

UNITED STATES

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Real economic growth fell from 4.1 percent in 2000 to 1.2 percent in 2001, but is expected to increase to 2.2 percent in 2002 and 3.4 percent in 2003. Lower interest rates, more stable equity markets, the continued working down of excess business inventories and capacity, higher defense spending, the implementation of tax cuts, and slowly accelerating foreign growth should encourage stronger U.S. growth in 2002 and 2003. Food prices are expected to increase 2.6 percent in 2002 and 2.0 percent in 2003. The percentage of income spent on all food will likely average 10.4 through 2003, as household disposable personal income increases. Large and highly diversified firms produce a larger share of processed food, with the 20 largest firms in the business accounting for over half of the sector's value added. New food product introductions increased to 9,699 in 2001 as manufacturers responded to consumers' changing needs with convenience items and numerous organic, soy, and vegetarian entries. Growth in U.S. agricultural trade is projected as the world economy recovers. The outlook calls for healthy economic growth in most of Asia, Latin America, Africa, the Middle East, and the former Soviet Union. Planted acreage for the eight major U.S. field crops is expected to increase over the next 3 years, as net returns influence the level of plantings. U.S. firms that make or distribute food products have a variety of incentives to produce safe food products. The incentives include food safety laws and regulations, product liability laws, and market forces.

Macroeconomic Situation and Outlook

FIRST QUARTER GROWTH UNEXPECTEDLY STRONG. The U.S. has moved strongly into an economic expansion. Real GDP likely expanded around 4.0 percent in 2002Q1 after growing 1.7 percent rate in 2001Q4. Real consumption spending grew 3.1 percent in January and 6.6 percent in February. While strong gains in consumption in early 2002 were supported by economic fundamentals such as robust gains in personal disposable income and consumer confidence, consumption spending also benefited from an extremely mild and dry winter. Very favorable mild and dry weather boosted overall consumer spending, by increasing consumer income derived from the construction industry and encouraging more consumer purchases of spring-, auto-, and housing-related durable goods. March consumption growth was much slower according to the chain store surveys of the Bank of Tokyo-Mitsubishi and Lynch, Jones, and Ryan.

Durable goods orders were up 1.6 and 1.8 percent in January and February, indicating that the current mild recovery in manufacturing is likely to accelerate in coming months. Construction activity continued to surge, with the real value of total month-over-month real construction spending up 0.8 percent and 1.2 percent for January and February. Strong growth in housing starts in January and February indicated that residential construction further strengthened in late winter and early spring.

Business capital spending was likely slightly negative in 2002Q1, but much improved relative to the 13-percent fall in 2001Q4. Real inventories fell a record \$119 billion in 2001Q4 (seasonally adjusted annual rate). With inventories falling at a much slower pace in 2002Q1, inventory investment will provide a strong boost to 2002Q1 GDP. The foreign trade deficit likely expanded at a more rapid rate in the first quarter as a result of strong import demand for final sales purposes and increased foreign imports for inventory holdings.

2.2 PERCENT ECONOMIC GROWTH EXPECTED FOR 2002. As mentioned above, growth, especially in the first half of the year, will get a substantial boost from business efforts to rebuild inventory. Real business inventories fell approximately \$62 billion in 2001, lowering real GDP growth by approximately 1.5 percent. With the inventory-to-sales ratio currently low by historical standards and with final sales expanding, business firms will build inventory over the course of 2002 to avoid lost sales from inadequate inventory levels.

However, growth in final demand will be tempered by a lack of pent-up demand on the part of consumers and homebuyers entering the expansion. Real purchases of consumer durables and residential housing rose 6.7 and 1.5 percent, respectively, in 2001. Typically in recessions, with falling real income and increased employment uncertainty, consumer purchases of durables and homes fall. Consumer debt burdens are high and the personal savings rate low entering this expansion, but these negative factors are being offset in the near term by recent strong gains in consumer confidence. The share of personal disposable income devoted to principle and interest payments is near the historical high reached in 1986.

The personal savings rate out of disposable personal income is not expected to fall for any extended period in the 2002 or 2003 below the January and February 2.0 percent rate. With real long-term interest rates higher since fall 2001, consumer gains in discretionary income from mortgage refinancing will be significantly smaller in 2002. Consumer spending will get a boost from lower consumer tax payments in 2002. Second half growth will benefit from a moderate expansion in business fixed investment and increased labor hiring, which will raise personal disposable income and consumer confidence. Gains in personal disposable income are expected to be moderate overall for 2002.

Business fixed investment, which fell 3.1 percent in 2001, is not expected to grow at a moderate pace until the second half of 2002. Near-term business spending on plant and equipment will be constrained by current excess capacity, poor profitability in many industries, and continued tight lending standards. U.S. exports will continue to struggle under the weight of slow real foreign growth and a very strong dollar.

Inflation should remain very low in 2002. Declines in producer prices that occurred in the second half of 2001 and early 2002 were broad-based. In addition, growth in employment costs—as measured by the employment cost index—slowed in the second half of 2001.

Given excess capacity in most industries, and the very strong dollar, business profit margins will remain tight. Therefore, little cost-push pressures exist in the economy outside of the volatile energy area.

Oil prices surged in March, rising approximately \$5 a barrel. Energy prices are notoriously volatile and likely will retreat somewhat if Middle East tensions are reduced. Moreover, outside of the energy area, inflationary pressures are absent in the economy. Very low and negative inflation in late 2001 and early 2002 and expected continued strong productivity growth should keep inflation very low for the remainder of 2002. Inflation is likely to pick up mildly in 2003 in response to tighter conditions in labor and capital markets, coupled with stronger growth abroad.

