not have this ability.

Agri-environmental measures are strictly voluntary. The EU subsidizes most measures that fall under a set of broad policy objectives, listed under the EU-wide programs in "EU-wide and EU Member Country Programs". In return for adopting such measures, EU producers receive a payment calculated on the basis of income foregone and the financial incentive needed for adoption. Payments are limited to 450-900 euros per hectare ($182 to $365 per acre at 1 euro = 1 dollar) depending on the type of land use. As in the EQIP program in the United States, producers in the EU can choose specific agri-environmental measures best suited to their operations. "EU-wide and EU Member Country Programs" provides examples of EU agri-environmental measures in EU member states.

The 2003 CAP reform added several new agri-environmental measures. It provided for increased funding for projects to promote the environment, allowed member states to make new payments to producers to support agricultural activities that are important for protection of the environment, and allowed member states to offer temporary support to help producers adapt to new environmental standards (European Commission, 2003).

Most EU agri-environmental programs, while funded at the EU level, are administered by the member states. Therefore, it is difficult to break down EU expenditures on specific programs. Table 1-F shows EU expenditures in 1998 on agri-environmental programs by member state. The EU spends considerably less in total (about US$1.6 billion or 4 percent of total EU agricultural spending) on agri-environmental programs than the United States (US$3.17 billion or 6 percent of U.S. agricultural spending), but possibly more per acre. In addition, both the EU and United States also have state-level funding of agri-environmental programs.

Perhaps the relevant difference between U.S. and EU agri-environmental programs is not the level of funding, however, but the types of programs that are considered

EU-wide and EU Member Country Programs Conforming to EC 2078/92 (examples)

EU-wide Programs

- The Nitrate Directive (EC 91/676/EEC) seeks to reduce pollution caused by nitrates from agricultural sources by requiring member states to implement action programs in areas identified as being vulnerable to pollution. Under the directive, the application of livestock manure is to be limited to 170 kg N/ha by 2003.
- Under EC Reg. 1257/99, support can be given to farmers who for at least 5 years use production methods designed to protect the environment and maintain the countryside in order to promote farming methods which promote the protection and improvement of the environment (which includes the landscape and its features, natural resources, the soil, and genetic diversity), environmental planning in farming practice, extensification, the conservation of farmed environments of high natural value, and the upkeep of the landscape.
- EC Reg. 1257/99 allows for compensatory payments to farmers who produce in less-favored areas such as mountainous areas, areas threatened with abandonment, or areas in which "the maintenance of agriculture is necessary to ensure the conservation or improvement of the environment, the management of the landscape, or its tourism value".
- As part of the EU's Agenda 2000 agricultural reform, farmers are expected to observe basic environmental standards, also known as good farming practices, without direct compensation. Good farming practices are not legal texts mandated by the Commission but rather the Commission allows each member state to decide what good farming practice is.
- Environmental programs under commodity support regimes. Certain of the EU commodity regimes provide payments for implementing environmental practices or require that producers implement environmental practices as a condition of receiving payments.
- Producers of beef cattle must not exceed a maximum stocking density (livestock units per hectare) as a condition of eligibility for payments. In addition, producers who observe lower stocking densities are eligible for an extensification premium.
- Producers of arable crops producing more than 92 tons of arable crops are required to set aside a portion of their land. The base level set-aside requirement is 10 percent. Member states are required to introduce measures that ensure that set-aside land is maintained so as to protect the environment. Some examples of recommended practices relate to the use of field margins, choice of set-aside cover, timing of cutting, cultivation, and the spreading of animal manure.

Examples of EU Member State Programs

- United Kingdom. In England, the Countryside Stewardship makes payments to farmers and other land managers to enhance and conserve agricultural landscapes as well as associated wildlife and history, and to improve opportunities for public access. Grants are available towards capital works such as hedge laying and planting, repairing dry stone walls, etc. The Organic Farming Scheme provides payments to farmers for adopting authorized conservation practices above those set out under the minimum standard of "good farming practices".
- Italy. Sicily's "Plan for Rural Development" (Regione Siciliana, undated) has provisions that include: 1) providing payments for adopting "integrated production methods" (or organic methods), to reduce nitrogen and phosphorus applications by at least 25 percent over the levels required under "good farming practices" for specific crops; 2) making payments for activities that maintain scenic aspects of agriculture, and 3) providing financial aid for maintaining olive trees in excess of 100 years old, and nuts and chestnuts on terraces at more than 300 mt altitude.
- Germany. Measures established at the state level include those that promote extensive farming by reducing inputs to arable land, organic farming, and support the rearing of local breeds of animals in danger of extinction. For example, the Schleswig-Holstein region offers a 20-year set-aside for arable land. North Rhine/Westphalia provides incentives for the conservation of fruit trees and wetlands, as well as arable land set-asides. Rheinland-Palatina provides incentive measures to preserve traditional agriculture activities such as wine growing in hill areas.
- Greece. Farmers are required to rotate cotton with cereals and to limit the application of nitrate fertilizer to specified low levels. Irrigation systems that reduce nitrogen leaching and erosion are promoted.
- France. All agri-environmental programs in France are administered under the auspices of the Land Management Contract (Contrat Territorial d'Exploitation, or CTE). The program funds project-specific contracts between individual producers and government. Projects may cover a broad set of objectives, including environmental protection. The program is co-funded by EU (Guarantee Fund) and the Government of France. Support is given to producers for project startup expenses, plus additional annual aid for up to 5 years for the increased cost of production resulting from the project. The share of expenses compensated varies. Examples of environmental projects include: rehabilitation and upkeep of irrigation, conversion to organic agriculture, replacing chemical herbicides with mechanical weed control, planting natural grasses between rows, replacing chemical fertilizers with compost, establishing and maintaining grassland (pasture), etc. About half the contracts have gone to livestock operations.
- Ireland. The basic program is the Rural Environment Protection Scheme (REPS). A farmer who joins the scheme enters into an environmental management agreement comprising a series of 12 obligations that must be fulfilled on all parts of the farm. The obligations include drawing up and following a plan for protections of water, nutrient management, stock management, hedge and stonewall repair, and habitat protection.

