

# An Integrated Global Marketplace

At the beginning of the 20<sup>th</sup> century, most of the world's food was eaten where it was produced – on subsistence farms and in local villages and towns. This was true in the United States, where my grandfather sold his milk and produce to local stores and neighbors in a small Vermont town. The last century, however, brought worldwide economic growth and development. Rapidly rising agricultural productivity and higher incomes led to integrated national markets for food and agricultural products. Today, this story of growth and development is being repeated around the world as consumers and farmers become part of an integrated global food market.

As incomes rise and food supplies become more secure, consumers' decisions about food become focused less on simple sustenance and more on greater choices, quality, and services. ERS research reveals that these income-driven changes in consumer demand, along with improved transportation, urbanization, and demographic shifts, are changing global food consumption patterns. These shifts have already profoundly changed global agricultural markets; for example, grain trade, which once dominated global agricultural trade, now represents only 30 percent of the agricultural products flowing through global markets.

The future of global food and agricultural markets is being shaped not only by changes in food consumption patterns, but also by equally important shifts in supply. In the 1990s, Argentina and Brazil emerged as a dynamic force in global soybean markets. More recently, the former Soviet Union has become an important competitor in global wheat markets, and China is a growing force in some fruit and vegetable markets.

What do these dynamic changes in global markets mean for Americans? For American consumers, these changes translate into seemingly limitless choices at the supermarket – choices that reflect the variety of food produced around the world, not just in the United States. For American farmers, a more integrated global marketplace means more opportunities to sell products – and more competition with farmers from other countries. And, for both groups, an integrated marketplace brings a set of new challenges, including those associated with food safety, as presented in the November 2003 issue of *Amber Waves*. Finally, these changes are also reflected in the agricultural trade balance, which has been declining since the late 1990s, raising questions about whether American agriculture is losing its competitive edge. A deeper look at our agricultural trade balance in this issue of *Amber Waves* suggests that the answer is no. Trade is a two-way street, and, in an integrated global marketplace,

rising imports of food and agricultural products reflect American consumers' desire for choice, quality, and service, just as exports from American farms support richer diets and greater choices in other countries around the world.



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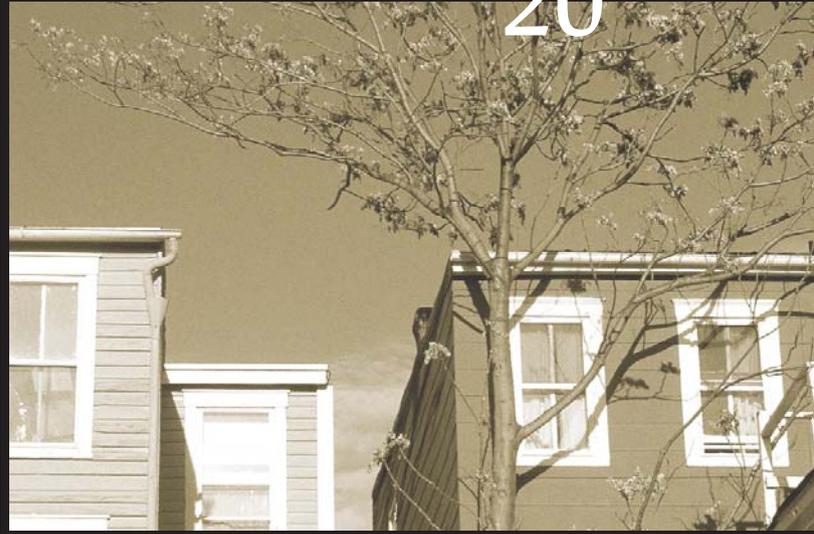
## FEATURES

Have Seed Industry Changes  
Affected Research Effort?

Jorge Fernandez-Cornejo and David Schimmelpfennig **14**

Anatomy of Nonmetro High Poverty Areas:  
Common in Plight, Distinctive in Nature

Calvin L. Beale **20**



Crop variety research and development have contributed to the unprecedented crop yields experienced by U.S. farmers since the 1930s. As the seed sector becomes increasingly dominated by large private firms, will the intensity of research effort decrease?

Poverty declined in the 1990s, particularly in rural and small-town nonmetro areas. Still, over 400 nonmetro areas had poverty rates of at least 20 percent in 2000. What socio-economic factors characterize these high-poverty areas, and what kinds of policies will help them?

## FINDINGS

### 4 MARKETS AND TRADE

- Marketing Could Boost the U.S. Sheep Industry
- Volume Production Keeps Floriculture Prices Low
- Russia Changes Global Market for Livestock Products

### 6 DIET AND HEALTH

- Got Milk? Implications of Generational and Aging Effects
- Juries Award Higher Amounts for Severe Foodborne Illnesses
- How Many U.S. Households Face Hunger... and How Often?

### 8 RESOURCES AND ENVIRONMENT

- Assessing Farm Household Well-Being—Beyond Farmers and Farm Income
- Science and Technology Hold Promise for Developing Countries in the 21<sup>st</sup> Century
- U.S. Increasingly Imports Nitrogen and Potash Fertilizer

### 10 RURAL AMERICA

- Booming China Trade Presents New Challenges for Rural America
- Rural America at a Glance
- Rural Governments Face Public Transportation Challenges and Opportunities

The Elephant Is Jogging: New Pressures for Agricultural Reform in India

Maurice R. Landes

28

The U.S. Trade Balance... More Than Just A Number

Alberto Jerardo

36



Endowed with rich land, water, and labor resources, India's agricultural sector boomed in the last half of the 20th century. Now, however, the ag sector is facing new pressures to meet the demands of a growing middle class. Are producers and policymakers poised to respond to these pressures?

The United States has been a net exporter of agricultural products since 1959, an uninterrupted span of 44 years. This surplus may turn into a deficit in the next decade. What does this turnabout say about the competitiveness of U.S. agriculture?

**12 DATA FEATURE**

Economics of the Food and Fiber System

**42 INDICATORS**

Selected statistics on agriculture and trade, diet and health, natural resources, and rural America

**46 GLEANINGS**

Snapshots of recent events at ERS, highlights of new publications, and previews of research in the works

**48 PROFILES**

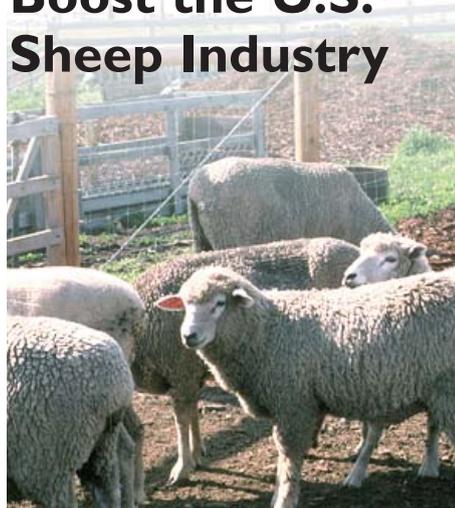
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*See inside back cover*



## Marketing Could Boost the U.S. Sheep Industry



Bob Nichols, USDA/NRCS

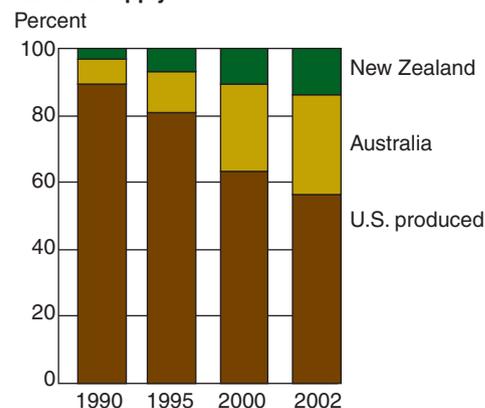
The U.S. sheep industry is in the midst of a long-term decline. The reasons are many: reduced wool demand, low lamb meat prices, losses to predators, and labor shortage. Despite these concerns, demand for lamb meat has remained steady, and imports have increased to meet U.S. consumer needs. The trend of declining domestic supply and increasing imports could be reversed if the industry pursued a different business model. The experience of Australia and New Zealand shows that aggressive marketing and diversification of demand offer hope for the industry's recovery.

Survey data indicate a lack of a broad consumer base, and little success has been achieved in promoting and differentiating U.S. lamb from other meats. The U.S. sheep industry focuses on high-valued cuts for the domestic market, concentrated mainly in the Northeast and Western States because of their large immigrant populations. It has neither capitalized on market segmentation nor developed export markets. Most low-valued meat is rendered or made into pet food. What little is exported goes mainly to Mexico in the form of whole mutton carcasses. In contrast, beef, pork, and poultry markets are geographically dispersed with organized export markets. In addition, they have consumers of all ages and backgrounds who buy a wider variety of cuts.

Australia and New Zealand offer a model for industry success. Lamb marketers in those countries have waged very aggressive ad campaigns aimed at clearly distinguishing their product from, and defining it as superior to, those of its competitors. Their ads, appealing to customers outside their borders, tout the fresh, wholesome, free-range, grass-fed image. Imports from Australia and New Zealand now make up more than 40 percent of U.S. lamb and mutton consumption.

Australia and New Zealand lamb and mutton exports have grown and diversified. Both countries export to a wide range of markets, including traditional markets in the European

### Lamb imports are a growing portion of the U.S. supply



Union, the Middle East, and Papua New Guinea and newer markets in the United States, Southeast Asia, and Africa. With these diverse markets, a clear delineation among three market segments has emerged. High-priced prime lamb products sell in the developed economies, lower valued lamb products sell in developing economies, and low-priced mutton sells in both developed and developing economies for institutional catering and for further processing.  $\mathbb{W}$

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This finding is drawn from . . .

*Trends in the U.S. Sheep Industry*, by Keithly Jones, AIB-787, USDA/ERS, January 2004, available at: [www.ers.usda.gov/publications/aib787/](http://www.ers.usda.gov/publications/aib787/)

## Volume Production Keeps Floriculture Prices Low

The trend toward mass marketing of floral crops, while increasing convenience and affordability for consumers, is forcing the industry to restructure. Prices of fresh-cut flowers, bedding, and garden flowering plants have been generally flat since 2000, and short-term prospects offer scant relief. Now sold alongside common household products in supermarkets, home centers, and discount stores, floriculture crops are increasingly produced in large volumes.

These developments, although a boon to consumers, are subjecting floral crop growers to downward price pressures on what had been higher margin crops. Real wholesale prices have actually fallen in the past few years, particularly for cut flowers, which face unrelenting competition from cut flower imports. Bedding and garden plants, such as mums, geraniums, and impatiens, remain at 2000 wholesale prices, in part due to higher production volume.



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# Russia Changes Global Market for Livestock Products

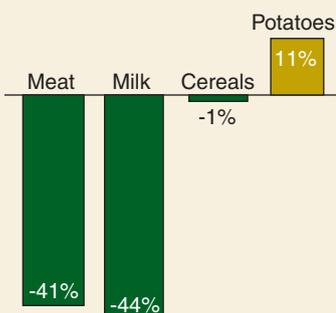


William Liefert, USDA/ERS

In moving from a centrally planned to a market economy, Russia experienced a dramatic drop in the consumption of high-value livestock products, such as meat, milk, and eggs. Per capita meat consumption, for example, fell from 165 pounds in 1990 to 90

pounds in 2000. The main reason for the decline was the elimination of massive government subsidies for livestock products that had helped boost production and consumption during the former Soviet era. Without these subsidies, producers could not sustain output levels, consumer prices rose, and demand fell. In addition, demand has shifted to goods and services of which consumers were starved during Soviet times, but that are now becoming more plentiful: fruits, vegetables, and packaged convenience foods, as well as consumer durables—such as automobiles, refrigerators, and televisions—and services ranging from legal and financial services to car repair and health clubs.

**Changes in per capita food consumption in Russia, 1990-2000**



Throughout the 1990s, floral and other ornamental crops achieved the fastest sales growth among U.S. crops. With a farm production value of \$14.4 billion in 2003, ornamental crops now rank fifth among the top eight agricultural sectors that gross at least \$13 billion in annual cash receipts, and trail only corn and vegetables among crops. The recent U.S. economic slowdown, however, not only flattened sales growth, but pushed down prices as well. To at least maintain former sales receipts, many producers boosted production, especially of bedding and garden plants, but low unit prices have squeezed profit margins across the industry. The weak economy, along with high labor costs and competition from imports, forced growers to cut costs and boost productivity.

Labor costs in the floriculture sector are among the highest in agriculture. The labor-intensive and seasonal nature of the ornamental crop industry makes it dependent on hired workers. Growers are responding to higher labor costs with automation, year-round greenhouse production, and outsourcing of seedling propagation, which is increasingly located in Mexico and Central America. But these trends have also raised capital costs and overall debt.

These changes could have important implications for global trade in meat, animal feeds, and high-value products. Incomes began to grow in Russia in 2000, following the 1998 financial crisis, and gross domestic product and consumer income are currently rising at about 5-6 percent per year. The income growth has generated a rebound in meat and other livestock consumption. But because the large subsidies of the former Soviet era encouraged overconsumption of livestock products relative to the economy's real wealth, per capita consumption is unlikely to return soon to the levels of that period. Nonetheless, the rise in livestock consumption provides export opportunities for U.S. producers.

Despite the drop in overall meat consumption, during the 1990s, Russia became a major meat importer, especially of poultry. In 2001, Russia imported 1.1 million tons of U.S. poultry, accounting for 45 percent of U.S. poultry exports. In spring 2003, however, Russia imposed a quota on its poultry imports, as well as restrictions on its beef and pork

imports. The poultry quota allows 1.05 million tons of imports a year, compared with Russia's total 2002 poultry imports of about 1.5 million tons. Russia's apparent motive behind these measures is to protect its poultry and other meat producers from import competition, given that, in recent years, Russia has been importing about a third of all domestically consumed beef and pork, and over half of its poultry. It remains an open question, however, as to whether Russian poultry producers will respond sufficiently to this added stimulus to satisfy the growing demand among Russian consumers for poultry meat. **W**

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**This finding is drawn from . . .**

*Changes in Agricultural Markets in Transition Economies*, by William Liefert and Johan Swinnen. AER-806. USDA/ERS, February 2002, available at: [www.ers.usda.gov/publications/aer806/](http://www.ers.usda.gov/publications/aer806/)

See also the ERS Briefing Room on Russia: [www.ers.usda.gov/briefing/russia/](http://www.ers.usda.gov/briefing/russia/)

Import competition has also been a catalyst for industry restructuring. More than half of fresh-cut flower sales are from imports, but there is hardly any import competition for finished flowering, bedding, garden, and foliage plants, except from Canada. Thus, in place of cut flowers, growers increasingly produce bedding and garden plants, which now account for half of total floriculture sales.

Mass marketing and volume production have led to a greater use of contract growing of ornamental crops. Contract growing reduces the market risk of ornamental farmers because sales are guaranteed in long-term contracts. Some buyers also ensure product quality by supplying such inputs as seeds, seedlings, fertilizer, and technical expertise. These emerging practices in the industry are encouraging specialization in product lines aimed at volume production, but they are also intensifying price competition. **W**

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**This finding is drawn from . . .**

The ERS Briefing Room on Floriculture Crops: [www.ers.usda.gov/briefing/floriculture/](http://www.ers.usda.gov/briefing/floriculture/)

got milk?<sup>®</sup>

## Implications of Generational and Aging Effects

As people age, their eating patterns change. The dishes of youth—foot-long hot-dogs, spicy Buffalo wings, and beer—are often replaced by broiled fish, baked potatoes, and high-bran cereal as a person's metabolism slows and health concerns become more central to well-being.



Whymilk.com

Generational effects also shape food choices. People born during the 1920s and 1930s generally grew up eating more typical "American fare"—eggs for breakfast, sandwiches for lunch, and pot roasts for dinner. Younger generations have had more exposure in their early years to McDonald's Happy

Meals and the cuisines of Southeast Asia and Latin America brought by America's more recent immigrants. "Generation X" tends to eat away from home more often than their grandparents do.

Aging and generational effects can influence spending on specific food groups. ERS researchers looked at the impact of both of these effects on per capita spending for milk, cheese, ice cream, and other dairy products bought in supermarkets, convenience stores, and other food stores. They found that both the aging of the U.S. population and the succession of the generations are working against at-home spending on dairy products.

Per capita, at-home spending on dairy products, adjusted for inflation, was estimated for eight generational groups, starting with group 1, who were 26-30 years old in 1982, and ending with group 8, who were 61-65 years old in the same year. The analysis followed each generational group over time.

## Juries Award Higher Amounts for Severe Foodborne Illnesses

U.S. food firms have a variety of incentives to produce safe products. Firms risk losing sales and reputation if consumers become concerned about the safety of the firms' products. Firms that violate Federal, State, or local food safety laws or regulations may face fines, recalls, or plant closures. And, finally, firms responsible for contaminated food products that make people ill can be sued by the people or their families. Many food poisoning lawsuits are settled out of court, and there is limited information on these settlements because of confidentiality provisions. Thus, the effectiveness of litigation in providing firms with incentives to produce safer food products has been largely unstudied.

To address this research void, ERS researchers analyzed a sample of 175 foodborne illness lawsuits resolved in court during 1988-97. Verdicts and award amounts in court cases are a matter of public record. The researchers found that less than a third of plaintiffs (55 cases) won compensation for their foodborne illness from food processors,

restaurants, or other food firms. The "expected award"—the average compensation including the cases in which plaintiffs lost as well as won—granted by juries to plaintiffs in such trials was \$41,888.

Injury severity is a major factor affecting an expected award. ERS researchers divided the 175 court cases into three severity categories: 6 cases involved a premature death, 60 cases involved nonfatal injuries severe enough to require hospitalization, and 109 cases involved less severe illnesses.

The expected award for a lawsuit that claimed a premature death as a result of a food poisoning was \$183,053, far higher than the expected awards for nonfatal illnesses.



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However, the award distribution was highly skewed, with the two largest awards accounting for 51 percent of the \$7.3 million total awarded in the 55 plaintiff victories. Thus, even if plaintiffs win compensation, they will likely receive less compensation than these estimates. The median award for the 55 plaintiff victories was \$25,560.  $\mathbb{W}$

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This finding is drawn from . . .

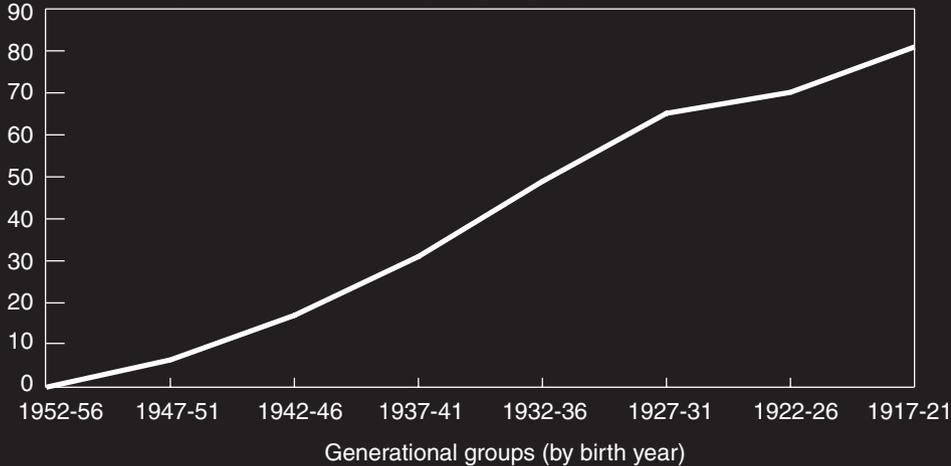
*Product Liability and Microbial Foodborne Illness*, by Jean C. Buzby, Paul D. Frenzen, and Barbara Rasco, AER-799, USDA/ERS, April 2001, available at: [www.ers.usda.gov/publications/aer799/](http://www.ers.usda.gov/publications/aer799/)

### Cases of severe food poisoning are more often won by plaintiffs and carry higher awards

Illness severity	Court cases during 1988-97 with award information	Percent won by plaintiff	Expected award per case
	Number	Percent	1998 dollars
Premature death	6	66.7	183,053
Hospitalized & survived	60	31.7	44,713
Other cases	109	29.4	32,563
Total	175	31.4	41,888

### The younger generation spends less per capita on dairy products consumed at home than the older generation

Additional cents per week relative to the youngest group



ending in 1995. In addition, we included 14 age intervals (ages 26-65) in the analysis to capture the aging effect independently from the generational effect.

The research found that older generations spend more on dairy products consumed at home than their children and grandchildren. For example, the second group spent about 6 cents more per capita per week than group 1,

while the oldest group spent about 80 cents more. The effect of aging was common to all generational groups. Per capita, at-home spending on dairy products falls as people age: compared with a 26-year old, those age 32-35 spend about 16 cents less per capita per week for dairy products, while those 65 and older spend about 58 cents less.

Taken together, these findings indicate that per capita, at-home spending on dairy products is likely to continue to decline. Population changes and food spending trends in the away-from-home-market must be examined to determine how total spending on dairy products in the U.S. will change over time. *W*

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**This finding is drawn from . . .**

*Income and Food Expenditures Decomposed by Cohort, Age, and Time Effects*, by Noel Blisard, TB-1896, USDA/ERS, August 2001, available at: [www.ers.usda.gov/publications/tb1896/](http://www.ers.usda.gov/publications/tb1896/)

## How Many U.S. Households Face Hunger...and How Often?

USDA monitors the food security of U.S. households—their consistent access to enough food for active, healthy living—through annual, nationally representative surveys. Statistics based on the December 2002 survey indicate that 89 percent of households were food secure throughout the year. The remaining 11 percent were food insecure at some time during 2002. These households were uncertain of having, or unable to acquire, enough food for all household members because they had insufficient money and other resources for food. Most food-insecure households avoided hunger by relying on a few basic foods, reducing variety in their diets, or getting emergency food from a food pantry. But 3.8 million households, 3.5 percent of all U.S. households, were food insecure to the extent that one or more household members were hungry at least some time during the year because they could not afford enough food.

What about that qualifying phrase, "at least some time during the year?" How often were people hungry in those 3.8 million households? Was this typically a rare, one-time occurrence, or do some U.S. households regularly face hunger? These are important questions for policymakers who design and manage programs to fight hunger. To answer these questions, ERS analyzed survey responses about how frequently households faced various food-insecure conditions during the year.

Findings include:

- About a third of the households that registered hunger "at least some time during the year" experienced the condition rarely or occasionally—in 1 or 2 months of the year. The remaining two-thirds experienced the condition in 3 or more months of the year, including about one household in four in which hunger occurred in almost every month.

- On average, households that were food insecure with hunger experienced this condition for a few days each month in 8 or 9 months of the year.

