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Why Have Food Commodity Prices Risen Again?

Ronald Trostle, rtrostle@ers.usda.gov

Daniel Marti, dmarti@ers.usda.gov

Stacey Rosen, srosen@ers.usda.gov

Paul Westcott, westcott@ers.usda.gov

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Abstract

Between early June 2010 and February 2011, prices of food commodities increased sharply, surpassing the 2008 peaks that had spread anxiety among policymakers and low-income consumers around the world. Most of the long-term trends in agricultural production and consumption that contributed to the 2002-06 price increases and the 2007-08 price spike also contributed to the recent price surge, including global growth in population and per capita incomes, increasing world per capita consumption of animal products, rising energy prices and growing global biofuel production, depreciation of the U.S. dollar, and slower growth in agricultural productivity. The price spikes in both periods also reflect short-term shocks from weather-related production shortfalls, a corresponding decline in world stocks of grains and oilseeds, and changes in trade policies and practices in some countries. Renewed economic growth and demand in low- and middle-income countries following the 2009 recession also played a role in recent price increases. While many of the factors that contributed to price increases in 2002-08 and 2010-11 are the same, the timing, sequence, and relative importance of these factors varied.

Keywords: Agricultural prices, food commodity prices, prices, supply, demand, global supply, global demand, food inflation, food security, energy prices, biofuels, dollar depreciation

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Introduction

Prices Are Up—Again

Sharp increases and declines in agricultural commodities are not uncommon, with five such periods over the past 40 years. Since June 2010, prices of food commodities (grains, oilseeds, vegetable oils, meat, seafood, sugar, and fruit) have risen sharply again. This increase is reminiscent of the 2007-08 price spike that spread anxiety among policymakers and low-income consumers around the world, particularly in developing countries dependent on imported food commodities.

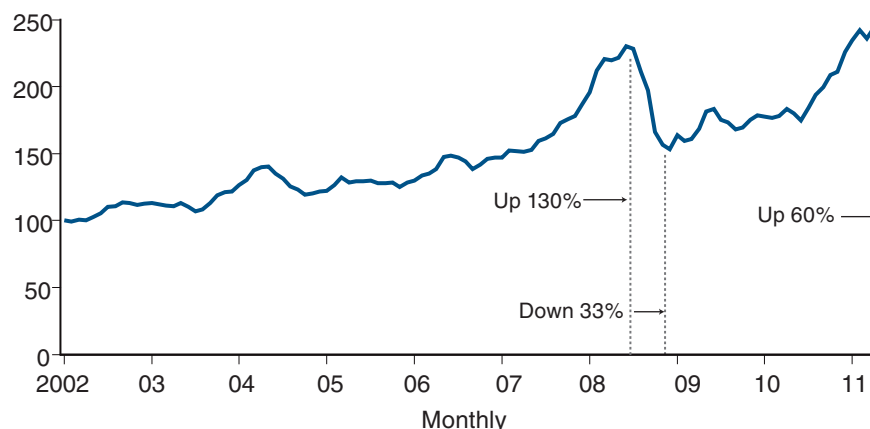
A monthly food commodity price index compiled by the International Monetary Fund (IMF) trended down from 1980 until the end of 2001 and then began to rise. During the 5 years from January 2002 to January 2007, the index rose 47 percent (fig. 1). Over the next 18 months, the price index accelerated (rising 56 percent) and stood 130 percent above the January 2002 level. During the next 6 months, the index declined 33 percent. After reaching a low point in December 2008, the index rose 59 percent through April 2011 and stood 6 percent above the previous June 2008 record.

Compared with food commodity prices, a price index for a four-crop subset (wheat, rice, corn, and soybeans) has had even greater fluctuations (fig. 2). This index, constructed by the Economic Research Service, also uses IMF monthly prices weighted by global trade shares. Between January 2002 and June 2008, this four-crop index rose 226 percent, compared with 130 percent for the overall food commodity index. During the following 6 months, the four-crop index declined 40 percent, while the food commodity index fell 33 percent. By June 2010, the four-crop index had fallen another 11 percent as the food commodity index continued to rise. In June 2010, the four-crop index reached its post-peak low and then began to rise again. Through February 2011, the four-crop index rose 70 percent, while the food commodity index was up 39 percent from June 2010.

Figure 1

Food commodity prices since January 2002

Index: January 2002 = 100

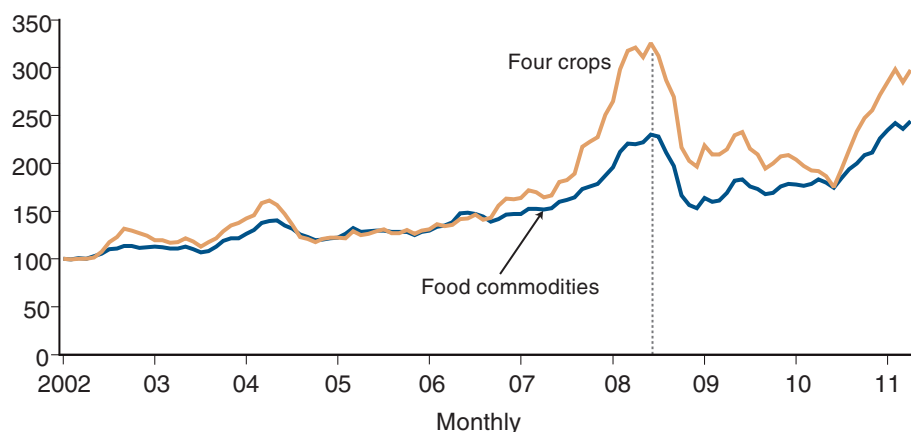


Source: International Monetary Fund, International Financial Statistics.

Figure 2

Price indices for food commodities and four crops¹

Index: January 2002 = 100



¹Index of wheat, rice, corn, and soybean prices weighted by trade shares.

Source: USDA, Economic Research Service calculations and International Monetary Fund, International Financial Statistics.

Composition of Price Increases Different from 2008

In both 2002-08 and 2010-11, markets experienced growing demand for a number of key commodities while contending with tightening supplies. Although the overall food commodity price index has risen again, the roles of various agricultural commodities differed across the two time periods (table 1). Prices of rice, wheat, and vegetable oils increased the most as prices peaked in 2008. In contrast, world rice prices have hardly increased since June 2010 and are half what they were at the peak in 2008. Global 2010/11 rice production is projected to be large, and stocks are perceived to be sufficient to meet expected consumption needs.

Global wheat stocks are currently much higher than they were toward the end of the 2007-08 spike. Feed-quality wheat, however, accounts for a much larger share of stocks, while milling-quality wheat stocks are low due to damage caused by rain in several major wheat producing countries. As a result, world milling-quality wheat prices rose more than prices for feed quality wheat.

Prices for vegetable oils rose sharply in both events and, since 2002, increased nearly twice as much as the overall food commodity index. World demand for vegetable oil for human consumption, for biodiesel feedstocks, and for other industrial uses has seen rapid growth since 2002.

Livestock products, particularly beef, have taken on a more significant role in the current increases in food commodity prices. During the 2002-08 increase in prices, livestock products did not play a significant role. Meat prices only began to increase during the final few months of the 6-year upward trend in the IMF's food commodity price index (fig. 3). In the current situation, however, meat prices began to increase nearly a year before crop prices started their upward trend. Between the latter part of 2009 and June 2010,

meat price increases more than offset declining crop prices as the total food commodity price index rose. Then, as crop prices began to rise in June 2010, meat prices leveled off for about 6 months before they started to climb again. Dairy product prices also began to rise before crop prices.

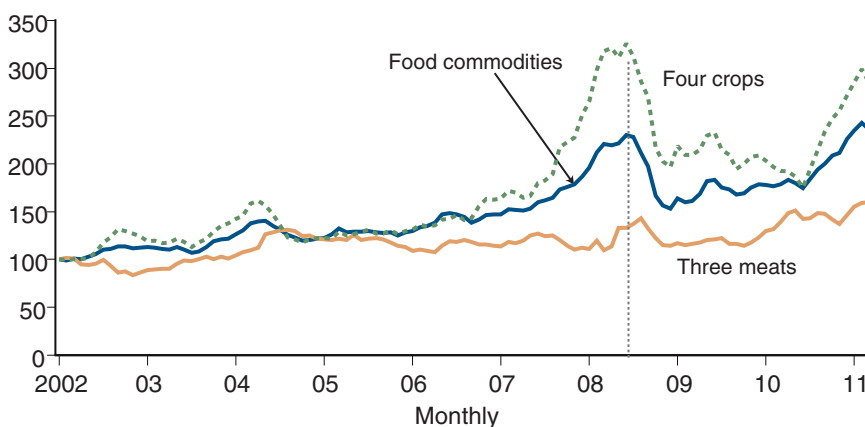
Other agricultural commodity prices also have increased significantly in the current situation. Brazil's 2010/11 sugarcane crop was affected by weather, and sugar prices nearly doubled from May 2010 to January 2011, rising more than any other food commodity. Prices for coffee, tea, fish, wool, and palm oil have also risen dramatically since mid-2010, and all were higher in April 2011 than when they peaked in 2008. Further, cotton prices increased more than any food commodity from mid-2010 to early 2011.¹

¹Although cotton is not a food commodity, it competes for cropland that could be used to produce food commodities.