Table 1-F—EAGGF-Guarantee Expenditures in 1998 for agri-environmental programs covered under EC regulation 2078/92 and related statistics[1]

Country	EAGGF-Guarantee Expenditures[2]		Percent acres covered by Reg. 2078/92[3]	Agricultural Gross Value Added as percent of GDP[4]
	Expenditure in ECU Millions	Expenditure as percent of total		
Belgium	12.4	0.72	1.7	1.00
Denmark	12.5	0.72	3.9	1.70
Germany	285.6	16.54	38.9	0.80
Greece	6.9	0.40	0.6	5.40
Spain	76.4	4.42	2.9	3.00
France	143.1	8.29	22.9	1.80
Ireland	113.7	6.58	24.1	2.60
Italy	379.4	21.97	13.6	2.40
Luxembourg	5.0	0.29	75.9	0.70
Netherlands	14.9	0.86	1.9	2.50
Austria	295.5	17.11	67.8	0.90
Portugal	87.3	5.06	16.8	1.90
Finland	140.5	8.14	86.9	0.60
Sweden	103.6	6.00	51.6	0.40
United Kingdom	50.2	2.91	14.6	0.50
EU Total	1,727.0	100.00		

Notes:
[1] Note that these data pre-date the Agenda 2000 reforms, which established many of the agri-environmental programs described in "EU-wide and EU Member Country Programs". Current expenditures are likely to be distributed differently.
[2] These European Agricultural Guarantee and Guidance Fund (EAGGF) expenditures represent outlays from the EU to member states.
[3] Percent of farm acres in each member country covered by agri-environmental programs covered under Reg. 2078/92.
[4] 1998 Agricultural Gross Value Added as a percentage of gross domestic product.

Sources: European Commission (1998); OECD (undated).

to be "agri-environmental." The following table lists agri-environmental measures or goals provided by the EC, divided into three broad categories:

EU Agri-environmental goals (by category)

1. Environmentally-beneficial productive farming
- input reduction
- organic farming
- extensification of livestock production
- conversion of arable land to grassland and rotation measures
- undersowing and cover crops, strips, preventing erosion and fire
- preserving areas of special biodiversity/nature interest
- maintenance of existing sustainable and extensive systems
- preserving farmed landscape

2. Non-productive land management
- set-aside
- upkeep of abandoned land and woodland
- maintenance of the countryside and landscape features
- maintaining public access

3. Socio-economic measures and impacts
- training
- supporting farm incomes
- employment
- societal attitudes

Source: European Commission (1998; pg. 38).

The EU, to a greater extent than in the United States, uses environmental protection as a rationale for the continued government support of agriculture as a whole and has a wider range of measures it considers to be environmentally related (point 3 in the box above). Some examples would be the protection of farm incomes and employment, promotion of rural development, and the upkeep of woodland.

The EU also places a special emphasis on the rural development goals of agri-environmental policy. While in the United States rural development and conservation are different policies addressed by different programs, agri-environmental policy in the EU is now a part of rural development policy and can be difficult to distinguish from rural development programs (e.g., European Commission, [undated]). For example, the compensation payment scheme in EC 1257/99 (table 2-F) highlights one of the explicit goals of the EU agri-environmental policy not found in U.S. agri-environmental policy, that of preventing land abandonment. The EC has stated that preventing land abandonment by keeping large numbers of family farmers on the land is necessary to preserve the natural environment in the EU (CEC, 1991). The 2003 CAP reform agreement gave member states broad discretion to maintain product-

specific support in order to prevent land abandonment and cessation of production (European Commission, 2003). While the prevention of land abandonment may also be an important issue in the United States, the proximity of rural and urban areas in the EU, combined with the fact that it is difficult to find untouched natural landscapes in Europe, may cause land abandonment concerns to play a more prominent role in directing EU agri-environmental policy (Potter, p. 108).

As a whole, the differences between U.S. and EU agri-environmental goals and programs can be considered to be largely definitional. Some agricultural policy goals and measures that the EU classifies as agri-environmental are classified in non-environmental categories in the United States. This difference in classification may make a difference in how agri-environmental programs are notified to the World Trade Organization (WTO).

Agri-environmental Policy and the WTO

In the 1995 Uruguay Round Agreement on Agriculture, WTO members agreed to reduce spending on many domestic support policies. However, an exception was made for expenditures on agricultural policies that are presumed to have a minimal impact on production and trade. This exception is commonly referred to as the "green box," and policies notified under this exemption are called "green box policies." Since 1995, most EU and U.S. agri-environmental policies have been notified as green box policies.

The Agreement on Agriculture sets forth conditions that all policies must meet to qualify for the green box exemption (WTO, undated):

- must have no, or at most minimal, trade-distorting effects or effects on production;
- must not support prices or increase consumer costs; and
- must be financed by the government.

In addition, there are specific conditions that agri-environmental policies must meet to qualify for exemption. Green box environmental programs must limit subsidies to the extra cost or loss of income involved in complying. Green box resource retirement programs (some agri-environmental programs are notified under "structural adjustment through resource retirement programs") must retire land for a minimum of 3 years and must not link payments to prices or production that apply to land not retired (Vasavada et al.).

Countries are required to notify the WTO of amounts spent on green box policies. In 1999, the last year for which U.S. domestic support notifications are available, the United States notified the WTO of outlays of US$332 million for environmental programs, and $1,434 million on resource retirement programs (e.g., the CRP). These two categories amounted to 3.6 percent of total U.S. green box expenditures. In addition, other outlays on research and advisory programs and technical assistance related to environmental and conservation programs are notified under "General Services."

In 1999/2000, the EU notified expenditures on environmental programs of about US$5.5 billion, and outlays on producer and resource retirement programs (long-term set-aside) of US$122 million, accounting for about 28 percent of total green box outlays. EU green box expenditures on environmental programs are higher than expenditures on agri-environmental payments shown in table 1-F because the green box includes expenditures on producer and resource retirement and forestry programs that are not agri-environmental programs.

Conclusion

The United States and the EU have many similar types of agri-environmental programs and goals, especially when it comes to preventing negative environmental by-products such as soil erosion, overuse of chemical pesticides and fertilizers, and abuse of environmentally sensitive areas such as wetlands and wildlife habitats. Moreover, both the EU and United States offer flexibility for programs to be modified to meet the specific environmental needs of individual communities. In the United States, this flexibility is given to the producer, while in the EU, it is more likely to be given to the member state.

However, there are also important differences between EU and U.S. programs. The EU programs can emphasize socio-economic goals such as maintaining farm income and employment in less-favored areas. The EU emphasis on maintaining landscape features has little counterpart in U.S. Federal agri-environmental policy. EU agri-environmental programs also focus on preventing land abandonment. Preventing land abandonment is an environmental concern for the EU that is also tied to rural development objectives. EU policy-

makers are concerned that lower support prices, reduced government support, and decoupling support from production may provide incentives for some producers to leave farming altogether.

Both the EU and United States are moving forward with plans to expand their agri-environmental programs. The agricultural policy reform adopted by the EU in June 2003 significantly increases the CAP's focus on the interactions between agriculture and the environment by shifting some funds from producer support to environmental programs, implementing compulsory cross-compliance. In the United States, the farm bill enacted by Congress in spring 2002 includes the new Conservation Security Program, which will introduce a form of "green payments." These payments are intended to accomplish the task of improving the environmental performance of production agriculture, but may also provide an alternative source of farm income relative to traditional commodity programs.