Monetary policy tightening is expected to begin around mid-year or late summer. The combination of low inflation, substantially higher long-term interest rates since October, and continued heightened economic uncertainty is likely to encourage a gradual tightening of monetary policy over 2002. Relatively mild upward pressure on long-term interest rates is projected for the remainder of the year. More substantial upward pressure on interest rates is expected in 2003, resulting from stronger U.S. and foreign growth and more substantial Federal Reserve tightening of monetary policy.

ECONOMIC GROWTH OF 3.4 PERCENT EXPECTED IN 2003. U.S. growth is expected to strengthen substantially in 2003. U.S. growth prospects will be enhanced by reduced short-term constraints on growth, underlying strong productivity, and higher foreign growth. Current constraints on U.S. output include sharply reduced business profitability in 2001; substantial excess capacity in many industries, especially in manufacturing and telecommunications; and tight credit standards in corporate debt and equity markets.

Corporate profits of nonfinancial firms fell 18 percent in 2001, leading to reduced internal funds for investment and poorer coverage of exiting interest and principal obligations. Business profitability should increase as a result of moderate economic growth in 2002 and business restructuring. Capacity utilization in overall manufacturing in January and February stood at 73 percent, its lowest level since 1983, while capacity utilization for telecommunications manufacturers was at an all-time low. As firms work off current excess capacity, the business capital spending environment will improve as well. Increased business profitability will increase internal funds for business investment as well as enhance the ability of firms to raise outside funds for business expansion in debt and equity markets. The sharp easing of monetary policy in 2001 increased bank liquidity substantially and should encourage the expansion of business lending in 2002 and 2003. Given strong domestic and foreign competition in most industries, U.S. firms will continue to be under long-term pressure to invest in capital goods to improve long-term productivity.

Underlying business productivity remains strong. Despite the economic slowdown and recession in the second half of 2000 and 2001, nonfarm business labor productivity increased 1.9 percent in 2001. This indicates that underlying trend growth in labor productivity is probably in the 2.25 to 2.50 percent range. Foreign growth should

pick up substantially in 2003, improving the U.S. export situation. With most of the rest of the world lagging the U.S. business cycle and still adjusting to slow growth in their domestic demands, most of the foreign rebound resulting from a strong U.S. recovery will be delayed until 2003. Overall real foreign growth in 2003 is expected to be moderate around 3.2 percent. U.S. exports will also benefit from an expected mild fall in the dollar in the second half of 2002 and 2003.

Food Prices and Consumption

Consumers can expect modest increases in food prices, with the Consumer Price Index (CPI) for all food projected to be up 2.6 percent in 2002 and 2.0 percent in 2003, compared with 3.2 percent in 2001. The general inflation rate is forecast to increase 1.1 percent in 2002 and 2.5 percent in 2003. Food at home is expected to increase 2.5 percent in 2002 and 2.1 percent in 2003; while food away from home is forecast to increase 2.6 percent in 2002 and 2.5 percent in 2003. The largest price increases in 2002 are expected for fresh and processed fruits and vegetables. Labor, energy, processing, and marketing costs, which particularly affect prices for highly processed foods, are expected to rise faster than the cost of farm commodities and have a greater effect on retail prices than do fluctuations in prices received by farmers.

Four factors contributing to moderate retail food prices are (1) low overall inflation, which keeps costs related to food production and marketing from rising substantially (labor, packaging, transportation, and advertising); (2) the stable farm value of the food dollar (about \$.19 by 2002 and 2003); (3) a trend toward economies of scale in the agricultural and food processing sector, which will slow the increase in per-unit production costs; and (4) a competitive environment in the food processing, food service, and retail markets. Although consolidation and concentration in the U.S. meat sector has accelerated since 1996, research has shown that consumers have benefited from lower per-unit processing costs while price competition between beef, pork, and poultry remains strong.

Consumer expenditures for all food in 2001 reached \$860.3 billion dollars, and are expected to grow to \$885 billion in 2002 and \$890 billion in 2003. Sales of food away from home increased over 4.9 percent in 2001 and sales of food at home increased 4.7 percent. Rising incomes are chiefly responsible for the increased spending on food away from home, which should average 48 percent of total food expenditures in 2002 and 2003. In the second half of 2001, food-away-from-home sales shifted from full-service restaurants to limited-service eating places, as the slumping U.S. economy encouraged consumers to spend less money when eating away from home. In 2001, food sales at full-service restaurants increased 3.6 percent from \$134.4 billion in 2000 while food sales at limited-service eating places were up 4.0 percent, from \$127.5 billion.

The percent of the consumer food dollar spent away from home has risen from 39 percent in 1968 to 48 percent in 2002 and 2003. As disposable income increases to \$26,479 in 2002 and \$27,670 in 2003,

the percentage of income spent on all food is expected to average 10.4 percent in 2002 and in 2003. Per-capita caloric intake is expected to increase to 3,653 calories a day in 2003 from 3,445 in 1998, an increase of 6 percent. About 32 percent of caloric intake is from animal products with the remaining 68 percent from vegetable products.

Food Processing and Marketing

The food marketing system is an important part of the U.S. economy, accounting for over 15 percent of total GDP and directly employing one-fifth of the nation's labor force. By 2003, the food marketing system is expected to account for \$.82 for every dollar expended by consumers on food.