Figure 3

Price indices: Food commodities, meats, and crops¹

Index: January 2002 = 100



¹Meats: Index of International Monetary Fund beef, pork, and chicken prices; weighted by world consumption shares. Crops: Index of wheat, rice, corn, and soybeans prices; weighted by trade shares.

Source: International Monetary Fund, International Financial Statistics.

Table 1

Changes in prices during two price spikes (U.S. dollars per metric ton¹)

Crop	Price Jan. 2002	Price at 2008 peak	Percent change from Jan. 2002	Price at next low	Percent change from 2008 peak	Price at recent peak	Percent change from previous low	Percent change from Jan. 2002
Food index	100.0	230.1	130	153.0	-33	244.1	60	146
Four crops	100.0	325.8	226	175.4	-46	298.9	70	199
All wheat	125.3	439.7	251	220.1	-50	348.2	58	178
Rice	191.1	1,015.2	431	540.8	-47	535.2	-1	180
Corn	92.0	287.1	212	158.2	-45	293.4	86	219
Soybeans	160.1	554.2	246	318.8	-42	512.1	61	220
Soybean oil	343.5	1,414.4	312	681.0	-52	1,268.4	86	269
Sugar	7.31	14.0	92	11.3	-19	29.4	160	302
Beef	101.0	135.5	34	107.1	-21	183.7	71	82
Pork	54.3	84.6	56	52.6	-38	83.2	58	53
Poultry	62.9	88.4	40	85.4	-3	85.1	0	35
Cotton	43.4	80.2	85	51.5	-36	213.2	314	391

¹Food index and four-crop index: January 2002 = 100.

Source: USDA, Economic Research Service calculations based on data from the International Monetary Fund, International Financial Statistics.

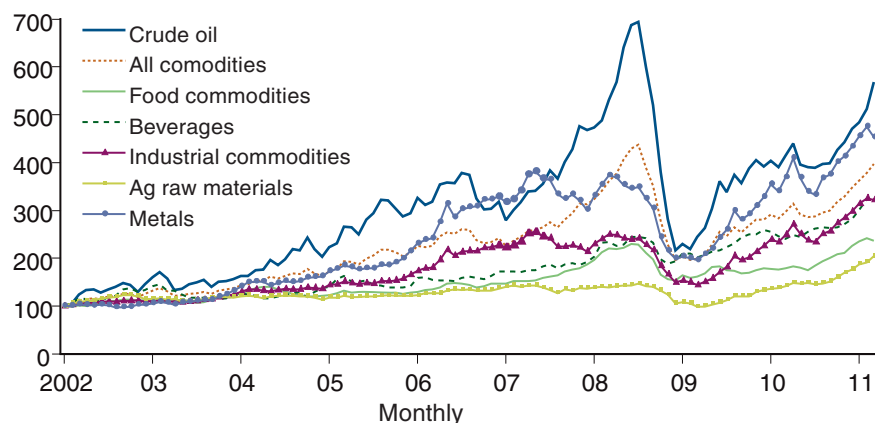
Nonagricultural Prices Are Also Up—Again

Prices for commodities other than food have also been rising. Price indices for commodity categories, such as energy, metals, beverages, and agricultural raw materials have also risen, suggesting that global economy-wide factors are contributing to the current surge in prices as they did during 2002-08 (fig. 4). All of these price indices declined after the peak in mid-2008 through the end of 2008 or the first quarter of 2009. Since then, each of these indices has risen more than the food commodity price index.

Figure 4

Prices of other commodities have risen even more

Index: January 2002 = 100



Source: International Monetary Fund, International Financial Statistics.

Why the Concern?

Rising food prices have received much press and raised many concerns because the 2007-08 price spike is still on the minds of food consumers, livestock producers, agri-businesses, and governments. In early January 2011, the United Nations' Food and Agriculture Organization (FAO) called additional attention to the increase in food commodity prices. FAO reported that its December 2010 food commodity price index had climbed higher than the previous record set in 2008 (see box, "Comparing Four Food Commodity Price Indices").

History shows that markets adjust and prices fall from the peaks of price spikes (see box, "Anatomy of a Price Spike"). Consumers in low-income, food-importing countries, however, are particularly vulnerable to rising food prices. The decline in world stocks of food commodities, combined with higher prices, raises concerns for governments with limited foreign exchange reserves to import the food needed to meet domestic needs and restrain food-price inflation.

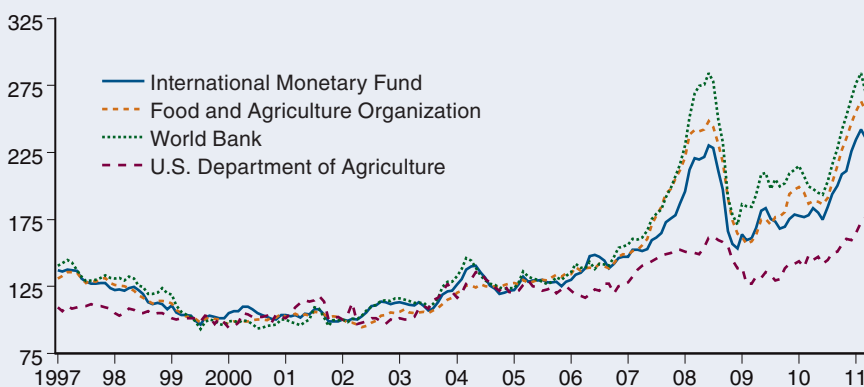
Comparing Four Food Commodity Price Indices

At least four organizations publish a monthly index of food commodity prices: the International Monetary Fund (IMF), the United Nation's Food and Agriculture Organization (FAO), the World Bank (WB), and the U.S. Department of Agriculture's National Agriculture Statistics Service (NASS). Each organization's index is based on a slightly different set of commodities and pricing points, as well as on different weights for each individual commodity's contribution to the overall index. All four indices, however, exhibit similar patterns as prices rise and fall (box fig.).

The FAO's index for December 2010 was higher than its previous high point in June of 2008. None of the other three organizations' December 2010 indices surpassed their previous record, primarily because the FAO index has higher weights for sugar and vegetable oils, commodities whose prices increased the most. The IMF index uses relatively higher weights for food grains. By January 2011, all of the indices had set a new record high, surpassing their June 2008 records.

Food commodity price indices, by organization

Index: January 2002 = 100



Source: IMF, FAO, WB, and USDA.

Anatomy of a Price Spike

During the last 40 years, five periods of large increases in agricultural prices were followed by sharp declines in the same prices (box fig.).¹ A sixth surge in prices began in July 2010 and has not yet turned down. For the purposes of this report, a price spike occurs when the price of a commodity rises and then falls significantly more than its normal price variations. Often, but not always, prices rise to record highs before dropping—sometimes falling as much as they had risen—or declining to a new plateau greater than historical levels. Each surge in prices has been followed by a decline in prices as the conditions that prompted the rapid increase were reversed.

The beginning of a price spike generally reflects unusually large changes in supply and/or demand. In some cases, unexpected production shortfalls reduced available supplies; in other cases, production simply stagnated while demand rose. On some occasions, demand rose rapidly and prices increased until production could respond. Sometimes changes in agricultural production or trade policies induced changes in both the production and consumption of agricultural commodities.

The current situation is the sixth time that crop prices have risen more than the normal year-to-year variation since 1970. Although many common factors contributed to the price spikes since 1970 (Peters, et al., 2009), the relative importance of each factor, as well as the magnitude and duration of the price movements up and down, generally differed.

¹A four-crop price index is used here because the IMF food commodity price index is not available prior to 1980.

In 1972-74 and 2002-08, prices rose significantly more in percentage terms than in the other time periods. Prices did not decline back to their pre-peak level, however, as they did during price spikes in the 1980s and 1990s. The upward price movement during 2002-08 was the longest and was followed by the fastest decline.

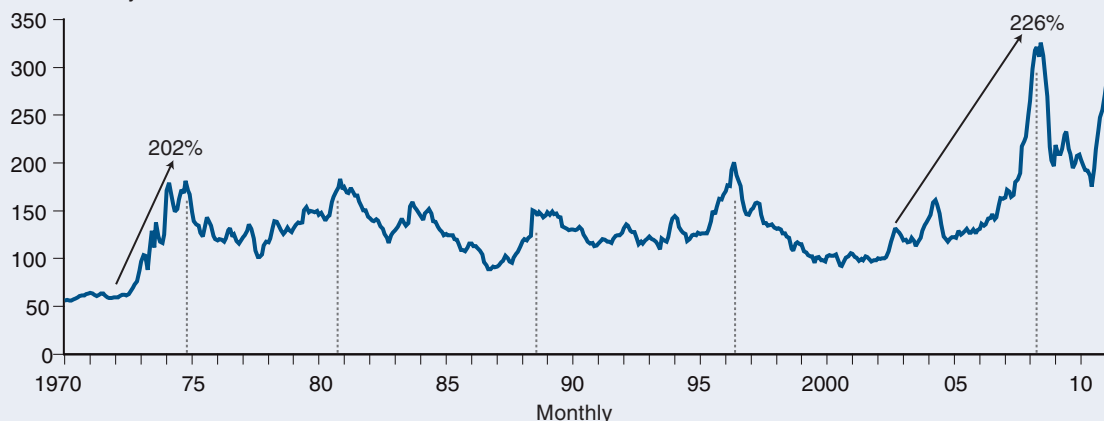
Although price peaks in the first four time periods were evenly spread out (about every 6-7 years), the 2008 peak occurred more than a decade after the preceding peak. The most recent 2010-11 price surge occurred less than 3 years after the June 2008 price peak. Prices for 2010-11 have risen faster than the other price spikes since 1970. The four-crop index rose about 70 percent in 8 months, equivalent to a 6.9 percent average monthly growth rate.