As environmental movements in developed countries grow more influential, the recasting of farm support programs in a "green" light may become more politically popular. Providing environmental services through agricultural programs may become an increasingly important rationale for continued agricultural support in the future. If new WTO trade negotiations produce an agreement to further reduce trade-distorting domestic support, countries may find it necessary to shift support from programs that are subject to reduction to exempt programs, such as agri-environmental programs that qualify for inclusion in the WTO's "green box". Such a shift will require more than cosmetic changes to price and income support programs if they are to comply with WTO criteria for green box payments.

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EU Enlargement: Implications for U.S.-EU Agricultural Relations

Nancy Cochrane

With the December 2002 Copenhagen Summit, the EU completed negotiations with 10 potential new members—eight Central and Eastern European (CEE) countries—Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Latvia, and Lithuania—plus Cyprus and Malta. The official time table calls for these countries to become EU members in May 2004. Negotiations are continuing with Romania and Bulgaria, and the EU goal is for these countries to join by 2007.

The eventual addition of 10 CEEs to the EU could profoundly change the shape of EU agriculture, and these changes will impact agricultural trade relations between the EU and the United States. To the extent that accession brings increases in CEE grain and livestock output, there will be impacts on commodity trade between the United States and the enlarged EU. There will also be some impact on global trade and hence world prices. If accession brings higher income to CEE consumers, there could be an increased demand for imported high-value products.

But of possibly greater importance, enlargement could dramatically accelerate pressures for reform of the Common Agricultural Policy (CAP). Enlargement to 25 members will be expensive for the EU budget—it will be very difficult to support the farmers of 25 countries at the levels now enjoyed by the farmers of the EU-15. The final Copenhagen compromise was carefully crafted to keep the cost of enlargement for the first 3 years within the limits established by Agenda 2000. But the 3-year cost will be 41 billion euros, and without major CAP reform, the cost will rise substantially in succeeding years. The result of any significant CAP reform could be significant reductions to current trade barriers and new opportunities for U.S. products.

Some Background: EU and CEE Agriculture Compared

Enlargement to include the 10 CEE candidate countries would increase the EU population by 28 percent, but would increase the arable land by 38 percent (tables 1-G and 2-G). The CEEs together are large grain producers. Grain area in the 10 CEEs totaled 23 million hectares in 2000, nearly two-thirds of the grain area in the current EU-15 (table 3-G).

The CEEs are currently extensive rather than intensive agricultural producers. Use of material inputs such as fertilizers, high quality seed, and pesticides is much lower throughout the CEEs than in the EU. CEE agriculture makes much heavier use of land and labor, both of which are plentiful and cheap. As a result, CEE grain yields in 2000 averaged 2.3 tons per hectare, less than half the EU-15 average.

CEE output of animal products is a much smaller percentage of EU output. Total CEE output of meat and milk in 2000 was only a fifth of the EU's. Livestock inventories and production throughout the CEEs fell drastically during the early years of the transition, the result of cuts in subsidies, rising feed costs, and a drop in consumer demand for meat. The declines ended for the most part in the late 1990s, and some subsectors, particularly poultry, are beginning to grow. But in general, inventories and production remain well below the levels of the 1980s and, more importantly, well below what CEE authorities consider to be their potential.

Other key differences between the CEEs and the EU:

- The average level of support to producers in most of the CEEs, while rising, is well below that of the EU. The 1999 aggregate Producer Support Estimates (PSEs), as calculated by the Organization for Economic Cooperation and Development (OECD), ranged from 15 percent in Estonia to 25 percent in Slovakia, compared with 40 percent in the EU. Only Slovenia, with an aggregate PSE of 48 percent, provided a higher level of support to producers.

Table G-1—Selected economic indicators of the candidate CEEs compared with the EU

Country	Population 1999	1999 GDP as a percent of EU average	Unemployment 2000	Average monthly wage 1999
	Million	*Percent*	*Percent*	*U.S. dollars*
Bulgaria	8.3	22	17.9	107
Czech Rep.	10.3	59	8.8	366
Estonia	1.4	36	5.9	324
Hungary	10.1	51	8.7	327
Latvia	2.4	27	7.8	246
Lithuania	3.7	29	12.6	281
Poland	38.7	37	15	430
Romania	22.5	27	10.5	128
Slovakia	5.4	49	17.9	261
Slovenia	2.0	71	11.9	953
CEE-10	104.8	n.a.	n.a.	n.a.
EU-15	376.8	n.a.	9.2	2,267*

*Estimate based on Eurostat report of average hourly wages and average number of hours worked per week.

Sources: Eurostat, EU Commission, Business Central Europe.

Table G-2—Agricultural indicators of the candidate CEEs compared with the EU

Country	Agricultural land, 1998	Arable land, 1998	Ag. share of GDP 1999	Ag. share of employment 1999
	Thousand hectares		*Percent*	
Bulgaria	6,203	4,511	17.3	26.6
Czech Rep.	4,280	3,333	3.7	5.2
Estonia	1,434	1,135	5.7	8.8
Hungary	6,193	5,045	5.5	7.1
Latvia	2,488	1,871	4.0	15.3
Lithuania	3,496	3,004	8.8	20.2
Poland	18,443	14,379	3.8	18.1
Romania	14,747	9,843	15.5	41.7
Slovakia	2,444	1,604	4.5	7.4
Slovenia	780	285	3.6	10.2
CEE-10	60,508	45,010	n.a.	n.a.
EU-15	142,614	74,470	1.5	4.7

Sources: United Nations Food and Agricultural Organization, country statistical yearbooks.

Table G-3—Area, yield, and production of grains in the candidate CEEs and the EU, 2000

	Barley	Corn	Wheat	Total grains	Barley	Corn	Wheat	Total grains	Barley	Corn	Wheat	Total grains
	Area--1,000 hectares				*Production--1,000 metric tons*				*Yield--tons per hectare*			
Bulgaria	236	350	1,100	1,766	684	937	2,800	4,545	2.90	2.68	2.55	2.57
Czech Republic	495	47	970	1,651	1,629	304	4,084	6,455	3.29	6.43	4.21	3.91
Estonia	170	n.a.	70	363	293	n.a.	149	647	1.73	n.a.	2.13	1.78
Hungary	323	152	1,024	2,748	905	923	3,709	9,956	2.80	6.06	3.62	3.62
Latvia	135	n.a.	158	423	261	n.a.	427	928	1.94	n.a.	2.70	2.19
Lithuania	353	n.a.	370	980	860	n.a.	1,238	2,658	2.43	n.a.	3.34	2.71
Poland	1,096	44	2,635	8,814	2,783	308	8,503	22,341	2.54	6.94	3.23	2.53
Romania	350	2,700	1,910	5,203	750	4,200	4,320	9,594	2.14	1.56	2.26	1.84
Slovakia	201	1,100	405	814	397	2,800	1,254	2,201	1.97	2.55	3.10	2.70
Slovenia	11	970	36	96	33	4,084	150	502	3.02	4.21	4.20	5.23
CEE 10	3,371	5,364	8,679	22,857	8,595	13,556	26,634	59,825	2.55	2.53	3.07	2.62
EU-15	10,709	4,024	17,680	36,334	51,615	38,450	104,595	206,043	4.83	9.18	5.93	5.67

Source: United Nations Food and Agriculture Organization, USDA.