Most recent available data suggest that the number of U.S. food processing establishments has increased to 21,835 after a long-term decline, reflecting industries where the number of small processors has been increasing. Estimated sales amounted to \$529 billion in 2001 with sales projected to increase to \$555 billion in 2003. Large and highly diversified firms produce the lion's share of the output: The 20 largest firms in the business account for over half of the sector's value added. According to the March 18, 2002, Food Institute Report, new food product introductions increased to 9,699 in 2001 compared to 9,248 in 2000. Manufacturers responded to consumers' changing needs with convenience items and numerous organic, soy, and vegetarian entries, and nutrition/energy bars. In January 2002, new product introductions were off to their best start in years, up 35 percent over January 2001.

Merchant food wholesalers buy products from manufacturers and distribute them to retailers and food service establishments. Wholesaler sales reached \$409 billion in 2001. If recent trends continue, sales will reach \$417 billion by 2002. Rapid consolidation continues to reshuffle the leading general-line grocery wholesalers, with sales of the top four reaching \$52 billion in 2001. Companies from outside the United States are also purchasing U.S. wholesalers. For example, Royal Ahold, Zaandam, The Netherlands, an international retail and food service company recently purchased Alliant, a leading food service distributor in the United States. Both consolidation and international trends are expected to continue.

Food store sales reached \$484 billion in 2000 and are expected to reach \$523 billion in 2003. This excludes grocery sales from supercenters operated by mass merchandisers such as Wal-Mart or from warehouse clubs. Consolidation of food stores continues to be important. From 1999 to 2000, the share of total U.S. grocery store sales controlled by the four largest firms rose from 26.5 percent to 27.4 percent, while sales controlled by the top 20 retailers rose from 51.9 percent to 52 percent.

Sales by the food service sector reached an estimated \$358 billion in 2000 and are projected to increase to \$383 billion in 2002 and \$399 billion in 2003. Fast food sales accounted for 35 percent of all food service sales in 2000, down slightly from 1999. Fast food sales are projected to increase to \$140 billion in 2003, up from \$125 billion in

2000. Fast food restaurants are as full-service restaurants and supermarkets represent an increasing share.

Mergers and acquisitions in the food industry fell for the third consecutive year. There were 516 mergers and acquisitions in 2001, down from 641 in 1999 and well below the record 813 in 1998. Grocery wholesalers, supermarkets, and fruit and vegetable processors were among the only firms posting an increase in the number of acquisitions during 2000.

The U.S. foreign direct investment position in food processing affiliates abroad continued to grow steadily, reaching an estimated \$40 billion in 2000, up from \$37 billion in 1999, and it is projected to increase to \$47 billion in 2003. Sales of these U.S.-owned affiliates reached an estimated \$158 billion in 2001. U.S. exports of processed food reached \$30 billion in 2000, up 4 percent from 1999, following 2 consecutive years of decline in 1998 and 1999. Foreign direct investment in the U.S. food processing sector stabilized at an estimated \$24.1 billion in 2000. In contrast, processed food imports into the United States grew to \$36.8 billion in 2000 from \$34.7 billion in 1999.

Agricultural Production and Trade

Growth in the volume of global and U.S. agricultural trade is projected during the next 10 years, aided by ample global supplies and steady demand growth. Long-run demand prospects are improved by an anticipated widespread economic recovery starting in 2003. The outlook calls for healthy economic growth in most of Asia, Latin America, Africa, the Middle East, and the former Soviet Union; moderate gains in developed countries; and continued progress toward freer trade through ongoing unilateral policy reforms and existing multilateral agreements. Global and U.S. commodity prices and trade value have been weak in recent years because of large stocks resulting from weakened global demand and large production in the late 1990s.

CROP SECTOR. Planted acreage for the eight major U.S. field crops (corn, sorghum, barley, oats, wheat, rice, upland cotton, and soybeans) is expected to increase over the next 3 years before leveling off at 22.2 million acres in 2005. Planting flexibility of current agricultural legislation facilitates acreage movements by allowing producers to respond to market prices and returns, augmented by marketing loan benefits in low price years. Net returns, including marketing loan benefits, influence the aggregate level of plantings as well as the cropping mix in the near term when prices are relatively low.

The United States is the world's leading producer of soybeans, with 2001-02 production expected to be 2,907 million bushels, with an expected increase to 2,945 million bushels in 2002-03. With the U.S. wheat area trending downward and U.S. share of the world wheat market eroding, 2001-02 production is expected to be 1,958 million bushels, and 2002-03 production is forecast at 2,190 million bushels, down from 2,232 million bushels produced in 2000-2001. Corn is the most widely produced feed grain in the United States, with the U.S. a major player in the world corn trade market. Approximately 20 percent of the U.S. corn crop is exported to other

countries. Production in 2001-02 is expected to be 9,430 million bushels, followed by 9,735 million bushels in 2002-03, down from 9,968 million bushels produced in 2000-2001.

The domestic market is the main component of use for the major field crops. However, the export market is projected to increase in importance for several commodities. Gains in disappearance for wheat and sorghum are driven by exports, with U.S. trade showing larger absolute increases and growth rates than domestic demand. Exports of corn grow at faster rates than its domestic use, but absolute increases in domestic use are larger than trade grains, reflecting the relative size of its utilization categories. In contrast, projected increases in consumption for barley, oats, rice, soybeans, soybean oil, and soybean meal are driven mainly by domestic use.