The commodity price spikes in the 1980s and 1990s were characterized by more moderate increases and declines. While the duration of the post peak declines in prices were longer, prices eventually fell to pre-spike levels.

Based on these five historical price spikes, when prices rise more than typical variations, markets adjust and prices eventually decline. It may take several months or several years for the markets to fully adjust, but eventually they will do so. The new equilibrium may return to pre-spike price levels or may be at a somewhat higher price plateau.

Crop price spikes since 1970¹

Index: January 2002 = 100



¹Weighted average of four crops (wheat, soybeans, corn, and rice); International Monetary Fund monthly prices weighted by world exports.

Source: USDA, Economic Research Service calculations based on International Monetary Fund nominal prices and weights.

Many Factors Contribute to Higher Food Commodity Prices

Most of the long-term factors underlying trends in agricultural production and consumption that contributed to the general rise in food commodity prices in 2002-08 continue to be important underlying factors in the recent price surge. These long-term factors include global growth in population and per capita incomes, related increases in world per capita consumption of animal products, depreciation of the U.S. dollar, rising energy prices and expanding global biofuel production, and slower growth in agricultural productivity.

Against this backdrop of generally rising food commodity prices since 2002, the sharp price spikes in 2007-08 and 2010-11 reflect short-term anomalies and shocks. Short-term factors include weather-related production shortfalls, a corresponding decline in world stocks of grains and oilseeds, and changes in trade policies and practices. In particular, underlying recent crop price increases has been a series of adverse weather events in a number of major world producing regions that occurred in a relatively compressed time period from June 2010 to April 2011. As a result, estimates of world crop production and stock levels steadily declined, tightening world supply and demand balances. Additionally, renewed economic growth and associated gains in food demand in low- and middle-income countries has contributed to recent food commodity price increases following the 2009 recession.²

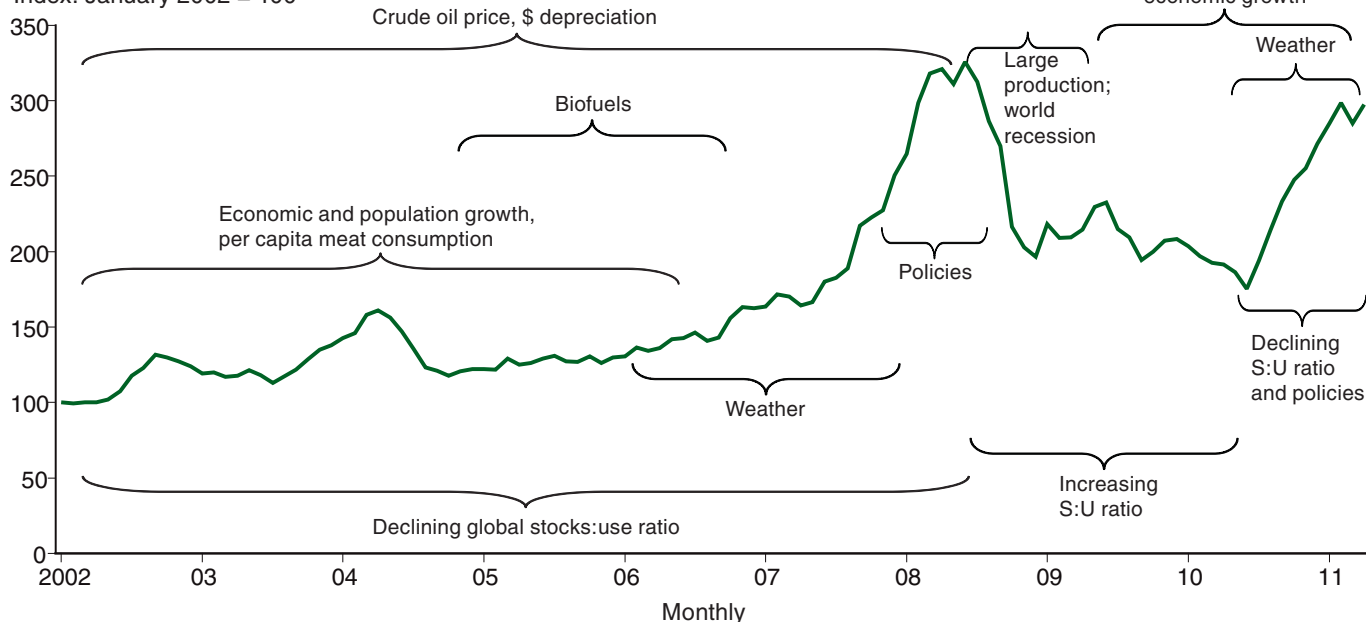
Although many of the factors that contributed to price increases in 2002-08 and 2010-11 are the same, the timing, sequence, and relative importance of each factor varied (fig. 5).

²The recession may have contributed to reducing food commodity prices below levels they would have otherwise been, as appears to be the case for crude oil prices.

Figure 5

Primary factors affecting crop prices¹

Index: January 2002 = 100



S:U=Stocks-to-use ratio.

¹Four-crop price index for wheat, rice, corn, and soybean prices weighted by trade shares.

Source: USDA, Economic Research Service calculations based on International Monetary Fund, International Financial Statistics.

Global Macroeconomic Factors

As noted previously, the upward price trends in 2002-08 and 2010-11 occurred for nearly all commodities, not just for agricultural products. Further, a subsequent sharp decline in prices from their 2008 peak levels was seen in nearly all commodities. Thus, it seems that broad, economy-wide factors contributed to both the rise and fall in prices. Although factors specific to the agriculture sector also played a role, the impact of global economic growth, the changing value of the U.S. dollar, and crude oil prices filtered through to most world commodity markets.

Economic Growth

The strong, long-term growth in the world's economy was interrupted the last half of 2008 by a global recession (fig. 6). The world's economy grew at 2.9 percent between 2001 and 2008, only to decline more than 2 percent in 2009. Global economic growth returned in 2010.

For most middle- and low-income countries, however, the recession was neither as deep nor as protracted as for developed countries. Further, the resurgent growth has included middle- and low-income countries, including China and India. These countries play an increasingly important role in the global economy and in the growth in food demand. Their high income growth and high responsiveness to that growth with increased consumption and imports of food and feed contributed to greater global agricultural demand and put upward pressure on food commodity prices.

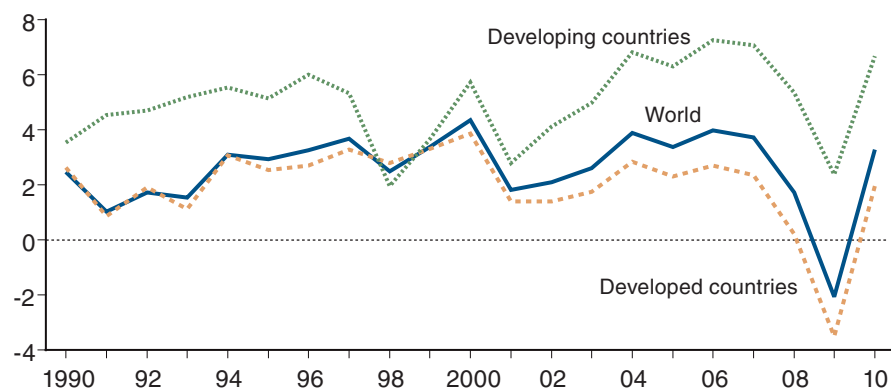
U.S. Dollar Exchange Rate

The declining value of the U.S. dollar contributed to the increase in world crop prices for the 2008 price spike and continued to be an important factor underlying the 2010-11 price increases. As the dollar loses value relative to the currency of an importing country, it reduces that country's cost of

Figure 6

Economic growth: World, developed, and developing countries

Percent growth in GDP



Source: USDA, Office of the Chief Economist, *USDA Agricultural Projections to 2020*, February 2011.

importing. Since the United States is a major source of many agricultural commodities, U.S. exports tend to rise, putting upward pressure on U.S. prices for those commodities.

The steep and steady depreciation of the dollar between 2002 and April 2008 contributed to the increase in most commodity prices leading up to 2008's price peaks (fig. 7). The dollar's value then rose between mid-2008 and March 2009 before declining again during the remainder of 2009, most of 2010, and into 2011. Although the dollar's value declined about 16 percent through February 2011, its value that month was only 4.3 percent below the April 2008 low because of the appreciation in 2008-09.