Table G-4—Farm structure in the candidate CEEs compared with the EU

Country	Cooperative	State farms	Corporate	Private	Average size of private farms
		Percent of total agricultural area			*Hectares*
Bulgaria	42	6	--	52	1.4
Czech Rep.	43	2	32	23	34.0
Estonia	--	--	37	63	19.8
Hungary	28	4	14	54	3.0
Latvia	--	1	4	95	23.6
Lithuania	--	--	33	67	7.6
Poland	3	7	8	82	7.0
Romania	12	21	--	67	2.7
Slovakia	60	15	20	5	7.7
Slovenia	--	4	--	96	4.8

Source: European Commission, Directorate for Agriculture.

- Gross Domestic Product (GDP) is less than 75 percent of the EU average in all 10 of the candidate CEEs. In all but Slovenia and the Czech Republic, GDP is less than half of the EU average. All 10 will thus qualify for EU Structural Funds (rural development funds allocated to regions with less than 75 percent of average EU GDP) after accession. This has raised considerable concern among the poorer members of the current EU, who may lose some of the structural assistance they now receive.
- The share of agriculture in GDP is higher in all 10 CEEs than the EU average. It is especially high in Bulgaria and Romania.
- The share of agriculture in total employment is even higher—18 percent in Poland, as high as 41 percent in Romania. Much of that labor is under-employed, and labor productivity continues to be very low.
- There is considerable diversity in farm structure (table 4-G). Some candidate countries, such as Hungary and the Czech Republic, are dominated by large-scale, restructured, state and cooperative farms. Others such as Poland, Slovenia, and Romania are characterized by a large number of very small, private farms. EU officials are quite concerned about the potential expense of providing CAP payments to millions of small Polish farmers.

These facts have strong implications for the shape of agriculture in the enlarged EU. With accession, levels of support to producers could rise substantially, providing an incentive for producers to expand output of several products. According to ERS analysis (see forthcoming *Transition Economies* Agriculture and Trade Report), enlargement bring increases in CEE beef and feed grain output. At the same time, enlargement will place a serious burden on the EU agricultural budget and could force some changes.

Impacts on Commodity Markets

Early in the decade, CEE prices for most commodities were well below EU prices, and it was generally expected that accession would lead to large increases in grain and livestock production in the acceding countries. However, in recent years there has been significant convergence between CEE and EU prices. In 2000, for example wheat prices in Hungary and Poland were above the EU intervention price, while CEE prices of high quality pork were slightly below those in the EU. CEE prices of feed grains (corn, rye, barley, oats), poultry, and beef were still substantially below EU prices (table 5-G).

There are two reasons for the convergence of prices. In part, some of the CEEs have been gradually aligning their policies with those of the CAP. The high wheat prices found in Poland and the Czech Republic are the result of intervention purchasing programs implemented by their governments. Another reason is a real appreciation of the CEE exchange rates, and the simultaneous devaluation of the euro. After accession, the CEEs will have to give up national policies supporting wheat prices, which could cause wheat prices to decline. However, results also depend strongly on the exchange rates at the time of accession.

Recently completed ERS analysis suggests that accession could bring lower wheat production in the CEEs, while output of other grains could rise. CEE feed grain prices, for the most part, are still below EU prices. For those commodities, accession to the EU could bring higher producer prices and also higher feed prices for

Table G-5—CEE prices for selected commodities, compared with EU: 2000

Commodity	Poland	Hungary	Czech	EU
		Dollars/ton		
Wheat	116.97	97.30	90.03	92.19[1]
Rye	82.76	n.a.	71.11	92.19[1]
Barley	n.a.	98.00	74.87	92.19[1]
Corn	n.a.	87.43	97.49	92.19[1]
Hogs: live wt	832.87	822.43	921.92	844.17
Hog: half carcass[2]	1,374.71	1,098.99	1,273.73	1,306.54
Cattle: live wt	660.32	727.61	1,044.25	1,201.80
Poultry	750.05	571.84	562.90	601.25
Milk (per 1,000 liters)	178.72	221.38	193.68	343.51
Eggs (wholesale)	838.16	712.46	881.31	908.74

[1]EU intervention prices at the time of accession, according to Agenda 2000.
[2]Price of grade "E", the top grade according to EU grading system.

Sources: Eurostat, central statistics offices of the East European countries.

livestock producers. The result could be higher net exports of feed grains. For the enlarged EU this will mean lower net imports of corn. Hungary and Romania will be able to supply much of the needs of the enlarged EU.

Implications for the livestock sector are less certain. CEE beef prices are significantly below EU prices. Hungarian and Czech poultry prices are slightly under the EU price, while Poland's poultry prices have been significantly above the EU average since 1997. CEE prices of top quality pork are only slightly below EU prices for similar quality. But higher EU prices will be offset by higher feed costs. The need to meet strict EU quality and sanitary standards will also tend to raise production costs and eliminate some of the benefits of higher prices. However, to date there has been no systematic effort to estimate the costs of compliance with these regulations.

Most CEE cattle are dual-purpose dairy and beef animals, and CEE producers will be subject to the EU system of dairy quotas after accession. The dairy quotas will limit the size of dairy herds, and thus constrain short-term increases in beef output. In the longer term, the high EU beef prices could encourage CEE producers to invest in specialized beef cattle production. But even without higher beef output, higher prices could reduce domestic consumption and lead to higher beef exports.

EU accession could result in some significant expansion of the poultry sector. The CEE-EU price differentials for poultry are large. While CEE producers will also face higher feed costs and the costs of compliance with EU sanitary requirements, these higher costs could be offset by productivity gains. There has also been a growing trend of consolidation in the poultry industry throughout the CEEs, which will greatly improve the competitive position of their poultry sectors.

The principal impact of EU enlargement on U.S. raw commodity exports to Europe will be felt in the poultry sector. There could be small gains in exports of soybean products, but little impact on grain trade.

- The United States could lose its CEE market for poultry meat. Currently the EU bans all poultry meat imports from the United States due to a ban on treating carcasses with chlorine. If this issue is not resolved, then all acceding CEE countries will also ban U.S. poultry upon accession. Poultry meat exports to Eastern Europe reached $83 million in fiscal 2001 (4 percent of total U.S poultry meat exports), of which $49 million went to Poland and $36 million went to the three Baltic countries. However, close to 90 percent of those exports were transshipments to various countries of the Newly Independent States. So far, most U.S. and Polish officials believe these transshipments will be allowed to continue.