Domestic demand for many crops is projected to grow slightly faster than population. Growth in domestic use of rice reflects a greater emphasis on dietary concerns and an increasing share of the U.S. population of Asian and Latin American descent. Gains in corn used for ethanol and corn sweeteners exceed population growth rates. Increases in domestic soybean crush reflect low soybean prices, but continue to reflect strong long-run growth in poultry production and demand for soybean meal.

LIVESTOCK SECTOR. Beef cattle inventories have continued to be held down by poor forage conditions over the past several years, which have encouraged more heifers to be placed in feedlots rather than retained for calving, even as cattle returns have improved. With the exception of the Corn Belt, most major cattle producing areas were hit with severe drought in 2000 and 2001. The length of the biological lag is likely to prevent beef cow herd expansion before 2004-2005. The beef production mix continues to shift toward a larger proportion of higher quality fed beef, with almost all steers and heifers being feedlot fed. Beef production also continues to move toward a higher graded product being directed toward the export and domestic hotel-restaurant markets. With U.S. beef production forecast to decline to about 25 million pounds in 2002 and 2003, exports are expected to be 2 to 3 million pounds each year.

The pork sector continues to transform into a more vertically coordinated industry with a mix of production and marketing contracts. Increased vertical coordination in pork production lowers production costs and improves pork quality and product consistency, allowing pork to increasingly challenge beef in the hotel-restaurant market as well as at retail. The United States is an important net pork exporter, in part reflecting environmental constraints in a number of competing countries that limit their production gains. Prospects for long-term growth markets for U.S. pork exports remain focused on Pacific Rim nations and Mexico. Canada will increasingly compete for trade in these markets. Pork production is forecast to be 19 million pounds in 2002 and 2003, with exports expected to be 1 to 2 million pounds each year.

The broiler and turkey industries have kept production costs from increasing at the full rate of inflation through technological advancements and improved production management practices, including tak-

ing advantage of economies of size through increasing horizontal and vertical integration. Further technological improvements are expected to occur, although efficiency gains are likely to be smaller than in the past. Competition in global poultry markets has held U.S. poultry exports to moderate gains. Asian imports are projected to expand, even with growing domestic broiler production in China. Increasing exports are also expected to Russia, Mexico, Central America, and the Caribbean. Total poultry production is forecast to be 37 million pounds in 2002 and 2003, with exports expected to be 6 to 7 million pounds each year.

Milk production grows despite slowly declining cow numbers as strengthening milk-feed price ratios, improved management, and dairy productivity gains push milk output per cow higher. Productivity gains in the dairy sector reflect the continued structural shift to larger sized operations as many traditional dairy farms, particularly smaller operations, will experience income stress caused by lower real milk prices and will exit the industry.

FARM INCOME. Net farm income has been maintained at levels near the average of the 1990s mostly because of large marketing loan benefits and additional funds provided to the sector in emergency and disaster assistance legislation in 1998 through 2000. These government payments balanced lower farm cash receipts during this period of generally low commodity prices. With current projections assuming no further ad hoc government assistance and with production flexibility contract payments scheduled to decline, farm income is forecast at \$40.6 billion in 2002, \$8.7 billion less than the \$49.3 billion in 2001. Farm income is projected to increase slightly after 2002, as farm prices are forecast to strengthen in 2003 and 2004. Further, production expenses for energy-related inputs, such as fuels and fertilizer, have been boosted due to price increases for oil and natural gas. The prices that farmers pay for fuels, including gasoline, diesel, LP gas, and natural gas, are typically more volatile than other farm input prices such as fertilizer, machinery, or general supplies. Despite some cash flow difficulties in the sector, a strong financial position achieved during the 1990s will help farmers through this period.

2002 FARM BILL DEBATE. Most provisions of the 1996 Farm Act expire in 2002, and provisions of the next U.S. farm bill are currently being debated in Congress. The current economic setting of low commodity prices is influencing the policy debate. In view of the large emergency payments in recent years, strong support exists for establishing a new income support program to complement the existing production flexibility contract and commodity marketing loan programs. A few observers are calling for implementing supply control programs such as a farmer-owned storage and acreage set-asides tied to higher commodity loan rates. A major difference between the 2002 farm bill debate and previous debates is the influence of international trade agreements. Concerns have been expressed about designing programs to be minimally trade distorting so that WTO goals can be met while addressing national agricultural policies related to market access limits, domestic support to agricultural producers, and export subsidies.

AGRICULTURAL TRADE. U.S. agricultural exports in fiscal year

2001 (October 2000 to September 2001) increased to \$52.8 billion in FY 2001 and are forecast at \$54.5 billion in FY 2002, up from \$50.8 billion in 2000. U.S. agricultural imports continued to increase in FY 2001 to \$39.0 billion from \$38.9 billion in 2000, and are projected at \$40 billion in 2002 and 2003. Total U.S. agricultural trade, as a result, is forecast to reach \$94.5 billion in 2002 and in 2003, up from \$91.8 billion in 2001. Rising European Union (EU) demand, to replenish reduced vegetable oil supplies and replace meat and bone meal, helped boost soybean and soybean meal exports. Import gains reflect the continued strength of the U.S. dollar and an expected increase in U.S. consumer spending as the economy recovers from recession.