Energy Related Prices

Crude oil prices rose sharply from early 2002 to mid-2008, much of which reflected increased crude oil demand caused by robust world economic growth and rapid manufacturing growth in China, India, and other Asian countries. The largest increases were from early 2007 to mid-2008, when oil prices more than doubled. In July 2008, monthly average crude oil prices surpassed \$130 per barrel. The IMF's monthly crude oil index was 594 percent above January 2002. The weakening of the global economy toward the end of 2008 and into 2009 resulted in a decline in demand for petroleum and other energy sources. By early 2009, crude oil prices were down about 70 percent from their peak.

Following the 2009 global recession, economic growth improved and was particularly robust in the more energy intensive economies of low- and middle-income countries. This growth increased the demand for energy and the price of crude oil rose sharply—even more than food commodity prices.

Figure 7

U.S. agricultural trade-weighted dollar exchange rate¹

Index value: 2005 = 100



¹Real U.S. agricultural trade-weighted dollar exchange rate, using U.S. agricultural export weights, based on 192 countries.

Source: USDA, Economic Research Service,
<http://www.ers.usda.gov/Briefing/Macroeconomics/>.

By April 2011, oil prices had almost tripled since the low point in December 2008 (fig. 8). Although oil prices were still well below the 2008 peak, the renewed rise appears to have moved crude oil prices back toward a longer run upward trend that was interrupted by the global recession.

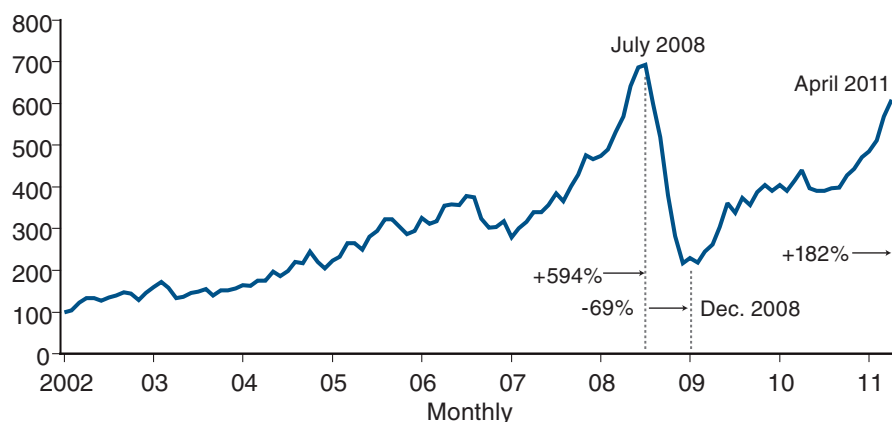
Ocean freight rates affect the cost of imported food commodities. As food commodity prices increased leading up to the 2008 peak, dry bulk freight rates rose even more rapidly, increasing more than 350 percent between January 2006 and November 2007. High oil prices, increased demand for ocean shipping, and slow growth in the availability of dry bulk shipping vessels were the major factors contributing to higher freight rates. By the end of 2008, ocean freight rates had plummeted more than 90 percent as a result of lower oil prices, reduced demand associated with the global recession, and an increase in the number of ships.

In the 12 months preceding February 2011, dry bulk freight rates did not increase or contribute to higher prices for imported food commodities. While ocean freight rates at the end of April 2011 were somewhat higher than in February 2011, they were still less than a fourth of the peak levels reached in 2007 and 2008, largely reflecting the increase in shipping capacity.

Figure 8

Crude oil prices¹

Index: January 2002 = 100



¹International Monetary Fund crude oil monthly price index.

Source: International Monetary Fund.

Developments in Agricultural Markets

In addition to global economy-wide factors supporting food commodity price increases, a variety of long-term trends and short-run developments in the agricultural sector contributed to the upward pressure on prices.

Increasing Consumption of Animal Products

With rising global incomes and increased diet diversification, world per capita meat consumption has been increasing steadily over the last three decades (fig. 9), particularly in low- and middle-income countries. Between 1990 and 2010, total per capita consumption of beef, pork, and poultry trended upward at 1.2 percent annually. Per capita poultry consumption rose most rapidly; beef consumption per person has not increased.

As the demand for meat rises, demand for the grain and protein feeds used to produce the meat also increases. Further, some countries have adopted policies to increase self-sufficiency in meat production. Livestock operations in these countries, however, may not be as efficient in feed conversion as those in the countries from which they might have imported the meat, thereby further increasing the demand for feedstuffs. However, biological lags in the livestock sector influence the timing of price relationships between crops (animal feeds) and livestock. (see box, “Biological Lags in Meat Production, Feed Demand, and the Dynamics of Crop-Livestock Price Relationships”).

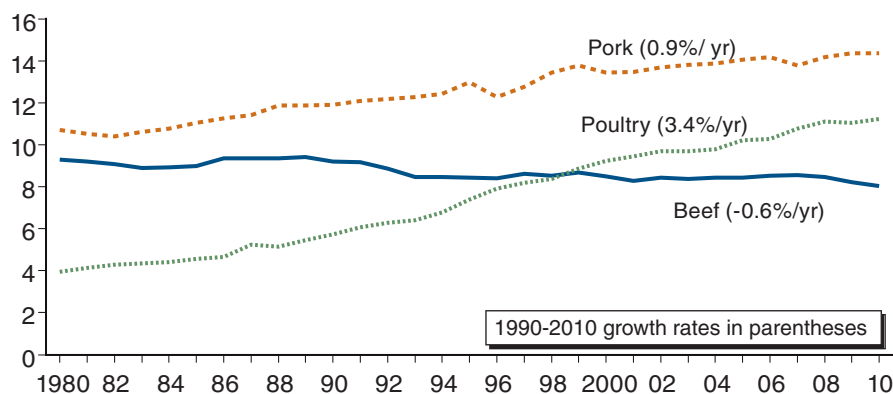
However, as the global economic recession deepened in 2008 and 2009, world demand for meat declined and shifted toward lower-priced poultry. With lower meat demand, world meat imports declined 1.2 million metric tons (5.5 percent) in 2009, the largest yearly decline since 1993.³ The reduction in world

³Russia and Mexico—two of the world’s larger beef importers—cut their beef imports by over 20 percent in 2009. Three of the world’s largest pork importing nations—Japan, Russia, and China/Hong Kong—dropped their pork imports by 14 percent, 20 percent, and 41 percent, respectively. Russia, China, and Japan—the world’s first, third, and eighth largest poultry meat importers—reduced imports by 22 percent, 10 percent, and 22 percent, respectively.

Figure 9

Global per capita meat consumption¹

Kilograms per capita



¹Data are not reported in USDA's Production, Supply and Distribution (PS&D) database for some countries, therefore data are not equal to true global total.

Source: USDA, Foreign Agricultural Service, Production, Supply and Distribution (PS&D) database; Food and Agriculture Organization's database and baseline projections.

Biological Lags in Meat Production, Feed Demand, and the Dynamics of Crop-Livestock Price Relationships

The changing composition of global meat production has affected the amount and kind of feed used. Poultry meat's share of world meat production has steadily increased, while beef's share has declined (box fig.).

Poultry production is the most efficient animal industry at converting grain and protein meal into meat and has been growing more rapidly than other meat industries. As a result, its growing share of world meat production contributed to improving the world's overall feed efficiency in producing meat.

Pork accounts for the largest share of world meat production. Much of the increase in world pork production since the 1980s has occurred in China, which produces half of the world's pork today. Most of the hogs raised in China still come from traditional, small-scale farms rather than from modern grower operations. These small farms feed relatively little commercial feeds that include grain and protein meal. Industrial hog farming techniques that rely on feed rations with high levels of corn and protein meal, however, are becoming more common. This trend to industrialize pork production has increased Chinese imports of soybeans and distiller's dried grains.

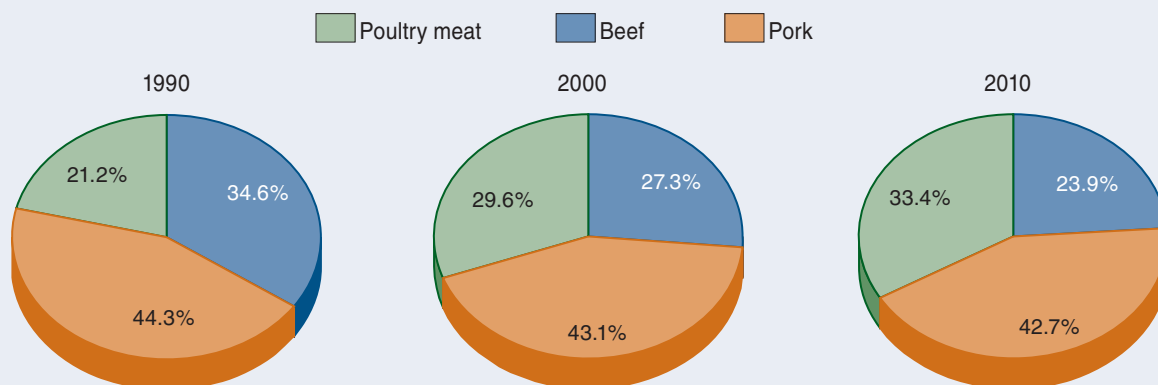
For cattle production, most of the birth-to-slaughter weight gain comes from pasture feeding. World cattle production,

however, has slowly turned toward more intensive feeding systems, which use more grain and protein meal. Thus, although world beef production has risen slowly during the last decade, the increased output was based on feeding relatively more grain and protein meal.