  If the sanitary issue between the United States and the EU is resolved, then the United States might retain at least part of its poultry market in the region, despite potential increases in CEE production. U.S. exports to Eastern Europe consist of low-priced frozen chicken legs, while the CEEs export fresh, whole birds. As long as large numbers of CEE consumers remain poor, there will be a demand for the low-priced U.S. product.

- On the other hand the United States does have a significant market for live poultry in both the EU ($3.1 million in 2001) and Eastern Europe, principally Hungary ($1 million in 2001). Any increase in CEE poultry output could mean additional exports of live poultry.
- To the extent that CEE poultry sectors expand, there could be an increase in U.S. soybean exports to the region.
- U.S. feed grain exports to the enlarged EU will likely be minimal. However, U.S. corn exports to the CEEs have already virtually stopped because of zero tolerance of ragweed seed on the part of Poland and Bulgaria. The EU has a higher tolerance level for ragweed seed. However, EU regulations on biotechnology will apply in all the new member countries. Thus, U.S. corn exports will continue to be blocked.

The Direct Payments Question

The December Copenhagen marked the close of a very difficult period of negotiations. Agriculture in general was the most difficult chapter, and within that chapter, the most contentious issue was whether or not CEE producers will be immediately eligible for the full range of direct payments that EU-15 producers are now entitled to. There are two principal sets of payments:

- Arable crop payments—per ton "compensation payments" intended to compensate EU producers for the cuts in support prices that came with the 1992 CAP reform. They are paid on a per-ton basis, but are tied to historical average area and yields.
- A variety of payments for beef cattle—a suckler calf premium, paid twice yearly for each calf, and a premium for bulls and steers paid twice in a lifetime. There is also a slaughter premium paid per animal at slaughter. All these premia are also limited by regional herd ceilings based on historical averages and limits on stocking density (number of animal units per hectare.)

From the very beginning of accession negotiations, the EU-15 were opposed to the idea of immediately granting the new members the full range of direct payment. The budget for enlargement outlined in Agenda 2000, for the years 2004-2006, included no funds for direct payments. The EU budget established by Agenda 2000 sets a ceiling for the EU budget equivalent to 1.27 percent of the EU's GDP, and it was possible to accommodate the accession of 10 countries in 2005 within that ceiling only without the extension of direct aid.

The EU Commission issued its first formal position regarding direct payments January 30, 2002. The proposal called for a 10-year transition period before CEE producers are eligible for the full range of direct payments enjoyed by current EU-15 producers. Under this proposal, CEE producers would receive only 25 percent of the payments in the first year following accession, gradually increasing to 100 percent during the 10th year.

The CEE candidates refused to agree to such a transition period, arguing that the single market competition rules require equal treatment. They claimed this would relegate CEE farmers to permanent second-class status, and that it would be impossible to compete with EU producers who receive greater income support. The problem, in the view of many, is that income provided EU-15 farmers through direct payments enables them to make investments in their farms to raise productivity and yields. Without these payments, CEE farms, already seriously undercapitalized, would not be able to make similar investments. They would continue to fall behind in the race to increase productivity.

In the final agreement at the Copenhagen Summit, the EU compromised on the issue. The EU will phase in the payments over 10 years, starting with 25 percent. However, the new members will be allowed to top off these payments by up to 30 percent. The CEEs can fund this increase in part by diverting a portion of the rural development funds that the EU will provide (under a separate budget item) and in part from their own budgets. In this way CEE farmers can receive up to 55 percent of the payments in the first year of accession, and there will be no increase on the budgetary burden on the EU.

The Copenhagen agreement remains significant even with the implementation of the CAP reform announced in June 2003. According to the reforms, these direct payments will be converted in 2005 to a single whole farm payment, intended to be fully decoupled from production decisions. The EU Commission subsequently issued a clarification stating that the single payment to CEE farmers will be phased in according to the same formula that was spelled out at the Copenhagen Summit.

Supply Controls Also at Issue

A related issue under negotiation is the levels at which the various supply controls under the CAP will be set for the new members. Currently, in the EU-15 milk and sugar output are governed by production quotas. In addition, EU direct payments are linked to a variety of supply controls. Direct payments provided to grain and oilseed producers are tied to a so-called base area and reference yield, set at a recent historical average for each region or country. Direct payments for male bovines, suckler cattle, and ewes are subject to national limits on herd sizes and limits on stocking density (livestock units per hectare.) These supply controls were also a subject of intense negotiation between the EU and the CEEs.

The EU originally proposed that dairy and sugar quotas for the new members will be set at the 1995-99 average levels of production. Direct payments would be based on average area, yields, and herd levels for the same period. CEE officials were insisting on substantially higher base areas and yields, arguing that current production is well under potential.[1] CEE producers feared that if they accept base areas and yields based on recent averages, they will never be able to catch up to the EU-15.

The EU compromised only slightly on these supply controls (tables 6-G-8-G). Most CEEs receive somewhat higher reference yields than the EU originally proposed, but the final base areas offered were nearly the same as in the original proposal. The EU remained steadfast on sugar and dairy quotas, agreeing in the case of dairy, only to raising the quota by a small amount in 2006, to account for an expected increase in on-farm milk consumption and a consequent increase in retail demand for milk.

What Does This Mean for the Enlarged EU?

The arable crop payments as administered in the EU are only partially decoupled. Farmers must produce one of the eligible crops in order to receive the payment. Thus, the final EU offer regarding direct payments will result in somewhat higher output of grains and oilseeds in the CEEs than the original EU proposal. However, ERS analysis suggests that changes in relative prices will have a far greater impact on CEE output than levels of direct payments.

The primary impact of the direct payments is on net farm income. Table 9-G shows the net effect of the EU and CEE proposals on area payments that will be received by producers in Poland, Hungary, and the Czech Republic.

It is clear that farmers will be considerably better off in terms of income under the final offer than they would have been under the original EU proposal. However, this final offer to some extent undermines the philosophy behind the initial EU offer. The EU had intended to offset the low direct payments with increased funds to support rural development in the new member countries. The rationale was that such an allocation of funds would encourage the farm restructuring that most believe is essential if the CEEs are to compete in a single market. The EU Commission feared that giving large direct payments to farmers would reduce incentives to restructure. And the compromise formula for granting direct payments may very well keep a large number of small Polish farms in business that might otherwise be forced out.

The burden of enlargement on the EU budget will be large. The final compromise was carefully crafted to make sure the total expenditures for 2004-2006 did not exceed the maximum set out in Agenda 2000. Even so, EU expenditures on enlargement for these 3 years will total 41 billion euros. This burden will simply add to pressures for CAP reform already building within the current EU.

Other Considerations

Accession may also bring significant changes to land, labor, and capital markets in the new member countries, and these will also influence levels of commodity production and trade in the enlarged EU. Little analysis has been done on these questions to date.