- As a result of these temporal patterns, the average monthly and daily prevalences of food insecurity with hunger were lower than the annual rate. During the 30-day period ending in early December 2002, 2.7 percent of U.S. households were food insecure with hunger, compared with the annual rate of 3.5 percent. Average daily prevalence during this period was probably between 0.5 and 0.7 percent. *W*

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**This finding is drawn from . . .**

*Household Food Security in the United States, 2002*, by Mark Nord, Margaret Andrews, and Steven Carlson, FANRR-35, USDA/ERS, October 2003, available at: [www.ers.usda.gov/publications/fanrr35/](http://www.ers.usda.gov/publications/fanrr35/)

Ken Hammond, USDA

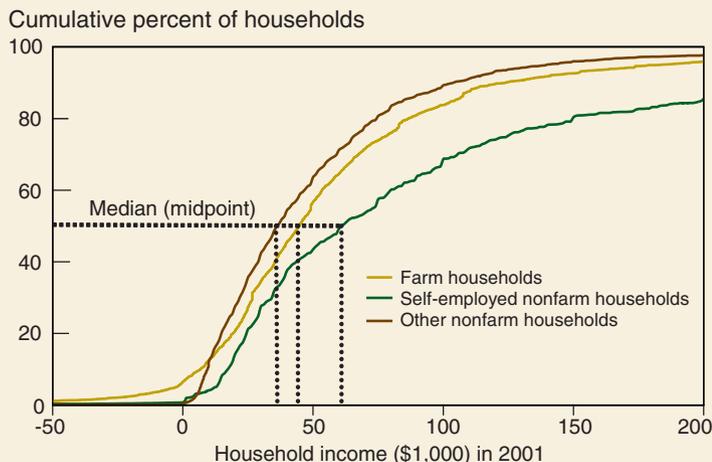
# Assessing Farm Household Well-Being—Beyond Farmers and Farm Income

Since its inception in the 1930s, farm policy has focused on achieving economic parity between farm families and other households. Although programs supporting farmers' incomes have been used for decades, the modern-day farm household also earns income off the farm and through investments.

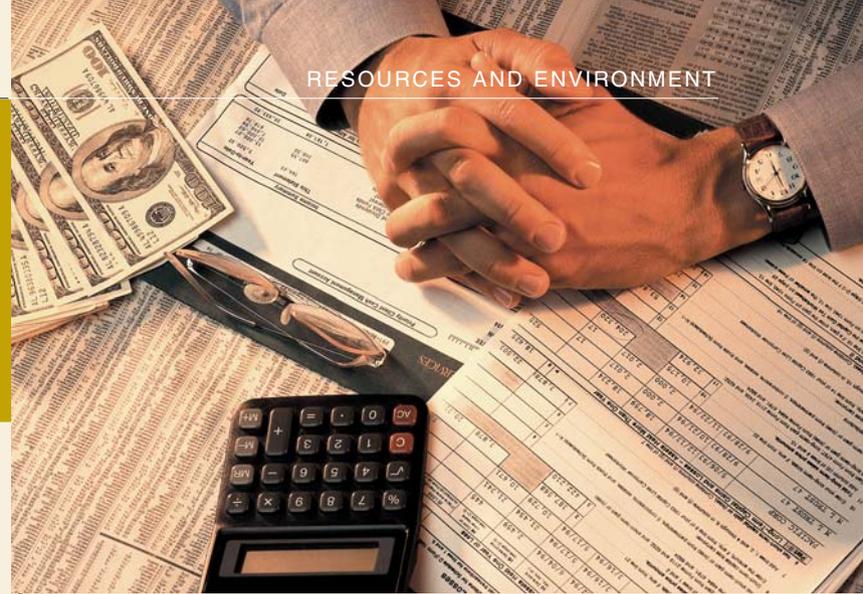
A comparison of how off-farm income and wealth affect well-being of both farm and nonfarm households provides an interesting perspective on the relevance of seeking parity for today's farmers. New data from USDA's Agricultural Resource Management Survey and the Federal Reserve's Survey of Consumer Finances allow comparison of America's 2 million farm households with two separate nonfarm populations that, depending on their economic focus, have much in common with farm households: 12 million self-employed nonfarm households (those running a business other than a farm) and 94 million other nonfarm households (those who worked for someone else, were retired, or otherwise did not work) in 2001.

Arranging the households in each of the three groups from lowest to highest income and wealth and comparing the resulting distributions yields useful insights. In particular, the median of each group—where half of the households have higher income or net worth (wealth) and half have lower income or net worth—is a logical starting point for comparison. Self-employed nonfarm households had the highest median income (\$62,000), followed by farm households (\$45,000) and other nonfarm households (\$37,000). The same ordering of incomes holds throughout the distribution—except at the lowest levels, where the order changes because farm households are more likely than nonfarm households to experience negative incomes. In 2001, negative incomes were reported for 6 percent of farm households. In contrast, far fewer nonfarm households, including self-employed households, had negative incomes.

## Farm and nonfarm households differ in terms of income...



Source: USDA's Agricultural Resource Management Survey and the Federal Reserve Board's Survey of Consumer Finances, 2001.



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Nonfarm households similarly lag farm households and nonfarm self-employed households when wealth distributions are compared. For example, the median net worth of farm households (\$339,000) and of self-employed nonfarm households (\$329,000) exceeded that of other nonfarm households (\$73,400). However, the ranking of farm households and self-employed nonfarm households switched near the median. Below the median, farm households' net worth tended to exceed that of self-employed nonfarm households. Above the median, farm households tended to have lower net worth than self-employed nonfarm households.

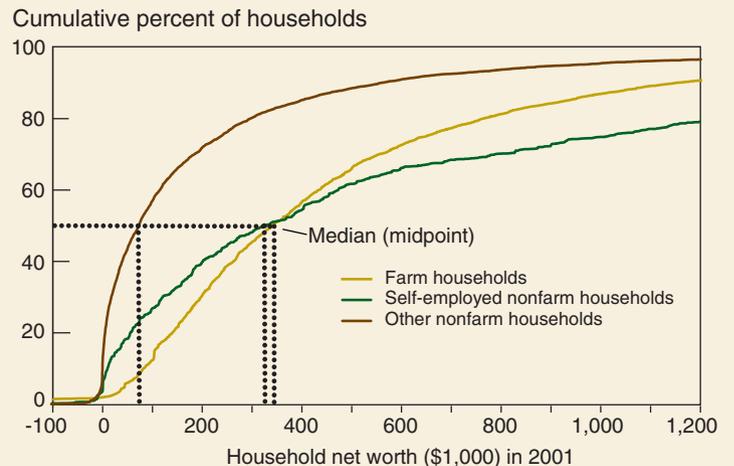
In effect, farm households are a diverse group. Although there are similarities to nonfarm households, any comparison is sensitive to whether income or wealth levels are used, as well as whether we compare farm households to nonfarm self-employed or the general population. As a result, the relevance and performance of farm policies that change the income and wealth distribution may be rated differently depending on the group, and the indicator, that is used for comparison purposes. **W**

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**This finding is drawn from ...**

The ERS Briefing Room on Farm Income and Costs:  
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## ...and even more in terms of wealth



Source: USDA's Agricultural Resource Management Survey and the Federal Reserve Board's Survey of Consumer Finances, 2001.

## Science and Technology Hold Promise for Developing Countries in the 21st Century

In the 1960s, there was growing concern about rapidly increasing populations and low agricultural production in developing countries. This concern prompted increased research investments by private and public institutions, including the Rockefeller and Ford Foundations, to develop and implement new farming technologies and practices in many of these countries. By the late 1960s, the development and spread of high-yielding varieties of rice, wheat, and maize, combined with greater use of fertilizers and irrigation, led to the "Green Revolution," a period marked by notable increases in crop yields for the major grains. While the Green Revolution brought increased production to many parts of the developing world, some countries did not benefit as greatly. For example, relatively little research focused on such crops as yams, cassava, sorghum, and cowpeas—staples in many parts of Africa. As a result, yield gains have been distributed unevenly among crops and regions, hindering the ability of many developing countries to achieve income growth and provide sufficient food for their populations.

New developments in science and technology hold promise for increasing agricultural productivity in developing countries in the 21st century. A host of technological advances, realized through public and (increasingly) private investments in research and development, are increasing agricultural production in developed countries. These include improved technologies for nutrient, soil, water, and pest management; precision agriculture (such as the use of global positioning satellites in farming); and agricultural biotechnology. Advances in livestock breeding and veterinary science will increase both the quantity and quality of animal protein available to consumers. Crops and animals that can tolerate a wider range of environmental conditions and offer consumers desired characteristics, such as nutritional value and extended shelf life, are being developed. Innovations in biological and information sciences have resulted in several emerging fields—such as nanotechnology, which refers to the ability to manipulate individual atoms and molecules—that may form the foundation for new technologies that will be used to improve sustainable agricultural production and protect ecosystem functions.

But, without the dissemination and adoption of new technologies, the full benefits of scientific breakthroughs will not be realized in developing countries. Successful research and technology transfer activities increasingly will depend on cooperative endeavors between developed and developing countries and between public and pri-



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private institutions. Developing countries must determine which technologies and advancements will address their unique economic, social, and environmental needs. And then these countries will benefit from working with developed countries and institutions to develop, adapt, and transfer productivity-increasing technologies to farmers in their countries. **W**

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**This finding is drawn from . . .**

The ERS Briefing Room on Agricultural Research and Productivity: [www.ers.usda.gov/briefing/agresearch/](http://www.ers.usda.gov/briefing/agresearch/)

## U.S. Increasingly Imports Nitrogen and Potash Fertilizer

Nitrogen, phosphate, and potash are essential plant nutrients. U.S. farmers use about 21 million tons of these nutrients each year in the form of chemical fertilizers, helping to sustain high U.S. crop yields. But the sources of the nitrogen and potash have changed markedly in recent years from domestic to foreign suppliers, making the U.S. increasingly dependent on fertilizer imports.

Today the U.S. imports over half of the nitrogen and 80 percent of the potash fertilizer used on its farms. The picture is different for phosphate, most of which comes from domestic production.

The changing levels and sources of fertilizer, which can be analyzed through a new database on the ERS website, have implications both for farmers and fertilizer providers. Farmers have benefited from lower nitrogen and potash prices because of the imports. But the competition has caused some U.S. fertilizer plants to close down. Also, the fertilizer distribution system has changed to accommodate the increasing imports.

The U.S. went from being the world's largest exporter of nitrogen fertilizer in the 1980s to becoming the largest importer in the 1990s. Domestic production of nitrogen fertilizer declined during the 1990s as the price of domestic natural gas (the primary source of nitrogen) increased because of demand for natural gas in the U.S. expanding faster than production. Imports of nitrogen—mainly from Trinidad and Tobago, Canada, and Russia, all with lower natural gas prices—quickly filled the gap.

The U.S. has long been a net importer of potash fertilizer. Domestic production of potash declined slightly in the late 1990s to less than 1 million tons per year, about one-fifth of domestic use. In the year ending June 2003, about 93 percent of potash imports came from Canada and 3 percent from Russia.

By contrast, the U.S. remains the world's largest exporter of phosphate fertilizer. The U.S. exported about 5 million tons (about half of total production) in the 12 months ending June 2003. About 37 percent of phosphate exports went to China, with smaller amounts to Australia, Canada, Brazil, Mexico, and other countries. But exports have declined by 25 percent since 1997 as production increased in other countries. Domestic use of phosphate has remained steady at just under 5 million tons per year. **W**

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**For more information** on U.S. fertilizer imports and exports, visit [www.ers.usda.gov/data/fertilizertrade/](http://www.ers.usda.gov/data/fertilizertrade/)



Lynn Betts, USDA/NRCS

## Booming China Trade Presents New Challenges for Rural America

The increasing prevalence of "made in China" labels signals greater competition for many businesses in the rural United States. U.S. imports from China totaled \$125.2 billion in 2002, up from \$19.3 billion (in constant 2002 dollars) in 1990. Trade with China grew even more in 2003. Preliminary data show that exports and imports had already surpassed their calendar year 2002 totals in the first 10 months of 2003. China's share of U.S. imports rose from 3 percent in 1990 to 12 percent in 2003 (based on January-October totals). Major rural industries, such as apparel, furniture, plastics, and metal products, face direct competition from China. These industries are an important part of the economic base in many rural U.S. communities. However, many other Chinese imports, such as toys and footwear, are displacing imports from other Asian countries; such products are not widely produced in rural America.

China's economic growth is also creating business opportunities for U.S. exporters. Between 1990 and 2002, U.S. exports to China



Fred Gale, USDA/ERS

grew from just \$6 billion to \$22 billion (in constant 2002 dollars). Only 3 percent of U.S. exports go to China, but that share has more than doubled since 1990. Dramatic growth in China's home construction, furniture, communications, automobile, supermarket, restaurant, education, and tourism sectors is increasing China's demand for imported goods and services. U.S. exports of industrial equipment, electronic components, aircraft, forest products, and animal hides have benefited the most from China's growth. China has been a boon for U.S. soybean producers, whose sales to China have exceeded \$1 billion annually in recent years, accounting for about half of U.S. agricultural exports to China.

Rural U.S. businesses may find many smaller market niches as China grows and opens its retail market to the outside world. U.S. apples, oranges, nuts, wines, cereals, snack foods, meat, and poultry are appearing more often on supermarket shelves and restaurant tables in

China. Specialized equipment, machinery, instruments, and technical expertise from the U.S. are in demand as China brings its manufacturing sector up to world standards. Chinese travel overseas is starting to bring extra business to rural U.S. destinations.

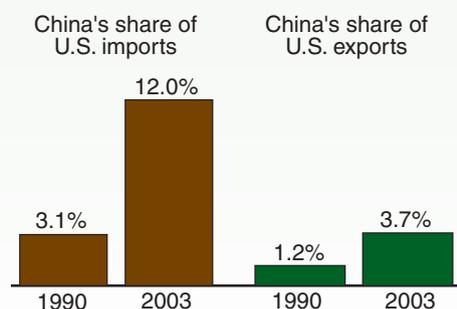
China's exports of basic items like clothing, shoes, toys, and household items benefit consumers in both rural and urban areas by keeping prices low. Additionally, many U.S. businesses benefit from lower costs of imported components, machinery, and equipment. **W**

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**This finding is drawn from . . .**

"How Does Growing U.S.-China Trade Affect Rural America?" by Fred Gale, *Rural America*, Vol. 17, No. 4, USDA/ERS, Winter 2002, available at: [www.ers.usda.gov/publications/ruralamerica/ra174/ra174i.pdf](http://www.ers.usda.gov/publications/ruralamerica/ra174/ra174i.pdf)

### China's share of U.S. trade, 1990-2003



Data for 2003 are for January-October. Source: World Trade Atlas data derived from U.S. Bureau of the Census statistics.

## Rural America at a Glance

During the 1990s, the U.S. experienced the longest economic expansion on record, with higher earnings and less poverty. Rural areas shared in the Nation's prosperity, leading demographers to declare it the decade of the "rural rebound." However, manufacturing went into a downturn in late summer 2000, and in March 2001, the economy slipped into an 8-month recession. Despite a

continuing soft job market, rural areas fared better than urban areas in 2002, with higher job growth and lower unemployment. An analysis of ongoing changes in rural areas helps in assessing strategies to enhance economic opportunity and quality of life for rural Americans.

Overall effects of the 2001 recession on rural areas were mild compared with earlier recessions. Nonmetro employment stayed about level from 2001 to 2002, while metro employment fell. However, the effects were not uniform. Employment levels rose significantly in many nonmetro counties, particularly in the Northeast and the West, while

falling in others. Employment losses in rural areas in the South and Midwest were largely a reflection of declines in manufacturing and mining. Average weekly earnings for nonmetro workers were \$543 in 2002, about 80 percent of the \$685 metro average. Nonmetro earnings, however, increased 1.4 percent during 2001-02, compared with 0.9 percent for metro earnings.

The sharp drop in exports in 2000, induced by a very strong dollar and sluggish world growth, contributed to a sharp decline in manufacturing jobs even before the recession started. Manufacturing employment has continued to drop despite recent export

## Rural Governments Face Public Transportation Challenges and Opportunities

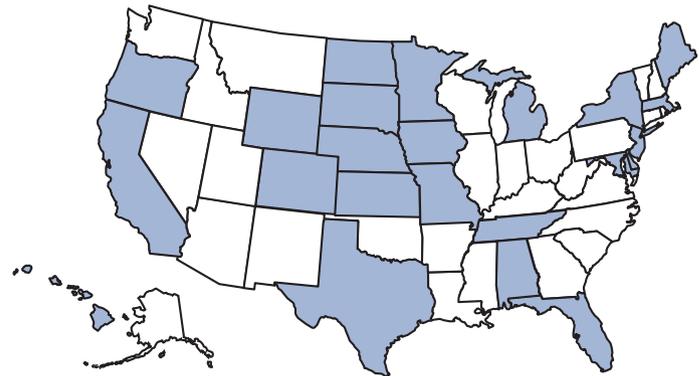
Poor rural households are three times more likely than nonpoor rural households to be without a vehicle. Public transportation serves about 60 percent of all rural counties, including 28 percent with limited service. For low-income rural residents, long commutes and lack of transportation are barriers to working. Limited transportation options also isolate the rural poor from government services and programs designed to lift them out of poverty. To address some of these challenges in rural areas, the Federal Government is providing public transportation through the Job Access and Reverse Commute (JARC) program.

Congress created the JARC grant program in 1998 to complement the 1996 welfare reform act. Administered by the U.S. Department of Transportation, JARC's aim is to transport recipients of Temporary Assistance for Needy Families (TANF) and low-income residents to jobs, training, and other social services. JARC also encourages development of transit services in new areas or expansion of existing services by complementing the transportation assistance from service agencies, such as those providing health care, education, and child support to rural residents.

A recent ERS study found that JARC services were successfully implemented in rural areas. Existing partnerships among local human service providers (such as social service agencies and job training organizations) led to cost sharing and expanded ridership as well as strengthened transit service. Funding from many sources, including Federal, State, and local governments, as well as human service program funds and transit fares, helped to ensure a viable rural transit service. ERS researchers concluded that local and State governments have opportunities to successfully develop and implement rural transit services to serve new locations and to expand existing services (such as bus routes and van service).

Many local communities and States face challenges in implementing the program. Like most rural transit systems, JARC service in nonmetro communities often has high per rider costs due to long distances and low population densities. Funding disruptions at the national, State, and local levels also threaten sustainability of transit service and create

### The rural Midwest is well served by public transit



■ Above-average service      □ Below-average service

Source: Community Transportation Association of America.

public perceptions of service unreliability. Administrative reporting requirements can also delay transit implementation, and electronic reporting systems are often not feasible due to incompatibility with system capabilities in many rural areas. Simultaneous implementation of welfare, workforce training, and transit programs resulted in initial implementation slowdowns and contributed to frequent staff turnover from bus drivers to case workers. Future success of the program in terms of job placement and retention will largely depend on employer involvement in local recruitment and community outreach. *W*

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The ERS Briefing Room on Rural Transportation:  
[www.ers.usda.gov/Briefing/Transport/](http://www.ers.usda.gov/Briefing/Transport/)



Eyewire

increases, disproportionately affecting rural communities. The steep decline in manufacturing jobs seen in 2001 had subsided by early 2003, with job decline at 4 percent in early 2003. Still, from the onset of the manufacturing downturn in August 2000, the share of manufacturing jobs lost was higher in nonmetro areas (19 percent) than in metro areas (14 percent).

Recently released 2001-02 population estimates show a leveling of the "rural rebound," a period in the 1990s when population in most nonmetro counties grew much faster or declined more slowly than in the 1980s. Rural population growth has slowed

since the mid-1990s, with a number of counties reverting to population loss. The South accounted for more than half of nonmetro population gains during 2001-02. Population growth in the nonmetro West was nearly twice the rate of the rest of rural America. *W*

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**This finding is drawn from . . .**

*Rural America at a Glance*, edited by Karen S. Hamrick, RDRR 97-1, September 2003, available at:  
[www.ers.usda.gov/publications/rdr97-1/](http://www.ers.usda.gov/publications/rdr97-1/)

# Economics of the Food and Fiber System

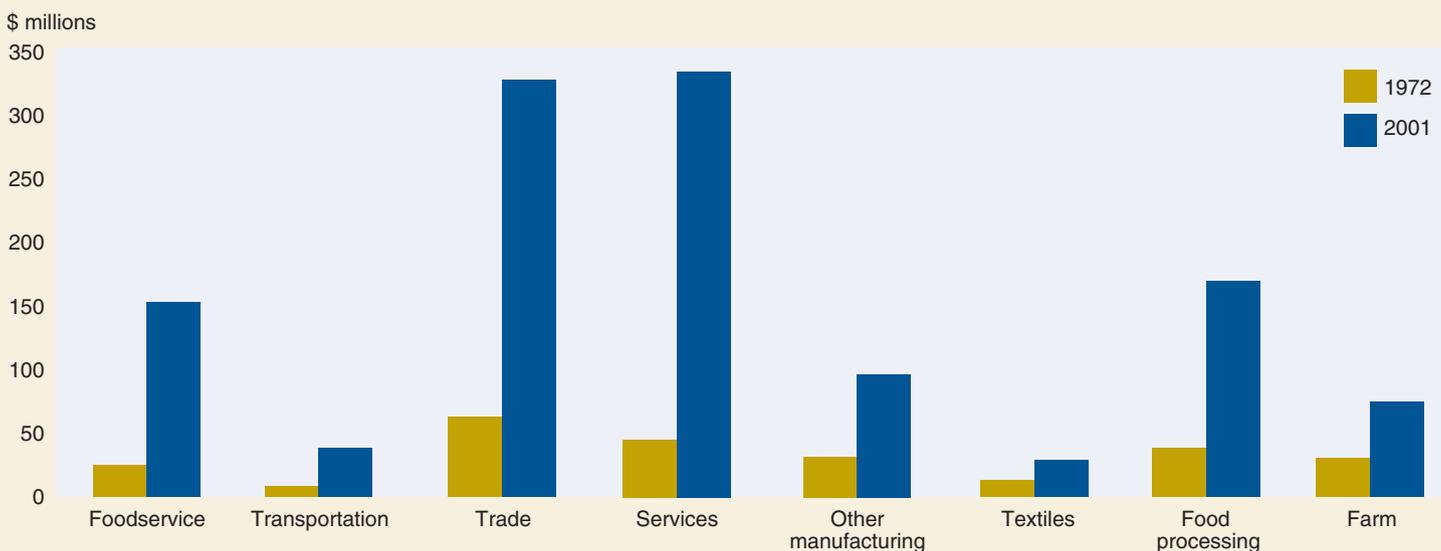
The U.S. food and fiber system (FFS) is a source of jobs and earnings for millions of American workers and a supplier of products worldwide. The food and fiber system encompasses a vast range from farm suppliers to fast food chains. The activities of farmers, processors, manufacturers, wholesalers, retailers, restaurateurs, and transporters are coordinated to satisfy the changing demands of households, businesses and government, and other nations. The total FFS economy added \$1.24 trillion to the Nation's gross domestic product (GDP), a measure of the Nation's wealth, and provided jobs for 23.7 million workers in 2001. Of the \$1.24 trillion, almost \$339 billion came from services, while \$334 billion came from trade, and \$73.8 billion from the farm sector.