Year-to-year changes in livestock product output, consumption, and prices tend to be more stable than for crops. Crop and livestock prices, however, each influence the other through a set of relationships that are both direct and indirect and have different time lags. Changes in meat demand and meat prices influence demand for and prices of crops. In turn, grains and oilseeds and their byproducts account for a large share of livestock production costs.

Sustained changes in crop prices affect livestock and poultry producers' profits, influencing decisions about how much meat to produce. The time horizon for the effect on meat prices depends on the duration of an animal's production cycle. Producers make decisions whether to expand or contract production long before the factors for profitability are known in the market. It takes 2-4 years from the time a heifer or cow is bred until the offspring go to market, about 10 months from the time a gilt or sow is bred until the pigs reach slaughter weight, and about 2-3 months for a chicken to have eggs and the chicks are large enough to be sold.

Changing composition of world meat production



Source: USDA, Foreign Agricultural Service, Production, Supply and Distribution (PS&D) database; Food and Agriculture Organization's database.

meat imports relieved pressure on food commodities demand and kept meat prices relatively low.

Because of biological production lags, world meat production could not quickly respond to the 2008-09 drop in world demand, creating a surplus of meat in the world market. The supplies of beef, pork, and poultry meat products in the market when the recession was deepest and demand was low, largely reflected production decisions made in earlier time periods, ranging from several months for poultry to several years for beef.

Beginning in early 2010, however, the world began to recover from the global economic recession. With incomes growing, demand for meat strengthened and prices for livestock products increased. As before, meat production decisions for this period were made earlier. In particular, production decisions affecting pork and beef supplies during 2010's rapid increase in world demand were made when prices were well below those prevailing at the end of 2010.

The world meat market continues to feel impacts of the world recession. Decisions made during the recession to reduce pork production will put upward pressure on pork prices for the rest of 2011. Decisions to reduce beef production will continue to affect prices for several more years.

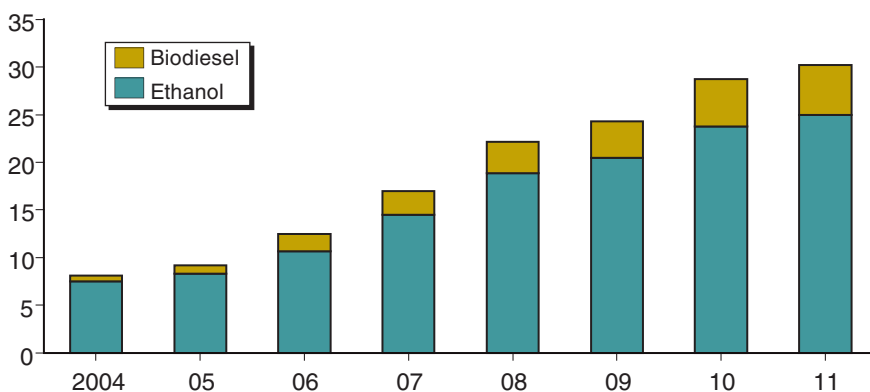
Global Biofuels

The role of biofuels in shaping food commodity prices has generated considerable debate. Over the last 5 years, use of corn and sugarcane for ethanol and vegetable oils for biodiesel has increased total demand for these crops. Although growth in global biofuel production has slowed from rates exceeding 30 percent per year in 2006-08 (fig. 10), overall increases continue and the shares of grain used for ethanol and vegetable oils used for biodiesel, relative to total use, continued to climb.

Figure 10

Biofuel production: Sum of largest producers¹

Billion gallons



¹The six largest producers (United States, Brazil, EU, China, Canada, and Argentina) accounted for 96 percent of world biofuel production in 2007.

Source: USDA, Foreign Agriculture Service.

In many countries, the expansion of biofuel production has depended on Government policies, specifically tax incentives and use mandates, motivated by environmental concerns and the goal to reduce dependence on petroleum imports. To the extent that mandates are binding, demand for feedstocks are less responsive to price changes.

In the United States, mandates under the Renewable Fuel Standard, the Volumetric Ethanol Excise Tax Credit (VEETC), and high crude oil prices have increased demand for corn for ethanol and raised corn prices. As a result of higher corn prices, U.S. corn exports and feed demand for corn have generally declined. Although U.S. ethanol expansion is slowing from the rapid pace of the previous 5 years, ethanol production accounts for a historically high share of corn utilization. In 2010/11, U.S. corn for ethanol is projected to account for 37 percent of total use, compared with 31 percent in 2008/09 (fig. 11). The impact of increased corn use for ethanol is partially offset by the feeding of distillers' dried grains, a byproduct of dry-mill corn-based ethanol production (Hoffman and Baker, 2010).

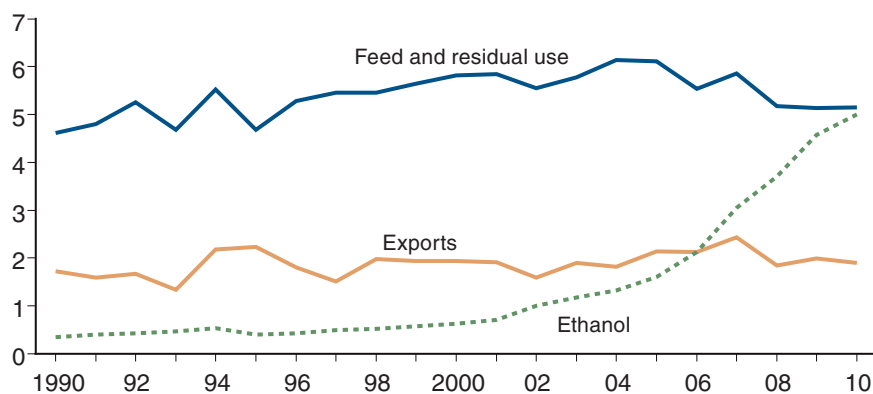
Increased demand for vegetable oil to produce biodiesel in the EU, Argentina, and Brazil contributed to higher prices for oilseeds and vegetable oils. In Argentina and Brazil, 2010 biodiesel production rose 57 percent and 46 percent, respectively, from the previous year. Both countries have biodiesel blending mandates. About two-thirds of Argentina's production was exported, partly due to a lower export tax on biodiesel (20 percent) than on soybean oil (32 percent). Most of Brazil's biodiesel production is used domestically. Jointly, the two countries used 3.5 million tons of soybean oil to produce biodiesel, accounting for about a quarter of their soybean oil production. As a result, soybean oil exports by Brazil and Argentina have declined in recent years.

Globally, the 2002-08 increase in biofuel production—ethanol in the United States and Brazil and biodiesel production in the EU, Argentina, and Brazil—played a role in raising prices for corn, sugar, rapeseed, and soybeans, as well as for other crops. Attributing most of the rise in food commodity prices to biofuel production, however, seems unrealistic. Crop prices dropped more than 30 percent during the last half of 2008 even though biofuel production

Figure 11

U.S. corn: Feed and residual use, ethanol, and exports

Billion bushels



Source: USDA, World Agricultural Supply and Demand Estimates (WASDE), May 2011.

continued to increase. Further, nonagricultural prices rose more than agricultural prices, and the price of corn (an ethanol feedstock) rose less than for rice and wheat (not biofuel feedstocks). Clearly, there were other factors at play. Thus, while the expansion of biofuels was an important factor underlying the general rise of food commodity prices in 2002-06 and their movement to a higher plane, it is less clear how much additional impact biofuels had during the subsequent 2007-08 spike in prices, as evidenced by biofuels' continued and growing presence through both the upside and downside of the spike.

Adverse Weather and Commodity Market Balances

As is typical in periods of significant increases in food commodity prices, weather effects on agricultural production have again been a major factor in 2010-11. A series of adverse weather events were compressed into 10 months, beginning in June 2010 (table 2 and fig. 12). Weather around the world was either too dry, too wet, too hot, or too cold, sharply reducing expectations for 2010 global crop production and stock levels and resulting in higher prices. Similar production-reducing weather events occurred prior to the 2008 price peak, but they were spread over a 3-year period (2005-07). Consequently, expectations for world crop production dropped more quickly after June 2010 than during the 2005-07 price increases. On the demand side, consumption of grains and oilseeds continued to rise. As a result, global stocks of aggregate grains and oilseed declined and prices began to rise rapidly (fig. 13).

Although figure 13 provides a summary of a tighter global supply and use situation, it masks some important details. At the end of 2007/08, most individual commodity stock-to-use ratios were rather low, but no single commodity was drastically low. Currently, corn and soybeans have quite low stock-to-use ratios. And, while the ratios for wheat and rice suggest reasonably comfortable stock levels, there is a relatively greater shortage of milling-quality wheat than is shown in the aggregate measure. Cotton, vegetable oils, and sugar are not included in this aggregate statistic, but their stock-to-use ratios are also low. These low ratios suggest competition among food commodities and between food and nonfood commodities for acreage in the 2011 planting seasons will be high.