As pointed out in the introduction, CEE agriculture now tends to be labor and land intensive. The results of such production practices are crop yields that are significantly lower than those in the EU and, in many of the CEEs, a higher share of labor employed in agriculture. Accession will bring pressures for change from several sources:

[1]CEE agricultural officials are convinced that the higher CAP prices and the anticipated inflow of investment will enable them to raise the productivity of their agricultural sectors.

Table G-6—Proposed base areas and reference yields for arable crops in the CEE candidate countries

Country	Base area			Reference yield		
	Candidate request	Original EU proposal	Final offer	Candidate request	Original EU proposal	Final offer
Czech Republic	2,401,845	2,221,844	2,253,600	4.20	4.18	4.20
Estonia	650,000	387,233	362,827	3.50	1.77	2.40
Hungary	3,653,353	3,553,200	3,487,792	5.04	4.26	4.73
Latvia	753,000	484,700	443,580	3.59	2.03	2.50
Lithuania	1,355,000	1,336,233	1,146,633	3.50	2.27	2.70
Poland	9,248,000	9,207,667	9,454,671	3.61	2.96	3.00
Slovakia	992,000	1,011,627	1,003,500	4.99	4.16	4.06
Slovenia	150,000	94,124	125,200	6.12	5.31	5.27

Source: Foreign Agricultural Service summary of EU Commission proposals; AgraEurope.

Table G-7—Dairy quotas-EU proposals versus candidate requests

Country	Candidate request			Original EU proposals			Final offer	
	Total	Deliveries to processors	Direct sales	Total	Deliveries to processors	Direct sales	Total	Reserve for 2006
				Tons				
Czech Republic	3,100,000	2,945,000	155,000	2,505,553	2,478,867	26,686	2,682,143	55,788
Estonia	900,000	810,000	90,000	562,633	484,800	77,833	624,483	21,885
Hungary	2,800,000	2,600,000	200,000	1,946,333	1,638,000	308,333	1,947,280	42,780
Latvia	1,200,000	900,000	300,000	489,474	405,167	84,307	695,000	33,253
Lithuania	2,250,000	1,700,000	550,000	1,459,000	1,174,333	284,667	1,646,939	57,900
Poland	13,740,000	13,176,000	564,000	8,875,000	6,956,333	1,918,667	8,964,017	416,126
Slovakia	1,235,900	1,147,000	61,800	946,150	932,150	14,000	1,013,316	27,472
Slovenia	695,000	556,000	139,000	463,333	422,700	40,633	560,424	16,214

Source: Foreign Agricultural Service summary of EU Commission proposals; AgraEurope.

Table G-8—Livestock ceilings: EU proposals versus candidate requests

	Czech Repub.	Estonia	Hungary	Latvia	Lithuania	Poland	Slovakia	Slovenia
					Head			
Ceiling for slaughter premia								
Adult animals								
Candidate request	530,000	106,600	480,000	145,000	335,000	2,021,000	260,000	163,000
Original EU proposal	424,911	80,500	202,199	124,320	367,484	2,034,309	204,062	125,107
Final offer	483,400	107,813	141,600	124,300	367,484	1,815,400	204,062	161,137
Calves								
Candidate request	131,100	79,300	480,000	75,000	290,000	1.017,000	60,000	22,000
Original EU proposal	179,733	73,700	104,713	53,280	244,200	1,200,625	62,841	53,617
Final offer	27,400	30,000	94,400	53,280	244,200	839,500	62,841	35,862
Ceiling for special beef premia								
Candidate request	305,000	50,000	245,000	75,000	154,000	2,200,000	80,000	95,000
Original EU proposal	231,595	35,580	143,000	70,200	150,000	857,700	78,348	77,921
Final offer	244,349	13,600	81,620	70,200	150,000	926,000	75,348	92,300
Ceiling for suckler cow premia								
Candidate request	230,000	2,000	300,000	25,000	62,000	1,500,000	50,000	150,000
Original EU proposal	90,113	637	133,200	2,021	10,043	453,314	39,708	49,067
Final offer	90,300	13,416	117,000	19,368	48,232	325,600	28,080	86,384

Source: Foreign Agricultural Service summary of EU Commission proposal; AgraEurope.

Table G-9—Per-hectare arable crop payments under alternative proposals

Country	Original EU proposal		Country requests		Final agreement	
	2006/07	2013/14	2006/07	2013/14	2006/07	2013/14
			Euros per hectare, current prices			
Poland	65.62	187.49	228.66	228.66	123.51	190.03
Hungary	94.44	269.83	319.23	319.23	194.74	299.60
Czech Republic	92.67	264.76	266.03	266.03	172.92	266.03

Source: ERS calculations based on official EU and candidate countries' proposals.

- The need to meet strict EU sanitary, phytosanitary, and animal welfare regulations will require substantial investment on the part of CEE farms and processing companies. These pressures have already led to investment and concentration in the processing sectors of the CEEs (see *Agricultural Outlook,* Dec. 2001). One can expect to see the same trends at the farm level. Smaller farms that are not able to make such investments will be forced out of business, and the result will be fewer, larger, and more capital-intensive farms. Further, the result will be a reduction in demand for agricultural labor.
- To the extent that accession brings higher income to CEE agriculture, land prices will rise. Land prices will rise even faster if all EU citizens obtain the right to buy CEE land (this issue is still under negotiation). Higher land prices will encourage more capital intensive production practices, and the result will be higher crop yields.
- After accession, the CEEs will be eligible for EU Structural Funds. These funds are targeted towards infrastructure improvements in regions of the EU whose average per capita GDP is less than 75 percent of the EU average. All the CEEs except Slovenia meet this criterion, and will therefore be eligible for these funds. These funds can total up to 4 percent of the recipient country's GDP. These funds could generate employment for workers who are released from agriculture. In addition, any resulting infrastructure improvements could raise the competitiveness of CEE agriculture by reducing the transactions costs of moving products from farm to market.
- Enlargement will make the CEEs much more attractive for foreign investors—in fact there has already been an increase in foreign direct investment in anticipation of enlargement. This too could generate higher non-agricultural employment, and ultimately higher incomes.

The potential impacts of accession on CEE factor markets have both supply and demand side implications. Any trend towards more intensive cultivation of CEE land will lead to higher yields and thus higher output. The upgrading of livestock production units and processing plants could enable CEE meat output to rise, even with higher production costs.

On the demand side, enlargement will bring more than 100 million new consumers to the EU. Currently most CEE consumers are poor, with the result that demand for high-value foods is limited to a small number of wealthy citizens in urban areas. Enlargement will bring higher prices for many foods, which will negatively impact consumers. But these negative effects could eventually be offset if accession brings higher employment and higher incomes to the CEEs. In the medium to long term, there could be significant opportunities to develop new markets for high-value foods.