World economic growth in 2002 is likely to fall to 1.1 percent from the expected 1.4 percent in 2001. The United States is expected to recover with stronger growth in the second half of 2002. Overall growth in the Asian developing countries is projected to be around 4 percent in 2002, significantly below historical rates. China and India continue to grow at very high rates, projected at 7.5 and 5 percent, respectively, in 2002. Significant slowdowns have occurred in South Korea, Taiwan, Malaysia, the Philippines, and Thailand. Indonesia has a foreign exchange constraint, which will likely slow imports. Japan, the countries of Latin America, Argentina, and Mexico are likely to remain in recession through 2002. The transition economies, including Hungary, Poland, and Russia, are expected to experience significant positive growth in 2002. Positive growth is also expected for Africa.

Global meat trade and U.S. meat exports are projected to grow moderately in the near term, a result of lower world economic growth. In Japan, there is expected to be some shift in 2002 away from beef and towards pork and poultry until concerns about the safety of beef subside. While there was a sharp decrease in beef consumption in 2000 and 2001 in some EU member states as a result of the bovine spongiform encephalopathy (BSE) and foot-and-mouth Disease (FMD), consumption has been recovering and will likely recover more in future years. In the response to the BSE crisis, an estimated 1 million cattle (1 percent of the EU herds) were slaughtered. About 4 million animals were slaughtered in the United Kingdom as a result of the FMD outbreak. These represented a small portion of the total livestock herd in the EU, so it is anticipated that total EU livestock production will not be significantly affected.

Exports of U.S. grains are expected at 85.45 million tons in FY 2002, down from 88.0 million tons in 2001. U.S. grain imports are projected to increase to 4.9 million tons in 2002, about the same as in 2001. Increased U.S. imports of agricultural products in FY 2002 and FY 2003 are attributed to larger demand for horticulture products, red meats, and sugar and related products. Among horticulture imports, fruits, vegetables, and wine and malt beverages lead in the year-to-year change. As has been the case in the past two decades, imported horticulture products are setting the pace for total U.S. food imports. The largest suppliers of U.S.-imported food are Canada, the European Union, Mexico and Latin America, Australia, New Zealand, and Southeast Asia.

The U.S. agricultural trade surplus in FY 2002 is forecast at \$14.5

billion, up from \$12 billion in 2000 and \$14 billion in 2001, but still below the \$27.4-billion surplus in 1996. The continued strength of the U.S. dollar and an expected increase in U.S. consumer spending is expected to increase the growth of U.S. imports. On the other hand, the competitive effect of this high dollar is a movement towards weakening U.S. agricultural export performance.

Food Safety

Each year in the United States, there are an estimated 76 million foodborne illnesses, 325,000 associated hospitalizations, and 5,000 deaths caused by microbial pathogens (that is, illness-causing bacteria, viruses, parasites, fungi, and their toxins). The bulk of these illnesses, or 62 million, are from *unknown* pathogens or agents that have not been identified and thus cannot be diagnosed. Of known pathogens, Norwalk-like viruses, *Campylobacter*, and *Salmonella* cause the most foodborne illnesses, whereas other pathogens, such as *Listeria monocytogenes* and *E. coli* O157:H7, are more likely to cause relatively more severe illnesses. Knowledge about known and emerging foodborne pathogens and their food vehicles is limited though expanding with advances in pathogen detection and identification techniques such as DNA fingerprinting and more rapid microbial tests.

In addition to pathogens, countries must deal with real and perceived food safety risks including a range of agents and issues such as pesticide residues, food additives, environmental toxins (for example, heavy metals like lead and mercury), persistent organic pollutants like dioxin, unconventional agents such as prions associated with bovine spongiform encephalopathy (BSE) in cattle (also known as “mad cow” disease—of which no cases have ever been confirmed in the United States), zoonotic diseases that can be transmitted through food from animals to humans (for example, tuberculosis), and foods produced with certain practices such as irradiation or animal products produced with the use of growth hormones or antibiotics. Scientists generally agree that food safety risks are low, though highest for foodborne pathogens such as *E. coli* O157:H7.

Food safety is a concern for many reasons. Food safety poses societal costs to individuals/households in terms of pain, suffering, and medical care; to industry through product liability suits and additional processing techniques used to boost food safety; and to regulatory and public health sectors for disease surveillance and outbreak investigations. The Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA) estimates that medical costs, productivity losses, and the value of premature deaths for diseases caused by five foodborne pathogens is \$6.9 billion each year in the United States (table 1). Food safety concerns can also hinder international trade of agriculture products and can be intertwined with other concerns. For example, international disagreements about food containing ingredients from genetically modified organisms (GMOs) and the labeling of these foods comprise a complex mixture of concerns including concerns about food safety, ethical issues, and the uncertain long-term impact of these foods on the environment.

INCENTIVES TO PRODUCE SAFER FOOD. U.S. firms that make or distribute food products have a variety of incentives to produce safe food products. These incentives generally take the form of adverse consequences for firms responsible for selling pathogen-contaminated food. The basic components of this incentive system in the United States are:

1. *Food safety laws and regulations:* Firms that violate federal, state, or local food safety laws or regulations may be subject to various penalties imposed by courts or government agencies, including fines, product recalls, and temporary or permanent plant closures.
2. *Product liability law:* Firms found responsible under product liability law for contaminated food products that made people ill may have to pay financial compensation to the plaintiffs as well as punitive damages. Firms also pay court costs and legal fees, regardless of most outcomes.
3. *Market forces:* Firms risk losing their business reputation, market share, and sales revenue if consumers become aware of safety problems with a firm's products.