Changes in Policies and Trade Practices

Rising world food commodity prices contributed to food price inflation in a number of countries, becoming an increasing concern in late 2010 and early 2011, just as it did toward the end of the 2002-08 increase in prices. During both periods, various countries changed their agricultural and trade policies and modified their trade practices after prices increased considerably, attempting to reduce the impact of rising world prices on their own consumers by (table 3):

- Establishing export restrictions in the form of quotas and higher export taxes;
- Imposing export bans on staple food commodities;
- Reducing or suspending import tariffs; or
- Increasing consumer subsidies to help offset rising food costs.

Table 2

Timeline of weather events

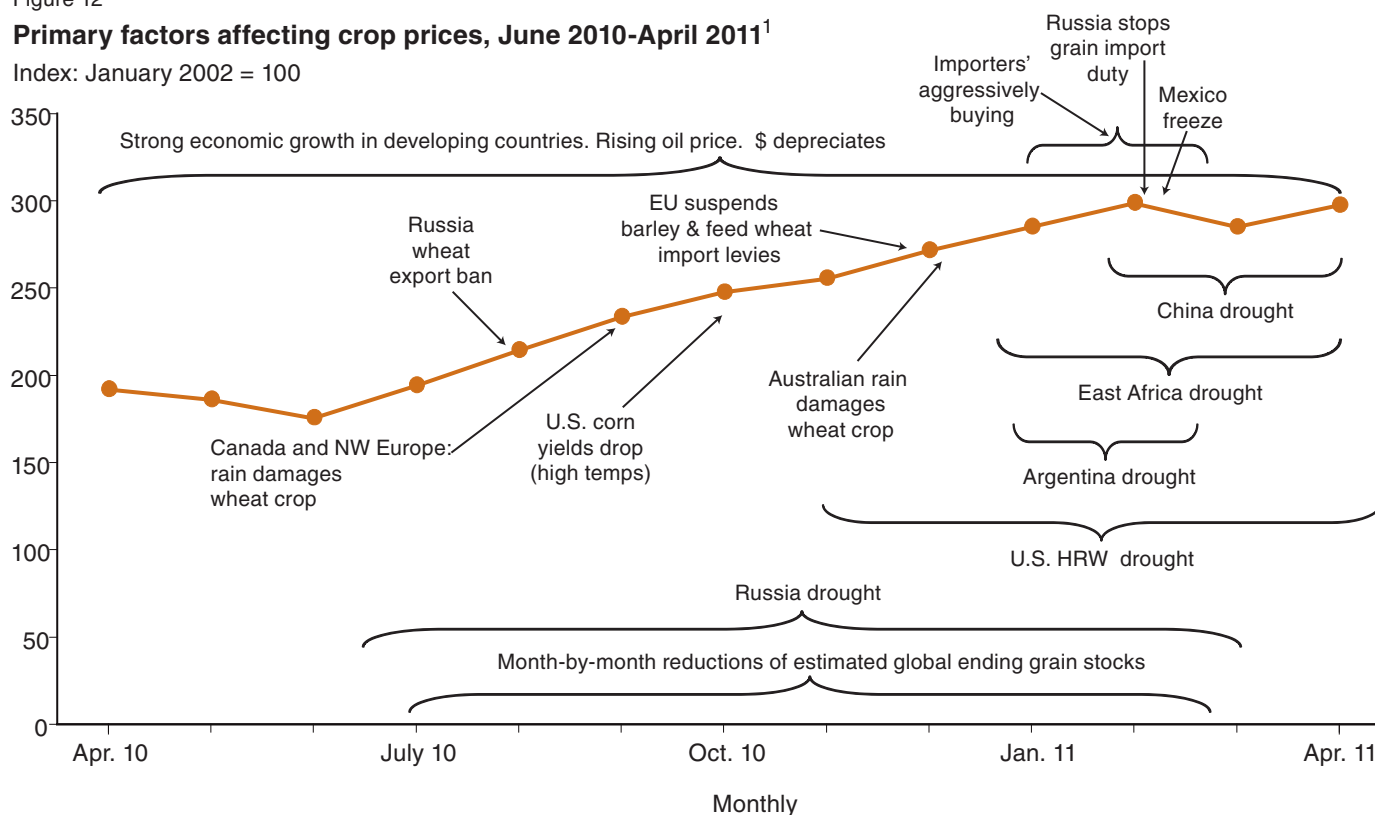
Date	Country/event
2010	
June	Severe drought in Russia, combined with widespread wildfires, sharply reduced expected production, particularly for wheat.
September	Drought began in the U.S. hard red winter wheat area.
November	Heavy rains in Australia damage wheat crop.
December	Russian area planted to winter crops was down 17.8 percent due to continued drought. East African countries began to experience drought conditions. The World Meteorological Organization indicated that the La Niña weather effect was largely responsible.
September-December	Large portions of the U.S. hard red winter (HRW) wheat area had very low precipitation: Western Kansas had the 11 th lowest in more than 100 years; eastern Colorado had the 3 rd lowest on record; the Texas panhandle had the 15 th lowest.
2011	
January 24	U.S. HRW wheat area: Temperatures well below zero, with little or no snow cover and poor root development, raised concerns about winter kill. Argentina, Ukraine, and Russia received precipitation—amounts were small but beneficial.
January 25	China: Drought across major wheat producing region getting worse. India: Frost damage to winter crops, including wheat, lentils, and fruits and vegetables.
January 31	Argentina received stabilizing rainfall the latter part of January.
February 10	Indonesia lowered soybean production estimate because of too much rain in Aceh and East Java which prohibited planting. Rice will be planted instead.
February 15	Argentina had good rainfall except in the southwest, which improved corn and soybean harvest prospects slightly. Brazil's forecasted soybean production rose 3 million tons. Russia's winter wheat crop in poor condition; perhaps 10 percent lost due to drought. Spring planting expected to be up 3 million hectares due to abandoned winter wheat and area not planted to winter wheat or barley. Russia not expected to lift wheat export ban until October 2011.
February 17	Mexico: a rare freeze killed some of the corn crop.
March 1	China's dry northern wheat area received rains. Rains in Brazil impeded soybean harvest and exports.
April 1	Heavy rains and floods delayed corn planting in major parts of the U.S. Corn Belt. Continued drought in extensive portions of the U.S. hard red winter wheat area further reduced production expectations.

Source: USDA, Economic Research Service compilation based on news media reports..

Figure 12

Primary factors affecting crop prices, June 2010-April 2011¹

Index: January 2002 = 100



HRW=Hard red winter wheat.

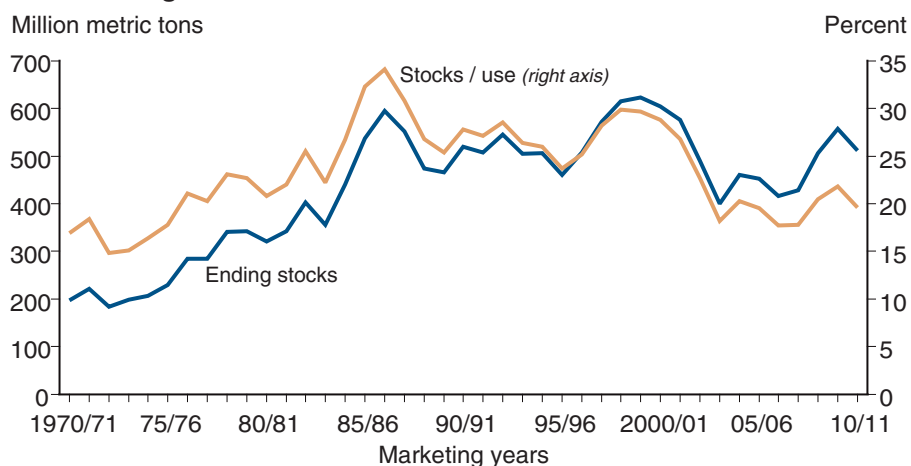
¹Four-crop price index: Wheat, rice, corn, and soybean prices, weighted by trade shares.

Source: International Monetary Fund, International Financial Statistics.

Figure 13

Total world grain and oilseed stocks and stock-to-use ratio¹

Million metric tons



¹Oilseeds include annual crops of soybeans, rapeseed, and sunflowers.

Source: USDA, World Agricultural Supply and Demand Estimates (WASDE) and Production, Supply, and Distribution (PS&D) database, May 2011.