Conclusions

There is no doubt that enlargement to include as many as 12 new members could profoundly change the shape of EU agriculture, and there will be consequences for U.S. agricultural trade with the EU. Enlargement will create both challenges and opportunities for U.S. agriculture. To the extent that enlargement brings higher incomes to CEE consumers, there could be new markets for high-value products. Depending on developments in the CEE livestock sectors, it could create new markets for soybean products. At the same time, potential challenges may not be as great as some might fear. U.S. corn exports to Eastern Europe have already virtually stopped, and accession to the EU will not change that. A beef hormone ban on the part of an EU-25 will not affect that market, since U.S. beef exports to Eastern Europe are currently negligible.

But potential opportunities this article has identified for U.S. agriculture are closely linked to developments in the CEE livestock sectors. And the ultimate impact of enlargement on CEE livestock production depends on a number of factors that have not yet been fully analyzed.

The final compromise regarding direct payments will have some effect on the CEE beef sector, but not much on pork or poultry. Most important for the future of CEE livestock are the likely changes in primary factor markets—land, labor, and capital.

At least equally important are the impacts of enlargement on the EU budget and the likely pressures for CAP reform. Throughout the negotiations, EU member governments became increasingly concerned about the cost of absorbing 10 or 12 new members. These costs will almost certainly intensify pressures for a much more drastic reform of EU agricultural policy than was contained in Agenda 2000. A significantly reformed CAP could have major consequences for U.S.-EU agricultural relations.

Appendix—Overview of U.S. and EU Commodity Programs

Dairy

United States

The two major Federal dairy programs are the milk price support program and the Federal milk marketing orders. Under the milk price support-purchase program, the Commodity Credit Corporation (CCC) will buy at the support purchase prices any butter, cheddar cheese, or nonfat dry milk that meets specifications. Support purchase prices are set to ensure that manufacturing milk prices average at least the support price for milk. Milk marketing orders are established to help create orderly marketing conditions for the benefit of both milk producers and dairy product consumers. The milk marketing orders establish different classes and prices for milk of different uses, and set minimum prices for the various use classes. Dairy market loss payments provide a price safety net for dairy producers. A monthly direct payment is to be made to dairy farm operators if the monthly Class I price in Boston (Federal Order 1) is less than $16.94 per hundredweight. Payments are to be made on up to 2.4 million pounds of milk per year per organization. The Dairy Export Incentive Program (DEIP) subsidizes exports of dairy products, removes products from the domestic market, and plays an important part in milk price support. Dairy products are also protected from import competition by high tariffs—the average U.S. tariff on dairy is 43 percent, and seven megatariffs apply (Gibson et al.)—and limited imports of dairy products are assured by tariff-rate quotas.

European Union

Products covered by the CAP dairy regime include fresh, concentrated, and powdered milk; cream; butter; cheese; and curd. Support mechanisms include tariffs and tariff-rate quotas on imports, export subsidies, and intervention buying of surpluses. A marketing quota on milk with stiff fines on over-quota production aims to prevent serious overproduction. Dairy producers may qualify for per-cow payments for suckler cows.[1] Consumption subsidies encourage use of milk and butter for certain groups of consumers and skimmed milk powder for feed. The dairy sector has eluded major reform, with only marginal reductions in the butter intervention price enacted in the 1992 reforms. The Agenda 2000 reform delayed cuts in dairy support prices until after 2005/06.

[1]A suckler cow is defined for purposes of the EU policy as a cow or in-calf heifer belonging to a meat breed or born of a cross with a meat breed, and belonging to a herd intended for rearing calves for meat production.

Meat and livestock

United States

Cattle, hogs, poultry, and sheep. U.S. government assistance to the (nondairy) livestock sector is limited to emergency measures approved for a specific scope and period of time to address the needs of producers suffering losses due to drought, hot weather, disease, insect infestation, flood, fire, hurricane, earthquake, severe storms, or other natural disasters. Such emergency measures were enacted under the Livestock Indemnity Program and the Livestock Assistance Program. When livestock producers are experiencing financial stress, USDA may purchase meats for domestic feeding programs to help strengthen prices. In 1999, payments were made to small hog producers to help re-establish their purchasing power under an infrequent use of Section 32 of the Agricultural Act of 1935. U.S. tariffs on imports of beef, pork, and poultry meat are low to moderate, and tariff-rate quotas provide for limited imports of beef at lower tariffs.

European Union

Beef and veal. The beef and veal regime covers both live cattle and meat, and uses both price support and direct payments to support beef producers' incomes. Price support mechanisms include intervention buying and storage, private storage aid, tariffs and tariff-rate quotas on imports, and export subsidies. Intervention purchasing is available only for certain quality grades. Producer payments have become a more important means of supporting incomes of beef producers following the 1992 CAP reform, and payments to beef producers have risen as price support has declined. Payments, or premia, are made on a per-animal, or headage basis, and include payments to producers to encourage beef production, to even out supply over the year, and to undertake less-intensive production, and to compensate for support price reductions. Under the Agenda 2000 reforms, the intervention price for beef is being reduced by 20 percent over 3 years beginning in 2000. The support price cut will be partially offset

by higher producer payments. Beginning in July 2002, intervention is replaced by private storage aid and "safety-net" buying-in triggered by low beef prices.

Pork and poultry. The pork and poultry regimes provided support primarily through border measures—import protection and export subsidies. Although there are provisions for intervention in the pork market, intervention is seldom used. There is no intervention for poultry. Price support for pork and poultry is provided by tariffs and export subsidies; tariff-rate quotas ensure minimum import access to the EU market for both commodity groups. Private storage aid may be offered to provide additional support to pork prices in times of surplus. The pork regime covers both live pigs and pork and processed pork products; poultry covers live poultry and poultry meat.

Sheepmeat. Sheep and sheepmeat producers are supported through a combination of price support and producer payments. Prices are supported through private storage aid when market prices warrant and import tariffs. Tariff-rate quotas ensure minimum import access levels for sheepmeat, goat meat, and live sheep and goats. Sheep producers receive additional support through annual premia for ewes, paid on a per-animal basis, and subject to limits. Producers in less-favored areas and who raised sheep in hilly areas receive additional per-animal payments, subject to limits. Export subsidies are available but seldom used.

Grains

United States

Producers of wheat, rice, and feed grains (corn, barley, oats, and grain sorghum) benefit from direct payments, counter-cyclical payments, the commodity loan program, disaster assistance, and subsidized crop and revenue insurance.

With full planting flexibility introduced in the 1996 Farm Act and retained in the 2002 Farm Act, many grain producers, who previously had to maintain their grain acreage to preserve commodity program benefits, could shift to other crops. Wheat is eligible for export subsidies under the Export Enhancement Program (EEP) program, but has not received EEP bonuses since 1995. Barley exports received a one-time EEP bonus in 1997. Average tariffs on grains and grain products are low.

Rice. The main government programs affecting rice producers are direct and counter-cyclical payments and the marketing loan program. Rice farmers also benefit from emergency and supplemental assistance. Tariffs on rice are low. Rice is eligible for export subsidies under EEP, but no EEP bonuses have been available for rice exports since 1995.