Regulatory Incentives

In the United States, there are three main agencies with regulatory jurisdiction over food safety. The Food and Drug Administration (FDA) of the Department of Health and Human Services (DHHS) has oversight of animal feeds, medicines, and all domestic and imported food intended for human consumption (except for meat and poultry and some egg products). The USDA's Food Safety and Inspection Service (FSIS) has jurisdiction over these other food products. Meanwhile, the Environmental Protection Agency (EPA) has oversight of drinking water, pesticides, toxic substances, and wastes.

These three agencies have instituted many food safety regulations, some dating back nearly 100 years. Recent actions include a new, expanded food safety effort announced by former President Clinton in 1997 called "A National Food Safety Initiative," which is coordinated by these three agencies plus the U.S. Centers for Disease Control and Prevention (CDC) in the DHHS. In 1996, a new U.S. rule required federally and state-inspected meat and poultry processors and slaughterhouses to adopt a Pathogen Reduction/Hazard Analysis and Critical Control Point (PR/HACCP) system to identify potential sources of food safety hazards and establish procedures to prevent, eliminate, or reduce these hazards. While this rule covered biological, chemical, and physical hazards, the emphasis was on controlling contamination from microbial pathogens. In particular, these establishments were required to:

1. develop a HACCP plan to identify and control food safety hazards in their products,
2. meet applicable pathogen reduction standards,
3. conduct microbial testing to determine the adequacy of sanitary dressing procedures used in slaughter operations, and
4. establish and follow written sanitary standard operating procedures.

Since this rule was adopted, other HACCP rules have been proposed or instituted for other food commodities such as fish/fishery products and juice, and there will likely be continued application of

HACCP regulations to other categories of foods and food products. HACCP prerequisites often incorporate techniques such as Good Manufacturing Practices (GMP) and Good Agricultural Practices (GAP). Meanwhile other actions are underway to fine-tune the existing regulations and to strengthen the government's ability to enforce food safety regulations.

In addition to the increased use of HACCP, U.S. policymakers have increasingly turned to the use of food safety information, such as labeling and education programs, to influence producer and consumer behavior. In general, labeling is not used as a standard tool in the United States to alert consumers about inherently unsafe food. Instead, mandatory labeling of food is generally geared to solve problems of asymmetric or missing information or to promote a social welfare goal. For example, raw meat and poultry packaging must have a label with safe handling instructions. In voluntary labeling decisions, private firms seek out attributes that are attractive to consumers and voluntarily provide label information about those attributes when the benefits of doing so outweigh the cost. For example, a product may be labeled that it has been pasteurized.

Food safety education programs are often a more appealing policy tool to industry because education elicits voluntary rather than mandatory changes in behavior and therefore tend not to cause abrupt market disruptions. Food safety education for consumers provides them with information about how to reduce their risks of foodborne illness. Two examples of U.S. government-sponsored food safety education programs are the USDA's "Thermify the Thermometer" (designed to encourage proper meat cooking) and the EPA's *Citizens Guide to Pest Control and Pesticide Safety*. At the producer level, food safety education programs could have an impact both on the choice of safety-enhancing techniques used in production processes and the level of safety of the final product. A number of variables, including financial considerations, contribute to the efficacy of producer education programs. That is, food industries promote food safety awareness among consumers, either through labeling or education, when the benefits of doing so outweigh the cost.

Legal Incentives

Currently, legal incentives to firms to produce safer food are limited partly because of the high information and transaction costs necessary to prevail in court. The proportion of foodborne illnesses due to separate food-handling errors by firms and consumers is unknown due to the limitations of data. Much of the costs of foodborne illnesses caused by firms are borne by ill consumers or their households, shifted to other parties such as employers, private health insurers, and governments (and in turn, taxpayers), or borne by some combination of these groups. If food firms have sufficient product liability insurance to cover a lawsuit, the full financial impact may not be felt by the firm, though their premiums and those of similar firms may increase in the future. One implication of the current social allocation of foodborne illness costs is that food firms receive only limited feedback to produce safer food and therefore probably under-invest in food safety.

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It is unclear whether foodborne illness litigation will become more common in the future. Foodborne illness—and the reasons for litigation—may decrease if firms continue to improve quality control practices to ensure safer food. In contrast, improvements in pathogen detection and identification techniques may increase the chances that foodborne illnesses will be detected and linked to specific food products and firms.

Market Incentives

Some people believe that market incentives are the most powerful of the three components in the incentive system because firms cannot ignore major market incentives and remain profitable or viable. If consumers become concerned about the safety of a firm's products, consumers may avoid the implicated products, in turn decreasing sales revenue and potentially causing serious financial difficulties for the firm. Market share and stock prices may fall.

As with food safety regulations, private system approaches to reduce food safety risks are becoming more widespread and stringent. Private system approaches include self-regulation, vertical integration (to ensure quality/safety of inputs, for example), voluntary or mandatory HACCP systems, and third-party certification such as the International Organization for Standardization (such as, the ISO 9000 series or "EN 29000" in Europe). Effective implementation of these private sector approaches is a key to enhancing food safety. These private sector approaches are often intertwined with each other (for example, ISO standards often use HACCP and statistical process control principles with multilateral coordination mechanisms, such as Codex HACCP standards). In short, the incentive system and the public and private actions to ensure safer food are complex and intertwined. Food safety regulations are evolving alongside the precedents from food poisoning litigation and the development of new private approaches.

OUTLOOK FOR FOOD SAFETY: CHALLENGES AND STRATEGIES

Although, for the United States at least, there is no evidence that imported food, as a whole, poses higher food safety risks than domestically produced food, the globalization of the food supply means that new food safety risks can be introduced into countries (for example, emerging bacteria), previously controlled risks like cholera can be re-

introduced into countries, and contaminated food can be spread across greater geographical areas and cause illness worldwide.