Table 3

Timeline: Changes in policies and practices

Date	Country/event
2010	
August 4	Russia imposed a ban on wheat exports because of drought-induced crop shortfalls and rising domestic prices.
August 19	U.S. export sales of total grain for the week were at a record high, suggesting importers were quickly seeking to replace wheat imports from Russia, even at higher prices.
September 15	Belarus banned exports of rapeseed oil to the European Union (EU) due to a 30-percent reduced harvest.
December 22	Turkey reduced the tariff on public sector wheat imports from 130 percent to zero.
2011	
January 21	China entered into an unusual contract to buy feed wheat from Australia. Jordan and Algeria bought larger amounts of wheat than usual.
January 28	Algeria bought 800,000 tons of wheat at \$380 (cost, insurance, freight). This large purchase at such a high price was an effort to calm protests against rising food prices. Bulgaria and Romania had plenty of feed-quality wheat but began to contract to import milling wheat.
February 1	Jordan, Libya, and Morocco contracted for additional imports to build up inflation buffers. Bangladesh and Taiwan reduced import duties or sales taxes for some food-related imports.
February 3	Russia lifted its 5 percent grain import duty until the end of June.
February 10	Afghanistan, Indonesia, and Egypt contracted for more wheat imports.
February 15	Iraq bought 350,000 tons of wheat and Tunisia bought 100,000 tons of wheat; more than their usual amount.
February 17	Unusually large U.S. corn export sales in each of the previous 3 weeks topped 1 million tons. Wheat export sales were larger than expected in spite of season-high prices. At the same time, large increases in outstanding export sales suggest importers were contracting for delivery further into the future.
February 18	EU suspended barley and feed wheat import levies.
March 1	Russia suspended its 5 percent tariff on soymeal imports for 3 months to reduce feed costs. Governments in the Middle East and North Africa (MENA) increased wheat imports from the United States, the EU, and Ukraine to build up food security stocks. Feed grain imports are generally handled by the private sector and have also been increasing. With southern Europe feed grain supplies in short supply and prices high, Spain bought sorghum from the United States and Argentina. Algeria, Libya, and Jordan relaxed food taxes or duties on food imports or cut prices of staple foods. Kuwait initiated a consumer subsidy and free food for its citizens to reduce the impact of higher costs. Morocco's Government, which heavily subsidizes food and gas, pledged to keep food prices at affordable levels.
March 3	Mounting evidence shows that even traditional corn importers are extending coverage into summer. U.S. export sales of corn topped 1 million tons for the fifth consecutive week.
March 9	Turkey reduced the tariff on private sector wheat imports from 130 percent to zero. Last December, it did the same for public sector imports.

Source: USDA, Economic Research Service compilation based on news media reports.

Some of the export restrictions still remain in effect. Following 2008's high prices, some countries appear to have shifted policies away from trade liberalization and toward those that increase self-sufficiency.

The current surge in prices has seen more use of tariff reductions by importers and fewer impositions of export restrictions compared with the 2007-08 policy interventions. While the 2007-08 export restrictions came toward the end of price increases, the Russian wheat export ban in August 2010 occurred shortly after wheat prices initially rose.

Importers' More Aggressive Buying Practices

As available global crop supplies declined and prices began to rise more quickly, some importing countries became concerned about their ability to obtain their future food-commodity import needs. A number of importers began to aggressively contract for additional imports.

For example, even though wheat prices rose sharply after Russia's ban on wheat exports, importers began contracting for larger volumes. This increase in volume suggests that countries that usually import sufficient quantities of grain to meet their needs for a few months into the future began contracting for imports to meet their needs for several additional months.

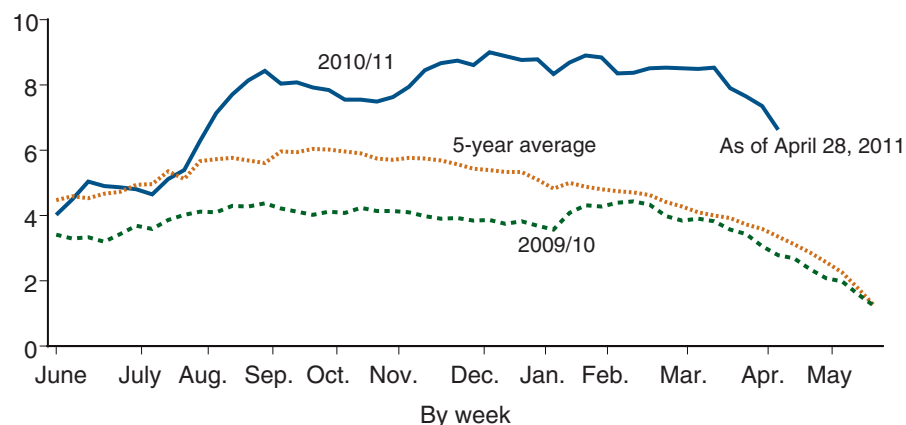
Outstanding U.S. wheat export sales—sales under contract but not yet delivered—began to rise above historic levels in the summer of 2010 (fig. 14). Although outstanding sales include recent sales intended for fairly immediate delivery, a large, sustained increase in outstanding sales also reflects contracts for future delivery. Beginning in August 2010, outstanding U.S. wheat sales began to rise rapidly and by early September were about 2.4 million metric tons (a third) larger than the 5-year average for that time of year. By mid-March 2011, outstanding sales were at 8.5 million tons, more than double the 5-year average. Although part of this trend reflects the overall 25-percent higher level of U.S. wheat exports forecasted for 2010/11, the doubling of outstanding sales is indicative of the accelerated pace and advanced timing of importer demands.

By mid-March 2011, more than 20 countries had outstanding wheat sales more than 50 percent above their 5-year average for mid-March. The volumes, however, were generally less than 100,000 metric tons. These 20 importers were geographically diversified, but generally represented middle-income countries. The countries with the largest outstanding sales were Egypt (more than a half million tons), Japan, and Yemen. Unknown destinations accounted for 1.8 million tons (21 percent) of total outstanding U.S. wheat export sales.

Figure 14

Outstanding U.S. wheat export sales: All destinations, June-May wheat marketing year

Million metric tons



Source: USDA, Foreign Agricultural Service sales reporting, April 2011.

Several other commodities also saw larger-than-average outstanding export sales, although all were relatively smaller than those for wheat. Outstanding U.S. corn export sales were about 30 percent larger than the 5-year average in September 2010 and were almost 20 percent higher in March 2011, even though U.S. 2010/11 corn exports are projected to be lower than the 5-year average. As in the case for wheat, this sales trend indicates an accelerated early season pace of U.S. corn purchases by importers. Soybean outstanding sales were close to 75 percent above the 5-year average in March 2011, while 2010/11 exports are forecast to be 29 percent higher than the 5-year average. In contrast, outstanding rice export sales have fallen below the 5-year average since the beginning of 2011, even though U.S. rice exports are forecast to rise in 2010/11, indicating that importers believe world rice stocks are adequate to meet import needs—unlike other commodities.

Until world supplies of food commodities rebuild, importers concerned with meeting their domestic food needs will likely continue to employ aggressive import practices to ensure supply availability. When global supplies are rebuilt and prices begin to decline, however, these same importers will feel less need to purchase additional quantities for some months. Fewer purchases will significantly reduce world import demand for several months, likely further lowering world prices as occurred following the 2008 price peak.

Speculation About Speculation

From 2005 through mid-2008, hedge funds, index funds, and sovereign wealth funds became increasingly involved with agricultural futures markets. Over this period, the share of open interest (the total number of contracts) held by funds in the futures market for agricultural commodities doubled. Investors in these funds were not so much interested in agricultural commodities specifically as they were in using commodities as an asset class to diversify their financial portfolios. These investors had primarily a financial interest in the markets and were not hedging physical commodities as would be typical of commercial agricultural-sector hedgers.

During the 2010-11 surge in commodity prices, involvement by noncommercial interests increased again (box fig). Total open interest increased in U.S. futures markets for wheat, corn, soybeans, and rice and the share of long positions (buyers rather than sellers of futures contracts) held by noncommercial investors also increased.

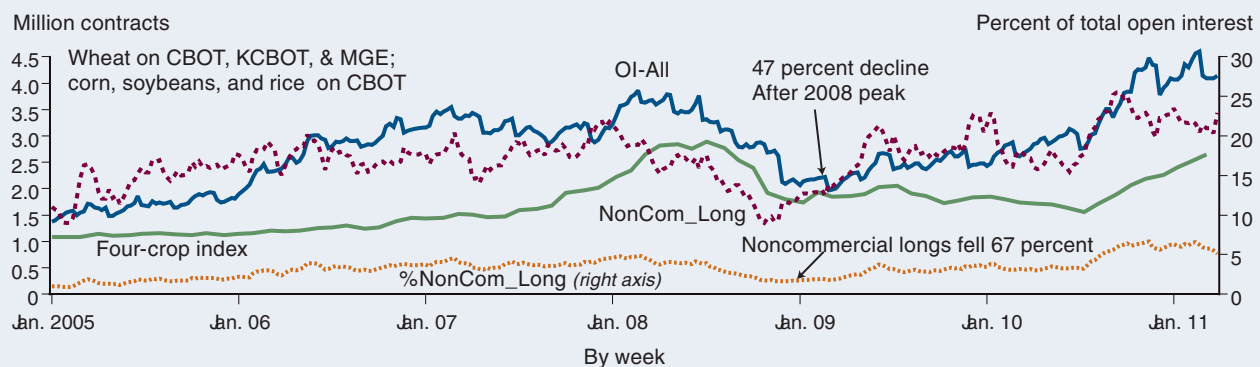
It is unclear what effects, if any, these new investors have on prices for agricultural products. Irwin and Sanders review and critique a number of recent studies on both sides of the argument and conclude that there is “precious little evidence that the “new speculators” [index funds] drove [the 2007-08] price movements.” However, others have hypothesized that computer-based, trend-following trading approaches employed by some funds may have increased the amplitude of short-term fluctuations in agricultural prices (Petzel, 2009; Masters, 2008).