Food and fiber GDP and employment increased almost every year between 1972 and 2001. Because the rest of the economy grew at a relatively faster pace, however, the food and fiber share of national GDP and employment declined. The FFS share of total GDP was 12.3 percent in 2001, down one-third from 1972. Similarly, employment generated by the system has trended downward from 23.4 percent of total employment in 1972 to 16.7 percent in 2001.

Changes in consumer demand for products and services affect both size and contribution, in jobs and value, of industries within the food and fiber system. Consumers now demand more services in their total food and fiber consumption shopping cart, and food consumed away from home has increased. In 2001, households spent 46 percent of their total food dollar in restaurants, compared with 34 percent in 1972. According to ERS research, spending in grocery stores accounted for 53.8 percent of the food dollar in 2001, down from 66 percent in 1972.

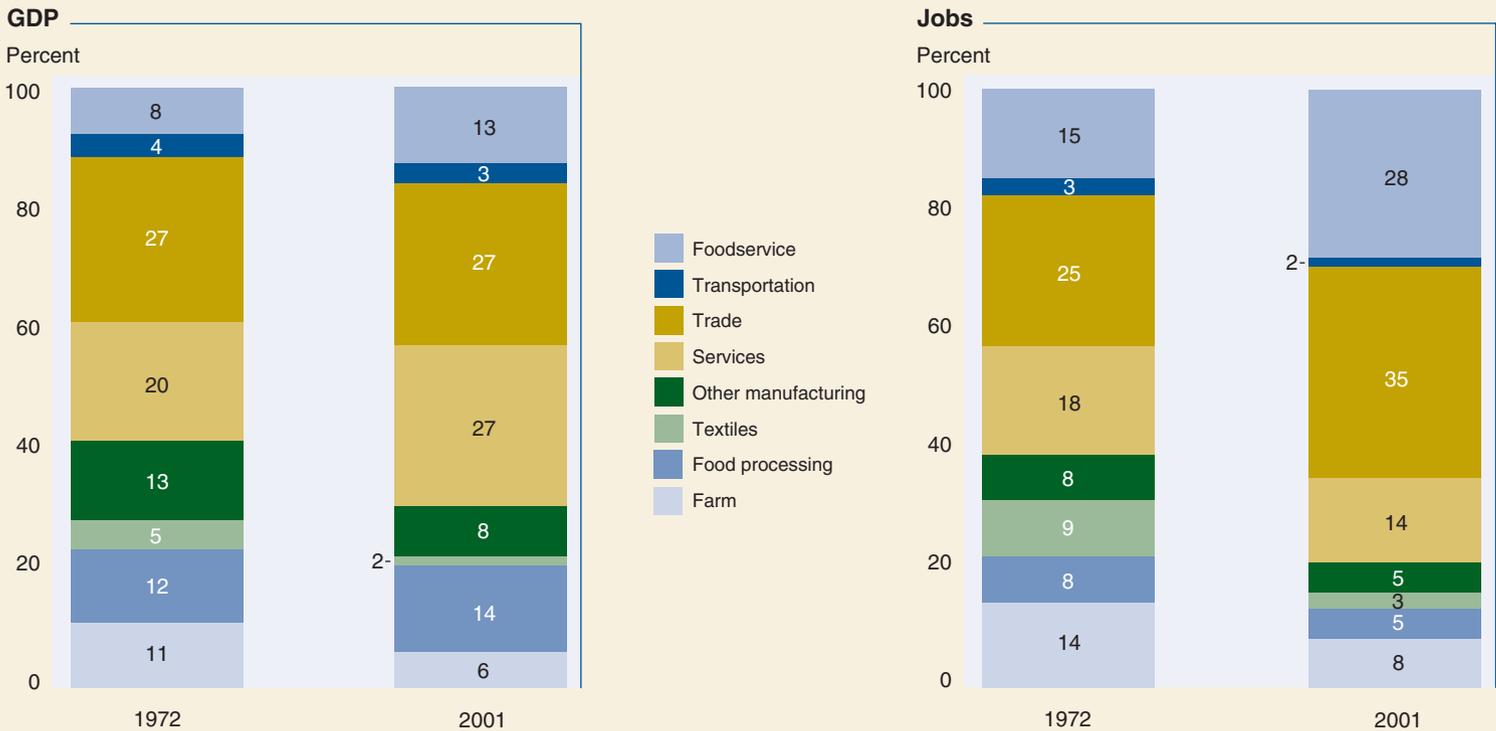
The core materials sectors—farm, food processing, textiles, and other manufacturing—generated 41 percent of food and fiber GDP and employment in 1972, falling to 30 percent of GDP and 21 percent of jobs in 2001. Wholesale and retail trade and the foodservice sectors grew, providing 63 percent of all food and fiber system jobs in 2001. The trade and service sectors generated the most GDP in 2001, almost 55 percent of the FFS total. In 1972, the trade sector (wholesale and retail) contributed the most to GDP, followed by services, other manufacturing, food processing, and farming. In 2001, services tied trade as the largest industry, and foodservice has become the fourth largest in the food and fiber sector.

**Services and trade are the largest contributors to the food and fiber system GDP, by industry, 1972 and 2001**





**Foodservice, trade, and other services have been the growth sectors of the food and fiber system**



Farm employment has remained steady since 1972, while the textile industry has fallen from the fifth largest generator of jobs to the seventh out of eight FFS industry sectors. Foodservice and trade have been the growth sectors for food and fiber sector jobs. The share of foodservice jobs in the FFS sector increased from 15 percent in 1972 to 28 percent in 2001.

The various sectors of the food and fiber system affect the economy differently. In some sectors, such as food processing, the share contributed to GDP was more than twice the share of

employment. In contrast, the relatively low-wage, labor-intensive foodservice sector job share was more than twice its GDP share in 2001.

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**For more information, see . . .**

*The U.S. Food and Fiber System*, at: [www.ers.usda.gov/briefing/foodmarketstructures/foodandfiber.htm](http://www.ers.usda.gov/briefing/foodmarketstructures/foodandfiber.htm)

**Note**

Every 5 years, the U.S. Department of Commerce publishes a new benchmark set of National Input-Output tables from which these estimates of economic activity in the food and fiber system are derived. This year, in addition to the benchmark, all industries have been redefined to match the new government-wide North American Industrial Classification System (NAICS), causing significant delays in the release of 2002 estimates of FFS GDP and employment. These FFS estimates are closely aligned with the methodology and accounting procedures of the U.S. Department of Commerce National Income and Product Accounts. Some fluctuations in the forthcoming annual estimates are expected because of this government wide data overhaul.

# Have Seed Industry Changes Affected Research Effort?

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Early in the 20<sup>th</sup> century, agricultural productivity growth came primarily from innovations in mechanical inputs that replaced farm labor. Starting in the 1930s, increases in land productivity were driven largely by high-yielding crop varieties in concert with fertilizers and chemical pesticides. Average U.S. corn yields rose sevenfold from 20 bushels per acre in 1930 to 140 bushels by the mid-1990s, while wheat, soybean, and cotton yields increased 2-4 times. This unprecedented growth in U.S. agricultural productivity owes much to a series of biological innovations embodied in major crop seeds—in particular corn, cotton, soybeans, and wheat. Such innovations resulted from investments in crop variety research and development (R&D), including plant breeding, genetic engineering, and other biotechnology. However, the seed sector has changed substantially in recent years, raising questions about whether the intensity of research effort on improved seeds and the contribution to productivity growth are being sustained.

Crop variety R&D over the past 30 years has moved from being predominantly public to predominantly private. Private sector firms have evolved from small operations to large integrated enterprises capable of variety development and seed production, conditioning, and marketing (see box "Seed Production, Marketing, and Distribution"). Greater protection of intellectual property rights for crop-seed innovations through patents and certificates has spurred private investment in general and may increasingly stimulate private R&D, even on such crops as soybeans where farmers have often saved part of the current crop for use as seed the following year. Still, ERS analysis shows that consolidation in the private seed industry over the past decade may have dampened the intensity of private research undertaken on crop biotechnology relative to what would have occurred without consolidation, at least for corn, cotton, and soybeans.

## Seed Production, Marketing, and Distribution

While different types of seed have distinct production processes and markets, the following description of how seeds are developed, produced, and distributed is generally applicable.

**Plant breeding**, including genetic engineering and other biotechnology, constitutes the foundation of the modern seed industry. By using science to create a unique and marketable product, plant breeders develop varieties embodying such improvements as higher crop yields, better crop quality, greater resistance to disease and pests, or traits aligned with regional agroclimatic conditions. Because of high costs, large-scale research and development (R&D) is limited to a few large companies, Federal agencies, and land-grant colleges and universities. High R&D costs require that varieties developed by the private sector be commercially viable, highly competitive, and well protected by intellectual property rights. Given the size of their R&D investments, plant breeders seek a central role in managing seed production, distribution, and marketing. The result has been extensive vertical integration of the industry.

**Seed production.** Seed firms with a marketable product typically contract out the production and multiplication processes to farmers, farmers' associations, and private firms. Breeders provide contract growers the *foundation seed* to produce either more foundation seed for continued R&D purposes, or *registered seed* for larger scale production purposes. Registered seed, in turn, is used to produce *certified seed* sold commercially to farmers. Certified seed conforms to standards of genetic purity and quality established by State agencies. The production of both registered and certified seed through contract growers is closely managed by seed firms to ensure that the desirable plant characteristics are carried through to subsequent gen-

erations, and to prevent open pollination, disease or pest infestation, or other problems that could affect product quality.

**Seed conditioning and inspection.** Once harvested, certified seed is *conditioned* for sale to farmers, a process that typically includes drying, cleaning, sorting, treating with insecticides and fungicides, and packaging for distribution and sale. Seed is also subject to inspection under various State programs to ensure that the final product meets quality standards. This may include tests for purity, germination, presence of noxious weed seeds, and moisture content.

**Seed marketing and distribution.** Large seed firms actively distribute their end product to regional, national, and international markets. Many firms also license or outsource marketing and distribution to private firms or individuals to improve access to local markets. Farmer-dealers, farmers' associations, company salespeople, and private wholesalers and retailers typically oversee local distribution. Different distribution channels are used in different regions and markets. In the Midwest, most corn seed is sold to farmers by farmer-dealers trained by the seed company. In the South, corn seed sales are channeled through agricultural supply stores. Also, seed companies often sell directly to large operations.

In addition to large integrated seed firms, the seed industry includes hundreds of companies operating under licenses and marketing agreements with the seed developers. Many firms are also involved in the production and distribution of public seed varieties. The absence of patents or plant variety protection (PVP) certificates on some seed varieties developed in the public domain allows individuals or firms to freely reproduce the seed.

## Private Spending on R&D Has Jumped

Both public and private research contributed to new agricultural technologies and productivity growth after World War II. However, the relative importance of the public and private sectors has been changing. Private sector spending on overall agricultural R&D in the U.S. jumped from \$2 billion in 1970 (expressed in 1996 dollars) to \$4.2 billion in 1996, while Federal and State spending has flattened out at around \$2.5 billion since 1978.

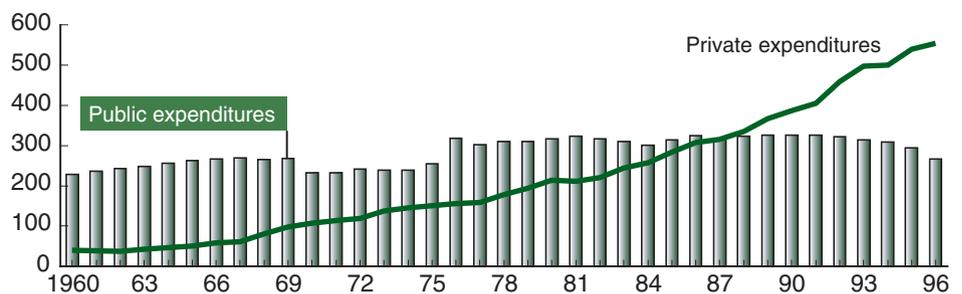
Expenditures on crop variety R&D alone show similar trends. Extensive private funding has been directed to research on marketable input and output traits of corn, soybeans, and cotton. In contrast,

the focus of public research (as shown by USDA's Current Research Information System) is shifting to minor crops and to

public goods such as environmental protection and food safety, areas less attrac-

### Private expenditures on crop variety R&D have exceeded those of the public sector since the late 1980s

\$ million (1996)



Source: Public expenditures are from the Current Research Information System, Cooperative State Research, Education, and Extension Service, USDA. Private expenditures are ERS estimates developed from various sources.

tive to the private sector because of lower profit potential.

Private spending on crop variety R&D increased 14-fold between 1960 and 1996 (adjusted for inflation), while public expenditures changed little. With the introduction in the 1930s of commercially viable hybrid seeds (higher yielding but degenerative, so farmers have to purchase new seed every year), R&D expenditures on corn began to shift from mainly public to mainly private. Private R&D expenditures on soybeans grew from almost zero to 25 percent of the total R&D on that crop between 1960 and 1984. In contrast, private R&D on wheat and many minor field crops, such as oats and barley, has been limited due to well-accepted public varieties and less profit potential.

### Protection of Innovations Has Spurred R&D

Behind the growth in private R&D on crop varieties has been the legal protection of intellectual property rights in seed innovations. Two principal forms of legal protection are plant variety protection (PVP) certificates issued by the Plant Variety Protection Office of USDA and patents issued by the U.S. Patent and Trademark Office of the U.S. Department of Commerce. Both grant private crop breeders exclusive rights to multiply and market their newly developed varieties. However, patents provide more control since PVP certificates have a research exemption allowing others to borrow the new variety for research purposes.

Ag biotech patents, mostly dealing with some aspect of plant breeding, have outpaced the general upward trend in patenting throughout the U.S. economy. During the 1996-2000 period, 75 percent of over 4,200 new ag biotech patents went to private industry (see "Ag Biotech Patents: Who's Doing What?" in *Amber Waves*, November 2003).



USDA technician checks on tiny experimental trees grown from lab-cultured cells to which researchers have given new genes.

Photo by Scott Bauer, USDA/ARS

ERS analysis indicates that patent protection in particular increased private research during the 1990s on soybeans. However, patent protection seems to have been used less for hybrid corn and cotton, likely because firms perceive less need to protect their investments in these crops. Hybrid corn produces high yields with the first crop, but yields on homegrown seed decline quickly, discouraging use of crop output for seed. In the case of cotton, seeds are removed from the cotton lint at a mill and are not generally returned to farmers.

#### Purpose of the 1970 Plant Variety Protection Act

"To encourage the development of novel varieties of sexually produced plants and to make them available to the public, providing protection to those individuals who breed, develop, or discover them, and thereby promoting progress in agriculture in the public interest."

The number of PVP certificates issued has grown rapidly since the 1970 Plant Variety Protection Act (see box "Purpose of the 1970 Plant Variety Protection Act"), suggesting that certification has a positive effect on private sector crop variety R&D. The increases were most marked for soybeans and corn, which together accounted for more than half of all certificates issued for field crops. Many of the certificates have been for genetically engineered (GE) varieties (see box "GE Varieties Are the Latest Innovation in Seed Development").

By the end of 2002, USDA had issued 2,584 PVP certificates (excluding certificates of foreign origin) for the four major field crops: 1,078 for soybeans, 648 for corn, 568 for wheat, and 290 for cotton. The private sector holds nearly all of the certificates for corn, 84-87 percent of those for cotton and soybeans, and two-thirds of those for wheat. In addition to new varieties protected by certificates, USDA and some land-grant universities have developed and released varieties that are freely available.

**GE Varieties Are the Latest Innovation in Seed Development**

In the past two decades, U.S. companies embraced agricultural biotechnology research, as evidenced by the jump in USDA-approved applications for field testing of genetically engineered (GE) varieties. The number of applications received by USDA's Animal and Plant Health Inspection Service for GE varieties increased from 9 in 1987 to a high of 1,206 in 1998. By mid-2001, over 7,600 applications had been received and 6,700 (88 percent) had been approved.

Most applications were for field testing new GE varieties of major crops: corn (over 3,300 applications), potatoes (761), soybeans (601), tomatoes (532), cotton (481), and wheat (209). Applications for field testing between 1987 and 2000 included GE varieties with herbicide tolerance (27 percent); insect resistance (25 percent); improved product quality, such as flavor, appearance, or nutrition (17 percent); virus resistance (9 percent); and agronomic properties, such as drought resistance (6 percent).

After extensively field testing a GE variety, an applicant may petition USDA to deregulate (grant permission to produce and sell) the prod-

uct. If, after extensive review, USDA determines that the new variety poses no significant risk to agriculture or the environment, permission is granted. As of mid-2001, USDA had received 79 petitions for permission to produce and sell GE varieties and granted 53 (18 for corn, 12 for tomato, 5 for soybean, 5 for cotton, and 13 for other crops). Thirty-six percent of the released varieties have herbicide-tolerance traits, 20 percent have insect-resistance traits, and 19 percent have product-quality traits.

Adoption of GE varieties in the U.S. has occurred rapidly despite consumer resistance in some other countries. Farmers planted herbicide tolerant (HT) soybeans on 75 percent of U.S. soybean acres in 2002, up from 17 percent in 1997. HT cotton, at 58 percent of planted acres in 2002, was up from 10 percent in 1997. Use of insect resistant Bt cotton expanded from 15 percent of cotton acreage in 1996 to 35 percent in 2002. In contrast, adoption of GE corn varieties has been much slower: farmers planted HT corn on only about 10 percent of corn acreage in 2002 and Bt corn on 24 percent.

**Seed Industry Consolidation**

The U.S. commercial seed market totaled \$5.7 billion in 1997, making it the world's largest, followed by China's (\$3 billion) and Japan's (\$2.5 billion). Moreover, the U.S. seed market is growing, mainly from farmers increasing purchases of seed from seed firms and reducing the planting of homegrown seed. Growth in the seed market has been particularly rapid for major field crops—corn, soybeans, cotton, and wheat—that together constituted two-thirds of the seed market value in 1997.

Until the 1930s, most commercial seed suppliers were small, family-owned businesses lacking the financial resources to pursue their own research. Plant breeding research was conducted primarily by the public sector (USDA, State agricultural experiment stations, and other cooperating institutions). The primary role of the private seed business was to multiply and sell seeds of varieties developed in the public domain.

With the development and rapid producer acceptance of hybrid corn in the first half of the 20<sup>th</sup> century and with greater protection of intellectual property rights, the amount of private capital

devoted to the seed industry and the number of private firms engaged in plant breeding grew rapidly until peaking in the early 1990s. Subsequently, seed industry consolidation prevailed, with

fewer firms capable of investments in research sufficient to develop new seed varieties. The share of U.S. seed sales controlled by the four largest firms providing seed of each crop reached 92 percent for cotton, 69 percent for corn, and 47 percent for soybeans in 1997 (see box, "Four largest firms..."). One contrast to this general trend was wheat, with more than 70 percent of the planted wheat in 1997 coming from varieties developed in the public sector. However, herbicide-tolerant varieties of wheat developed by the private sector are on the horizon, so the private proportion could increase.

**Is Consolidation Dampening Research Intensity?**

An indicator of research output (as opposed to expenditures, which is an input measure) is the number of applications to USDA for field testing of GE crop varieties. All newly developed GE crop varieties have to go through USDA-authorized field trials and receive USDA permission before being produced and sold (see box "GE Varieties Are the Latest Innovation in Seed Development"). The annual number of field-trial applications for GE crops

**Four largest firms dominated sales of seed for cotton and corn in 1997, and to a lesser extent for soybeans**

Crop and largest seed providers	Share of seed sales
	Percent
<b>Corn seed:</b>	
Pioneer Hi-Bred	42
Monsanto	14
Novartis	9
Dow/Mycogen	4
Four largest total	69
<b>Cotton seed:</b>	
Delta & Pine Land	73
Monsanto	11
CPSD <sup>1</sup>	6
All-Tex	2
Four largest total	92
<b>Soybean seed:</b>	
Pioneer Hi-Bred	19
Monsanto	19
Novartis	5
Dow/Mycogen	4
Four largest total	47

<sup>1</sup>California Planting Seed Distributors. Source: Corn and soybean shares are from Hayenga, M., *AgBioForum*, 1(2)(1998):43-55. Cotton shares are ERS estimates based on volume of seeds planted as reported by USDA's Agricultural Marketing Service.

increased from 9 in 1987 to 1,206 in 1998. Dividing the annual number of field-trial applications from private firms by private industry sales of seed for each major crop provides a measure of research intensity (applications per million dollars of sales) comparable across crops.

Calculations for corn, soybeans, and cotton indicate that as the seed industry became more concentrated during the late 1990s, private research intensity dropped or slowed. Was there a connection between the concentrating industry and the slowing intensity? Further ERS analysis, using econometric methods, found a simultaneous self-reinforcing relationship. Those companies that survived seed industry consolidation appear to be sponsoring less research relative to the size of their individual markets than when more companies were involved. This finding runs counter to the hypothesis that dominant firms in consolidated industries conduct more new product research than they otherwise would in order to expand the size of their markets (because of less risk of being outcompeted during the long time periods required to bring new products to mar-

ket). Also, fewer companies developing crops and marketing seeds may translate into fewer varieties offered. On the other hand, some multinational firms have recently spun off their agricultural divisions, in effect creating smaller new firms doing agricultural research. This reduction in concentration, after a time lag, could offset some of the prior dampening of research intensity.

### Public Research Could Stimulate Private Research

Total spending on crop variety R&D will continue to increase and to contribute to agricultural productivity growth, but possibly dampened relative to what might otherwise exist in the absence of seed industry consolidation. One factor that could offset the dampening is additional public investment in crop variety R&D. ERS analysis indicates that public research on corn, soybeans, and cotton has a stimulative effect on private biotech research. Thus, increasing public research on these crops would not only sustain the oft-documented high rates of return to public research, but could also promote additional private research. **W**



Peggy Greb, USDA/ARS

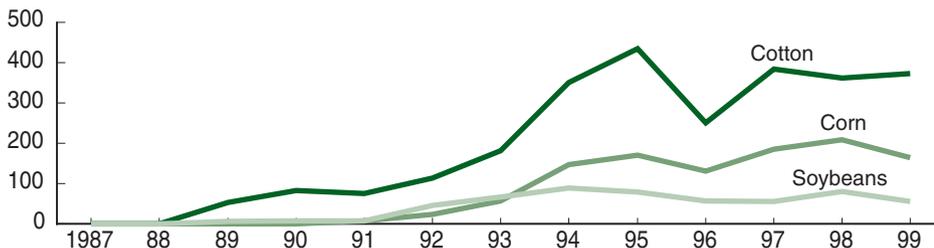
#### This article is drawn from . . .

*The Seed Industry in U.S. Agriculture*, by Jorge Fernandez-Cornejo, with contributions from Jonathan Keller, David Spielman, Mohinder Gill, John King, and Paul Heisey, AIB-786, USDA/ERS, January 2004, available at: [www.ers.usda.gov/publications/aib786/](http://www.ers.usda.gov/publications/aib786/)

"The Impact of Seed Industry Concentration on Innovation: A Study of U.S. Biotech Market Leaders," by David E. Schimmelpfennig, Carl E. Pray, and Margaret F. Brennan, in *Agricultural Economics* [in press]. Paper can be downloaded free from the Social Science Research Network website at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=365600#Paper%20Download/](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=365600#Paper%20Download/)

### Private research intensity on GE varieties of corn, cotton, and soybeans dropped or slowed in the late 1990s

Private applications for seed field trials /\$ million of seed sales



Consumer acceptance of GE crops in the European Union did not become a major issue until 2000.