In general, the set of food safety issues is changing—new foodborne pathogens are emerging and some are associated with new food vehicles. The list of countries where BSE has been identified is growing. Some people believe that other food-related issues pose significant human health risks, despite limited or inconclusive scientific evidence (for example, growth hormones in beef and antibiotic residues in animal products). These concerns may nevertheless reduce demand for these products and alter international food trade patterns. Policymakers, particularly in developed countries, are feeling increased pressure to guard or enhance the safety of their national food supply. The safety of international food trade has become increasingly important to industry, consumers, and policymakers.

What countries accept, in terms of food safety risks in food imports, depends on what countries want, which in turn depends on both their tastes and preferences for foods with different bundles of attributes, and on what they are willing and able to pay to avoid food safety risks. Accordingly, wealthier countries with more information about food safety risks (even if it may be sensationalized) not only demand increased year-round access to a wider variety of internationally traded foods but they also tend to demand more stringent food safety standards on both domestically produced and imported food and are generally willing to pay more for these higher levels of food safety. Trade effects can originate from consumers who reduce or stop buying imported foods because of food safety concerns or from governments that introduce food safety regulations that hinder trade. Regulations affecting international trade take the form of bans on imports or more stringent requirements for imports such as "test and hold" procedures or veterinary approval of foreign processors and producers.

Beyond dealing with the growing list of real and perceived food safety concerns, some future challenges for countries include dealing with different levels or types of food safety standards across countries. For example, one country might use a product standard while the trading partner uses a process standard. The issue of equivalence, that is, the capability of different inspection and certification systems to meet the same objectives, will continue to pose challenges in the next decade.

Table 1. Estimated annual costs due to selected foodborne pathogens in the United States, 2000

ESTIMATED ANNUAL FOODBORNE ILLNESSES¹

Pathogen	Cases Number	Hospitalizations Number	Deaths Number	Costs ² Billion US\$ in 2000
Campylobacter spp	1,963,141	10,539	99	1.2
E. coli O157:H7	62,458	1,843	52	0.7
E. coli, non-O157 STEC	31,229	921	26	0.3
Listeria monocytogenes	2,493	2,298	499	2.3
Salmonella	1,341,873	15,608	553	2.4
Total	3,401,194	31,209	1,229	6.9

Source: Economic Research Service, USDA. <http://www.ers.usda.gov/Emphases/SafeFood/features.htm#start>

¹ Data from the Centers for Disease Control and Prevention, *Food-Related Illness and Death in the United States*, <http://www.cdc.gov/ncidod/eid/vol5no5/mead.htm>.

² Costs include medical expenses, the value of forgone or lost wages for nonfatal foodborne illnesses, and an estimate of the value of statistical life for each premature death that varies with age at death.

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	Units	1998	1999	2000	2001	2002 ^E	2003 ^F
FOOD CONSUMPTION PATTERNS ^a							
Per capita caloric intake	Cal/day	3,545	3,606	3,653	3,633	3,649	3,653
From animal products	Cal/day	1,132	1,162	1,167	1,155	1,156	1,153
From vegetable products	Cal/day	2,413	2,444	2,486	2,478	2,493	2,500
Protein (% of calories)	%	15.4	15.4	15.4	15.4	15.4	15.4
Fat (% of calories)	%	32.8	32.8	32.8	32.8	32.8	32.8
Carbohydrates (% of calories)	%	51.8	51.8	51.8	51.8	51.8	51.8
INCOME AND FOOD PRICES							
Disposable personal income ^b	US\$/capita	23,032	23,708	24,889	25,945	26,479	27,670
% of disposable income for total food ^c	%	10.4	10.3	10.2	10.2	10.1	10.1
% disposable income, food away from home ^c	%	4.9	4.5	4.3	4.3	4.3	4.3
Food price index ^d	1990=100	121.4	123.9	126.7	130.7	134.1	136.7
General price index ^d	1990=100	124.7	127.5	131.8	135.5	137	140.5
Agriculture's share of retail food dollar ^e	%	22.0	20.0	20.0	19.0	19.0	19.0
POPULATION							
U.S. resident population, July 1, millions ^f	Millions	276.0	279.2	282.5	285.9	288.9	291.5
Urban population ^g	%	80.1	80.2	80.2	80.3	80.3	80.3
Nonurban ^g	%	19.9	19.8	19.8	19.7	19.7	19.7
Share of population in the following age groups ^f							
0–4 years	%	7.0	6.9	6.9	6.8	6.8	6.8
5–14 years	%	14.5	14.5	15.4	14.3	14.2	14.2
15–19 years	%	7.2	7.2	7.2	7.2	7.2	7.2
20–44 years	%	37.3	37.0	36.6	36.3	35.9	35.9
45–64 years	%	21.2	21.7	22.2	22.7	23.3	23.3
65–79 years	%	9.0	9.4	9.3	9.2	9.1	9.1
80–over years	%	3.7	3.3	3.4	3.4	3.5	3.5
Median age of population ^f	Years	35.2	35.5	35.8	36.0	36.2	36.2
Female labor force participation ^f	%	59.8	60.0	60.2	60.4	60.5	60.5
LIFE EXPECTANCY ^g							
Males	Years	73.9	74.1	74.2	74.2	74.2	74.2
Females	Years	79.4	79.7	79.9	79.9	79.9	79.9
FOOD INFRASTRUCTURE							
Trade capacity ^b							
Grain exports	1,000 Tons	73,100	89,600	88,750	88,010	85,450	na
Grain imports	1,000 Tons	5,100	5,300	4,500	4,908	4,900	na
Total food and agricultural trade	Million US\$	90,600	86,500	89,700	91,800	94,500	na
Total food and agricultural exports	Million US\$	53,700	49,100	50,800	52,800	54,500	na
Perishable products ⁱ	Million US\$	11,285	11,758	12,652	na	na	na
Fishery exports	Million US\$	2,303	2,889	2,909	na	na	na
Total food and agricultural imports	Million US\$	36,800	37,300	38,900	39,000	40,000	na
Perishable products ⁱ	Million US\$	11,570	12,855	13,510	na	na	na
Fishery imports	Million US\$	8,053	8,832	9,845	na	na	na
Port capacity ^j	Million Short Tons	na	na	na	na	na	na
Road access ^k	1,000 Miles	3,932	na	na	na	na	na
Rail access ^l	1,000 Miles	132	na	na	na	na	na
Power generation ^m							
Production	Quadrillion btu	72.6	72.5	72.5	72.5	72.5	72.5
Consumption	Quadrillion btu	94.6	96.6	96.6	96.6	96.6	96.6
Percent of population with refrigerators ^m	%	99.7	99.7	99.7	99.7	99.7	99.7
FOREIGN INVESTMENT IN THE FOOD SECTOR							
Inward FDI in the food sector, total ^o	Million US\$	22,026	16,717	na	na	na	na
From other PECC economies ^p	Million US\$	6,778	3,128	na	na	na	na
Outward FDI in the food sector, total ^q	Million US\$	35,074	36,125	na	na	na	na
To other PECC economies ^r	Million US\$	13,922	14,320	na	na	na	na
ROLE OF AGRICULTURE AND TRADE IN THE ECONOMY							
Agriculture as a share of GNP	%	1.1	1.1	1.1	1.1	1.1	1.1
Self sufficiency in grain, percent ^s	%	145	na	na	na	na	na
Self sufficiency in horticultural products ^t	%	105.0	na	na	na	na	na
POLICY TRANSFERS							
Consumer subsidy equivalents ^u	%	-4	-2	3	0	na	na
Total transfers (tax/subsidy) ^u	Million US\$	-5551	-2732	4852	43	na	na
MACROECONOMICS INDICATORS							
GDP growth ^v	%	4.3	4.1	4.1	1.1	1.6	3.1
Interest rate ^w	%	8.4	8.0	9.2	7.0	5.6	6.4