European Union

Grains are covered under the regime for arable crops. All grain produced within and imported into EU countries (wheat, barley, corn, rye, oats, sorghum, other minor grains, and some grain products) is covered (rice is covered under a separate regime). Grains are covered by a combination of support price, producer payments, and mandatory set-aside. The intervention price is the same for all grains covered by the regime. Grain intervention prices are being cut 15 percent under Agenda 2000. Grain producers receive compensatory payments to offset price cuts. Compensatory payments are paid to producers on a per-hectare basis, and are based on the average historical yield in the region. Producers are required to set-aside a portion of their land and receive a set-aside payment for area idled, but small producers are exempt from this requirement. There is a limit on total arable crops area, and penalties are assessed if area exceeds the limit. Additional support is provided by tariffs and export subsidies. In the Uruguay Round Agreement on Agriculture (URAA), the EU converted its previous variable levies to tariffs and further agreed that the duty-paid import price of grains would not exceed 155 percent of the intervention price. Export subsidies are also limited under the URAA.

Rice. A separate regime for rice is similar to the grains regime, but no set-aside is required, and a tariff-rate quota is in place as compensation for former exporting countries after the 1995 enlargement.

Oilseeds

United States

Soybean producers became eligible for direct and counter-cyclical payments in the 2002 Farm Act. Soybean producers benefit from marketing loan provisions of the commodity loan program, and subsidized crop and revenue insurance. Tariff protection for soybeans and soybean meal is zero or low, but imported soybean oil faces a moderate tariff.

Peanuts. Under the 2002 Farm Act, the peanut marketing quota system was eliminated and peanuts are treated similarly to "program" crops such as grains and cotton—with direct payments, counter-cyclical payments, and marketing loan provisions available to peanut producers. Farmers no longer have to own or rent peanut marketing quota rights to produce for domestic edible consumption. Compensation (a "buy-out") is provided to quota holders for elimination of the peanut quota system. All farmers with a history of peanut production during 1998-2001, whether quota-holders or not, are eligible for fixed direct payments and for counter-cyclical payments based on an established target price.

European Union

Oilseeds (rapeseed, sunflowerseed, soybeans, and linseed for oil) are under the arable crops regime (see "Grains"), but differ in important respects from the grains program. Oilseed producers receive compensatory payments, but there is no price support—oilseeds trade within the EU at close to the world market price. Consequently, no export subsidies are required. The area of subsidized oilseed production is limited by the terms of the U.S.-EU "Blair House" Agreement, and oilseed producers (except small producers) are required to set aside a minimum 10 percent of their land to qualify for payments. There is a zero tariff on oilseeds and meal and a low or nominal tariff on vegetable oil other than olive oil.

Sugar

United States

The three main elements of U.S. sugar policy are the price support loan program, the tariff-rate quota (TRQ) import system, and supply control through marketing allotments. The loan program supports the U.S. price of sugar by making loans to processors of domestically grown sugarbeets and sugarcane. The United States establishes separate TRQs for imports of raw cane sugar and for imports of certain other sugars, syrups, and molasses. The tariff-rate quota system ensures that there is an adequate supply of sugar at reasonable prices for both consumers and producers. U.S. commitments under international trade agreements, including the North American Free Trade Agreement (NAFTA), affect the level and allocation of the TRQs. Tariffs on over-quota imports of sugar are high. The United States also operates the Refined Sugar and Sugar-Containing Products Re-Export Programs to allow U.S. refiners to be competitive in global refined and sugar-containing products markets. The 2002 Farm Act authorized USDA to establish marketing allotments for sugar.

European Union

Sugar production is supported through a mixture of price supports and supply controls. Intervention buying of the processed products (raw or white sugar) supports the price of the raw commodity (mostly sugarbeets). Support is limited by a production quota. Producers also pay to dispose of surpluses on the export market through a producer levy on sugar produced within quota. Part of the surplus production (so-called "A" and "B" sugar) is exported with subsidy, while the remaining "C" quota sugar is exported at the world market price. Imports are restricted by tariff-rate quotas, most of which are allocated to beneficiaries of preferential access agreements (African, Caribbean, and Pacific countries, under the Lome Convention; and India, under a similar arrangement).

Fruits, nuts, and vegetables

United States

Historically, Federal price and income support programs have not directly covered fruit, nuts, and vegetables. Marketing orders and marketing agreements are designed to help stabilize market conditions for fruit and vegetable products. The programs assist farmers in allowing them to collectively work to solve marketing problems. Industries voluntarily enter into these programs and choose to have Federal oversight of certain aspects of their operations. Marketing orders and agreements may:

- maintain the high quality of produce that is on the market;
- standardize packages and containers;
- regulate the flow of product to market;
- establish reserve pools for storable commodities; and
- authorize production research, marketing research and development, and advertising.

There are 36 active marketing agreement and order programs that collect assessment fees from handlers to cover operation and administrative costs of the

programs. Federal Marketing Orders are currently in force for potatoes, onions, tomatoes, citrus, dried fruit, tree nuts, grapes, pears, peaches, cherries, avocados, nectarines, kiwifruit, apricots, papayas, cranberries, melons, and olives. Fruit and vegetables also benefit from crop insurance, ad hoc Federal disaster assistance, western irrigation subsidies, and tariffs.

European Union

The fruit and vegetable regime includes all fruit and vegetables grown in the EU, with the exception of potatoes, peas and beans for fodder, wine grapes, olives, and bananas, for which separate arrangements operate. Market prices are supported by a combination of tariffs (including higher tariffs in season for some products), TRQs, and export subsidies. A system of compensation for withdrawal of produce from the market acts as a safety net for certain perishable products in times of oversupply. Withdrawal is limited to a small group of commodities that include tomatoes, apples, oranges, and peaches. Processors of some products (tomatoes, citrus fruit, peaches, and pears) also receive processing subsidies to help defray the higher costs of buying EU products.

Cotton

United States

Many cotton producers benefit from direct and countercyclical payments, the commodity loan program, subsidized crop and revenue insurance, and market loss assistance payments. Cotton producers benefited significantly from the commodity loan program in 1999-2002, when prices were below the loan rate. Other policies that affect cotton producers' management decisions include planting flexibility, conservation programs, and environmental regulations. Cotton imports are regulated by TRQs, and over-quota tariffs are high. U.S. cotton exports do not receive export subsidies.

European Union

Cotton producers are guaranteed a minimum price ("guide price"), which is realized through production aid paid to cotton processors (ginning operations). Production aid makes up the difference between the (higher) EU guide price and the world market price, and is based on a system of guaranteed national quantities that limit the amount eligible for this aid. Producers are penalized for production in excess of these quantities. Tariffs on cotton are zero or very low. EU cotton exports do not receive export subsidies.