Source: Applications from private firms to USDA's Animal and Plant Health Inspection Service for field trials of biotech seed. Seed sales are ERS estimates based on seed use and prices paid by farmers.

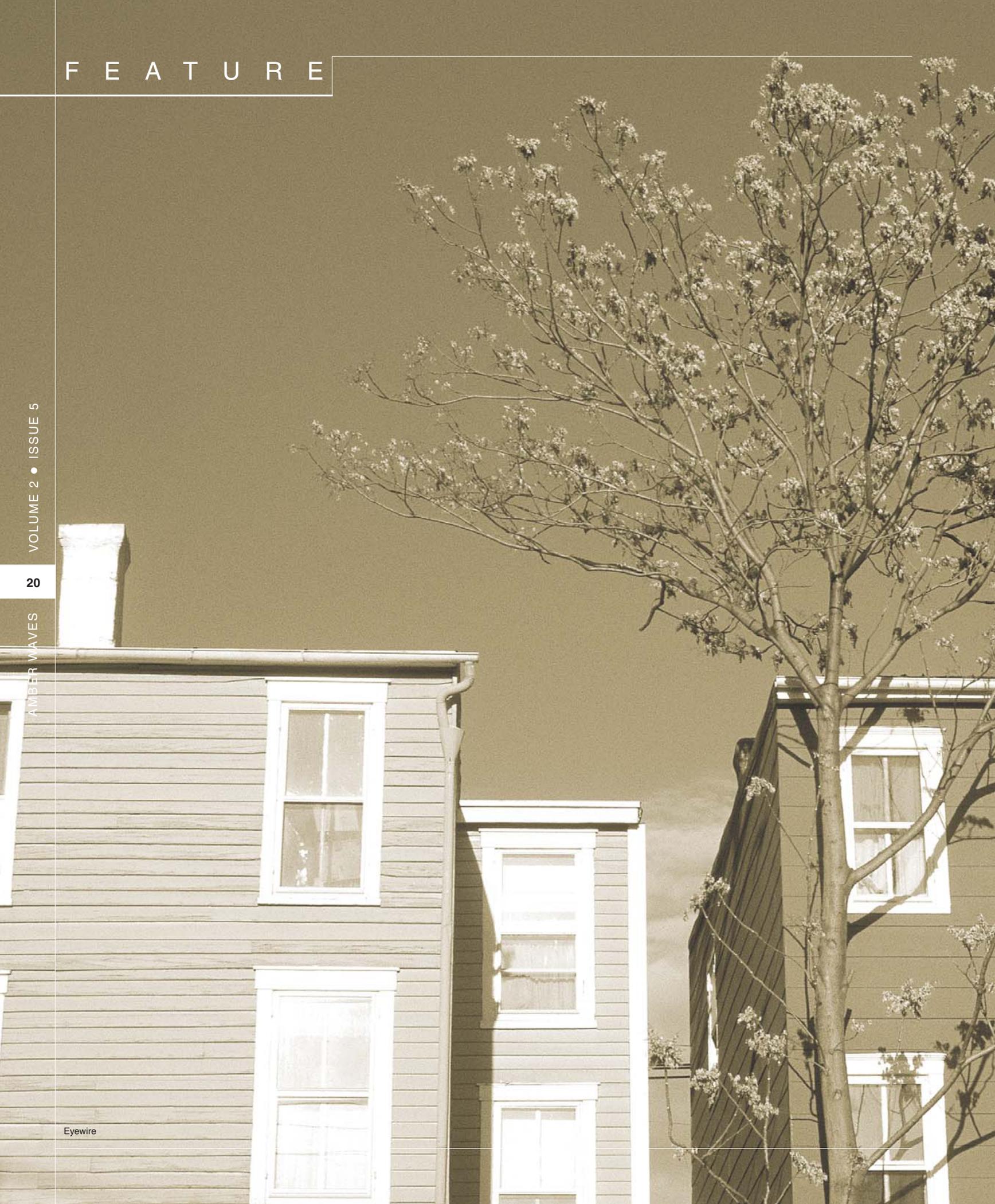
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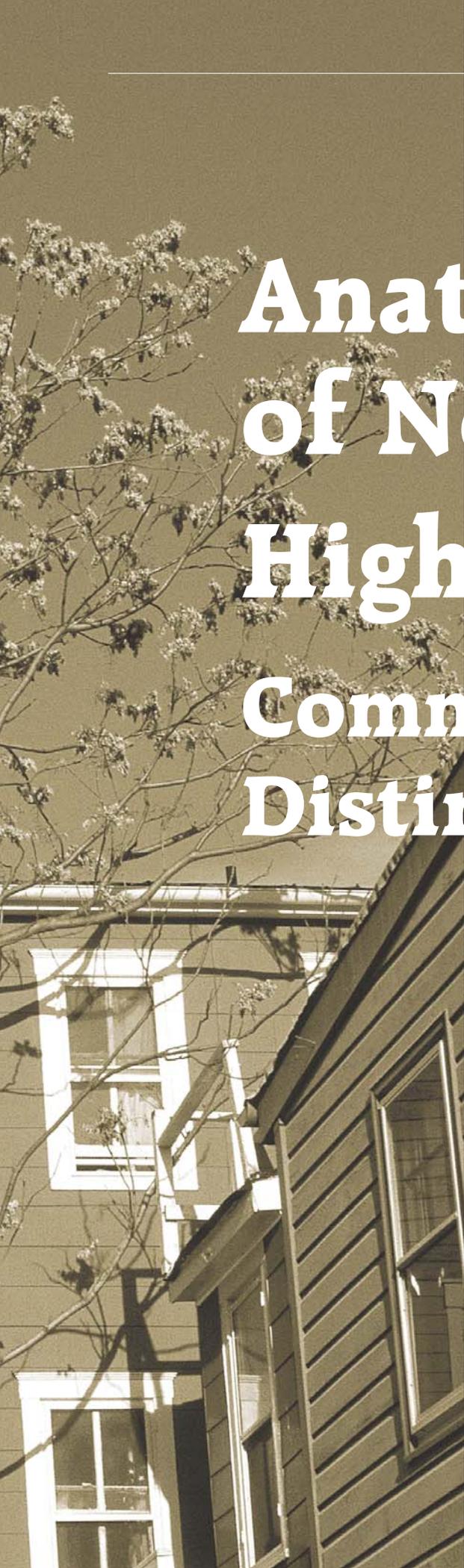
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20

AMBER WAVES

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# Anatomy of Nonmetro High-Poverty Areas Common in Plight, Distinctive in Nature

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The 1990s saw growing U.S. prosperity, ending with record-high average income levels and the lowest unemployment rate in 30 years. As a result, the incidence of poverty dropped from its level of a decade earlier, according to the 2000 Census. This welcome decline occurred particularly in rural and small-town nonmetropolitan (nonmetro) areas, where the poverty rate fell from 17.1 percent in 1990 to 14.6 percent in 2000. Despite this improvement, over 400 nonmetro counties (of a total of 2,308) still had high poverty rates of 20 percent or more in 2000.

High poverty frequently occurs among specific ethnic groups or in certain geographic areas, but the factors affecting poverty differ within these contexts. The diversity within high-poverty areas means that there is no single recipe for prosperity. Strategies to improve the economic well-being of rural residents in such areas will differ based on individual and community needs. Some high-poverty areas have low labor force participation rates and could benefit from job training and job development. Others have a high share of female-headed families with children, and programs that provide child care and secure child support would help defray child care costs and open up employment opportunities. Education and training programs could help

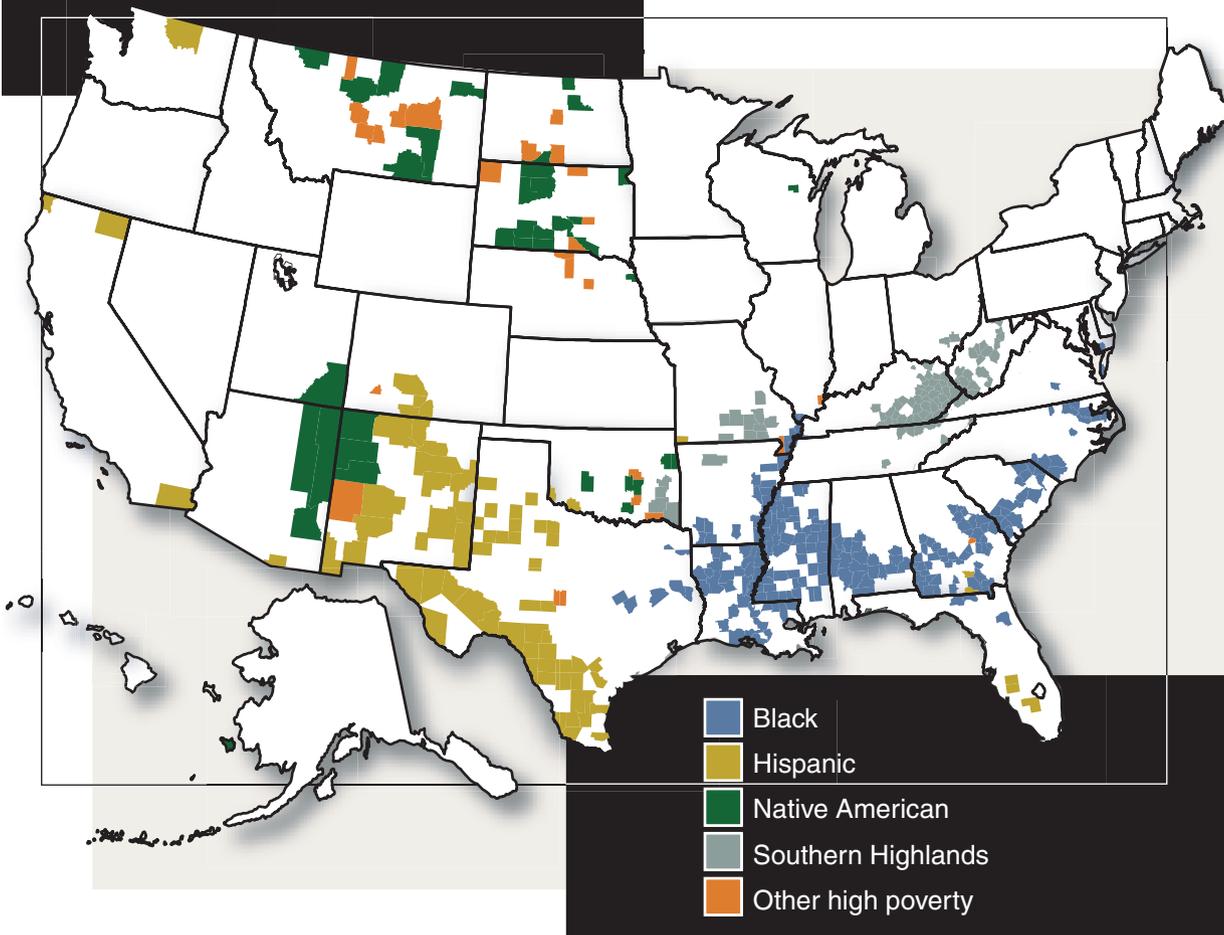
high-poverty areas with particularly low educational levels to boost the skills of their workers. The local economic context is typically more difficult and limiting for minority poor persons than for poor non-Hispanic Whites.

For the most part, areas of high poverty are of long standing, with conditions stemming from a complex of social and economic factors rather than from personal events, such as temporary job layoffs or loss of a spouse. This article identifies a typology of high-poverty counties that reflect racial/ethnic and regional differences in major characteristics such as education, employment,



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**Nonmetro counties with high poverty, 2000**



Source: U.S. Census Bureau, 2000. High poverty is defined as a poverty rate of 20 percent or more. Map prepared by the Economic Research Service.

## Defining Poverty and High-Poverty Counties

The statistical measure of poverty was developed by the Social Security Administration in 1964 and, with slight revisions, has been widely used since then. The measure is based on the income of families and of persons living alone or with nonrelatives. The concept is not applied to persons living in institutions (such as prisons, nursing homes, or long-term hospitals), college dormitories, and military barracks. The income threshold separating poor from nonpoor varies depending on the number and age of persons in a family and is adjusted annually to reflect changes in the value of the dollar. For example, the 1999 poverty threshold was \$8,667 for a person under age 65 living alone or not in a family; \$11,214 for a family of two under age 65; and \$16,985 for a couple with two children under age 18.

This article presents a typology of high-poverty counties that reflects racial/ethnic and regional differences in the character of these counties. High-poverty counties are defined here as nonmetro counties with a poverty rate of 20 percent or more based on 1999 income reported in the 2000 Census. This definition is consistent with the Census Bureau practice of identifying poverty areas. Of the 444 nonmetro counties (based on the 1993 Office of Management and Budget nonmetro definition) classified as high-poverty counties in 2000, three-fourths reflect the low income of racial and ethnic minorities. Black (210 counties), Hispanic (74 counties), or Native American (40 counties) high-poverty areas are identified by one of two conditions: (1) over half of the poor population in the county is from one of these minority groups or (2) over half of the poor population is non-Hispanic White, but it is the high poverty rate of a minority group that pushes the county's poverty rate over 20 percent. For example, Alabama's Crenshaw County has a poverty population that is 55 percent non-Hispanic White and 44 percent Black. The poverty rate for Whites is 17 percent, but the 39-percent poverty rate of Blacks pushes the overall county poverty rate above 20 percent. The Southern Highlands high-poverty areas (93 counties) are located in this part of the country and the poor are predominantly non-Hispanic White. The remaining 27 high-poverty counties fall outside the definition of racial/ethnic minority and Southern Highlands county types.

The typology of high-poverty counties used here is based on county-level data. Once the high-poverty counties are identified, comparisons among high-poverty types are made for persons or households within the county by poverty level, education, employment, family structure, incidence of disability, and language proficiency.

family structure, incidence of disability, and language proficiency that are relevant to programs of poverty alleviation. Of the 444 nonmetro counties classified as high-poverty counties in 2000 (based on 1999 income), three-fourths reflect the low income of racial and ethnic minorities and are classified as Black, Native American, or Hispanic high-poverty counties. The remaining quarter of high-poverty counties are mostly located in the Southern Highlands, and the poor are predominantly non-Hispanic Whites (see box "Defining Poverty and High-Poverty Counties").

### Black High-Poverty Counties

Of all high-poverty counties, 210 were characterized by the low income of their Black residents. These counties, with nearly 5 million population, lie in the old plantation belt of the southern coastal

plain, especially from southern North Carolina through Louisiana. Thirty-nine percent of Blacks in these counties had poverty-level income, a proportion well above that of Blacks in nonmetro counties without high poverty (28 percent) or in metro areas (24 percent). Among conditions associated with poverty, nonmetro counties with high Black poverty stand out most prominently in the fact that a third of all poor children under age 18 were in female-headed households with no husband present. This proportion is much higher than that found in other types of high-poverty areas, and is double that in nonmetro counties without high poverty.

In general, poverty is dramatically higher in female-headed households with children, no husband present, than it is in other household types. In nonmetro America as a whole, such households had

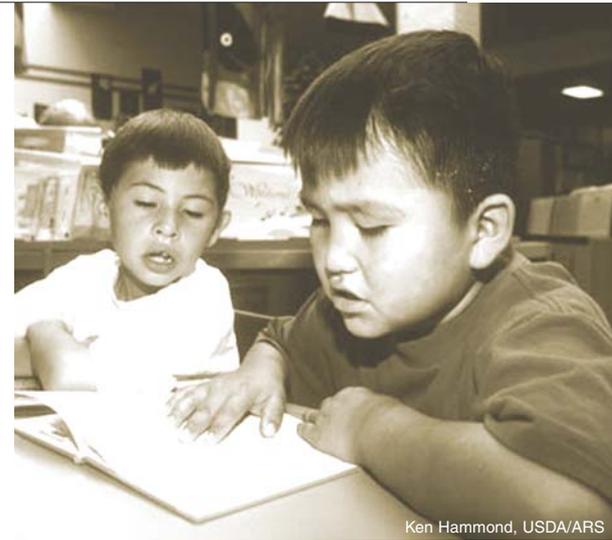
a poverty incidence of 42 percent, compared with 10 percent for all other households with minor children. It is difficult for female-headed families to exit poverty, unless they receive child support, given the lower average wages of women and the lack of other wage earners in such families.

Black high-poverty counties also have a higher proportion of households without a motor vehicle (12.5 percent) than other high-poverty county types and nonmetro counties without high poverty. In rural and small-town communities that have little or no public transportation, lack of a motor vehicle can inhibit access to employment and essential services. (See "Rural Governments Face Public Transportation Challenges and Opportunities" on p. 11.)

### Hispanic High-Poverty Counties

High poverty among Hispanics accounted for the overall high poverty rates in 74 counties. These counties are still concentrated in the traditional Hispanic areas of the Southwest, especially

Texas and New Mexico, but some are now in Florida, Georgia, Missouri, and Washington, as the Hispanic population has grown rapidly from immigration and dispersed outside traditional settlement areas. Within the 74 counties, Hispanic



Ken Hammond, USDA/ARS

### Distinctive characteristics of high-poverty counties

	Nonmetro counties	
	High-poverty counties	Not high-poverty counties
<b>Black high-poverty counties</b>	<i>Percent</i>	
Female-headed households with children, no husband	32.7	16.8
Households with no vehicle	12.5	6.9
<b>Hispanic high-poverty counties</b>	<i>Percent</i>	
Do not speak English "very well"	21.7	2.7
	<i>\$U.S.</i>	
Mean earnings of women with full-time, year-round work	16,900	29,000
<b>Native American high-poverty counties</b>	<i>Number</i>	
Employees per 100 people	35	47
	<i>Ratio</i>	
Poor under age 18: poor age 65 and older	5.9	2.6
	<i>Percent</i>	
Percent of poor in deep poverty (<75 percent)	20.5	8.4
<b>Southern Highlands high-poverty counties</b>	<i>Percent</i>	
Report disability, age 21-64	31.0	20.2
	<i>Ratio</i>	
High school dropouts: college graduates	3.5	1.3
	<i>Percent</i>	
Male adults working full-time, year-around	35.6	47.5

Source: U.S. Census Bureau, 2000.

poverty rates averaged 32 percent in 2000, a substantial decline from 41 percent in 1990. This drop was achieved despite the fact that Hispanics rose as a share of the entire population in the 74 counties (from 53 percent in 1990 to 58.5 percent in 2000), while the proportion of higher income non-Hispanic Whites in these counties dropped, with absolute declines in many counties.

Among all nonmetro Hispanics, a declining share now lives in high-poverty areas, despite the rising dominance of Hispanics within high-poverty areas where the poor are mostly Hispanic. Hispanic growth in nonmetro areas outside the high-poverty areas was so rapid in the 1990s that the share of all nonmetro Hispanics living in Hispanic high-poverty counties fell from 34 percent to 26 percent. In contrast, nonmetro Blacks and Native Americans showed only modest shifts away from high-poverty areas to lower poverty counties.

Hispanic high-poverty counties differ most widely from other high-poverty counties in the share of people who report that they do not speak English "very well" (22 percent). Native American high-poverty counties had the next highest proportion, with 11 percent of residents reporting difficulty with the English language, but no other group was above 3 percent. Lack of English proficiency is an obvious hindrance to obtaining

higher skilled work. It is especially prevalent in areas with large recent influxes of immigrants, such as along the Mexican border, where it exceeds 40 percent in some non-metro counties.

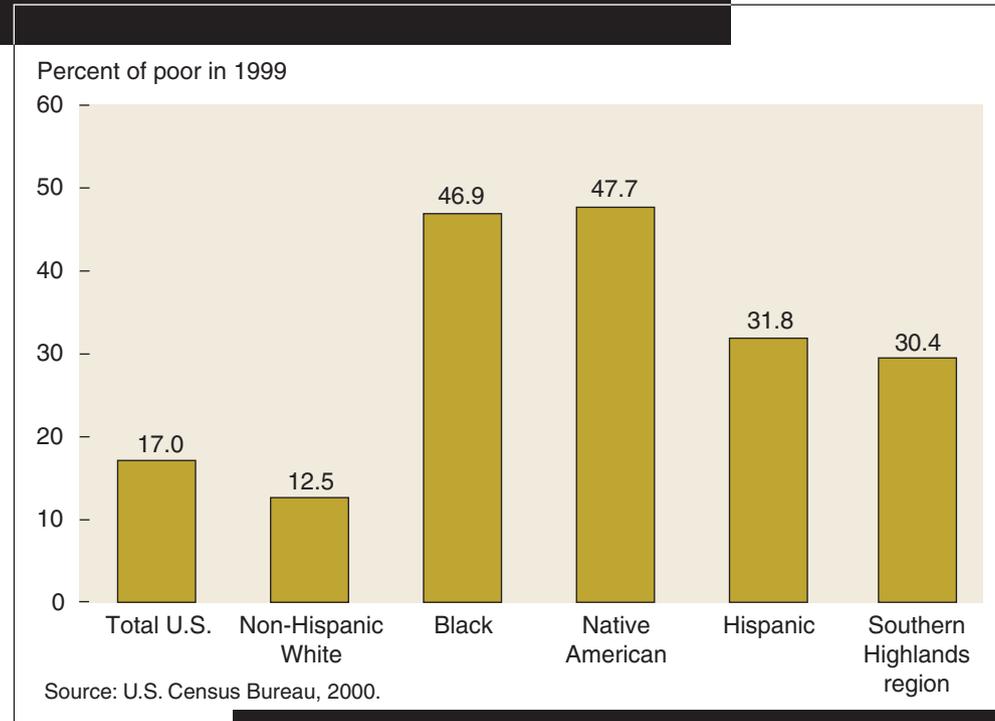
Hispanic poverty counties have a large share of adults (37 percent) who did not complete high school, a condition created partly by the high amount of recent immigration and the limited schooling that many Hispanic immigrants attained in their home countries. This level is considerably higher than the 21 percent for Hispanics in nonmetro counties without high poverty. Hispanic high-poverty counties have more than double the ratio of high school dropouts to 4-year college graduates than do nonmetro areas without high poverty.

The earning capacity of women in Hispanic high-poverty areas is particularly limited, due to their concentration in low-skill, low-wage jobs, reflecting both low education and the economic structure of these areas. In these counties, average annual earnings for women working full time and year round were \$16,900 in 1999, compared with \$19,400 for women in the next lowest county group (Native American) and \$29,000 in counties with low or moderate poverty.