na = not available E = estimate F = forecast

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Sources:

- a. Source: U.S. Department of Agriculture, ERS, Baseline.
- b. Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Economic Indicators". Data for 2001 and 2002 are ERS estimates.
- c. USDA's Economic Research Service estimates food expenditures by families and individuals. Food expenditures include purchases from grocery stores and other retail outlets, including purchases with food stamps and Women, Infants, and Children Supplemental Feeding Program vouchers, and food produced and consumed on farms (valued at farm prices). Expenditures also include purchases of meals and snacks by families and individuals, and food furnished to employees. These estimates exclude government-donated foods and food paid for by government and business, such as foods donated to schools, meals in prisons and other institutions, and expense-account meals. Data for 2000-2002 are ERS estimates.
- d. Source: U.S. Department of Labor, Bureau of Labor Statistics. 2001 and 2002 are ERS estimates.
- e. Farm value percentage of consumer expenditures. Source: ERS' marketing bill series. 2001 and 2002 are estimates.
- f. Source: U.S. Bureau of the Census, "Current Population Reports" and unpublished data. 2001 and 2002 resident population data are estimates.
- g. Source: U.S. Social Security Administration, Office of the Actuary. "Trustees Report to Congress."
- b. Source: Contrade database of UN Statistics Division.
- i. Excludes nursery products.
- j. Waterborne commerce. Source: U.S. Army Corps of Engineers, "Waterborne Commerce of the United States," annual.
- k. Source: U.S. Federal Highway Administration, "Highway Statistics," annual.
- l. Source: Association of American Railroads, Washington, D.C., "Railroad Facts, Statistics of Railroads of Class I," annual and "Analysis of Class Railroads," annual.
- m. Source: U.S. Energy Information Administration, "Annual Energy Review."
- n. Source: U.S. Bureau of the Census, "American Housing Survey for the United States in 1993" (H-150-93). 1990 through 1992 and 1994 through 2002 are ERS estimates.
- o. Source: Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis. September 1997 and July 1993. Foreign direct investment position in the U.S. food processing sector on a historical-cost basis.
- p. Canada and all countries of Asia and the Pacific.
- q. Source: Survey of Current Business, U.S. Department of Commerce, Bureau of Economic Analysis. September 1997 and August 1994. Foreign direct investment position abroad on a historical-cost basis.
- r. Canada, Chile, Colombia, Peru, Mexico, and all countries of Asia and the Pacific.
- s. Source: ERS supply and use estimates. Includes wheat, rice, rye, corn, oats, barley and sorghum.
- t. Source: ERS supply and use estimates. Includes only fresh fruits and vegetables.
- u. Source: OECD.
- v. Chained 1992 dollars. Source: U.S. Bureau of Economic Analysis, "National Income and Product Accounts of the United States", and "Survey of Current Business".
- w. Prime rate charged by banks. Source: Board of Governors of the Federal Reserve System, "Federal Reserve Bulletin," monthly, and "Annual Statistical Digest."