In both 2007-08 and 2010-11, the relationship between rising crop prices, rising total open interest, and a rising share of long positions held by noncommercial investors shows some general correlation, but does not necessarily indicate any causal effects. When viewed in longer-term annual time periods, changes in prices appear to reflect changes in the market fundamentals of supply and demand. If noncommercial

investors affect prices, their influence is likely temporary and takes place over shorter time periods (see Harris and Buyuksahin for a related discussion).

One hypothesis is that the momentum or trend-following trading practices of large noncommercial entities can result in larger short-run price movements on both the upside and downside than market fundamentals would suggest. For example, when price increases are sustained (e.g., 2005-08 and again in the last half of 2010), trend-following, noncommercial longs disproportionately buy from commercial shorts (sellers) hedging physical commodities. The number of contracts (open interest) rises and the share of long positions held by noncommercial increases. When prices subsequently turn down (e.g., June 2008), noncommercial longs sell their long contracts, while short commercial interests who had hedged physical commodities are slow to liquidate their favorable positions. As a result, prices fall sharply and may continue to decline as noncommercial longs have difficulty finding new buyers. Prices decline until they have dropped sufficiently to entice buyers, generally commercial long hedgers using futures contracts as a temporary substitute for an eventual cash market purchase (e.g., December 2008). During this period, the share of long positions held by noncommercial investors drops. Under this scenario, noncommercial interests have a series of short-term price-influencing effects—first toward the end of a sustained upward price movement, then in the quick reversal of prices, and finally toward the end of the downswing in prices—which in total may accentuate short-term price volatility. The price effects associated with the rapid increase or decrease in noncommercial open interest may be interpreted as a lack of short-term liquidity on the commercial or hedging side of the market resulting in a short-term over-reaction of prices. However, others may argue that the actions of such noncommercial traders have the effect of increasing the rapidity of price adjustment to changing fundamental market conditions.

Crop prices and noncommercial long positions: U.S. futures markets for wheat, corn, soybeans, and rice



CBOT = Chicago Board of Trade. KCBOT = Kansas City Board of Trade. MGE = Minneapolis Grain Exchange. OI-All = Open interest for all commodities evaluated.
Source: U.S. Commodity Futures Trading Commission.

Impacts

Food Security

Rising food commodity prices tend to negatively affect lower income consumers more than higher income consumers because:

1. Lower income consumers spend a larger share of their income on food;
2. Staple food commodities, such as corn, wheat, rice, and soybeans, account for a larger share of food expenditures in low-income families;
3. Consumers in some low-income, food-deficit countries are particularly vulnerable because they rely on imports for a large share of their grain supplies, usually purchased at higher world prices; and
4. Countries receiving food aid donations based on fixed budgets receive smaller quantities of aid.

As world food commodity prices rose in 2010-11, the impact of high commodity prices on food security in developing economies had been limited in the near term. Many low-income, food-deficit countries experienced high domestic production in 2010, so their food supplies were adequate and, as a result, their local prices remained low. In Sub-Saharan Africa, in particular, good harvests in many countries have spared that region from rising world prices so far. Also, since imports contribute a small share of overall food supplies for many of these countries, domestic production performance and the factors that affect it, such as weather, play a critical role in the food security situation of those countries. In addition, there is often little or a lagged price transmission from the international market to these local markets due to limited integration in the global marketplace, poor market infrastructure, and subsidies provided by these governments. Government trade and domestic food policies affect how much of an increase in world prices gets passed on to consumers.

Some developing countries, particularly those in Latin America and the Caribbean, have increasingly relied on imports to augment their food supplies. When prices rise, these imports are often purchased at the higher world prices (Rosen, et al., 2011).

Public Unrest

Toward the end of 2002-08's rise in food commodity prices, public demonstrations protesting higher food costs were held in several dozen countries. Many protests were peaceful, some were violent riots, and one resulted in the removal of that nation's president.

Recent public protests and demonstrations during the current surge in food commodity prices seem to be motivated somewhat differently. Although the first—Algeria in early January 2011—appears to have started as a protest against high food prices, the demonstrations and civil strife that subsequently occurred in another half dozen countries seem to have been less about food prices and more about other economic and political issues.

Most of these countries with recent public protests are not considered to be especially food insecure. Although most are net food importers, they generally have the financial resources available to buy the imports they regularly rely on. Some of the countries that had demonstrations in 2007-08 have had good harvests in the past year and actually have more domestically produced food available than a year ago. As a result, they are less dependent on importing higher-cost food commodities.

Prospects

Although we cannot forecast the future of the current price spike with certainty, we can identify some factors that have a high probability of playing significant roles in the direction of future price movements, including weather and supply and demand responses to high prices.

Weather will likely play an important role, as it has at the beginning and/or end of most previous agricultural price spikes. In the near term, precipitation in the northern hemisphere will have a large impact on the winter wheat crop to be harvested in June and July 2011. Areas of particular concern include Russia, the western U.S. Great Plains, and China's northern plain. For a slightly longer time horizon, precipitation between now and July could influence production decisions regarding which crops to plant and whether short- or full-season varieties are used. For example, if wet field conditions in the U.S. Corn Belt persist and delay corn plantings, some farmers could shift to shorter-season varieties (with typically lower yields) or they could shift some acreage from corn to soybeans. At an even longer term, northern hemisphere weather through the summer will affect total crop production in the fall and grain and oilseed supplies over the following 6 months.

Once prices have peaked and begin to decline, the magnitude of the price drop will be affected by the volume of foreign trade shipments already contracted for future delivery. For example, the larger the volume of outstanding U.S. export sales for delayed delivery, the more import purchases are likely to decline. The drop in import demand will further exacerbate price drops until new purchases are made.

The rapid increase in crop prices in the second half of 2010 and early 2011 is expected to stimulate increased plantings and more intensive use of other production inputs in 2011. Farmers in the northern hemisphere will have strong incentives to increase the area planted to all crops. According to USDA's March 2011 *Prospective Plantings* report, U.S. farmers have already indicated their intention to raise acreage planted to major field crops by 3.5 percent.

Longer Term Prospects and Projections

USDA's 10-year projections show price declines for the major crops in the near term that reflect projected global production and demand response to current high prices (fig. 15). Nonetheless, after near-term price declines, long-term growth in global demand for agricultural products and slower projected productivity growth holds prices for grain and oilseeds at historically high levels.

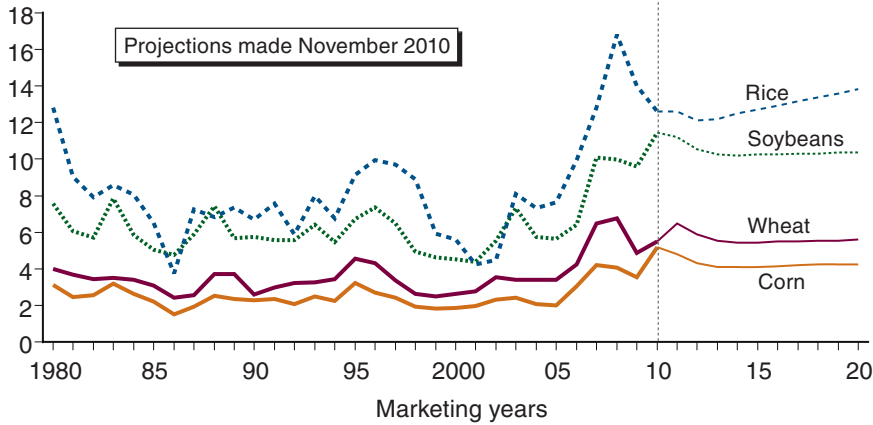
In the global livestock sector, adjustments to high feed costs continue in the near term, slowing growth in total meat and poultry production and raising livestock and meat prices. Improving net returns provide economic incentives for expansion later in the decade, with nominal livestock prices rising moderately over the next decade.

Other factors may affect food commodity prices over a longer time horizon. If prices stay high, more countries will likely adjust trade policies and

Figure 15

Corn, wheat, rice, and soybean prices projected to remain historically high

\$ per bushel (per cwt for rice)



cwt = Hundredweight.

Source: USDA, Office of the Chief Economist, *USDA Agricultural Baseline Projections to 2020*, February 2011.

practices to shield their consumers from higher world prices, putting additional upward pressure on global commodity prices. Sustained high energy prices could increase the cost of agricultural production, processing and transportation, gradually resulting in higher retail food costs for consumers around the world. Further depreciation of the U.S. dollar would also result in higher world prices.

Conclusions

Periods of rising and falling prices for agricultural products are not uncommon. The specific factors contributing to price fluctuations may differ somewhat, and the magnitude and duration of the fluctuations may vary. Historically, however, in each price spike, rising commodity prices constrained demand and increased production, which in turn, led to declining prices. These adjustments determine the path to a new equilibrium, which may push prices back to their pre-spike level, or to a level somewhat higher than historical prices.

Prospects for the future path of prices depend on many developments. As before, high prices will provide incentives to increase global agricultural production. Farmers around the world will make production decisions about allocating available land to various competing crops and about how much additional production inputs to use. With average weather over the next year or so, world agricultural production would be expected to increase and prices would retreat.

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