### Native American High-Poverty Counties

The high poverty rate in 40 nonmetro counties resulted from low income among Native Americans, including Alaskan Natives. These counties are all located in areas of either historic tribal presence or 19th-century Indian reservation resettlement, especially in the Northern Plains, the Southwest, Oklahoma, and Alaska. The poverty rate of Native Americans in these counties was 41 percent, a level greater than that of the dominant minority in

Percent of poor living in high-poverty counties



other types of high-poverty counties. The Native American counties did not simply have a greater incidence of poverty—they also had the highest proportion in deep poverty. A full fifth of the total population in these areas lived in households with incomes below 75 percent of the poverty line. Thus, substantial increases in income would be required to lift the standard of living of this poorest-of-the-poor segment of the population to a minimally sufficient level.

Native American high-poverty counties have both the lowest share of people employed and the lowest share of men employed in full-time, year-round work compared with other high-poverty counties. In 2000, Native American counties had only 35 employed persons for every 100 persons of all ages (excluding those in institutions), compared with 47 workers per 100 persons in nonmetro counties without high poverty. Only 36 percent of males age 16 and over had full-time, year-

round work in high-poverty Native American counties, versus 47.5 percent in counties without high poverty.

Native Americans in high-poverty counties are much more likely to be children in families than older people, compared with high-poverty minorities in other areas. Native American high-poverty counties have 5.9 poor children under age 18 for each poor person age 65 and over. This compares with ratios of 4.2 for every poor older person in Hispanic high-poverty counties, and just 2.6 in nonmetro counties without high poverty. Thus, alleviation of poverty has to focus more on children and their parents in Native American high-poverty areas than it does in other areas.

In many Native American high-poverty counties, especially in the Northern Plains, the White proportion of the population has dwindled as the number of White farmers and ranchers interspersed among the Indian lands has declined. The non-Hispanic White share of

the population in these areas fell from 44.5 percent in 1990 to 40 percent in 2000. Thus, it is impressive that despite the serious conditions outlined here, an overall reduction in poverty from 34 to 28 percent was achieved in the Native American areas during the 1990s even with the diminished presence of the racial group with the highest income.

### High Poverty in the Southern Highlands

Of the high-poverty counties not classified as Black, Hispanic, or Native American, the great majority (93) are in the Southern Highlands. Most are in the Allegheny and Cumberland Plateau country of Kentucky and West Virginia, but others are in the Ozark Plateau and Ouachita Mountains, west of the Mississippi River. Racial and ethnic minorities in these counties are few, and the vast majority of the poor are non-Hispanic Whites.

Poverty in the Southern Highlands is chronic. Historically, the region's topography offered limited potential for commercial farming, few urban centers emerged, education lagged, and much of the area was subject to periods of boom and bust in the logging and mining industries. The modern era has brought improvements, with poverty much reduced since 1960. But the remaining high-poverty counties share several conditions that contribute to income remaining below the poverty level for more than a fifth of the population.

One feature that stands out in the Southern Highlands high-poverty counties is that 31 percent of people age 21-64 report having a disability. This is a higher incidence than that found in any of the other high-poverty county groups and more than one-half higher than that in counties without high poverty (20 percent). Some disabilities stem from mining-related injuries or diseases, but many of the counties with high rates are not mining areas. Not all of the disabilities are work limiting, but their high prevalence

## Profiles of Selected High-Poverty Nonmetro Counties

### Southern Highlands

Clay County, Kentucky, with 24,000 people, lies in the hill country of eastern Kentucky, with much of its land in a national forest. The county went through an early era of salt making and small-scale farming, followed by timber cutting and coal mining. Today, farming and mining account for just 7 percent of jobs. The county has some manufacturing, and a sixth of the work force commutes to jobs in and around London, in the next county. Despite acquiring a new Federal prison in the 1990s, median household income in Clay County was an exceptionally low \$16,300 in 1999, less than half the nonmetro average. Twenty-two percent of households received assistance from Supplemental Security Income (four times the nonmetro average), labor force participation was very low, as was educational attainment, and 39 percent of persons age 21 to 64 reported having a disability in 2000. Clay County's poverty rate of 40 percent is much reduced from the past, but is nearly the highest in the Highlands, and the nature of its circumstances is widely echoed in other Highlands counties.

### Black

It is fair to say that no rural county saw more economic transformation in the 1990s than Tunica County, Mississippi. In 1990, Tunica had the third highest poverty rate in the country. This completely rural Delta area continues to be a land of large cotton, soybean, and rice farms, with a high proportion of Black residents (70.5 percent in 2000), only a few of whom had a stake in farming, except as hired workers.

But the biggest nonmetro complex of gambling casinos in the entire country was added to the county in the 1990s. These large, elaborate casino hotels employed over 14,000 people in 2000, a number far larger than the county's total population of 9,200. The casinos can tap nearby Memphis for many customers, but they have also become destination resorts, with golfing and other attractions. From 1990 to 2000, the poverty rate for Blacks in the county fell from an astonishing 71 percent to 41 percent (but with no drop for Whites, at 15 percent). Obviously, the decline is good news; however, the median county household income of \$23,300 was still more than \$10,000 below the national nonmetro average. Longstanding high disability rates, low educational levels, and high rates of child poverty associated with one-parent households do not disappear in a few years, even with a boom of the magnitude of Tunica County's.

### Hispanic

Crosby County, Texas, is an example of a type of Hispanic high-poverty area that has evolved in the West Texas Plains. In many cotton counties there, farmers began extensive use of irrigation after World War II, tapping the Ogallala Aquifer. Historically, these areas had been highly non-Hispanic White in population. Irrigation greatly increased crop yields, but

restricts the potential for education and employment opportunities alone to reduce Southern Highlands poverty.

Despite strides in educational attainment, the high-poverty Southern Highlands counties retain a ratio of 3.5 high school dropouts to each 4-year college graduate. This is 2-½ times the ratio in

nonmetro counties without high poverty and is also higher than that in any of the minority high-poverty county groups. Many young people in the Southern Highlands who have attained advanced education have moved elsewhere for economic opportunity. The Southern Highlands high-poverty counties also

created a need for much more labor. Hispanic workers were brought in for such tasks and soon settled permanently. As farms in the region have become larger but fewer in recent decades, the non-Hispanic population declined, while the Hispanic population increased. The result has been a major change in ethnic makeup. In Crosby County, Hispanics comprised just 6 percent of the population in 1950. Since then, the non-Hispanic population has fallen by 60 percent, while Hispanics have grown by 500 percent and now make up nearly half (49 percent) of the total population of 7,000.

Counties such as Crosby have conflicting forces shaping the poverty rate. On the one hand, the population with the lowest incomes (Hispanics) is becoming an ever-larger share of the total, and its income level thus plays a growing role in determining the overall poverty rate. On the other hand, the poverty rate among Hispanics in the county fell during the 1990s from 50 percent to 39 percent. The rate among non-Hispanic Whites was 15 percent in 2000, a small increase. The county's overall poverty rate declined modestly in the decade from 29.5 to 28 percent. Although farming remains the dominant industry in Crosby County, Hispanics, who make up nearly half of the population, operate only 1 percent of the farms. Texas Plains Hispanics have not yet gained a significant proprietary role in the agricultural industry, either as owners or tenants. Their educational levels are much higher than in the past, but their welfare increasingly depends on local economies that lack enough growth of other work opportunities to offset the loss of farm jobs.

### Native American

Todd County, South Dakota, is coextensive with the Rosebud Sioux Reservation, one of a number of Native American reservations in the northern Great Plains. The county's very high poverty rate of 48 percent in 2000 reflects the serious financial circumstances among the nearly seven-eighths of the county's 9,000 residents who are Native American. Median annual earnings of men working year-round, full-time were \$21,000, a third below the national average. The land is not suitable to sustain the population from agriculture, the location is remote from urban areas (whether viewed as markets or accessible job centers), and an "export industry" economy is largely lacking. Over half of all employed people work in education, health services, social services, and public administration, twice the national average. The high poverty level in 2000 persisted despite the opening of a casino and motel.

Poverty has proven much more intractable in the Northern Plains Native American counties than in high-poverty areas elsewhere. All of the Plains Native American high-poverty counties had poverty rates in 2000 that were either somewhat higher or nearly as high as in 1970. One bright development has been the creation of tribal colleges, such as Sinta Gleska University in Todd County. And the Rosebud Nation, like other tribes, is developing wind-derived "green" electricity, one natural resource that the area may have in abundance.

match Native American areas in the low share of men (36 percent) who are employed in full-time, year-round work.

Only 27 high-poverty counties fall outside the classification of Black, Hispanic, Native American, or Southern

Highlands. Fifteen are thinly settled farming areas in the northern Great Plains, where income levels can vary widely from year to year depending on wheat and cattle prices and output. Two others are

the only high-poverty counties where Asians are over half of the poor.

### Concentration of Minority Poor

Among poor people living in non-metro America, minority populations are much more likely than non-Hispanic Whites to live in areas where the overall level of poverty is high. Nearly half of all nonmetro poor Blacks and Native Americans live in high-poverty areas, as do nearly a third of all poor Hispanics. By contrast, only an eighth of poor non-Hispanic White households live in a milieu of widespread poverty, notwithstanding the regional concentrations in the Southern Highlands. The local economic context, thus, is typically more difficult and limiting for minority poor persons than for poor non-Hispanic Whites.

### Conclusion

All types of high-poverty counties have multiple characteristics on which they differ adversely from counties with less poverty. Virtually all (94 percent) of these counties reflect historic geographical concentrations of minority or Southern Highlands populations. Widespread poverty limits the tax base and, where chronic, may impose a poverty of services. But each type of high-poverty county has its own signature poverty-related characteristics. It is essential to recognize these typically deep-rooted distinctions and their significance if low-income problems are to be addressed successfully in Federal and other programs. High poverty is high poverty, but the context in which it exists varies. **W**

### This article is drawn from . . .

The High-Poverty Counties chapter of the ERS Briefing Room on Rural Income, Poverty, and Welfare: [www.ers.usda.gov/briefing/incomepovertywelfare/](http://www.ers.usda.gov/briefing/incomepovertywelfare/)

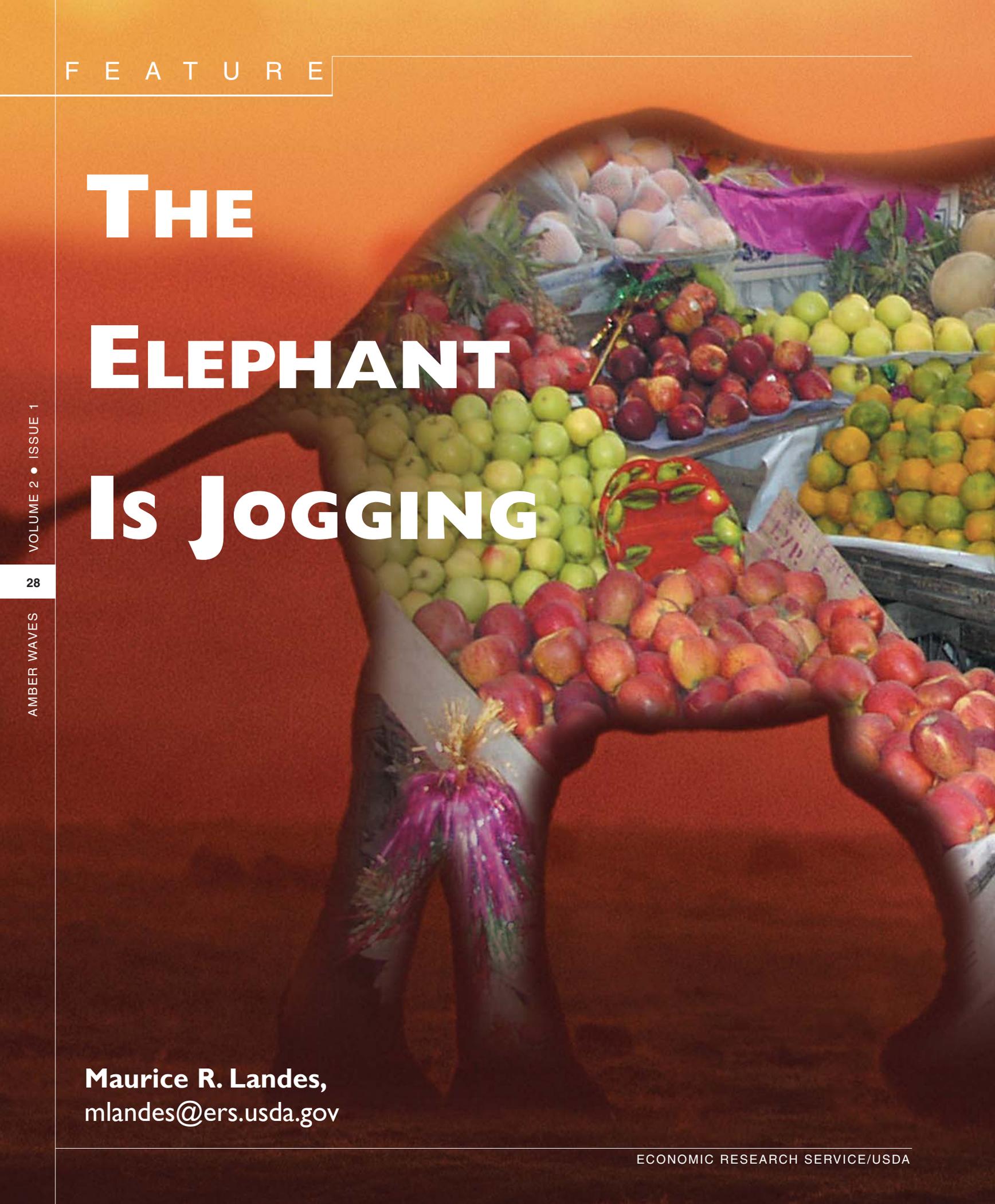
# The Elephant Is Jogging

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AMBER WAVES

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# New Pressures for Agricultural Reform In India

Corbis (Elephants);  
Maurice R. Landes (Indian markets)

Although often characterized as a lumbering elephant compared with the tigers (such as Malaysia and Thailand) and the dragon (China) of Southeast and East Asia, India's economy and agricultural sector have made remarkable progress in the 57 years since independence in 1947. Endowed with rich land, water, and labor resources, India increased production of its staple cereals from 42 million tons just after independence in 1950/51 to over 188 million by 2000/01—more than a fourfold increase. Much of this gain was driven by the introduction of high-yielding wheat and rice varieties during the Green Revolution period of the late 1960s and early 1970s, combined with supportive price policies and investments in irrigation.

Now, however, the agricultural sector has outgrown the policies that contributed to past success and is facing new pressures as consumer incomes rise. The middle class of the world's second most populous nation is growing ever wealthier and seeks greater diversity in food products. And, because the average Indian household spends about 55 percent of its income on food—a much higher share than in developed countries—changes in food prices resulting from new domestic and trade policies are also driving changes in food demand patterns.

Indian producers are responding to rising demand with only partial success. Recent trade liberalization measures have introduced new products at lower prices, thus creating competitive pressures for domestic producers. Constraints such as poor infrastructure, inefficient markets, and low investment also hobble Indian producers' ability to satisfy consumer demand.

Economywide trade and regulatory reforms are improving the investment climate for both domestic and foreign companies in India. But policy reform in agriculture has proven politically difficult, and the pace of reform in that sector will likely be slower than in some other fast-



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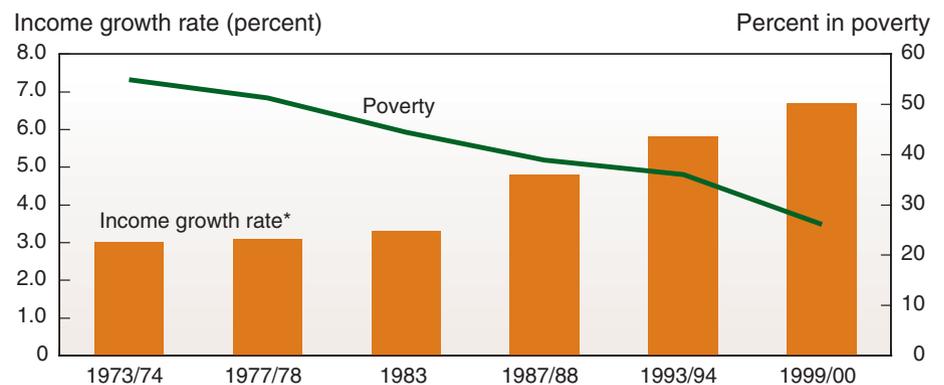
growing Asian economies, such as Malaysia, Thailand, or China. Even so, the past few years have seen an expansion in India's farm trade. This is not likely to bring short-term benefits to U.S. exporters, since many U.S. products are not price-competitive in India's market. But there is significant potential for investment in production and marketing.

## Economic Growth Begins To Transform Food Demand

After more than three decades of sluggish economic gains stretching from independence to the early 1980s, Asia's elephant has now broken into a jog. The economy has grown at an annual rate of 5.7 percent since 1980, ranking India among the fastest growing economies. Rapid per capita income growth is now the major force behind the emerging transition of Indian agriculture and policy. Although India is still home to a large share of the world's poor, the share of the population in poverty is declining, and a significant, relatively affluent, middle class has emerged.

India's per capita income of about \$460 remains low by developed country standards, but actual buying power is more than five times that amount because Indian prices for many goods and services are well below world averages. Middle-class households with buying power well above that average include roughly 150-200 million consumers and constitute the fastest growing segment of the population. Urbanization is also on the rise. Urban dwellers account for about 28 percent of the population, and their share of the population is growing about 3 percent annually.

### Higher income growth has boosted food demand and reduced the incidence of poverty



\*Income growth rate for preceding 5 years.

Source: Economic Survey, Government of India.

Higher incomes, particularly in lower- and middle-income households, are having an important impact on food demand in India because these groups tend to spend a relatively large share of their income on food consumption. Middle-income and urban consumers are also likely to spend more of their income on upgrading and diversifying their diets, eating out more often and eating more processed and convenience foods.

Indian food consumption patterns have diversified significantly since the 1980s. Consumption of fruits, vegetables, edible oils, and animal products is rising much faster than that of wheat and rice, staple grains in the Indian diet.

Milk—of which India is now the world's largest producer—along with eggs and poultry meat are the most important animal products, and all are registering strong growth in production and consumption. Poultry meat is finding broad consumer acceptance, in part due to its low relative price, and the sector is growing 10-15 percent per year—ranking it among the fastest growing poultry sectors in the world.

Despite traditional vegetarian dietary preferences, the growth of the poultry and egg industries is evidence that the expansion of meat and feed demand will play a role in the transformation of Indian agriculture, as it has in other developing countries. In fact, consumer studies suggest that while 20-30 percent of consumers have strict vegetarian preferences, meat consumption by the remaining 70-80 percent is limited more by income than religious preference.

### Price Changes Also Drive Food Demand and Trade

Changes in food prices, whether arising from lower import barriers or from improved efficiency of domestic production and marketing, are also playing an important role in India's food demand and



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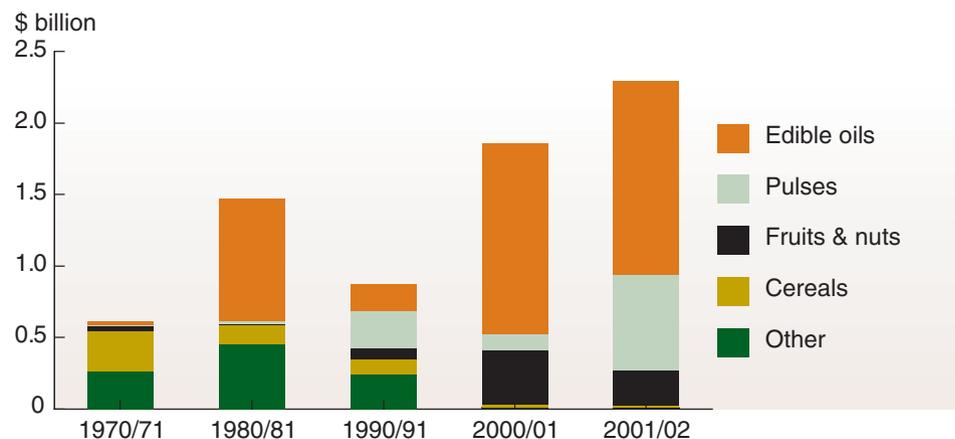
trade. Because such a large proportion of income is spent on food, consumers are more likely to adjust the amounts and types of food they buy when prices change. Recent developments illustrate the increased influence of world prices, and of improved marketing efficiency, on consumption and trade:

- Poultry meat consumption is sharply higher in southern India, primarily because large, integrated producers have significantly reduced marketing costs and consumer prices in the region.
- A sharp increase in edible oil consumption since the mid-1990s stems from larger imports and lower domestic prices following the reduction of import barriers. Low relative prices for imported palm oil, which was not traditionally consumed in India, have made it the single largest oil used in India.
- India's pulse imports have surged recently because of a low tariff and increased global supplies of low-priced white peas. Although not traditionally consumed in India, white peas have gained acceptance due to their low price.

### Trade Liberalization Has Brought Increased Imports of Some Products ...

Faster income growth, together with lower import barriers, helped to more than double India's farm imports during the 1990s to \$1.9 billion in 2000/01. Complying with World Trade Organization (WTO) rules, India removed all quantitative barriers to agricultural imports by 2001 and voluntarily reduced tariffs below required lev-

### Imports have nearly tripled since 1990/91, and are dominated by edible oils and pulses



Source: Economic Survey, Government of India.



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els for a number of commodities, including edible oils, pulses, and cotton.

As a result of trade liberalization, India is now the world's largest market for edible oils and pulses. In general, India has chosen to liberalize imports of those products where domestic production is least competitive. Edible oil imports—about two-thirds of which are low-priced palm oil—now account for about half of domestic oil consumption. Imports of pulses, widely used in traditional Indian meals, averaged more than 2 million tons during 2001/02 and 2002/03, up from just 0.4 million in 2000/01. These imports are mostly low-cost varieties of chickpeas (garbanzos) and peas (mainly white peas, but also including some green peas). Imports of raw cotton—a primary input for India's large textile sector—have also been on the rise, primarily to meet the quality needs of textile exporters.

For other products, however, including most high-value consumer items such as fresh fruits and processed foods, India has chosen to protect domestic production by imposing high tariffs. Apples, for example, face a 50-percent tariff. Most processed and packaged foods—including canned goods, cereal preparations, and packaged meats—face import duties of 50 to 150 percent. This high border protection has dampened overall imports of consumer food products, but their recent upswing testifies to the rising purchasing power of India's higher-income consumers.

These trends have brought only limited benefits to U.S. agriculture. U.S. agricultural exports to India, consisting primarily of raw cotton and almonds, accounted for just 15 percent of India's total agricultural imports between 2000 and 2002. A key constraint on U.S. sales is that many U.S. products, particularly soybean oil and pulses, have not been price-competitive in the Indian market.

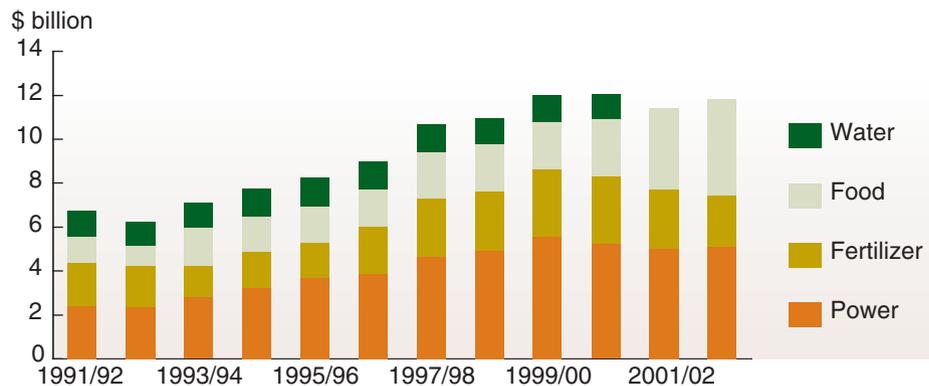
### ... But Agriculture, Despite Subsidies, Suffers From Low Productivity and Under-Investment

Consumer demand for greater variety, coupled with more liberal import policies, is pressuring India's producers and mar-

keting system to provide a broader range of products at competitive prices. But Indian agriculture is characterized by low productivity, with average crop yields well below world levels. Large investments, public and private, are needed to improve seed varieties and improve irrigation and plant protection practices. Government agencies are promoting diversification in production, research, and farm extension. But successful diversification is likely to require shifting public resources away from subsidies and improving incentives for private investment.

Historically, India's agricultural policies sought to ensure self-sufficiency in two staple grains, wheat and rice. That focus continues today, even though current grain production is more than enough to satisfy consumer demand. Through the "food subsidy," the Indian Government covers the cost of price support, distribution, and storage of wheat and rice—totaling about \$4.4 billion in 2002, equivalent to 5 percent of all government expenditures (see box "Food Grain Surplus Signals Need for Policy Change"). The government also subsidizes other farm inputs, including fertilizer, power, and irrigation water. The total subsidy bill has now grown to more than \$12 billion annually—far

### India's annual outlays on agricultural subsidies now total more than \$12 billion, or about 14 percent of total government expenditures



Note: Water subsidy data not available for 2001/02 and 2002/03.

Sources: Economic Survey, Government of India; Gulati, Ashok, and S. Narayanan, *The Subsidy Syndrome in Indian Agriculture*, Oxford University Press, New Delhi, 2003.

## Food Grain Surplus Signals Need for Policy Change

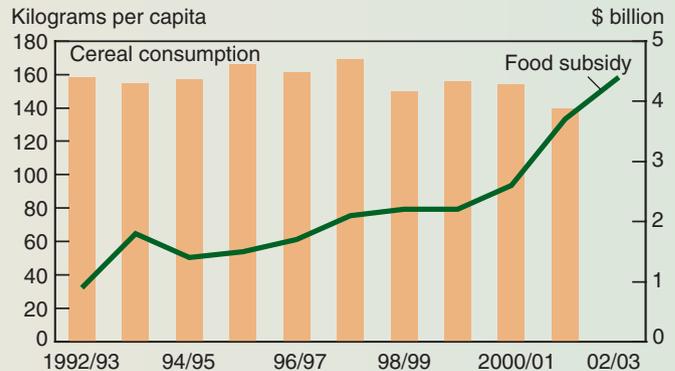
In the last several years, the Indian Government has accumulated stocks of wheat and rice far in excess of those needed as a food security buffer. Although stocks declined to about 35 million tons as of July 2003, due to poor weather, the pattern of food grain stock accumulation remains a major symptom of the need for policy change, particularly when contrasted with India's still-large population living in poverty.

Two policies drove the emergence of surpluses. First, since the late 1990s, wheat and rice producers were given support prices based on full costs of production—and sometimes higher—rather than on market price. Even as surpluses began to emerge, support prices did not adjust downward, and production and government procurement continued to rise. The support price program does not work for other crops and could not provide incentives to shift to other crops.

Second, in the mid-1990s, the government tried to reform the Public Distribution System (PDS), which provided general consumer subsidies on large volumes of grain, into a system better targeted on the lowest income consumers. Although large amounts of grain were allocated to the new schemes, the amount of grain actually distributed declined sharply due to administrative and cost problems, particularly with identifying and certifying poor consumers. More recently, distribution has been increased again by distributing grain through untargeted channels to higher income consumers.

The result of these policies has become what some observers call a "de facto nationalization" of wheat and rice trade. Little average-quality grain is now held by private traders, domestic prices are well above the price that would clear the domestic market, and consumption is actually down. Despite this situa-

**Cereal consumption and the food subsidy in India**



Source: Economic Survey, Government of India.

tion, and soaring government costs, it has proved difficult to withdraw support from politically influential growers in the few surplus states that benefit from the policy.

The budgetary cost of the price support and food distribution program is known as the "food subsidy," although, at present, most of the benefit is accruing to producers rather than consumers. The annual cost of the policy has grown to about \$4.4 billion, equivalent to about 5 percent of all government expenditures. In addition, about \$11 billion of bank credit, or roughly 10 percent of all bank credit in the country, is now tied up by government borrowing to hold wheat and rice stocks.

To help reduce costs, the government initiated exports of wheat and rice. Exports require subsidies to be competitive in world markets, but these costs are lower than holding the grain in stocks. Subsidized exports averaged about 3.1 million tons of wheat and 3.9 million tons of rice during 2000-2003.

exceeding both public (\$1 billion in 2001/02) and private (\$2.8 billion) investment in agriculture.

Rising subsidies and a large overall public sector deficit have dampened public investment in agriculture. Although private investment has grown, it remains small, amounting to only about 1.4 percent of agricultural output, compared with 24 percent for the economy as a whole. Private investors have, historically, been discouraged by an array of market regulations and licensing requirements that, among other things, have restricted private storage and movement of major farm goods and limited the scale of food processing plants.

Weak incentives have led to significant underinvestment in agricultural marketing and processing, as well as production. Marketing chains are highly fragmented, often including six to eight intermediaries, and are dominated by small-scale enterprises. Rural road and transport infrastructure remains poor and relatively costly. Because markets are inefficient, farmers tend to receive a small share of the consumer price—only about 25 percent in the case of unprocessed vegetables. Physical losses in the food chain are high as well—roughly 40 percent for horticultural products. Inefficient marketing also raises the cost of imported foods, as high margins taken by wholesalers, retailers,

and intermediaries exacerbate the effect of high tariffs.

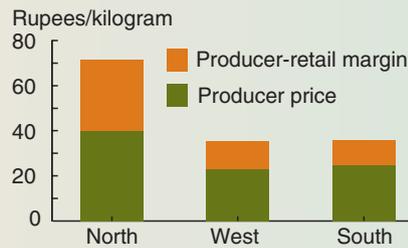
Vertical integration—the consolidation or coordination of production and processing stages by one firm—is a common feature of efficient food marketing systems in other large agricultural economies, but is nascent in India. Only about 4 percent of output is processed, and only a handful of food processors have annual turnover as large as \$150 million—a scale considered small in many other developed and developing countries. Even with more than 1 billion consumers and a retail food market estimated at \$133 billion, small "Pop & Son" shops still dominate retail food sales. Organized chain

## India's Inefficient Markets are Targets for Change . . .

India's traditional and inefficient agricultural marketing system is yielding to change. Sources of inefficiency include poor transport and handling infrastructure, domestic taxes, and fragmented, non-integrated marketing chains dominated by small-scale enterprises. Policies are now beginning to promote domestic and foreign private investment in a more efficient agricultural processing and marketing system. The pace and extent of change will likely have a significant impact on the growth and competitiveness of India's agricultural sector. Some examples:

**Poultry marketing:** In southern and western India, vertically integrated broiler operations are reducing production costs among contract growers, as well as producer-consumer margins. Consumers are responding to the lower retail prices by boosting consumption. However, most broilers are still sold as live birds that are manually dressed by retailers, a practice that limits the market radius and scale of the integrators. A shift to machine-processed, chilled, and frozen products may be key to the continued expansion of poultry integrators.

### Poultry production and marketing costs are sharply lower in South and West India



**Wheat marketing:** Most of India's 70 million tons of annual wheat consumption is sold by independent retailers as whole grain, then custom-ground into "atta" (whole meal flour) by small-scale "chakis" (motor-driven stone grinders). Only about 15 percent of wheat is marketed as flour processed in modern flour mills. Producer-to-retail marketing costs in the system are high, particularly if the high costs of government storage, handling, and transport are accounted for. Since the late 1990s, however, domestic and multinational firms have been marketing nationally branded pre-packaged atta. To compete on price, these firms are vertically integrating to secure raw materials and market products, and finding growing markets in urban areas.

stores are emerging and expanding rapidly, but at present account for only about 1 percent of food sales.

### Major Agricultural Policy Reform Remains Politically Difficult . . .

India's improved economic growth has stemmed largely from major domestic and trade policy reforms in the industry and service sectors in the early 1990s. Complementary reforms in agriculture have proven more difficult. Political consensus on major agricultural reform remains elusive, in part because of reform's potential impacts on food prices and employment—agriculture accounts

for 60 percent of India's employment. In addition, price support and input subsidy policies, which primarily benefit producers of wheat and rice in surplus regions, have proven difficult to withdraw despite the stockpiling of grain.

The most significant policy changes in the sector have been in market access, including the WTO-required liberalization of import policies completed in 2001. Longstanding restrictions on farm exports that taxed local producers and precluded competitive export industries began to lessen in the mid-1990s. These reforms helped stimulate trade, including the rise in edible oil imports and increased exports

of rice and wheat. But they have also exposed the inefficiencies of the domestic marketing system, including high transport and handling costs, small-scale and inefficient milling and processing, and lack of food grading and inspection services.

### . . . But the Seeds of Policy Reform Are Being Planted

Many policies that have, historically, weakened private investment incentives and contributed to India's fragmented, small-scale, and inefficient marketing system are now being changed. The central government and several state governments have lifted longstanding measures that restricted private storage and interstate movement of grain and other essential foods. Licenses are no longer needed to establish food-processing firms, and regulations restricting their size have been mostly eliminated. In addition, foreign direct investments (FDI) in food processing and marketing—with the exception of retail marketing—are now automatically approved for investments up to 51-percent equity.

Other key changes are underway that should improve the climate for investment. One is establishing legal frameworks to protect both farmers and processors in contract farming agreements, and to enforce those agreements. With Indian agriculture dominated by small-scale holdings of only about 2-½ hectares, food processors struggle to procure adequate supplies of high-quality produce. Contract farming is already expanding in some regions and products, including broilers in Tamil Nadu and Maharashtra and vegetables in Punjab, and has proved successful at reducing marketing risks faced by both buyers and sellers. But contract farming is not recognized or protected by current laws, and the practice could expand more rapidly with stronger legal protections in place.

A related reform now under discussion would involve changes in current

laws governing the leasing of agricultural land. At present, inadequate protections for both lessors and lessees limit the use of land rental to assemble larger, and potentially more efficient and competitive, holdings.

Another anticipated reform is the streamlining of food safety laws and their alignment with international standards. Indian food law now falls under five outdated statutes, with jurisdiction spread across four ministries, thus greatly increasing the cost and complexity of compliance. A major revamp of the food law aimed at consolidation of responsibilities and jurisdiction, as well as closer links to international standards, is now underway, although there is no clear time frame for its completion.

A relaxation of the current ban on FDI in retailing, should it occur, could also have a big impact on the transformation of India's food markets by providing an infusion of capital and expertise, as well as promoting linkages and standards backward through the marketing chain. Several large Indian firms have announced ventures in food retailing. FDI has already begun to flow into wholesale food distribution in Bangalore.

### Emerging Trade and Investment Trends

The pace of change in agricultural policy, trade, and investment in India is likely to remain closer to that of an elephant than a dragon or tiger. Achieving political consensus for significant change in agriculture remains a slow process, even as economic imperatives become clear. Gradually, regulatory and policy change is helping transform agricultural markets, creating opportunity for trade and investment.

India's agricultural imports will probably continue to be dominated by basic commodities—such as edible oils and pulses—where price competitiveness will remain the key to boosting trade. The



Maurice R. Landes, USDA/ERS

extent to which India emerges as a major global market for other commodities—such as feed grains—will hinge on how successfully it exploits its rich resources and boosts farm productivity. Similarly,

future trends in high-value product trade will be driven not only by demand, but also by success in diversifying production, and building a modern, market-oriented agricultural marketing system.

Indian import demand is likely to remain extremely price-sensitive, and this will continue to hinder U.S. exports to that market. While trade prospects may be limited, there could be opportunities for investment. India appears poised for an expansion of investment to modernize agribusiness, including input supply, distribution and marketing, and food processing. Significant investment opportunities are likely in the markets for both basic and high-value foods, where demand can be driven by rising incomes and price reductions achieved through increased integration and efficiency in the supply chain. Huge annual investments, estimated by some at more than \$30 billion, will be needed for this transformation and, if the policy climate continues to improve, foreign direct investment could play a key role. **W**

#### ERS Emerging Markets Activities in India...

An ERS project funded by USDA's Emerging Markets Program (EMP) since 2001 is promoting collaborative research between ERS and Indian economists on issues affecting the long-term outlook for Indian agriculture. Research projects are focusing on topics related to commodity markets of interest to U.S. agriculture, including wheat, corn, pulses, poultry, oilseeds, oilseed products, cotton, and apples.

Recent ERS products based on activities under the EMP, include:

"India's Consumer and Producer Price Policies: Implications for Food Security," by Suresh Persaud and Stacey Rosen, in *Food Security Assessment*, GFA-14, USDA/ERS, February 2003, available at: [www.ers.usda.gov/publications/gfa14/](http://www.ers.usda.gov/publications/gfa14/)

*India's Pulse Sector: Results of Field Research*, by Greg Price, Rip Landes, and A. Govindan, WRS-03-01, USDA/ERS, May 2003, available at: [www.ers.usda.gov/publications/wrs03/may03/wrs0301/](http://www.ers.usda.gov/publications/wrs03/may03/wrs0301/)

*India's Edible Oil Sector: Imports Fill Rising Demand*, by Erik Dohlman, Rip Landes, and Suresh Persaud, OCS090301, USDA/ERS, November 2003, available at: [www.ers.usda.gov/publications/ocs/nov03/ocs090301/](http://www.ers.usda.gov/publications/ocs/nov03/ocs090301/)

*India's Poultry Sector: Development and Prospects*, by Rip Landes and Suresh Persaud, WRS-04-03, USDA/ERS, January 2004, available at: [www.ers.usda.gov/publications/wrs0403/](http://www.ers.usda.gov/publications/wrs0403/)

# The U.S. Ag Trade Balance... More Than Just a Number

**Alberto Jerardo**  
ajerardo@ers.usda.gov



A decade ago, a scenario in which the value of U.S. agricultural imports would someday exceed that of U.S. exports seemed farfetched. Indeed, the United States has been a net exporter of agricultural products since 1959, an uninterrupted span of 44 years. Today, the improbable has become probable. Since 1996, the agricultural trade surplus has shrunk from \$27.3 billion (an all-time high) to \$10.5 billion. Although U.S. agricultural exports continue to rise, imports are increasing nearly twice as fast.

The rapid growth of U.S. agricultural imports relative to exports in recent years may come as a surprise to many because the U.S. is still the world's leading exporter of

farm products. In fact, U.S. agricultural exports grew by almost \$3 billion in 2003. And, higher commodity prices point to export gains in 2004. But the U.S. is also the world's largest agricultural importer. Over the last 7 years, U.S. agricultural imports have increased by more than \$13 billion, from \$32 billion in 1996 to \$46 billion in 2003. Agricultural economists Philip Paarlberg and Phil Abbott, both at Purdue University, predict that, if these trends continue, the current agricultural trade surplus will turn into a deficit toward the end of the decade. This forecast is consistent with ERS analysis of U.S. import and export trends.

This projected reversal of the trade balance raises questions not only about why a trade deficit may be imminent, but also about whether a trade deficit signals waning competitiveness. The trade balance, however, is primarily an accounting measure that, by itself, does not provide information about the scale or composition of a country's international exchange of goods, nor the benefits derived from those goods. A closer examination of the composition of U.S. agricultural trade, economic growth, demographic shifts, changes in consumer preferences, and other factors indicates that there's more to the looming trade deficit than a simple negative sign.

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### Exports Fall in the Late 1990s Amid Global Economic Events

Only 20 years ago, about half of U.S. exports consisted of major bulk commodities—grains, oilseeds, cotton, and tobacco. The shares of livestock and horticulture products in total agricultural exports were 10 percent and 9 percent. Today, the export share of bulk commodities has fallen to 36 percent, while livestock products rose to 16 percent and horticulture products increased to 21 percent.

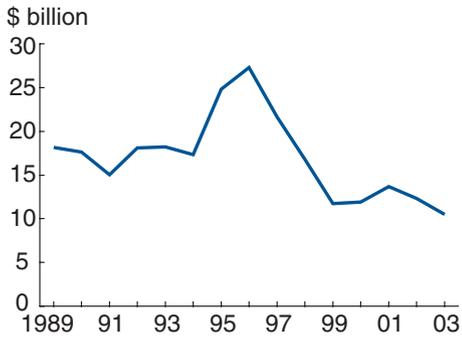
At the same time that the composition of U.S. agricultural exports was changing, economic developments across the globe

led to a decline of U.S. agricultural exports and boosted U.S. agricultural imports. First, the financial crisis in Asia, starting in 1997, gave rise to debt burdens and economic recessions, stifling demand for U.S. agricultural products in many major Asian markets—Korea, Taiwan, Hong Kong, Thailand, and Indonesia. As the crisis spread to Russia, then to South America, U.S. agricultural exports fell further.

Meanwhile, the U.S. economy was booming, causing the U.S. dollar to appreciate and effectively driving up prices of U.S. agricultural exports. Demand for U.S. products fell and the value of agricultural

exports dropped by more than \$10 billion from 1996 to 1999. The value of bulk shipments of food and feed grains, cotton, and tobacco fell by an average of 10 percent annually during this period, but has rebounded in recent years. Among grains, exports of wheat, rice, corn, barley, and sorghum dropped the most. The total value of bulk shipments fell \$6 billion from 1996 to 2000, with grain exports alone decreasing by \$3.4 billion. As volume shipments of most grains fell, lower world farm commodity prices exacerbated the drop in export values.

**Farm trade surplus declines as imports rise twice as fast as exports**



Source: U.S. Census Bureau.

U.S. agricultural exports would have been even smaller had processed food exports not expanded by 5 and 6 percent in 2000 and 2001. Still, overall U.S. exports of processed foods have been generally flat over the past decade. Demand for these products has been weakened by slower growing, mature markets, such as Japan and Europe. Also, high U.S. labor costs limit U.S. exports of processed products, which can often be supplied to foreign markets at lower cost when manufactured by foreign affiliates of U.S. firms. Nevertheless, U.S. processed food exports have roughly kept pace with processed food imports, excluding fish and shellfish.

Despite growing imports, the U.S. has remained a net agricultural exporter because of a natural comparative advantage in producing such crops as grains and oilseeds. Because of a cost advantage due to favorable land resources and capital-to-labor ratios, the U.S. is comparatively better at producing these crops than other countries. The adoption of biotechnology and consolidation of farm operations have further boosted productivity in these capital-intensive sectors. Stagnant import demand in major markets, however, has resulted in a shift in U.S. exports of grains and oilseeds. Over the last decade, the share of U.S. bulk commodity exports shipped to developed countries dropped from 43 to 34 percent. Fast-growing devel-

oping countries are the prospective future markets for U.S. bulk crops and other farm exports. China, for example, is now the largest importer of U.S. soybeans, having surpassed the European Union (EU).

**Imports Rise as U.S. Economy Prospers**

The strong dollar in the late 1990s dampened U.S. exports, but enabled Americans to purchase more foreign farm products. From 1996 to 1999, as U.S. agricultural exports fell in value, imports rose steadily. As disposable incomes and wealth from investment assets reached unprecedented levels in the late 1990s, U.S. consumers responded by opening their wallets for higher value products, including imported foods and beverages. Imports of horticulture crops and products—vegetables, fruits, fruit juices, nuts, wine, beer, and cut flowers—were in highest demand. From 1994 to 2003, 53 percent of the rise in U.S. agricultural imports was attributed to horticulture products. Purchases of fresh and processed vegetables increased from \$2.7 billion to \$6.2 billion between 1994 and 2003. The value of imported wine jumped from \$1 billion in

1994 to \$3.2 billion in 2003. Animal products—red meat and dairy products—and grain and sugar products rounded out the rest of the gains in agricultural imports.

American consumers, buoyed with larger spending budgets, also purchased more imported processed foods. Of total U.S. agricultural imports of \$46 billion in 2003, processed food and feed products and beverages accounted for \$28 billion, or 62 percent. Excluding fish, seafood, and distilled liquors, U.S. processed food imports exceeded corresponding exports (by more than \$2 billion) in fiscal 2003, the first time since 1989. Cheese, canned and preserved fruits and vegetables, bakery products, pasta, candy, vegetable oils (except soybean), wine, beer, coffee, and cocoa are among the imported processed foods making the largest net gains. Processed food imports increased by an average 7 percent per year from 1994 to 2003, for a total of 96 percent over the decade. This increase does not reflect the larger share of processed foods manufactured by foreign firms with U.S.-based affiliates, such as Nestle.



**Grain shipped to former Soviet Union from the U.S.**

Ken Hammond, USDA

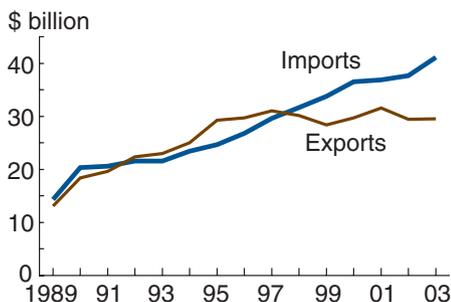
### Consumer-Driven Demand Will Continue To Feed Import Growth

A number of key economic and demographic forces—continued U.S. population growth, higher real disposable income, a relatively strong dollar, and comparatively weaker economies in Japan and the EU—suggest that recent trends in import and export growth are likely to continue over the next few years. Changing consumer preferences in food and beverages, driven in part by healthier lifestyles and increasing ethnic diversity, are evident in the products that are increasingly imported today.

Per capita food consumption in the U.S. averaged 2,000 pounds in 2002, of which 36 percent, or more than 700 pounds, were horticulture products. About 43 percent of U.S. agricultural imports in 2003 were horticulture products, which have expanded in value by an average of 8.4 percent annually since 1994. By 2010, close to half of U.S. agricultural imports will be horticulture products, based on long-term trends. When other tropical products such as cocoa, coffee, and sugar are added, horticulture's share of total imports rises even higher.

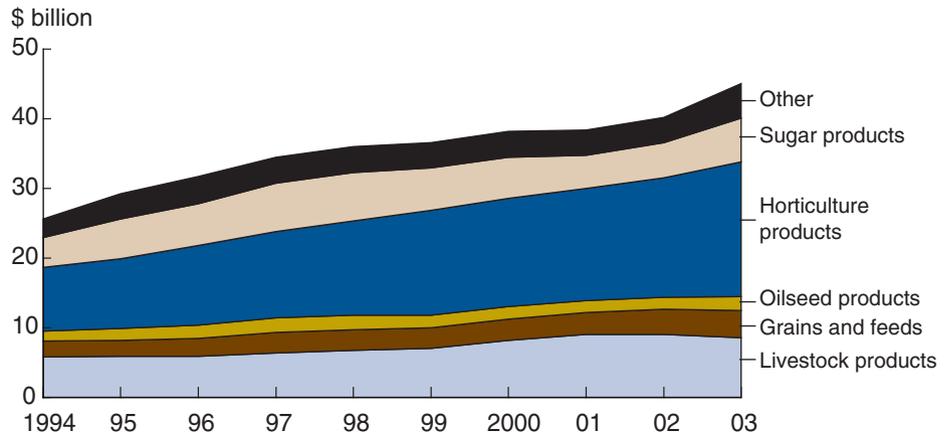
Increased U.S. per capita consumption (by quantity) of fruits and vegetables, fruit juices, and nuts reflects, in part, the economic forces mentioned above, but also demographic shifts and changing eating

### U.S. processed food imports are rising fast while exports are flat



Note: These data include fish and shellfish.  
Source: U.S. Census Bureau.

### Horticulture products drive U.S. import surge in the past decade



Source: U.S. Census Bureau.

habits in the United States. As the U.S. population ages, the diets of senior citizens—who tend to eat healthful foods—affect the types of foods consumed. In addition to eating more nutritious and high-fiber foods, American consumers are turning increasingly to grain and bakery products, wine, beer, and cheese, reflecting their preference for more processed, prepared, and high-quality products. Increasing numbers of Americans are eating meals outside their homes and ordering more expensive foods. For meals prepared and eaten at home, ready-to-eat foods, easy-to-fix meals, and prepackaged or precooked products are gaining in popularity, particularly among consumers with little time to cook. A growing familiarity with and exposure to ethnic restaurant menus and grocery selections is fueling imports of more exotic and processed products. With domestic suppliers unable to fully satisfy Americans' demands for more diverse food and beverage choices, consumers are increasingly turning to imported goods.

The U.S. is largely self-sufficient in the production of food staples and feed—grains and oilseeds—as well as meat, poultry, dairy, and vegetables. Imports' shares of consumption for these products are all below the import share of total food consumption, 13 percent in 2002 (see box,

"Imports' Share of U.S. Food Consumption Climbs to 13 Percent"). Foods more commonly imported by the U.S. include crops not grown domestically, products that are more cheaply produced overseas, and off-season produce. These imports widen the variety of foods available to U.S. consumers and provide year-round supplies. Imports also help to lower food price inflation with less price volatility. Like other affluent countries, the U.S. demands more premium and convenience (time-saving) foods as consumers' incomes rise. And as the population grows, so, too, does consumption of these imported products.

### Developing Countries Are Penetrating U.S. Market

Natural resource endowments in foreign countries, especially developing countries, favor the production of abundant agricultural and food supplies intended for export. For example, despite their large populations, India, China, and Indonesia are producing some crops in excess of domestic consumption and are exporting them. The spread of farm, seed, and food processing technology, a large and underemployed labor force, and favorable climates for high-value crop production are among the advantages that developing countries can exploit in not only

**Imports' Share of U.S. Food Consumption Climbs to 13 Percent**

Per capita food consumption in the U.S. increased by an average of 10 pounds per year over the past 20 years. At the same time, imported food per capita grew by 5 pounds per year. In 1983, each American consumed about 1,800 pounds of food, of which 160 pounds were imported. By 2002, per capita consumption had risen to 2,000 pounds and per capita imports reached 263 pounds. Thus, not only are Americans eating more imported food each year, but the share of imports in total food consumed is also steadily increasing. Based on the value of total U.S. agricultural imports, each American consumed \$142 of imported food and agriculture products in 2002, more than twice the value of imported food consumed in 1983.

From the early 1980s to 2002, the average share of imports in U.S.-consumed food climbed from 9 percent to 13 percent (based on weight measures). This steady growth is largely attributed to annual increases of imported horticulture crops and products—fruits, fruit juices, nuts, vegetables, wine, and beer. Over the past two decades, as the average American consumed 20 percent more fruits, vegetables, and grain products, imports of these products rose by more than 100 percent (in total weight). Food imports in 2002 exceeded food import levels in 1982 by 39 million pounds. Of that total, more than 22 billion pounds, or 57 percent, were horticulture products. That is, 1.1 billion pounds of the average 2 billion additional pounds of food imported each year over the past 20 years have been horticulture products.

Even though U.S. per capita consumption of red meat fell from an average of 124 pounds per year in the early 1980s to 110 pounds in 2002 (based on boneless, trimmed weight), the import share of red meats consumed, largely beef and veal, rose from 6.6 to 9.3 percent. The import share of dairy foods consumed, mainly cheese, almost doubled from 1.9 to 3.5 percent in the same time span. Fish and shellfish imports as a share of consumption is now close to 80 percent, up from 50 percent in 1982. Together, the import share of animal and seafood products climbed from 3.3 percent in 1982 to 5.2 percent in 2002. The aggregate import share for animal products is low because the import shares of large components—chicken and poultry products and dairy products—are small. Compared with import shares of crops and crop products, shares of animal products are significantly lower.

The aggregate import share of crops and crop products—horticulture foods and beverages, vegetable oils, grains and grain products, sweeteners, candy, and tropical products—was 19 percent in 2002, up from 13 percent in 1983. Except for tropical products (coffee, cocoa, tea, and spices) which have an import share of U.S. consumption close to 100 percent, and fish and shellfish, no food group is imported at a volume more than a third of its domestic consumption weight. Only the collective import share of fruits, fruit juices, and tree nuts comes close at 31 percent, although individual components, such as grapes and grape juice, or apple juice, certainly have much higher shares. Among the major vegetables, broccoli, cucumbers, and tomatoes have the highest import shares of U.S. consumption, and imports of asparagus, chili peppers, potatoes, and squash are also rising fast. Yet despite the smaller import shares of red meat and dairy products, their import values more favorably compare with those of crops and crop products because of higher prices per weight unit of livestock products.

**The import share of U.S. food consumption is steadily rising**

Food groups	Average percent				Percent	
	1981-85	1986-90	1991-95	1996-2000	2001	2002p
<b>Total food consumption<sup>1</sup></b>	9.0	9.7	10.5	12.0	12.5	13.0
<b>Animal products<sup>2</sup></b>	3.4	3.7	3.5	4.1	5.2	5.3
Red meat	6.7	8.1	7.3	7.7	9.3	9.5
Dairy products	1.9	1.8	1.9	2.5	3.4	3.5
Fish and shellfish	50.9	56.0	56.0	64.4	77.8	78.6
<b>Crops and products<sup>3</sup></b>	14.0	14.9	16.1	18.2	18.4	19.1
Fruits, juices, and nuts	21.0	26.6	27.3	28.6	30.0	31.0
Vegetables	4.9	6.0	5.5	8.0	8.8	9.6
Vegetable oils	15.5	17.6	17.4	18.0	15.5	15.5
Grains and products	1.7	2.9	5.6	5.9	5.8	5.3
Sweeteners and candy	35.8	25.6	29.4	34.2	28.6	28.0

p = Preliminary or projected.

<sup>1</sup>Calculated from units of weight, weight equivalents, or content weight.

<sup>2</sup>Includes poultry meats and animal fats; egg imports are negligible.

<sup>3</sup>Includes coffee, cocoa, and tea whose import shares are 100 percent; includes beverages.

Sources: ERS; U.S. Census Bureau.

feeding local populations, but also supplying foreign consumers. The opportunity to earn hard currency through exports is a strong incentive to produce crops and products for foreign markets.

Horticulture crops are among the major exports of developing countries. Forty-two percent of U.S. agricultural imports are horticulture products, of which 43 percent come from Mexico and Latin America. Controlled-climate transport, refrigerated storage, and plant breeding technology in developing countries help maintain the quality and year-round supply of horticulture crops exported to the U.S. Developing countries also supply one-third of U.S. imports of processed foods. Given that 62 percent of total U.S. agricultural imports are processed foods, developing countries will supply an increasing share of processed food in Americans' diets.

**U.S. Multinational Companies Play a Role in Trade**

About 15 percent of U.S. food imports are supplied by U.S. food companies through their farms, processing plants, and affiliates in foreign countries. For example, the U.S. imports bananas, pineapples, avocados, other tropical fruits, and canned or fresh vegetables produced overseas by Dole, Del Monte, and Chiquita. Foreign growers under contract to U.S. companies also supply agricultural products to the large U.S. market. U.S. food growers and manufacturers, or their affiliated companies, abroad will supply more fresh and processed foods to U.S. consumers, much like other U.S. multinational companies that take advantage of lower costs of land, labor, raw materials, or capital overseas. In Mexico, a number of U.S.-affiliated food growers and manufacturers already export fresh and processed fruits and vegetables to the United States, the result of contract agreements or economic advantages available locally.



Dana Downie, AgStockUSA

The U.S. imports large quantities of tropical crops, like bananas.

Many large U.S. multinational companies prefer to supply foreign markets through sales from their foreign operations or affiliates. The proximity to markets, lower production costs, and avoidance of tariffs and trade barriers provide companies incentives to manufacture products abroad rather than export products from the United States. While the U.S. is a net importer of processed foods from Canada, U.S. companies dominate food manufacturing in Canada, as well as in Mexico. Kraft Foods is the leading food manufacturer in Canada, and PepsiCo is the largest in Mexico. The United States imports more soft drinks than it exports, even though Coca-Cola and PepsiCo are the world's biggest soft drink manufacturers. Circumstances such as these limit the growth of U.S. exports without affecting U.S. imports, in part because U.S. food companies themselves export to the United States from foreign bases.

### Trade Brings Americans the Foods They Want

Aside from its symbolic value, the U.S. agricultural trade balance is not by itself a measure of export competitiveness, or import dependence. The U.S. remains a highly competitive exporter of grains, oilseeds, red meats, poultry, and cotton. But the U.S. also imports large quantities of grain products, vegetable

oils, beef, pork, and cattle. U.S. farmers and food manufacturers do not and cannot produce all or enough of the foods that Americans desire, especially tropical crops. Today, trade is simply a means of providing for needs and wants that are not satisfied domestically or are more cheaply produced elsewhere.

U.S. agricultural imports generally differ from U.S. agricultural exports and will continue to increase independently of exports. Imported perishables arrive when domestic supplies are down or are not available, and imports consist mostly of high-value products, while 36 percent of U.S. exports are bulk commodities. The declining U.S. trade surplus does not signal reduced competitiveness of the U.S. farm sector, but rather Americans' preference for a wider variety of foods and beverages. It also reflects the intense competition among foreign food producers and manufacturers to supply the large American market, including American companies and their affiliates.

U.S. population, income growth, and consumer tastes will ultimately push imports even higher in the long run. Fueled by immigration, the population is forecast to increase by 20 million people to 313 million by 2010. As the size and diversity of the population continue to grow, both the quantity and the variety of

food imports will also grow. Disposable incomes of Americans, which are projected to grow by 1 percent in real terms annually, will drive up per capita food spending on higher quality and higher value products. Thus, U.S. agricultural imports in coming years are expected to increase both in quantity and value, as well as in share of total food consumed. U.S. exports over time, on the other hand, depend on economic and demographic growth in the rest of the world. Both imports and exports are dependent on the dollar's exchange value, but with different effects. The higher the purchasing power of the dollar, the faster imports will grow relative to exports, enabling Americans to buy more of the foods they want. **W**

### This article is drawn from . . .

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*Import Share of U.S. Food Consumption Stable at 11 Percent*, by Alberto Jerardo, FAU7901, USDA/ERS, July 2003, available at: [www.ers.usda.gov/publications/fau/july03/fau7901/](http://www.ers.usda.gov/publications/fau/july03/fau7901/)

"America's Changing Appetite: Food Consumption and Spending to 2020," by Noel Blisard, Biing-Hwan Lin, John Cromartie, and Nicole Ballenger, in *FoodReview*, Vol. 25, Issue 1, Spring 2002, available at: [www.ers.usda.gov/publications/foodreview/may2002/frvol25i1a.pdf](http://www.ers.usda.gov/publications/foodreview/may2002/frvol25i1a.pdf)

"Imports' Share of U.S. Diet Rises in Late 1990s," by Judy Putnam and Jane Allshouse, in *FoodReview*, Vol. 24, Issue 3, September-December 2001, available at: [www.ers.usda.gov/publications/foodreview/septdec01/frv24i3c.pdf](http://www.ers.usda.gov/publications/foodreview/septdec01/frv24i3c.pdf)

"U.S. Agricultural Imports Largely Driven by Rising Horticultural Sales," by Ernest Carter, in *International Agricultural Trade Report*, May 22, 2001, available by request from Ernest Carter, phone 202-720-2922.

**Farm, Rural, and Natural Resources Indicators**

	1990	1995	2000	2001	2002	2003	Annual percent change		
							1990-2000	2001-02	2002-03
Cash receipts (\$ billion)	169.5	188.0	192.0	199.8	192.9	209.9f	1.3	-3.5	8.8
Crops	80.3	100.8	92.4	93.4	99.5	105.6f	1.4	6.5	6.1
Livestock	89.2	87.2	99.5	106.4	93.5	104.3f	1.1	-12.1	11.6
Direct government payments (\$ billion)	9.3	7.3	22.9	20.7	11.0	19.7f	9.4	-46.9	79.1
Gross cash income (\$ billion)	186.9	205.9	228.6	235.3	219.4	246.0f	2.0	-6.8	12.1
Net cash income (\$ billion)	52.7	52.5	56.5	59.2	49.1	65.1f	0.7	-17.1	32.6
Net value added (\$ billion)	80.8	74.8	92.0	94.2	76.9	100.1f	1.3	-18.4	30.2
Farm equity (\$ billion)	702.6	815.0	1,025.6	1,070.1	1,110.7f	1,147.2f	3.9	3.8	3.3
Farm debt-asset ratio	16.4	15.6	14.8	14.8	14.8f	14.8f	-1.0	0.0	0.0
Farm household income (\$/farm household)	38,237	44,392	61,947	64,117 p	65,757 p	68,884 f	4.9	2.6	4.8
Farm household income relative to average U.S. household income (%)	103.1	98.8	108.6	110.2	na	na	0.5	na	na
Nonmetro-Metro difference in poverty rate (%)	3.6	2.2	2.6	3.1	2.6	na	-3.2	-1.7	na
Cropland harvested (million acres)	310	302	314	311	307 p	na	0.1	-1.3	na
USDA Conservation Program Expenditures (\$ bil.) <sup>1</sup>	3.0	3.5	3.4	3.7	3.5 q	na	1.3	-5.4	na

**Food and Fiber Sector Indicators**

U.S. gross domestic product (\$ billion current) <sup>2</sup>	5,803	7,401	9,825	10,082	10,446	10,863 f	5.4	3.6	4.0
Food and fiber share (%)	15.1	14.2	12.6	12.3	na	na	-1.8	na	na
Farm sector share (%)	1.4	1.0	0.8	0.8	0.8	na	-5.4	0.0	na
Total agricultural imports (\$ billion) <sup>1</sup>	22.7	29.8	38.9	39.0	41.0	45.7	5.5	5.1	11.5
Total agricultural exports (\$ billion) <sup>1</sup>	40.3	54.6	50.7	52.7	53.3	56.2	2.3	1.1	5.4
Export share of the volume of U.S. agricultural production (%)	22.5	25.8	22.4	22.5	21.9 p	na	-0.0	-2.7	na
CPI for food (1982-84=100)	132.4	148.4	167.9	173.1	176.2	180.0 f	2.4	1.8	2.2
Share of U.S. disposable income spent on food (%)	11.2	10.6	10.2	10.2	10.1	na	-0.9	-1.0	na
Share of total food expenditures for at-home consumption (%)	55.4	53.9	53.3	53.8	53.9 p	na	-0.4	0.2	na
Farm-to-retail price spread (1982-84=100)	144.5	174.5	210.3	215.4	221.2	na	3.8	2.7	na
Total USDA food and nutrition assistance spending (\$ billion) <sup>1</sup>	24.9	37.9	32.6	34.2	38.0	41.6	2.7	11.1	9.5

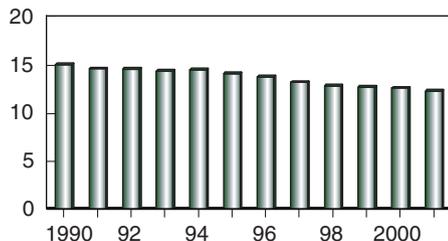
f = Forecast. p = Preliminary. q = 2002 Administration request. na = Not available.

<sup>1</sup> Based on October-September fiscal years ending with year indicated.

<sup>2</sup> Forecast for 2003 based on the Office of Management and Budget's Midsession Budget Review, July 2003.

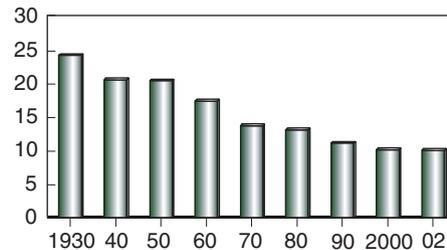
**The food and fiber sector (farming, processing, and marketing) has been slowly declining as a percent of U.S. gross domestic product (GDP)**

Percent of U.S. GDP

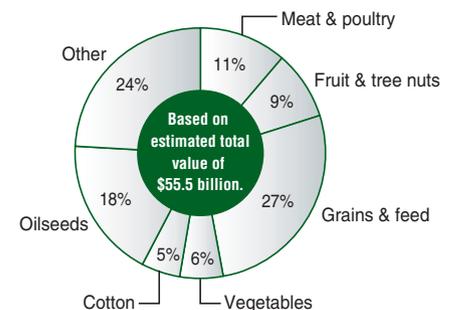


**Food purchases by U.S. consumers are a declining share of their disposable personal income**

Percent of disposable personal income



**Major U.S. agricultural exports, 2003**



For more information, see [www.ers.usda.gov/AmberWaves](http://www.ers.usda.gov/AmberWaves)

**Behind the Data**

**Calculating the Food Marketing Bill**

Total consumer spending on food grown and processed in the U.S. was \$709 billion in 2002. Nineteen cents of every dollar spent on U.S.-grown food goes to the farmer for the raw food inputs, while the other 81 cents covers the cost of transforming these inputs into food products and getting them to our grocery shelves and lunch counters. ERS tracks these processing and distribution costs by calculating what consumers spend for U.S.-grown food each year, and then subtracting the farm value (what farmers were paid) to derive the "marketing bill."

Retail sales data from the Bureau of Census are used to calculate how much consumers spend on foods purchased in grocery stores and eating establishments. The value of food served by schools, hospitals, and other institutions is also included in these estimates. ERS uses super-market industry data to exclude spending for imported foods and seafood.

ERS calculates the farm value by multiplying farm prices (from USDA's National Agricultural Statistics Service) by the quantity of farm products purchased in a given year (from ERS supply and utilization tables). Nonfood byproducts (hides, offal, etc.) are excluded from the farm value estimates.

ERS estimates 11 cost components of the marketing bill. Labor, the largest component, includes wages and salaries of employees, earnings of owners and proprietors, and employee benefits. ERS calculates labor costs using payroll data from the Bureau of the Census and the Bureau of Labor Statistics. Packaging (the second largest component) and energy costs are calculated from Census data. The remaining cost components are derived from Internal Revenue Service statistics.

The size of the marketing bill is affected by changes in the amount and type of products consumers buy. For example, restaurant meals have more marketing costs associated with them, and are therefore more expensive than foods at grocery stores. So, as consumers spend more at restaurants, the marketing bill increases in value. Similarly, as

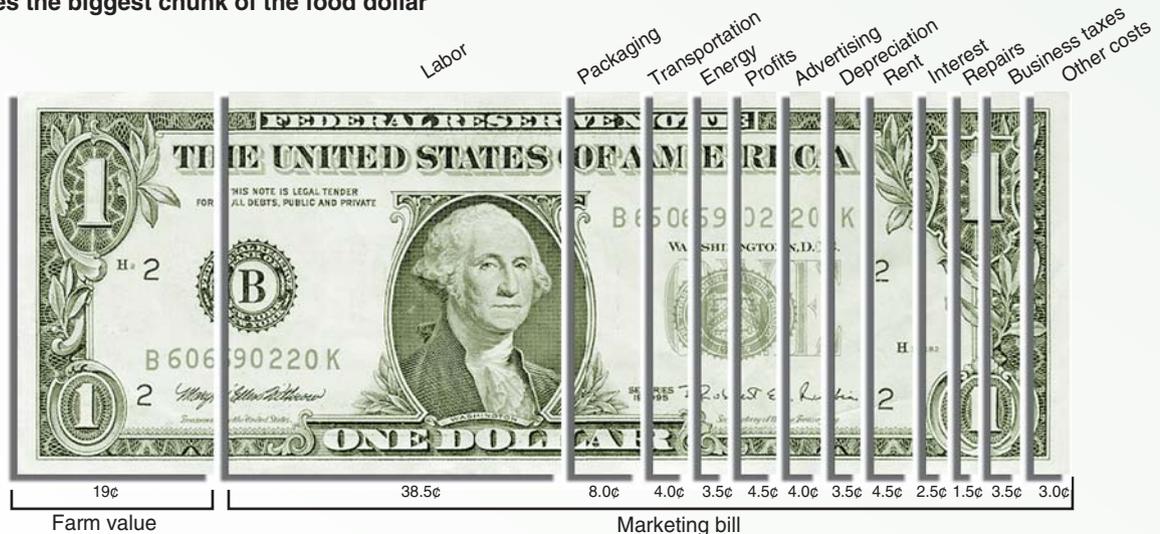
**The marketing bill for U.S.-grown food totaled \$577 billion in 2002**

Expenditures	1980	1990	2000	2002
<i>Billion dollars</i>				
Labor	81.5	154.0	252.9	273.1
Packaging materials	21.0	36.5	53.5	56.8
Rail and truck transportation	13.0	19.8	26.4	28.4
Fuels and electricity	9.0	15.2	23.1	24.9
Pretax corporate profits	9.9	13.2	31.1	33.0
Advertising	7.3	17.1	26.1	28.1
Depreciation	7.8	16.3	24.2	25.3
Net interest	3.4	13.5	16.9	19.2
Net rent	6.8	13.9	26.7	30.3
Repairs	3.6	6.2	10.1	10.9
Business taxes	8.3	15.7	23.5	24.9
Other costs	11.1	22.2	23.3	22.0
<b>Total marketing bill</b>	<b>182.7</b>	<b>343.6</b>	<b>537.8</b>	<b>576.9</b>
Farm value	81.7	106.2	123.3	132.5
<b>Consumer expenditures</b>	<b>264.4</b>	<b>449.8</b>	<b>661.1</b>	<b>709.4</b>

consumers purchase more highly processed food products, such as microwave-ready dinners, relative to less processed fruits, vegetables, and meats, the value of the marketing bill increases. Over the last two decades, the marketing bill has increasingly taken a larger share of the consumer food dollar, growing from 73 percent of consumer food spending in 1982 to 81 percent in 2002.

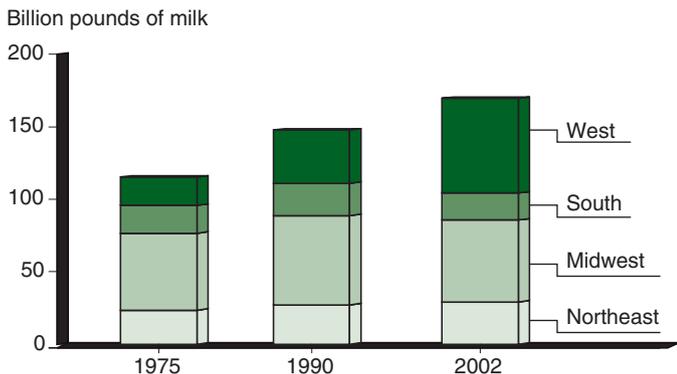
**Howard Elitzak,**  
helitzak@ers.usda.gov

**Labor takes the biggest chunk of the food dollar**



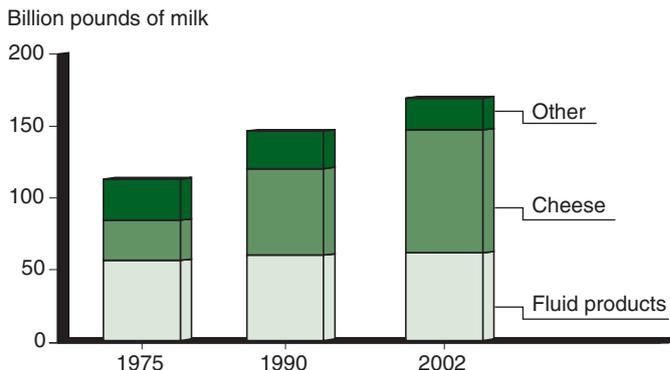
**Markets and Trade**

**Productivity has boosted milk production, especially in the West. . .**



Source: USDA's National Agricultural Statistics Service.

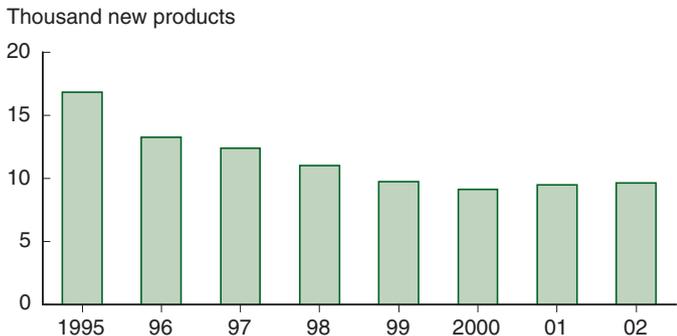
**. . . with the added milk going mostly into cheese**



Sources: USDA's National Agricultural Statistics Service & ERS compilations.

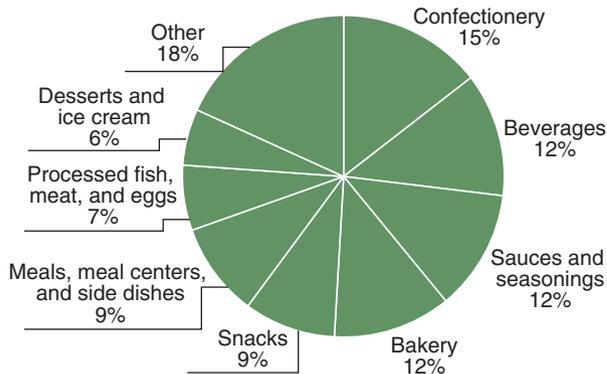
**Diet and Health**

**Annual introductions of new food and beverage products in the U.S. market were dropping until 2000 but have since increased slightly**



Source: Mintel International, Global New Products Database, *New Product News*.

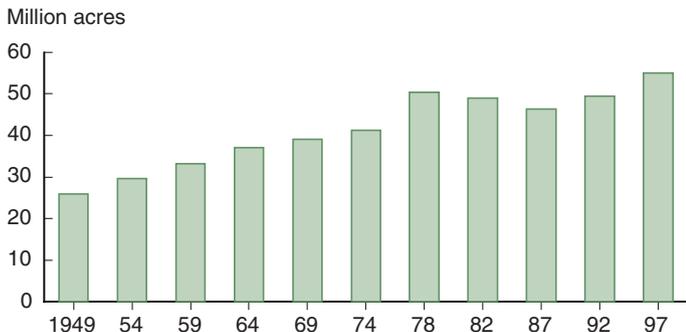
**New products satisfying America's sweet tooth lead 2002 food introductions**



Source: Mintel International, Global New Products Database, *New Product News*.

**Natural Resources and Environment**

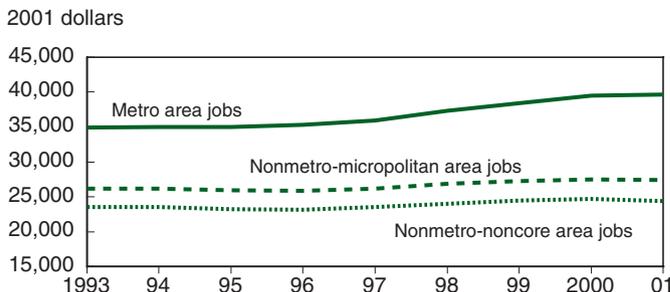
**Irrigated farmland in the U.S. is increasing after a dip in the mid-1980s that was due to weak commodity prices and high cropland idling**



Source: Census of Agriculture.

**Rural America**

**Real earnings per nonfarm job have grown faster in metro than nonmetro areas since 1997**



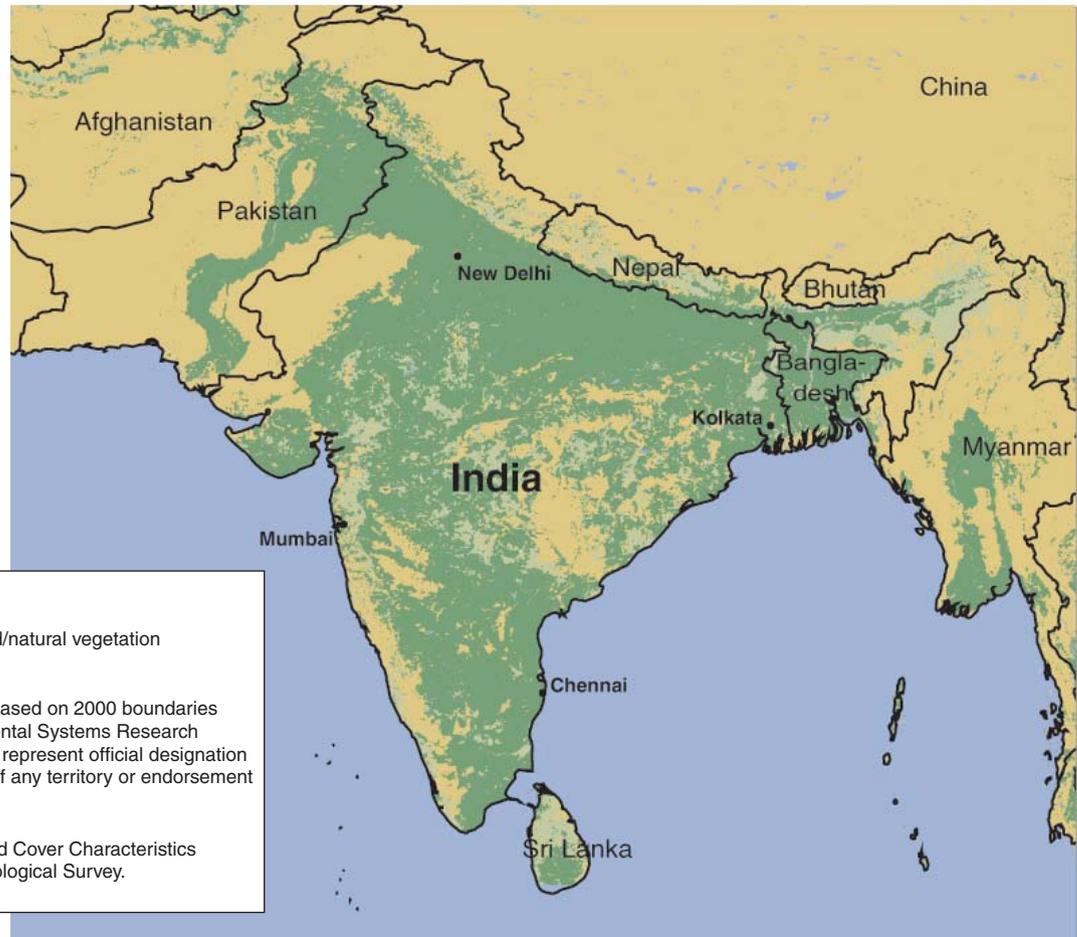
Micropolitan areas are nonmetro counties with an urban cluster of 10,000-50,000 persons, or outlying counties with commuting levels of 25 percent or higher into or out of the urban cluster. Noncore areas are nonmetro counties not meeting the micropolitan classification.

Source: Calculated by ERS using data from the Bureau of Economic Analysis.

**On the Map**

**Agricultural land in India.** Agriculture is a major economic activity in virtually all regions of India. Wheat is the major crop grown in the north, rice in the east and south, and coarse grains, pulses, and oilseeds in the central and western regions.

**Keith Wiebe,**  
kdwiebe@ers.usda.gov



**Land cover**

- Cropland
- Mixed cropland/natural vegetation
- Other

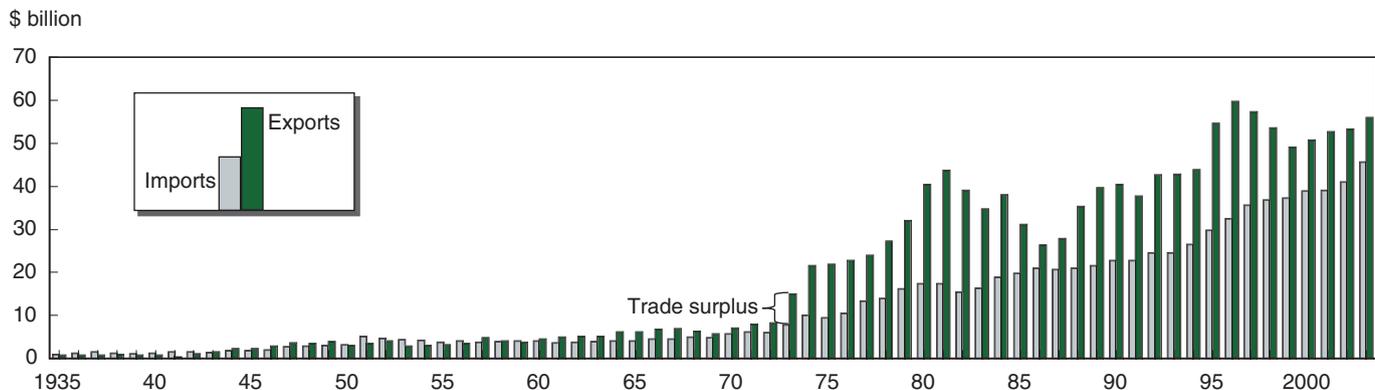
Note: Borders are based on 2000 boundaries from the Environmental Systems Research Institute and do not represent official designation of the legal status of any territory or endorsement of such boundaries.

Source: Global Land Cover Characteristics Database, U.S. Geological Survey.

**In the Long Run**

**U.S. agricultural trade.** Farm exports have recovered after declines in the late 1990s, not unlike in the 1980s. Although our trade surplus continues, it is smaller than in recent years, and imports have been growing faster than exports since 1997.

**Carol Whitton,** cwhitton@ers.usda.gov  
**Alberto Jerardo,** ajerardo@ers.usda.gov



Trade surplus is represented by the height of the export bar over the import bar.  
Sources: Economic Research Service, USDA, and Census Bureau, U.S. Dept. of Commerce.

# Current Activities

## Allocating Resources to Manage Invasive Species and Pests

As part of ERS's research program on the economics of invasive species, ERS and USDA's Animal and Plant Health Inspection Service (APHIS) are developing a methodology for allocating resources to manage invasive species and pests. The effects of invasive species on production, trade, and the environment differ across species. A single methodology for ranking agricultural pests according to different effects will help policymakers to allocate resources in a consistent and transparent manner. A recent workshop with APHIS's Center for Plant Health Science and Technology was one step in the process of constructing a methodology. **Kitty Smith, [ksmith@ers.usda.gov](mailto:ksmith@ers.usda.gov)**

## Collaboration With the Food and Agriculture Organization

ERS economists routinely collaborate with partners around the country and around the world, including the Food and Agriculture Organization of the United Nations (FAO) in Rome, Italy. In October 2003, Joseph Cooper served as the

environmental economics advisor to FAO's Roles of Agriculture Project, which analyzes the side effects (both beneficial and adverse) of agriculture in developing countries. Also at FAO in October, Keith Wiebe discussed shared research interests in land degradation and agricultural productivity, and Shahla Shapouri described ongoing ERS analysis of global food security. **Keith Wiebe, [kdwiebe@ers.usda.gov](mailto:kdwiebe@ers.usda.gov)**

## How Are Changing Preferences Affecting World Food Markets?

ERS research indicates that, although consumer demand for processed food products continues to rise, trade may not keep pace with demand growth. Industry trends toward tighter coordination will encourage tailoring local product manufacturing to specific country markets. The global food industry will continue to evolve in response to specific consumer demands in individual markets. Strategies in developed countries are expected to focus on quality enhancement and consumer trust, while market expansion will be important in the growing developing country markets. In general, market forces



PhotoSpin

are expected to push the global food industry toward greater efficiency, higher quality products, more integrated food supply chains, and fewer players. Future work in this area will focus on linkages between consumer markets and producers. **Anita Regmi, [aregmi@ers.usda.gov](mailto:aregmi@ers.usda.gov)**

## Ag Policy Information Reaches a Wider Audience

ERS economists and technical staffers teamed up recently to create web applications utilizing Flash MX to deliver information in a more dynamic and interactive fashion. The first Flash presentation highlights a recent ERS conference on trade policy, "WTO: Competing Policy and Agendas for Agricultural Trade" (available on the ERS website at: [www.ers.usda.gov/features/wto/conference/post-conference/](http://www.ers.usda.gov/features/wto/conference/post-conference/)). The second presentation, "Potential Market Impacts of the 2002 Farm Act: Current and Future" (available on CD-ROM), integrates video, text, audio, and graphics into an effective educational tool on U.S. farm policy for overseas audiences. **Suchada Langley, [slangley@ers.usda.gov](mailto:slangley@ers.usda.gov)**

# New Releases

## Education in Rural Areas

*Rural Education at a Glance* (RDRR-98-1), the latest in a series of ERS reports on rural social and economic conditions, draws upon the most recent Federal data to summarize the education characteristics of rural America. This six-page report charts the progress made in educational attainment in the 1990s and documents the increasing importance of education to the economic well-being of rural workers and places. It also notes the challenges of a persistent education gap between rural racial and ethnic groups as well as between regions. **Robert Gibbs, [rgibbs@ers.usda.gov](mailto:rgibbs@ers.usda.gov)**

## More Information on Production Practices

Data from the *Agricultural Resource Management Survey* (ARMS) have typically provided information on individual production practices. A recent enhancement to this database (available at: [www.ers.usda.gov/data/cropproductionpractices/](http://www.ers.usda.gov/data/cropproductionpractices/)) allows users to examine production practices—particularly those related to nutrient and pesticide management—in much greater detail. Specifically, researchers can now generate tables that will help them analyze and understand the relationships between different production practices. Data are presented in html tables, and are available to download as Excel spreadsheets from a link at the bottom of each table. **James Payne, [jpayne@ers.usda.gov](mailto:jpayne@ers.usda.gov), and C.S. Kim, [ckim@ers.usda.gov](mailto:ckim@ers.usda.gov)**

## Agricultural Resources and Environmental Indicators Database and Mapping Tool

ERS has developed an online interactive mapping tool that displays data on agriculture and related issues from a variety of sources (available at: <http://maps.ers.usda.gov/agresources/>). Users can create maps and tables that display published county-level data from the *U.S. Census of Agriculture for 1997, 1992, and 1987*. Additional data on population, natural resources, and other variables will appear in the future. **William Quinby, [wquinby@ers.usda.gov](mailto:wquinby@ers.usda.gov)**

Rural  
Education  
At A  
Glance



# Recent Meetings

## Annual Meetings of Social Scientists

In January 2004, several ERS economists participated in the annual Allied Social Science Association (ASSA) meetings in San Diego, CA. The joint meetings of more than 50 related social science disciplines, including agricultural economics and economics, provide a unique opportunity for a diverse group of professionals to interact on current developments in economics and related disciplines. Jim MacDonald, Mary Ahearn, and David Banker presented a paper on the relevance of organizational economics concepts in addressing contemporary policy issues, such as contracting. Agapi Somwaru collaborated on a paper with Shiva Makki on trade, investment, and growth in developing countries. Dean Jolliffe presented a paper on poverty differences and related measurement issues, between metro and nonmetro areas. And Ashok Mishra organized a session and presented a paper on off-farm employment, government policy, and the structure of agriculture from an international perspective.



Eyewire

## Population Change in Rural America

In January 2004, ERS and Cornell University hosted a conference, "Population Change and Rural Society," that highlighted research findings from Census 2000 data on rural demographic change and its implications for economic and social well-being, land use patterns, and rural policy. The conference was organized around four critical themes: changing demographic composition; economic restructuring, globalization, and

changing livelihoods; land use contestation; and regions of chronic disadvantage and emerging opportunity. Presentations by leading social scientists consisted of overviews broadly surveying each critical theme followed by case studies that grounded themes in specific geographic regions. **William Kandel**, [wkandel@ers.usda.gov](mailto:wkandel@ers.usda.gov)

## New State-Level Estimates From ARMS

In December 2003, ERS and the Farm Foundation hosted a workshop in St. Louis, MO, to discuss opportunities to use new data from the Agricultural Resource Management Survey (ARMS). These data include statistically significant State-level estimates for the 15 States with the largest value of agricultural production, in addition to national and regional estimates. About 100 participants from commodity groups, Federal and State agencies, conservation groups, community groups, universities, and the private sector shared information on how the new data can be used to inform issues of importance to a wide variety of stakeholders. **Jim Johnson**, [jimjohn@ers.usda.gov](mailto:jimjohn@ers.usda.gov)

## Food Consumption Data Under Review

In December 2003, ERS hosted a meeting with representatives of Federal statistical agencies to discuss a forthcoming review of USDA's food consumption data infrastructure by the National Research Council's Committee on National Statistics (CNSTAT). Food consumption data are crucial to a wide range of USDA activities, including assessing outcomes of food assistance and nutrition programs, the effectiveness of dietary guidelines, and the risk of foodborne illness, and conducting research and providing market intelligence on U.S. food consumption patterns. Surveys conducted by other Federal statistical agencies, such as the National Health and Nutrition Examination Survey (Department of Health and Human Services) and the Consumer Expenditure Surveys (Bureau of Labor Statistics) could be included in the CNSTAT review. **Nicole Ballenger**, [nicole@ers.usda.gov](mailto:nicole@ers.usda.gov)



Corbis

## Improving Efficiency of Farmland Preservation Programs

In November 2003, ERS, the Farm Foundation, and USDA's Natural Resources Conservation Service (NRCS) and Cooperative State Research, Education, and Extension Service (CSREES) co-sponsored a workshop in Baltimore, MD, on how economic research can be used to improve targeting of farmland preservation program dollars. Participants included ERS and university researchers, NRCS Farm and Ranchland Protection Program specialists, CSREES land use specialists, State and local preservation program administrators, and representatives from farmer and nonprofit groups. Participants concluded that local variation in program goals and diverse community preferences, among other factors, make it difficult to incorporate economic research results into a nationwide parcel-ranking tool, such as the Environmental Benefit Index used for the Conservation Reserve Program. But more can be done to use economic research results to help inform the parcel selection process. **Mary Ahearn**, [mahearn@ers.usda.gov](mailto:mahearn@ers.usda.gov)

## Geographic Information System Analysis Team

**Geographic information system (GIS) software** is a revolutionary technology that links geographic information with descriptive information and provides a wide array of spatial modeling capabilities. GIS mapping, modeling, and database retrieval technologies allow ERS researchers to, among other things, link land quality to agricultural productivity in developing countries, determine how much U.S. farmland is subject to development pressure, or measure accessibility of low-income populations to USDA food assistance programs in more robust way. Using these capabilities, researchers can integrate data from different disciplines, develop indicators at various geographic levels, manage and analyze spatial and tabular data, and generate maps and other visualization tools to display and communicate their findings. Such integration of disparate data into a single context helps analysts answer social science questions with physical science and other data at detailed spatial resolution—an endeavor severely limited even 10 years ago.

Key to these analyses is the ERS GIS Analysis Team. Led by Vince Breneman, the team is as diverse as the research efforts it supports, composed of individuals with spatial modeling expertise, as well as backgrounds in economics, cartography, and computer science. The team divides its time and resources between supporting the ERS research program and aiding senior officials from other USDA agencies in enhancing homeland security.

Shawn Bucholtz, Chris Dicken, and Huajun Zhang support every step of the research process. Through spatial analysis, data visualization, and other data management techniques, they help researchers to establish the conceptual framework and construct the data needed to test hypotheses. In a recent study of manure management in the Chesapeake Bay watershed, spatial gravity models and satellite-derived land cover data were used to help researchers analyze potential increases in producer hauling costs associated with manure management rulings proposed by the Environmental Protection Agency (see *Amber Waves*, June 2003). The development of mapping



Back row (l to r): Chris Dicken, Huajun Zhang, Cory Schinkel, Vince Breneman  
Front row (l to r): Shawn Bucholtz, Amy Goldian, David Nulph, Bryan McEnaney

applications and tools helps researchers to analyze the data and, through interactive maps on the web, share the results with the public. The Agricultural Resource and Environmental Indicators Database and Mapping Tool ([www.ers.usda.gov/data/agresources/](http://www.ers.usda.gov/data/agresources/)) and the Summer Food Service Program Map Machine ([www.ers.usda.gov/data/sfsp/](http://www.ers.usda.gov/data/sfsp/)) are a couple of ERS's most popular online mapping tools.

Amy Goldian, Bryan McEnaney, David Nulph, and Cory Schinkel support homeland security officials in USDA and other agencies by assembling and analyzing data on the Nation's food and fiber system. These analyses aid senior officials in examining the possible effects of disasters or emergencies (such as a food contamination incident, an outbreak of Foot and Mouth disease, or an introduction of Soybean Rust) and designing appropriate responses.

Future efforts of the GIS team include development of advanced visualization features for the web and the development and web delivery of many of ERS's environmental and agricultural indicators and databases. Vince adds, "The diversity of topics and expanding capabilities of technology make this work both interesting and worthwhile."



Vince Breneman, Team leader